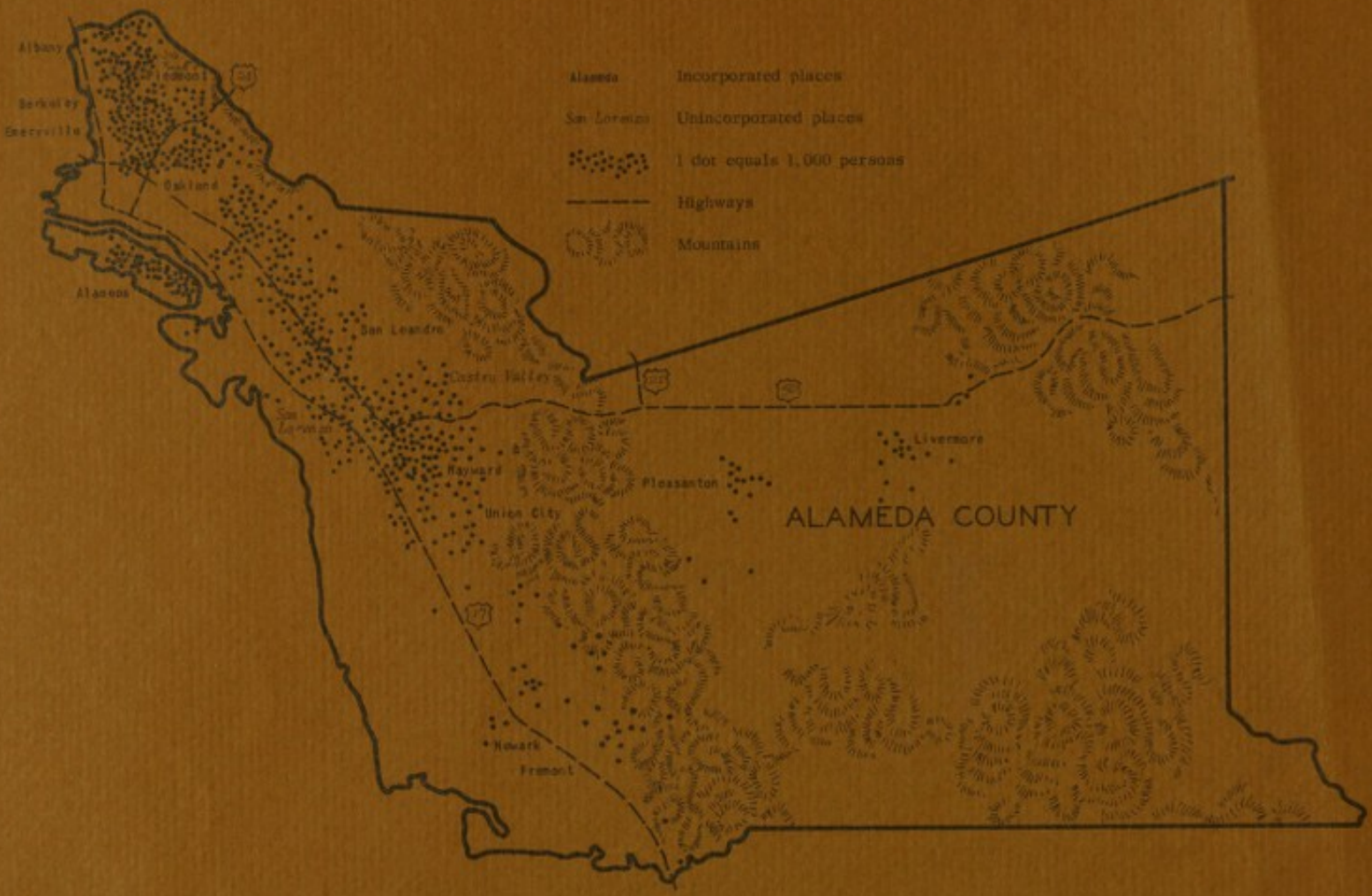
Alameda County blood pressure study / Department of Public Health, State of California.

Alameda County BLOOD PRESSURE STUDY

June 1968



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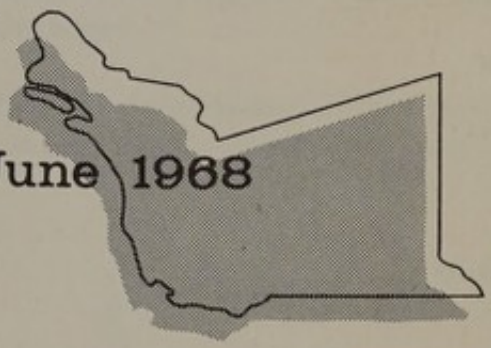

June 1968

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Study funded by Public Health Service under Grant No. CD-00242-02
Publication funded by California Committee on Regional Medical Programs

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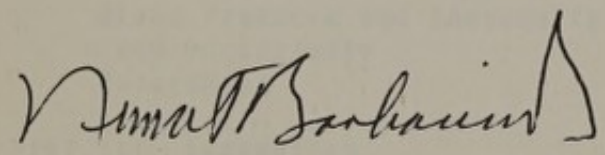
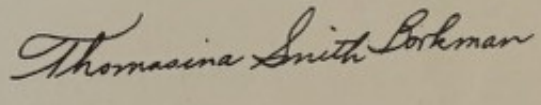
Acknowledgement

The generous cooperation of the Alameda County residents who participated in the Survey was largely responsible for its successful completion. We also appreciate the support of the Alameda-Contra Costa County Medical Association as well as other health agencies in the community.

We wish to express our thanks for the interest and cooperation in addition to the financial support which the Public Health Service has vested in this study. Financial support for the publication of this document from the Office of the California Committee on Regional Medical Programs, San Francisco is gratefully acknowledged.

We trust that the findings will be of assistance in understanding the relationship of blood pressure to social and environmental factors.





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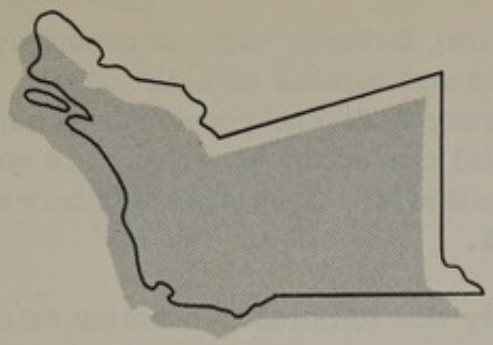


Introduction

The association between the level of systolic and diastolic blood pressure, as determined by a single "casual" reading, and subsequent mortality has been established.(1-3) It is therefore of considerable epidemiologic importance to learn about the distribution of blood pressure levels in the general population and the various factors which affect this distribution.

Of all factors associated with variation in blood pressure among different groups of people, only a few have been definitely identified. Population surveys have demonstrated the relationships between blood pressure level and age, race, sex and weight. These factors, however, do not entirely account for total variation in blood pressure distribution. Little is known about the relationship between environmental and social factors and blood pressure distribution. Concordance in blood pressure levels between husband and wife living in the same house has been reported which may indicate the effect of a shared environment.(4-5) Further, there is a suggestion that concordant couples may have similar social characteristics, in contrast to nonconcordant couples.

Recent epidemiological studies in the field of cardiovascular diseases have utilized a set of concepts derived from the social sciences which hold promise in delineating the relationships between blood pressure and sociocultural factors. These studies have primarily focused on rapid and frequent sociocultural change and the resulting cultural incongruities experienced by those involved in such rapid change. Sociocultural change has been found to be associated with an increased frequency of coronary heart disease and hypertension.(6-15) The underlying explanation is that persons involved in moving from one sociocultural setting to another are ex-

posed to different customs, values and beliefs; the process of change and need to adapt and adjust is thought to be a source of "social stress", and this type of cultural discontinuity, in turn, may be associated with an increased frequency of these diseases.

Some evidence suggests that sociocultural factors, such as occupation, marital status, income level, education and number of children may be related to blood pressure variation among different population groups. (16-19) Examination of these basic social characteristics therefore constitutes a necessary step in the exploration of the relationship between blood pressure and sociocultural factors.

The Alameda County Blood Pressure Study was initiated to examine selectively the relationship between blood pressure level and various sociocultural and environmental factors in an urban-suburban population. Its specific aims were to:

1. Determine the relationship between blood pressure level and selected social factors, such as income, education, and occupation (separately, and combined in an index of socioeconomic status), religion, marital status and number of children,

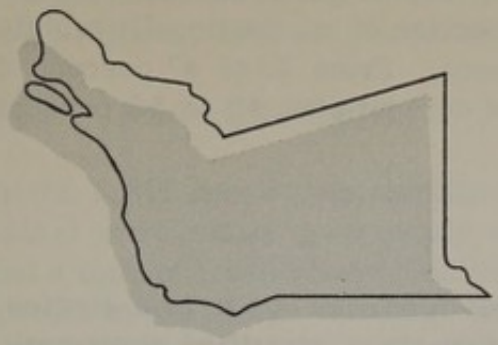
2. Examine the possible association of residential, occupational and social mobility, as well as cultural discontinuity, with blood pressure distribution by age, race and sex,

3. Test the hypothesis that there is a concordance between the level of blood pressure of husband and wife living together in the same household, and to compare concordant and nonconcordant couples with respect to congruency of social characteristics, and

4. Utilize the distribution of blood pressure levels, determined among a randomly selected sample of the adult population of Alameda County, as a baseline for future epidemiologic studies.

Data on the third objective, spouse concordance of blood pressure levels, will be presented elsewhere and not in this monograph.

The research plan involved a field study utilizing a probability sample of 1,811 households in Alameda County, California. Casual reading of blood pressure, together with measurements of height and weight, for all persons 20 years of age and older residing at the time of the survey in the selected households were recorded by registered nurses. Social and environmental data were obtained through a standardized questionnaire.



Alameda County and Study Sample

DESCRIPTION OF STUDY AREA

Alameda County is located along the eastern shoreline of San Francisco Bay. The county is predominantly urban-suburban and includes the cities of Oakland, Berkeley, Hayward, San Leandro and a number of smaller suburban towns and semi-rural communities. The county population was estimated to be 1,056,000 as of 1965, of whom 655,823 were 20 years of age and older, 82 percent were white, 14 percent Negro, and 4 percent other races.(20) In 1960, Alameda County had the highest proportion of Negroes of any county in California; the largest influx of Negroes into the county occurred during World War II when migration to work in defense industries occurred.

The county has a socially heterogeneous population which exhibits a high level of occupational mobility, migration and various types of social change. Alameda County, like California as a whole, has a relatively high median family income and educational level in comparison with other states; however, a wide spread of income and educational levels are also represented in the county. The 1960 Census indicated that, in 1959, 13.6 percent of county residents had family incomes of less than $3,000 and 21.2 percent had incomes of $10,000 or more. A wide range of educational accomplishments was also reported in the 1960 Census, 28.4 percent having completed only eighth grade or less, and 23.1 percent having completed one or more years of college.

Like the State as a whole, Alameda County has a relatively high population growth rate. Less than one-half of the residents of the county in 1960 were native Californians. Population change in the county is also reflected in the extent of residential mobility - people who have changed resi-

dence within a five-year period. Only 40.8 percent of Alameda County residents lived in the same house in 1955 and 1960.(21) Occupational mobility is also high among county residents. Lipset and Bendix in the Oakland Mobility Study reported a large proportion of occupationally mobile persons in Oakland and the rest of the county. From 43 to 47 percent of the population had worked in four or more occupations; 40 to 53 percent of them had held six or more jobs.(22)

SAMPLE DESIGN

The sample was designed to meet the needs for three concurrent studies, including the present one.(20) It was a two-stage stratified systematic sample of Alameda County housing units. Persons living in group quarters such as hospitals, prisons or other institutions were excluded along with persons temporarily in the county who had permanent residence elsewhere.

The sampling method utilized a stratified two-stage design namely:

1. Division of Alameda County into twenty-five strata, and

2. Selection of blocks from each stratum and selection of households within the blocks.

The stratification divided Alameda County into 25 areas; the areas were approximately equal in number of household units according to the 1960 Census. Each stratum was composed of contiguous census tracts combined in such a way as to maximize within-stratum homogeneity according to median household income of census tract and also to maximize the divergence between strata. A complete description of the sampling design has been published elsewhere.(20)

One quarter of the total selected households were to be allocated to the Alameda County Blood Pressure Study; approximately 1,500 households. However, because of the growth and change in the area since the 1960 Census, when the enumeration was done in 1965, a total of 1,786 households were included in the portion of the sample allocated to this study. Because the sample design was such as to yield a self-weighting sample of all Alameda County households, the number of actual households included in the final sample when the field work was begun in 1966 increased to 1,811 households. Since all persons 20 years and over in a selected household were included in the study, the sample of individuals was also self-weighting.

A household was defined as residence for a person living alone or a group of persons permanently sharing common arrangements for the provision of at least one principal meal a day. According to this definition, res-

ident domestic servants, employees and other persons living together and sharing meals were considered members of the same household. Roomers who did not share meals were considered as residents of a separate household, although they did share the same dwelling units.

SAMPLE RESPONDENTS

Of the 1,811 households identified in the sample, 6.5 percent (117 households) were found to be vacant or had no members eligible for the study and a total of 1,694 households had residents who were eligible for participation in the study. Of these only 211 (12.4 percent) refused to participate. Participation status of sampled households is shown in Table I. Some of the 1,483 participating households had members who did not participate or who had data missing on some of the participating members.

Table I

PARTICIPATION STATUS OF SAMPLED HOUSEHOLDS

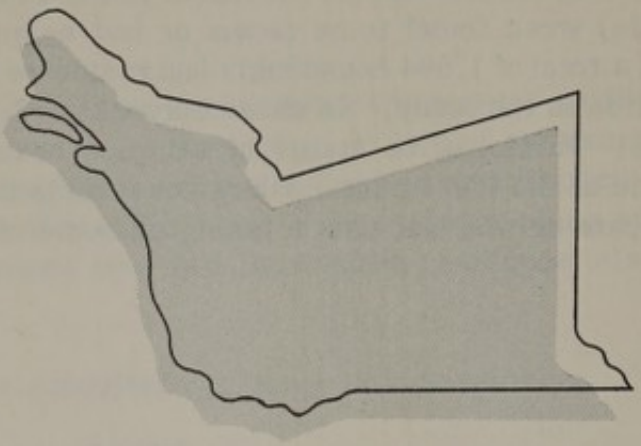
HOUSEHOLD PARTICIPATION STATUS	NUMBER OF HOUSEHOLDS	PERCENT		
Total Households	1,811	100.0		
Vacant[1]	117	6.5		
Occupied at the Time of Study	1,694	93.5	100.0	
Refusal Interview	211	11.6	12.4	
Respondents	1,483	81.9	87.5	100.0
Complete Interview[2]	1,379	76.1		93.0
Partial Interview[3]	104	5.7		7.0

1 Vacant also includes several households in which no eligible persons (aged 20 or over) lived.
2 All data forms completed for all eligible members of a household.
3 Not all data forms on all eligible persons were completed or not all eligible members of a household participated.

Note: Percents are rounded independently and may not add to totals.

When households were enumerated at the start of the study, data were obtained on how many household members lived in the household, and, when possible, age of members was obtained. Therefore, for some of the households who later refused to participate this information is known. The refusal group shows a disproportionate number in the older age group. (Table 1, Appendix B)

PART I
METHODOLOGY



Data Measurement and Collection Procedures

BLOOD PRESSURE MEASUREMENT

Fluctuations in blood pressure levels normally occur in individual persons each day.(23) The level rises gradually during the day, falls during the first few hours of sleep and again rises slightly before awakening; it rises during and shortly after eating. Muscular effort or exercise generally elevate arterial blood pressure as do emotional stresses such as fear, excitement, worry or anger. Some persons even show variations in blood pressure in each arm. Thus, any single measurement represents only one point in a range of possible readings for an individual. For epidemiologic studies, however, it can be safely assumed that these individual variations do not introduce too great a bias, and that the mean value of the group under study is representative of persons in that group under the conditions of observation.

The hazards of errors in blood pressure measurement have been discussed in detail by Rose, et al.(24) Furthermore, for epidemiological studies errors in measurement associated particularly with observer variations have received attention from several investigators.(25-27) These variations are usually greater for diastolic readings than for systolic, and among hypertensive subjects than in normotensives. Length or recency of experience in taking blood pressure usually do not necessarily reduce variations because patterns of preference and habits causing bias in measurement tend to remain unchanged. There is some evidence, however, that specific training administered just prior to a survey, and designed to reduce inter-observer variation, does, in fact, minimize the differences between observers' readings. There is no indication of how long the improved agreement among the observers thus trained may be expected to last.

Several instruments have been developed which, by recording blood pressure readings partially automatically, will eliminate some sources of error in observer variation. These apparatuses have been recommended for epidemiological investigations, but they are impractical for a field survey as they are too large to handle in the field and are relatively expensive.

The Alameda County Blood Pressure Study procedure was designed to assure that blood pressure measurements would be recorded according to a standardized method. The ultimate aim was, of course, to insure, insofar as possible, comparability of observations and to reduce inter-observer variability to a minimum.

Because of the common view that taking blood pressure is a medical procedure, it was felt that having blood pressure measured by registered nurses rather than by trained lay observers would result in greater public acceptance and cooperation. Physicians or medical students could have been utilized, but logistically it was not feasible to do so.

Study Procedure for Blood Pressure Measurements

Ten white female nurses were selected to conduct the field operation. They were extensively trained to take blood pressure in a standardized fashion. Three casual blood pressure readings on the right arm, using a mercury manometer were recorded according to the recommendations of the World Health Organization's Expert Committee.(28-29) These recommendations include having the subject in a sitting position, using a 14 cm. cuff and recording both phase IV and phase V diastolic pressures. The three measurements were taken approximately at five-minute intervals during a home visit. Readings were made to the next lowest even number of millimeters on the scale and recorded immediately on the blood pressure data sheet.(Appendix A-I) Pulse readings were taken before blood pressure measurements, using the radial artery of the right wrist.

Systolic pressure was defined as the point at which a series of tapping sounds in rhythm with the heart beat are first audible; the phase IV diastolic pressure as the point at which these sounds quite suddenly become dull and muffled; phase V diastolic pressure as the point at which these sounds first disappear.

Instructions given to the nurses were: The subject should be seated comfortably beside a table with arm relaxed, slightly flexed and supported at heart level on the table; make certain that the subject's arm is not constricted by a tight sleeve or other hindrance to blood flow; the cuff should be applied smoothly and snugly around the upper arm with the cuff edge about one inch above the bend in the elbow - that is, the antecubital space; determine the point of arterial pulsation in the antecubital space; palpate the radial artery at the wrist and inflate the cuff to about 30 mm above the point at which the radial pulse is occluded; place the bell of the stethoscope over that point where the arterial pulsation was felt in the antecubital space; begin deflating the cuff gently and record the systolic pressure and phases IV and V of the diastolic pressure.

Training of Nurses

Prior to the field work, the nurses were given two weeks training in both survey procedures and blood pressure measurement. A physician was responsible for teaching the standardized W.H.O. measurement techniques. He lectured on the physiology of blood pressure, and checked each nurse's reading by making simultaneous readings on the same subject by using a double stethoscope. Before the training began, only one of the ten nurses had previously read phase IV diastolic pressure (muffling), though all of them had experience taking systolic and phase V diastolic readings. A considerable amount of training time was devoted to clarification of phase IV diastolic reading.

During the training period there were three test sessions in which nurses recorded blood pressure on ten subjects. The first test was given before any training; the second was made after some training and the third was administered at the end of the training period, immediately preceding field work. These sessions, plus a fourth which was scheduled midway through the actual field work, provided data from which estimates of inter-observer variability was drawn.

A second week of training consisted of a field trial on a specially-drawn sample of the population other than in the original sample. One hundred households in a nearby city in Alameda County were selected for this purpose. After this practice field work assignment, group sessions were held to discuss and resolve problems and ambiguities which arose during practice visits. A final practice session in blood pressure measurement was held which also included a review of the blood pressure procedure,

methods for taking other measurements, and of the blood pressure data sheet, the form on which data were finally recorded. In addition, the nurses were instructed to adhere to recommended techniques and to take necessary precautions against factors which could compound observer errors.

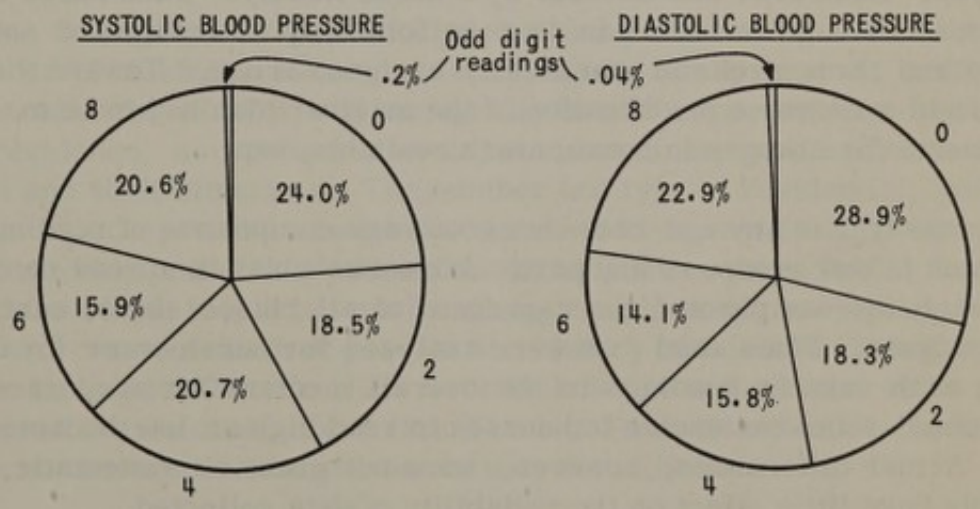
Tests of Inter-Observer Variability

An experimental design was developed to evaluate these training techniques and to attempt to measure variability in blood pressure readings between nurses. Knowing that individual's blood pressures are also variable these test measurement sessions were designed to account for observer variation, subject variation and order of measurement. The complete description, analysis and results of these tests applied to determine inter-observer variation are presented in Appendix E. Some highlights of the analysis follow.

Strong preferences for certain terminal digits, particularly "0", were indicated in the study data, though this was less pronounced than has been reported in other studies. As can be seen from Figure I in which digit preference in third reading of the final study data are shown, training did not completely overcome this digit preference.

Figure I

PERCENT DISTRIBUTION OF TERMINAL DIGITS
ON THIRD BLOOD PRESSURE READING



In the early test sessions difficulty in recognizing and recording two phases of diastolic blood pressure appeared to introduce a significant amount of confusion. Later, the nurses became increasingly aware that the disappearance of diastolic sounds occurs after the muffling phase which made them sensitive to detect the last sounds. This oversensitivity may have contributed to the generally low diastolic V readings reported. In comparing the nurse-associated variations with the total variations for each

type of blood pressure reading it became obvious the nurses had a hard time mastering the diastolic IV measurement. This was considered, along with other factors, in the decision to use diastolic V measurements in the final analysis of data.

The most outstanding implication of the analysis, however, was the improvement in the nurses' agreement as training proceeded. There was more observer error in every aspect of evaluation between test 1 and 2 (performed before training was completed) and test 3 and 4 (performed after training was completed and again after some field work was done). Improvement shown between test 3 and 4 illustrates the need for field practice after training is completed.

The training directed toward standardizing blood pressure measurements did help to increase the reliability of the study data. The analysis of these test measurement sessions made it possible to estimate the confidence which could be placed in the measurements and to determine that the data need not be corrected for observer variation.

Nurse Assignments in the Field Work

In a further attempt to minimize bias due to inter-observer variability, a method of assigning each nurse's work equally in all areas of Alameda County was devised. The county was divided into eight geographical areas for actual field work and two clean-up areas for follow-up of refusals and not-at-homes. A system of random assignments of nurses to areas was employed. Each area was covered by a nurse weekly. Each nurse spent in random rotation one week in four on follow-up (refusals and not-at-homes) and three weeks in specifically assigned areas. Toward the end of the field work some modification of the original plan had to be made to compensate for changes in hours, work available, etc.

Blood pressures in any age-race-sex group are composites of readings by all nurses in that group, so any particular nurse's bias is spread randomly through the sample and the aggregate of all biases should cancel in final analysis. When final data were analyzed for nurse error (by comparing each nurse's readings to the overall medians for age, race and sex groups) some tendencies for nurses to read high or low became evident. Actual differences, however, were not great or systematic, and probably have little effect on the reliability of data collected.

An attempt was made to control another possible source of bias by standardizing calibration of the manometers at the beginning of the field work and by rotation of the instruments among nurses approximately at four week intervals. Operational difficulties with the manometers were infrequent, but when a defect was suspected, the instrument was checked. Defective instruments were replaced from a set of extra sphygmomanometers.

HEIGHT AND WEIGHT MEASUREMENTS

The subject's height without shoes was measured with a portable, adjustable metal height measuring rod with a weighted base; it was recorded to the nearest one-fourth inch. Weight was measured on portable bathroom type scales and recorded to the nearest pound. Scales were standardized and checked for accuracy once a month.

These measurements along with blood pressure readings were recorded on the blood pressure data sheet, which also contained information on sex, race, age, use of medication and pills and name and address of personal physician. (Appendix A-I)

MEASUREMENT OF SOCIAL AND BIOMEDICAL FACTORS

Social factors were obtained from a self-administered questionnaire; demographic data on all household members were obtained by the household enumeration sheet. (Appendix A-II and III) The questionnaire contained mostly precoded items on social, demographic, mobility and incongruities, and biomedical factors, and it was mailed to participants in advance of home visits. In practice, respondents usually completed the questionnaire when it was received; their answers were later reviewed and checked by nurses or interviewers visiting the home. The questionnaire was prepared after careful review of many studies. It went through a number of revisions and the final questionnaire was pretested in two field tests.

Social demographic factors included, among other things, marital status, number of children, education, occupation, family income, religion and place of birth. Mobility and incongruity factors represented either changes of residence, occupation or social status or incongruities between childhood and adult situations. The number and type of residential, geographical and occupational changes were elicited from life-time histories of residence and full-time jobs held. In addition to these social factors, a few biomedical indicators such as: smoking history, menopausal status, age and cause of death of parents and history of selected chronic diseases were included. Two sections were included to reflect interest in hereditary factors, to obtain information on blood relatives, and to obtain social information on parents with whom they actually lived.

Basic demographic data on all members of a household, regardless of age, were also obtained through completion of the household enumeration sheet. (Appendix A-III) The interviewer or nurse interviewed an adult member of the household to get age, sex and relationship to head of household of each member along with educational, employment and marital status of each person 16 years of age or older. In addition, the type of dwelling unit, number of rooms, and rental/own status were obtained.

The questionnaire was carefully designed to be understandable with appropriate definitions of terms and instructions. Nurses or interviewers reviewed and checked most of the completed questionnaires at the time of home visit and obtained missing information and resolved ambiguous answers during the review process. As necessary, they interviewed persons unable to complete the questionnaire. This procedure was quite successful.

Thirty people completed questionnaires but were unwilling or refused to have their blood pressure measured. Minimal follow-up was necessary to obtain questionnaire data; only about seven percent of those who finally completed questionnaires had to be recontacted. Furthermore, questionnaire information was largely complete, with only a very small percent of "no answers" to most items. The only questions which proved exceptions involve either items about which persons are sensitive such as income or for which they may lack knowledge. For example, items asking information regarding incidence of high blood pressure among father, mother, sisters or brothers were answered less frequently perhaps due to lack of knowledge. Some people did not know about their family because of separation or lack of contact with them.

DESIGN AND PRETESTING OF QUESTIONNAIRE

The questionnaire was prepared in a format similar to self-administered questionnaires designed and pretested by the Human Population Laboratory, Bureau of Chronic Diseases. Where appropriate, identical items from these questionnaires were used as in the case of many of the social-demographic and biomedical factors. In other cases, particularly on mobility and incongruity factors, new items were designed to fulfill the specific objectives of the study.

Difficulty in obtaining valid and complete job or residence histories is well known; problems of recall probably lead the list of difficulties in these areas. Errors in such information were considered not to be seriously limiting since concern was primarily with the range of values as reflections of high, medium and low mobility rather than with accurate counts. Summary measures are used in the analysis rather than detailed categories; thus, the need for precision of information on mobility is reduced. It was reasoned that, generally, nonmobile people who had had only one or two changes of job or residence would be likely to remember them, while highly mobile people might not recall all moves, but would recall most of them. So, by the use of only three or four categories in the final classification of mobility this highly mobile group would be labeled as highly mobile anyway. In addition, questions for job or residential moves were restricted to fairly major events of fairly long duration rather than to all possibilities. Therefore, only full-time jobs of six months or longer duration and towns and cities lived in six months or longer were asked for in the history questions.

After several revisions and two informal pretests, one on a group of volunteers and the second on several families in a nearby town, two field tests of the questionnaire were made to validate new items, assess the adequacy of the coding scheme, and determine overall response and acceptance. Census tracts representing extremes in median income level in a city adjacent to Alameda County were chosen; trained interviewers contacted adults in 60 households in these areas asking them to complete the questionnaire. When the interviewers returned to pick up the questionnaire, individuals were interviewed on the same items. Data obtained from the two instruments were then compared and an analysis of errors and other problems found in the self-administered questionnaire was made. The initial pretest results from 48 households revealed the questionnaire was workable and accepted positively, but there were some problems with residential and occupational histories. The questionnaire was revised accordingly and a second field test was conducted in 21 other households. From the analysis of these pretests, the final questionnaire was prepared.

Occupational and residential histories in the first pretest version asked for kind of work and places lived without dates. Minimal definitions and instructions were given. Respondents were also asked to sum the number of jobs held, places lived, years spent on longest job, etc. Results of the pretest revealed large differences in definitions of terms such as "job", "place of residence" or "full time". For example, definitions of "full time" included working 40 hours per week or working at a job permanently (not seasonally) regardless of the number of hours worked per week. It also revealed difficulty in counting and summarizing items. There was no internal means of checking consistency or completeness of histories without dates.

As finally revised, the questionnaire included instructions containing definitions of relevant terms such as full-time job, place of residence, provided examples of terms such as kind of work and asked for sequential histories with dates. In addition, summary questions such as number of jobs held, were deleted as they could be determined from the histories more accurately by coders.

Comparison of the questionnaire and interview results in the pretest showed that most discrepancies between the number of jobs or places reported were slight. The few people with large discrepancies, several jobs or places not reported, were those who had problems responding in all areas of the questionnaire or interview--the hard-core problem people.

Several means were employed to minimize the error involved in collecting residential and occupational histories. In addition to restricting events to major ones of fairly long duration, and carefully defining the items to increase the likelihood of standardized responses, the self-administered questionnaire was followed by review and check of answers thus providing

several opportunities for respondents to recall events. The respondents had plenty of time to check their memories against records or with family members while filling out the questionnaire. Then, the nurses or interviewers checked the history items during the home visit for completeness and consistency, interviewing individuals about any discrepancies. Notes of explanation for missing years or incomplete data were also made on the form. Finally, in the office all questionnaires were edited and attempts were made by telephone or follow-up visits to resolve any remaining discrepancies.

TRAINING OF NURSES AND INTERVIEWERS

Nurses and interviewers were trained in administering the questionnaire. During training sessions, the meaning and purpose of each item in the questionnaire was discussed along with the most common errors, ambiguities and gaps in information found in the pretests. Written instructions were also provided. Role-playing sessions in administering and checking questionnaires were held, followed by discussions of problems and their solutions. Additional practice and training in a week of "mock" field work were also given after which completed questionnaires were reviewed thoroughly and discussed by the field supervisor. Throughout the survey, work of the field staff was reviewed weekly by the field supervisor. Periodic meetings of all nurses and interviewers were held to clarify and resolve problems and to facilitate standardization of questionnaire review and administration.

Training to obtain occupational data was particularly emphasized in view of the well known difficulties in getting adequate information in this area. The kind of work the respondent did was needed rather than the industry or organization without reference to kind of work. Typical recurring problems were discussed, such as failure to specify what skill level (grade school teacher versus college professor, apprentice plumber versus journeyman plumber) or condition of employment (owner/manager of barber shop versus salaried barber). The nurses and interviewers checked each occupation reported and, when necessary, interviewed to obtain adequate information.

Other checking instructions for occupational and residential histories included:

1. Checking number of years worked or lived in all places. If there was a discrepancy of several years probe to determine if all items had been included.

2. Note on the questionnaire reason for "legitimate" gaps in years or dates. For example, many females were home raising a family and out of the labor force at one or more periods of long duration in their life. Gaps in occupational

data for males were sometimes due to several years of unemployment or a series of part-time jobs.

3. If only one or two jobs or places were reported, probe to determine if the respondent included all relevant ones.

FIELD WORK PROCEDURES

Contact Procedures

During the six month's field work respondents were contacted as follows: An introductory letter explaining the study was sent to each household. (Appendix A-IV) Two questionnaires were enclosed with each letter. Several days later, a nurse telephoned to make an appointment for a home visit at a time when all eligible persons would be available. At this time the number of adults residing in the household was determined and additional questionnaires sent, if needed. Persons were asked to complete questionnaires before the nurse's visit.

If there was no telephone for the household, or if the nurse was unable to contact a household member after repeated calls, a survey interviewer was sent to the household to establish contact, leave copies of the questionnaire and make an appointment for the nurse's home visit.

Home Visits

The procedure used during the home visit was as follows. After introducing herself and briefly explaining the study and the purpose of the home visit, the nurse interviewed an adult to enumerate the household and to obtain basic demographic data on all persons residing there by completing the household enumeration sheet. Then, separately for each adult in the household she measured pulse and blood pressure, completed the blood pressure data sheet, checked over the questionnaire, and took height and weight measurements.

Respondents were seated about five minutes before the first blood pressure reading was taken and they remained seated until readings were completed. Before and between readings, the nurse completed the blood pressure data sheet, reviewed questionnaires with the subject, filled in missing data and clarified ambiguities. Completing the measurements and questionnaire required from 30-45 minutes per respondent.

If a respondent had not filled out the questionnaire, the nurse determined if he was able and willing to complete it. If he were able and willing, she left an envelope and instructions for him to mail the questionnaire. If he seemed unable to fill it out, she interviewed him if time permitted or made an appointment for an interviewer.

Follow-up Procedures

Ninety percent of the questionnaires were returned by the nurse and required no follow-up; another three percent were returned by mail. Follow-up visits by interviewers were needed on approximately seven percent. If respondents who were to mail questionnaires had not done so within ten days, follow-up letters were sent requesting them to complete and return the form. (Appendix A-V) If the questionnaire was still not returned after twenty days, an interviewer was sent to obtain the questionnaire.

Follow-up visits were also made to complete blood pressure measurements on all eligible persons in the households as necessary. Refusals were recontacted by interviewers, or by nurses in selected cases, four to six weeks after the initial contact. All reasonable efforts were made to follow-up refusals including two or more personal contacts after an initial refusal.

Procedures used to obtain questionnaire data facilitated the collection of relatively complete data with a minimum of expense and follow-up. Since questionnaires were mailed in advance and largely completed by the time of the home visit, a minimum of nurse and interviewer time was expended. Follow-up to obtain questionnaires was reduced to a minimum in the process, and this procedure provided extensive control over the completeness and quality of data.

Three very competent interviewers experienced in survey work in Alameda County were recruited to administer questionnaires and household enumeration sheets. They contacted respondents without telephones, handled other problem contact cases, and followed up refusals, not-at-homes, etc. Although most of the nurses initially were inexperienced in field surveys, all developed considerable skill through field experience during the course of data collection. The study initially planned for survey interviewers to handle difficult cases of contacting or following respondents as it was recognized that the skills involved in managing such problems in a community survey differ greatly from those required of competent graduate nurses. However, after some experience, several nurses demonstrated such skill and they were then given these "difficult" assignments; their performance was excellent.

Work Assignments

Work assignments were made on a weekly basis, and consisted of random sets of households from each of the eight assignment areas. In the beginning about 10-20 households from each of the eight assignment areas was allotted to each nurse. This number was reduced later, however, when only more "difficult" cases remained.

Two of the ten nurses worked full time. The other eight worked varying part-time schedules from 15 to 35 hours a week according to preference

and project need. Individual nurses worked from three to six months and interviewed from 117-540 persons each. This wide variation is due to the length of time worked as well as the number of hours worked per week. Table 2, Appendix B, presents total number of individuals in the sample who were observed by each nurse. The proportions of study population in various race-sex groups contacted and observed by each nurse was similar for all ten nurses.

Nurses were carefully instructed not to tell respondents their blood pressure reading(s), but to assure them that the readings, as recorded, would be forwarded to the respondent's personal physician. All physicians named by respondents were sent blood pressure readings with a letter explaining the study. (Appendix A-VI)

Blood Pressure Remeasurements

In order to replicate Kantor's method of determining the size and nature of the blood pressure intervals to be used in the analysis of spouse concordance of blood pressure levels, the remeasurement of blood pressure levels in a subsample was necessary.(30) Accordingly, a subsample of 100 households was selected at random from the list of households whose members had participated in the study.

After the subsample of 100 completed households had been drawn, a letter was sent to each, thanking them for their earlier participation and requesting their cooperation with a blood pressure remeasurement needed for statistical analysis.(Appendix A-VII) Within a few days an interviewer highly skilled in phone contacts called each "remeasurement" household to schedule an appointment for a nurse's home visit whenever convenient.

With careful scheduling, only two nurses were needed for this phase of field work. The remeasurement home visit required only the determination of blood pressure level for those adults who had previously participated, and took only 20 to 30 minutes. Within three weeks all households had been contacted, and, if possible, visited. Remeasurements were made from one to five months after the original measurements - an average of two and a half months between measurements.

Cooperation was excellent in the subsample. Of the 100 households contacted by letter and phone, remeasurements were completed in 91 households. There were two refusals, four households had moved leaving no forwarding address or were out of Alameda County, and three were never home after repeated phone calls or visits at different times of the day.

In the 91 households visited there was a total of 165 adults. Remeasurements were completed on 159 (96.5 percent). The other six were away

or could not be reached during the remeasurement field period. The blood pressure remeasurements were obtained without the knowledge of the original readings on these individuals. Of these 159, there were 150 persons who had systolic and diastolic V readings recorded in the initial study and in the remeasurement field period. The measurement - remeasurement differences between third readings are shown in Table 3, Appendix B.

DATA EDITING AND CODING

Returned questionnaires and blood pressure data sheets were reviewed for completeness, then filed in individual household folders together with household enumeration sheets. When data forms on all adults in a household were completed, questionnaires were edited to spot missing information, resolve ambiguities and check internal consistency. After editing the forms, all data were coded then transferred to IBM cards and tape for computer processing and analysis.

In the editing process questionnaires with missing information were returned to the field staff for follow-up completion. This, however, rarely occurred, because of the thorough review and check system used during home visits. As necessary, additional information was obtained from respondents by telephone or home visits. In addition, editors prepared the forms for routine coding and checked consistency of selected items. Answers to selected items given by appropriate family members were compared for consistency. For example, "family income" answers reported by husband and wife were compared; in this particular case, discrepancies were resolved by taking the husband's answer as it was assumed that husbands were more likely to know accurately the total family income.

Occupational and residential histories were carefully checked. "Illegitimate" items such as jobs or places which did not meet specified criteria (six months or longer duration, full-time not part-time jobs, etc.) were flagged for deletion and gaps in dates reported for the coders.

Most items were precoded and numbers were easily transferred to the right-hand margin of the questionnaire. The remaining codes and instructions, such as for mobility data obtained from the occupational and residential histories, were developed and tested on the practice sample of questionnaires collected during the field training period. Several steps were involved in deriving mobility codes. For example, each town or city reported in the residential history was coded to state, and each job in the occupational history was coded to the two-digit occupational code which was a modified version of the 1960 Census occupational code. After residences and occupations were coded, counts and necessary calculations were made to obtain the amount of mobility and other measures of mobility. These summary figures were then coded on the right-hand margin of the questionnaire.

Coders and Quality Control Checks of Data

Routine coding was done by persons who received several sessions of training and practice after which their work was carefully checked according to the procedure described below. Editing of data forms and more complicated coding, such as residence and occupational mobility was done by more experienced coders who received equivalent training, practice and checks of work; particular attention was given to coding occupations in a standardized manner.

A checking procedure was developed to insure that a five percent or less error rate was obtained by all coders. Initially, 100 percent of each person's coding was checked. When the acceptable level of proficiency was reached by each coder, checking was reduced to 50 percent, then 25 percent and finally 10 percent, as the expected level of proficiency was obtained and continued.

Data Processing

Key punching and verifying of IBM cards was done directly from coded questionnaires and blood pressure data sheets; four cards were required for each individual in the study population. Data were edited for illegal and inconsistent codes and put on tape. A number of variables not obtained directly such as age, mean blood pressure readings, and mobility scores were calculated using computer programs. This was not only time saving but reduced errors.

Tabulations were done using computer facilities in the Department, and the Health Sciences Computer Facility, UCLA. Some special computer programs were written to handle specific analysis problems while existing computer programs were used for the bulk of the tabulations.

DECISIONS ON TREATMENT OF VARIABLES

The handling of some items related to blood pressure presented problems since alternative methods were available. These data were examined in light of their alternatives and the basis for the decisions is discussed below.

Selection of the Phase of Diastolic Readings

As discussed earlier both phase IV and phase V readings were recorded in this study. In 1951 the "Committee to Revise Standardization of High Blood Pressure Readings" recommended that phase V be used for diastolic pressure. Since many epidemiologic studies were done following this recommendation it was decided that we would follow this practice in presentation of data in this monograph. Therefore, unless otherwise

stated, diastolic blood pressure refers to phase V readings in this monograph. However, both phases were read.

A reexamination of which phase should be used as representing diastolic pressure was concurrently being made. Subsequently new recommendations have been made (31) and in light of these recommendations an analysis of the relationship of variables with phase IV may be presented in later communications.

Although most analysis utilized diastolic V blood pressure readings, some examination of diastolic IV readings was done. The distribution of average diastolic IV readings by age, sex, for whites and Negroes is shown in Tables 4 and 5 in Appendix B. Diastolic IV readings were not as often obtained by the nurse as the other phases. There were only 2,403 persons on whom both a diastolic IV and V readings were obtained. The average difference in readings between the IV and V phase was 6.57 mm Hg.

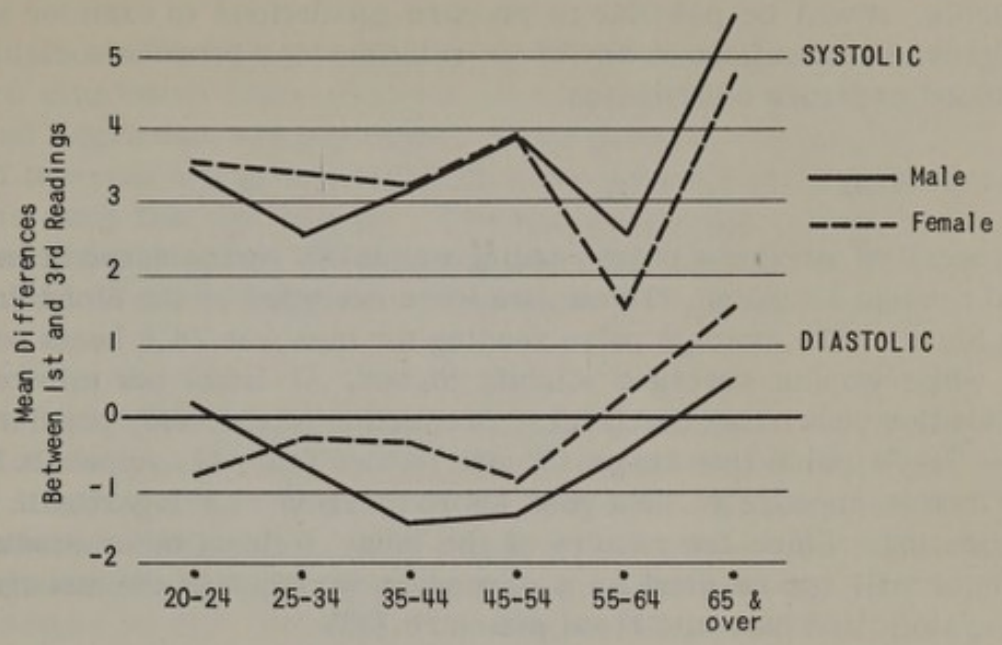
Use of Mean Blood Pressure Readings

Studies dealing with casual blood pressure readings in a general population have varied in their practices including taking of only one reading, as with McDonough in Evans County, Georgia, use of a third reading as was done by Comstock in Muscogee County, Georgia, or use of the average of the blood pressure readings as is currently being done by the National Health Examination Survey. It seemed reasonable to average the three blood pressure measurements obtained on each individual. It was assumed that this would be the best measure of a casual reading. The use of the average also tends to reduce the effect of reading preference. In this study most persons had three readings on which to base the average. Only five persons had less than three systolic readings while there were 125 persons with less than three diastolic readings.(Table 6, Appendix B)

The differences between first and third reading were examined. First readings of systolic blood pressure tended to be slightly higher than the third reading - 3.37 mm Hg for men, 3.46 mm Hg for women - similar to previous reports in the literature. The first and third diastolic V readings tended to be about the same with more men having a higher third reading than the first, (average of .68 mm Hg) and women showed even less of a difference (.16 mm Hg). There was, however, an interesting difference between the sexes by age. Figure II shows that the differences between first and third reading of systolic blood pressure for women under 45 was greater than for men of the same age group, while the pattern reverses for the older ages. This might well be related to the change in the relationship between the sexes of the level of systolic readings where the mean readings for women are higher than men after 55. This subject will be described in detail and discussed in Part II - Results under Blood Pressure Distribution by Age-Race and Sex.

Figure II

DIFFERENCES BETWEEN FIRST AND THIRD READINGS
FOR SYSTOLIC AND DIASTOLIC BLOOD PRESSURE (mm Hg) BY SEX AND AGE



Blood Pressure Medication

With the increasing use of blood pressure medication to reduce and control hypertension in the last few years, this factor must be considered since it might obscure relationships between blood pressure and social factors.

The respondents were asked "Are you taking any medication for your blood pressure?" This was recorded on the Blood Pressure Data Sheet. It was assumed the majority of persons reporting use of blood pressure medication would be taking anti-hypertensive medication. Six percent of the study population reported use of such medication, but as might be expected they were concentrated in the older age groups.(Table 7, Appendix B) Almost one out of every five persons 65 years and over reported use of medication. In addition, it appears that women are more likely to be taking medication than men and the Negro is more likely than the white to have medicine prescribed.

The mean blood pressures, both systolic and diastolic, of persons reporting the use of blood pressure medication were high, much higher than the total study group.(Table 8, Appendix B) However, when the distribution of readings of those taking medication is examined, these people constitute a fair proportion of the study population with low systolic readings. For example, approximately 5 percent of those with systolic readings of less than 115 mm Hg are taking medication while 9 percent of those with diastolic readings of less than 65 mm Hg also are on medication for high blood pressure.(Tables 9 and 10, Appendix B)

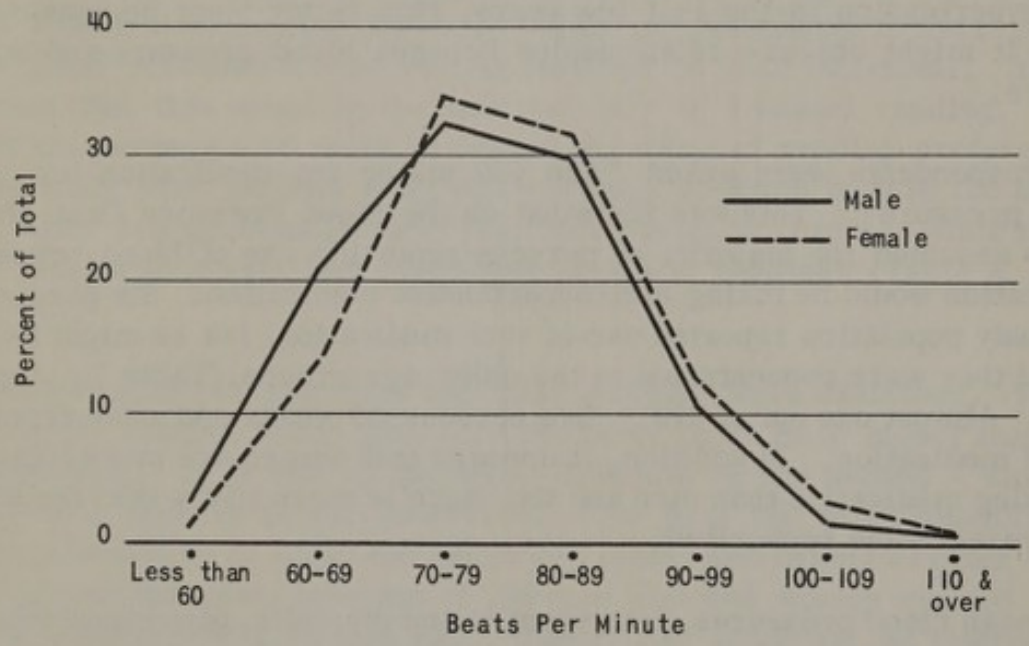
Since this study was meant to be representative of the general population it was decided to include persons taking medication in order to more accurately describe such a population. However, since the information is available, it will be possible to prepare tabulations to examine whether this group has an effect on any of the relationships between social factors and blood pressure distribution.

Pulse Readings

As described earlier a pulse reading was taken by the nurse before each blood pressure reading. These data were recorded on the Blood Pressure Data Sheet. The average pulse reading for men was 78.5 beats per minute, while women averaged slightly higher, 81 beats per minute. The distribution shows that the largest proportion of the study population fall in the 70-74 pulse rate range.(Figure III and Table 11, Appendix B) The distribution appears to be a good approximation to a logarthmic normal distribution. Since the results of the study follows other studies this measure will not be used as a dependent variable in the monograph as will systolic and diastolic blood pressure.(32)

Figure III

PERCENT DISTRIBUTION OF AVERAGE PULSE RATE BY SEX



Age, Race and Sex Considerations

Since age, race and sex are known to be related to blood pressure levels, the analyses will be made primarily in terms of age, race and sex specific groups. This is one method of independently examining the relationship between blood pressure levels and other factors of the known influence of age, race and sex. Since many of the social factors also vary

considerably by these factors and some are applicable or relevant in terms of one sex or some age groups only, this method of using age-race-sex-specific groups is desirable.

The sample of Orientals and other races yielded such small numbers that they are eliminated from analyses concerning blood pressure and only white and Negro data are presented. White persons are subdivided on the basis of ten-year age groups but there were too few Negroes in the sample to permit such fine age breaks. Two age groups are generally used for Negroes: under 45 years and 45 years and over. Forty-five years appear as a natural break point from an inspection of the blood pressure distribution.

The examination of blood pressure levels in relation to some social and biomedical factors was limited in many instances to persons 25-64 years of age. It was felt that the group under 25 could be eliminated since their blood pressure levels do not have a wide spread and are for the most part uniformly low; in addition, the young group does not vary much on many social factors such as mobility of residence, occupation or status. Older groups (65 and over) are also atypical since they are a selected and highly variable group of survivors in their age cohort many of whom have an unknown number of complicating illnesses and other characteristics.

Approach to Data Analysis

The approach used in examining and analyzing data included looking for consistent patterns in the findings in terms of age, race, or sex groups rather than isolated significant differences. For example, if a social factor was significantly associated with blood pressure in only one race-sex-age-specific group (e.g., white females 25-34), this was considered an isolated and probably unmeaningful difference. However, if a factor were associated with blood pressure in several race and/or sex-age groups like Negro males 45 and over and Negro females 45 and over, or white and Negro males, it was felt to be more consistent and meaningful.

Consistency in the direction of specific relationships was also focused upon in terms of specific hypotheses or some other regular pattern. That is, if educational level is negatively associated with blood pressure in one group but positively associated in another group, one places less credence in the associations because of the lack of consistency unless there is some plausible and readily apparent explanation for the reversals. Findings reported as "significant" denote the five percent level of significance and the "highly significant" denotes the one percent level based either on the standard error or the probability that correlation coefficients are different from zero. The definition and use of the standard error is explained in Appendix C. Statistical significance in combination with observed differences across age, sex and/or race groups provides some confidence that the associations seen are meaningful.

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Population Description

In 1,483 participating households 2,605 persons were interviewed. For 30 persons, blood pressure readings could not be taken for various reasons.(Table 12, Appendix B) Therefore, in Part II results on only 2,575 persons are presented. Tables 13-15, Appendix B show selected socio-demographic characteristics of this population by sex, race and age. Most of the variables are social demographic factors which will be related to blood pressure readings; the measurement of these factors and their occurrence are described to provide a profile of the study population.

FAMILY INCOME

In this presentation family income rather than individual income, is used since there are frequently two or more income producers in a family and the financial resources of a household, or an individual in a household, depend on total combined income rather than that of the primary "breadwinner" or any individual in a family. The answer to the question on total annual income before taxes of all members of the immediate family in the dwelling unit gave the measured family income.(Question 39, Appendix A-II)

The median family income for all heads of households was $7,380 per year. There were some differences between races, with whites having a median income of $8,000; "other" nonwhite races $6,670; while Negroes had the lowest, $5,020 per year.(Table 16, Appendix B) However, a number of Negro families had a fairly high family income; for example 35 families (18 percent of Negro families) had an income of $8,000 or more.

EDUCATION

Educational level was measured in terms of number of grades of school completed.(Question 38, Appendix A-II) There was also a difference in educational level between the various races; the greatest difference was seen between younger men and those 45 years of age and older. For example, for white males under 45, only 23 percent did not graduate from high school, while 30 percent of the Negroes in the same age group did not graduate. Among older white males 47 percent had not completed high school; while 83 percent of older Negro males, did not graduate from high school.

OCCUPATION

Each person in the sample was asked about his major activity.(Question 13, Appendix A-II) Eighty percent of the men were currently employed; the remainder being either students, retired or unemployed. Forty percent of the women were employed full or part time. Almost half of the women reported being a housewife as their major activity; the remainder listed themselves as students, retired or unemployed.

Each person was asked to report his occupation in answer to the question, "What kind of work do you do, exactly? For those who are not working now: What kind of work did you do when you last worked?"(Question 14, Appendix A-II) In this study most of the analysis deals with males currently employed.

Two indicators of occupational status were used to examine relationships between occupation and blood pressure levels. The first was the traditional grouping of occupations into professional, semi-professional, etc. (The Census groupings were used in modified form.) This classification roughly reflects (1) occupational status from high to low, (2) skill or edcational level and (3) nature of work. The second measure was occupational prestige level which reflects the relative amount of prestige accorded occupations in our society and generally corresponds with socioeconomic status. Although the two indicators are highly correlated with each other, there are important differences between them. Variations in status or prestige found in any major occupational grouping such as clerical and sales workers are taken into account in the prestige level score for which each occupation is separately ranked.(Appendix D)

Major Occupation Groups

The entire range of occupational groups from professional to unskilled workers was well represented in the sample of currently employed males. Racial differences in occupation were large but age differences were smaller. Among white males 22 percent held professional or semi-professional jobs whereas only 6 percent of Negro males were in this category.

For the blood pressure analysis of Negro males the six occupational classifications defined earlier were grouped into two, white collar and blue collar, because of the small numbers. White collar includes professional and semi-professional, proprietors, managers and officials, clerical and sales workers. The remaining three lower groups as indicated in Appendix D, were labeled blue collar. Among Negro males only 16 percent in the older age group were white collar workers while 28 percent of the younger Negro males held white collar jobs.

Occupational Prestige Level

The second indicator of occupational status, the occupational prestige level, was measured in a scale which varied from a low of two to a high of nine. The distribution of prestige levels by race and sex among males was similar to that of occupational groups. Very high prestige levels (score of 8 or more) were held by only 3 Negroes whereas 20 to 34 percent of white males in 10-year age groups between 25 and 64 had high prestige level occupations[1]. Low prestige level occupations (scores of 2-5) were held by 42 percent of younger Negro males and by 62 percent of older ones; no more than 17 percent of white males in any of these age groups held such low prestige occupations.

SOCIOECONOMIC STATUS

Socioeconomic status refers to the structure of hierarchial rankings from high to low in our society, based on differentials in prestige, standard of living, extent of social and economic resources and styles of life among other things[2]. Stemming from an interest in "social class", a multidimensional attribute, called socioeconomic status (SES) is commonly measured, especially in terms of three criteria - level of education, occupation and income. Single indicators of SES are less preferable than a multidimensional index in many cases, but among these single indicators occupational level is the single best indicator for many purposes.(1-2)

Occupation, education and income levels are highly intercorrelated but the overlap between them is not perfect by virtue of the stratification system. For example, many professional or other high level occupations require high educational attainments but have relatively low income levels (such as college professor). There are other occupations which require relatively low educational levels but have large incomes. The correlation coefficients between SES index and the variables making up the index and

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[1] A few of the traditionally high status professions are given a "9" rating on the score, such as judges, lawyers, physicians and architects. The score "7" is modal and contains such disparate occupations as cashiers and most clerical workers, electricians and many other skilled workers, state and local inspectors, insurance adjusters and investigators, librarians and airplane mechanics. Low scores of 4 and 5 (there were few, if any 2's or 3's in our sample) are assigned to occupations such as car washers, hospital attendants, farm laborers, janitors, shoemakers, warehousemen and peddlers.

[2] Typical examples of the extremes are: high SES - a lawyer or other professional with college or graduate education earning $20,000 a year; low SES - an unskilled laborer with 8 or less years education earning $4,000 a year.

also between the variables are highly significant.(Table II) Family income related to the other variables has the lowest correlation coefficients.

Table II

CORRELATION COEFFICIENTS[1], BETWEEN SES INDEX VARIABLES AND SES INDEX FOR THE STUDY POPULATION

	FAMILY INCOME	EDUCATION	OCCUPATIONAL GROUPS
SES Index	.694	.698	.703
Family Income		.302	.329
Education			.555

[1] No answer groups omitted in calculation.

In many studies involving socioeconomic status, one or another of the single indicators is more strongly related to the independent factor being studied than is the SES index. This single factor reflects more clearly which dimension of SES is operating in relation to the dependent factor. For example, educational level is more highly associated with certain aspects of voting and political behavior than income level.(3)

The SES index developed for this study was based on the averaging of education, occupation and income levels and ranges from a low of 7 to a high of 100.(See Appendix D for definition) Married females' socioeconomic status is based on their husband's occupational and educational status as the husband is the primary status carrier in our society. SES distribution was divided into low, medium and high, with roughly one third of the total population in each level. Medium and high groupings were combined in the analysis of Negroes as too few were in the high status group to warrant a separate group for analysis.

As can be seen from Table III race and age differences in socioeconomic status levels are clearly reflected among males in the differential proportions of race-age groups with low SES levels. The majority of Negro males have low SES levels but no more than a third of white males are in the low SES category. Within each racial group, older males have a higher proportion in low SES groups than younger males with this age difference accentuated among Negroes.

SUBJECTIVE SOCIAL STANDING

Subjective social standing refers to the respondent's self-evaluation of his rank or level in the status structure or his social class standing. Five class categories on a continuum from lower class to upper class were provided respondents for the assignment of their subjective social stand-

Table III

PERCENT OF MALES WITH LOW SES SCORES BY RACE AND TWO AGE GROUPS

RACE AND AGE GROUP	PERCENT WITH LOW SES
Total White Male	27
Less than 45 Years	23
45 Years and Over	33
Total Negro Male	64
Less than 45 Years	52
45 Years and Over	79

Table IV

CORRELATION COEFFICIENTS BETWEEN SES INDEX AND SUBJECTIVE SOCIAL STANDING BY RACE, SEX AND TWO AGE GROUPS

RACE, SEX AND AGE	NUMBER[1]	CORRELATION COEFFICIENT
Total	1,646	.118
White Male		
Less than 45 Years	456	.226[a]
45 Years and Over	320	.333[a]
White Female		
Less than 45 Years	436	.306[a]
45 Years and Over	250	.373[a]
Negro Male		
Less than 45 Years	61	-.177
45 Years and Over	47	-.415[a]
Negro Female		
Less than 45 Years	47	.026
45 Years and Over	29	-.328

[1] Only those individuals where income, education, occupation and subjective social standing are known were included.

[a] Significant at 1 percent level.

ing in answering the question, "If you were asked to choose one of these names for your social standing in the community, which would you say fits you best? Lower, Lower Middle, Middle, Upper Middle, Upper." (Question 42, Appendix A-II) Typically, the majority of persons in the United States choose "middle class" which was also the case in the Alameda County data with 59 percent of the sample choosing "middle class". Twenty-six percent chose "upper middle" or "upper class"; a much larger percent (41) of the Negro females chose these groups. In many studies subjective class standing correlates highly with objectively determined socioeconomic status although the overlap is never complete. In this study, the correlation coefficient between SES index and subjective social standing was low, .118. Examination of the linear correlation between the SES index and subjective social standing for the various age-race-sex groups revealed the expected positive relationship among whites only. (Table IV) The correlation coefficients among the younger Negroes were insignificant; among older Negroes they were negative. This indicated that older Negroes with lower objective socioeconomic status tend to rank themselves as "upper middle" or "upper class" and vice versa.

MARITAL STATUS

Current marital status was obtained from answers to two questions: the first question distinguished "never married" from sometime married and the second asked those who indicated "sometime married" if they were currently married, separated, divorced or widowed. (Questions 33 and 35, Appendix A-II) The sample contains a majority of married persons, 72 percent, with 11 percent never married and the remainder separated, widowed or divorced.

NUMBER OF CHILDREN

The number of reported own children, as distinguished from step or adopted children, was obtained from the questions: "Do you have any children of your own? If yes, How many?" (Question 36, Appendix A-II) Twenty-eight percent reported no children of their own while twenty-nine percent had three or more children and the remainder had one or two children.

RELIGION

Persons reported religion was obtained from the question "What is your religion? Protestant, Catholic, Jewish, Other, None." (Question 40, Appendix A-II) A majority of the sample were Protestants, 58 percent, with 29 percent Catholic and approximately 10 percent reported having no religion. Jewish and "other religions" were combined because of small numbers in each group; together they totaled only three percent of the sample. Negroes differed extensively from the total sample in that 83 percent of them were Protestant.

BIRTHPLACE

Place of birth was obtained from the question, "Where were you born? In the United States or in some other country." United States residents were asked, "Which city and state?"; all others were asked, "Which country?"(Question 18, Appendix A-II) As is well known, Californians are largely migrants and a relatively small proportion of the sample were born in California. Eighty-seven percent of the total sample were born in the United States but the area of their birth differed greatly by race. (Table 17, Appendix B) Fifty-six percent of "other" nonwhite races, predominantly Orientals, were foreign born; only twenty-five percent of them were born in California. A third of the white persons were California born but only six percent of Negroes were born in California. The Negroes were predominantly from the South Central area (77 percent).

RESIDENTIAL STABILITY

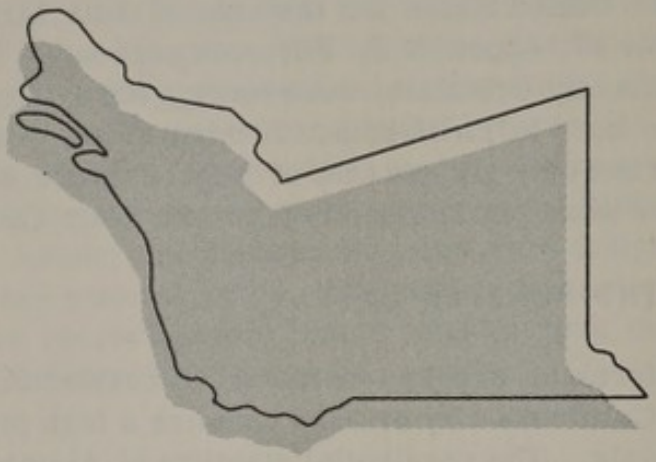
Californians are known for their residential mobility; the population of any California city or area contains a high proportion of relatively recent arrivals. The residential stability of Alameda County residents was examined in terms of the number of years they had lived in their present town or city.(Table 18, Appendix B) This was obtained from the residential history items. Forty percent of the study population had lived in their present town or city five or less years. However, there was a large proportion of stable old-timers too; 44 percent had lived 11 or more years in their current city or town. Negroes were more stable than the whites. Fifty-six percent of the Negroes had lived eleven or more years in their current city or town.

SUMMARY

In this section the nature of the study population has been described in terms of family income, education and occupational levels. Most of the sample population were married, had children, and were born outside of California. The mobility of the sample was manifested by the large proportion who lived in their current place of residence five years or less; however, there was also a large proportion of residentially stable persons. Considering all of these social and demographic factors, a wide spread has been shown reflecting the socially heterogeneous nature of the sample population.

The Negro group in the sample was also heterogeneous. Although the majority was born in the South and was at the lower educational, occupational, income or SES level, there was a fair proportion of medium-high SES levels among them, particularly the younger Negroes. The contrast between the young and the old is noteworthy among Negroes particularly in terms of education and SES level.

PART II
RESULTS



Blood Pressure Distribution by Age, Race and Sex

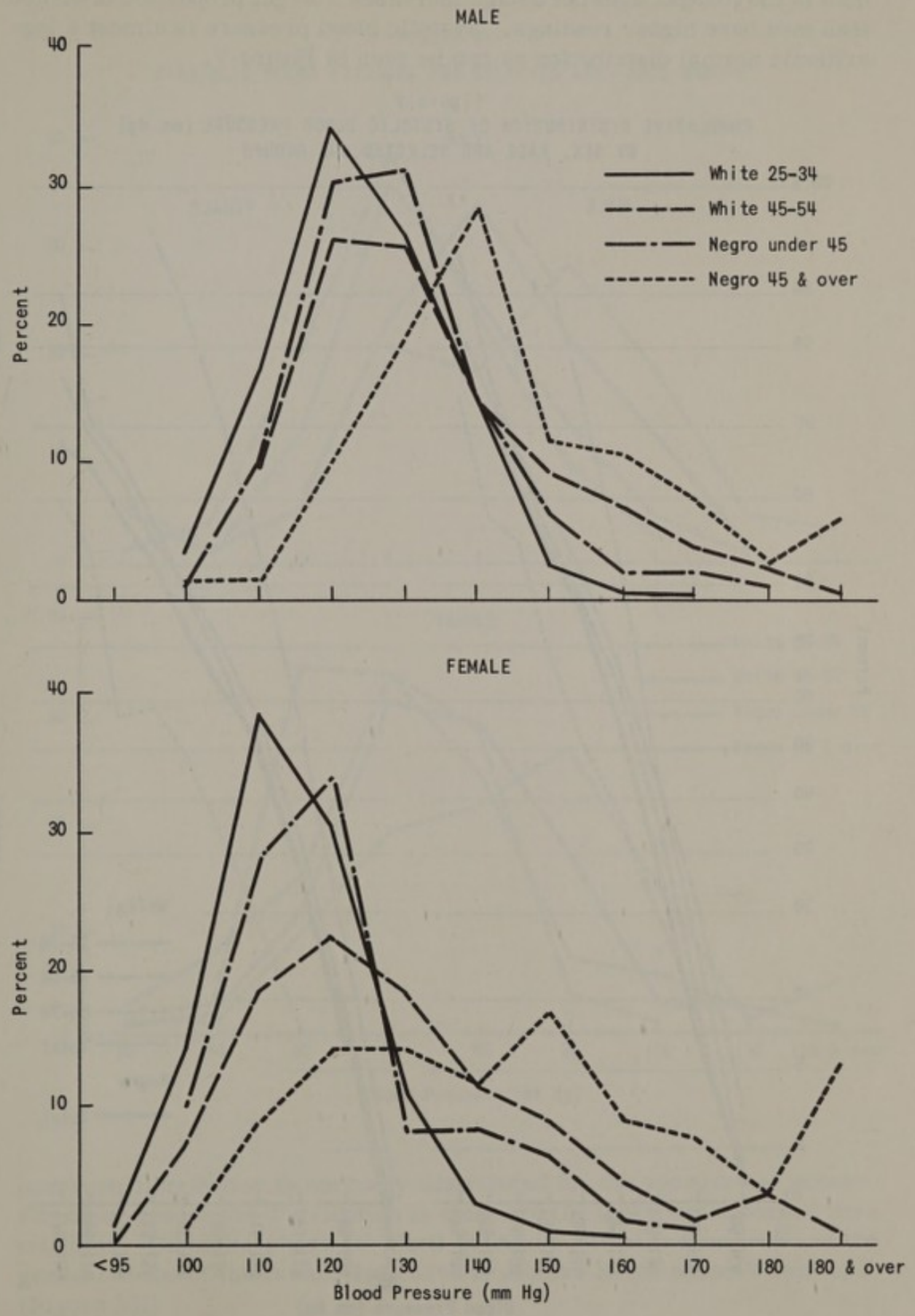
Data presented in this section will describe the frequency and cumulative distributions, mean, standard deviation and percentile distribution as well as prevalence of hypertension in the Alameda County population under study by age-race-sex groups. The mean blood pressures of the study population will also be compared to the results of other surveys conducted in the United States.

FREQUENCY DISTRIBUTION

The frequency distribution of the population for systolic blood pressure is shown in Tables 19 and 20, Appendix B. As can be seen from Figure IV

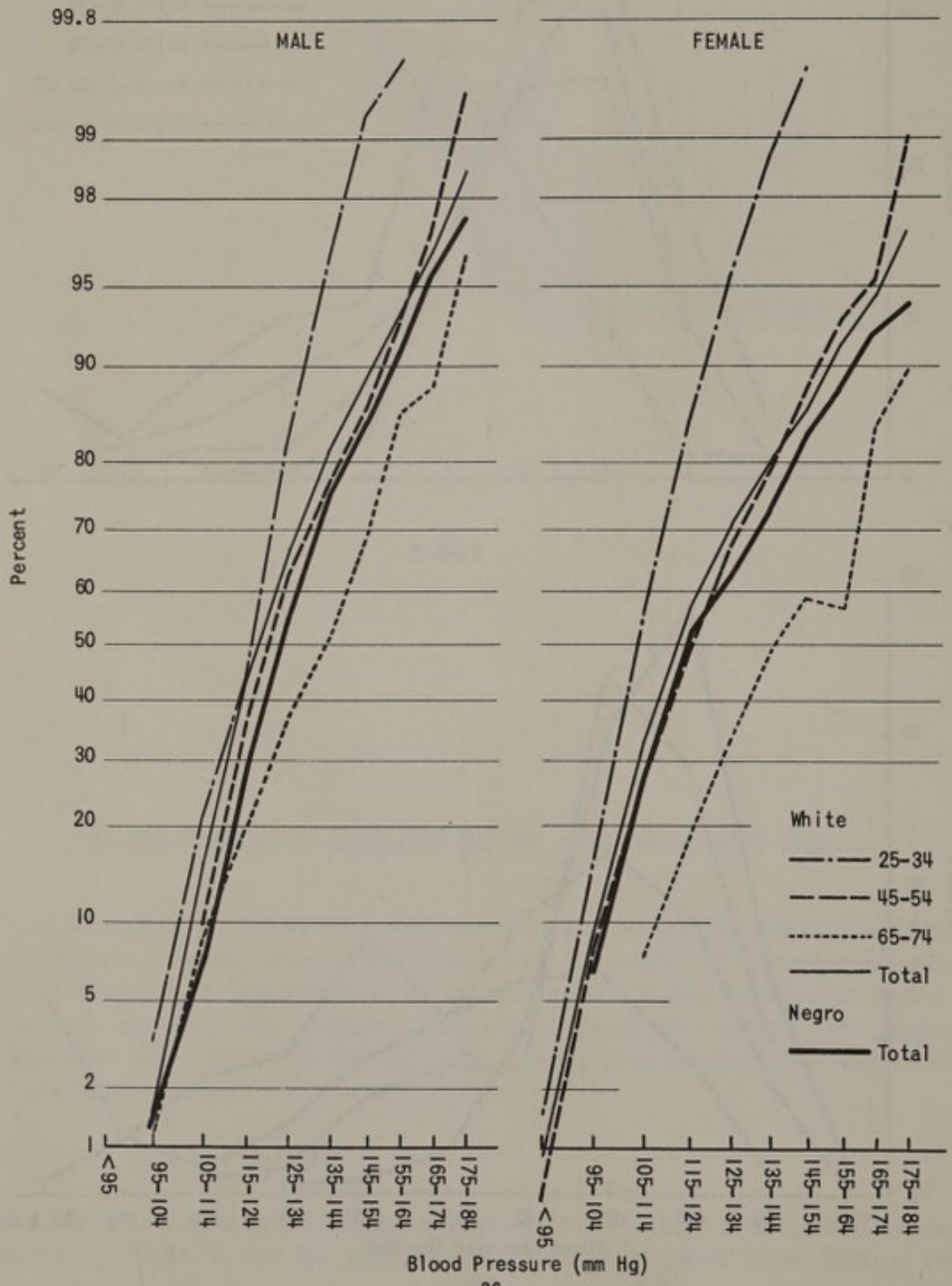
Figure IV

SYSTOLIC BLOOD PRESSURE FOR SELECTED AGE - RACE GROUPS



systolic blood pressure increases with age, a pattern which has been previously reported by others.(4-5) The frequency distribution is positively skewed. For women, blood pressure readings are generally lower than men in the younger ages but as age increases a larger proportion of women than men have higher readings. Systolic blood pressure is almost a logarithmic normal distribution as can be seen in Figure V.

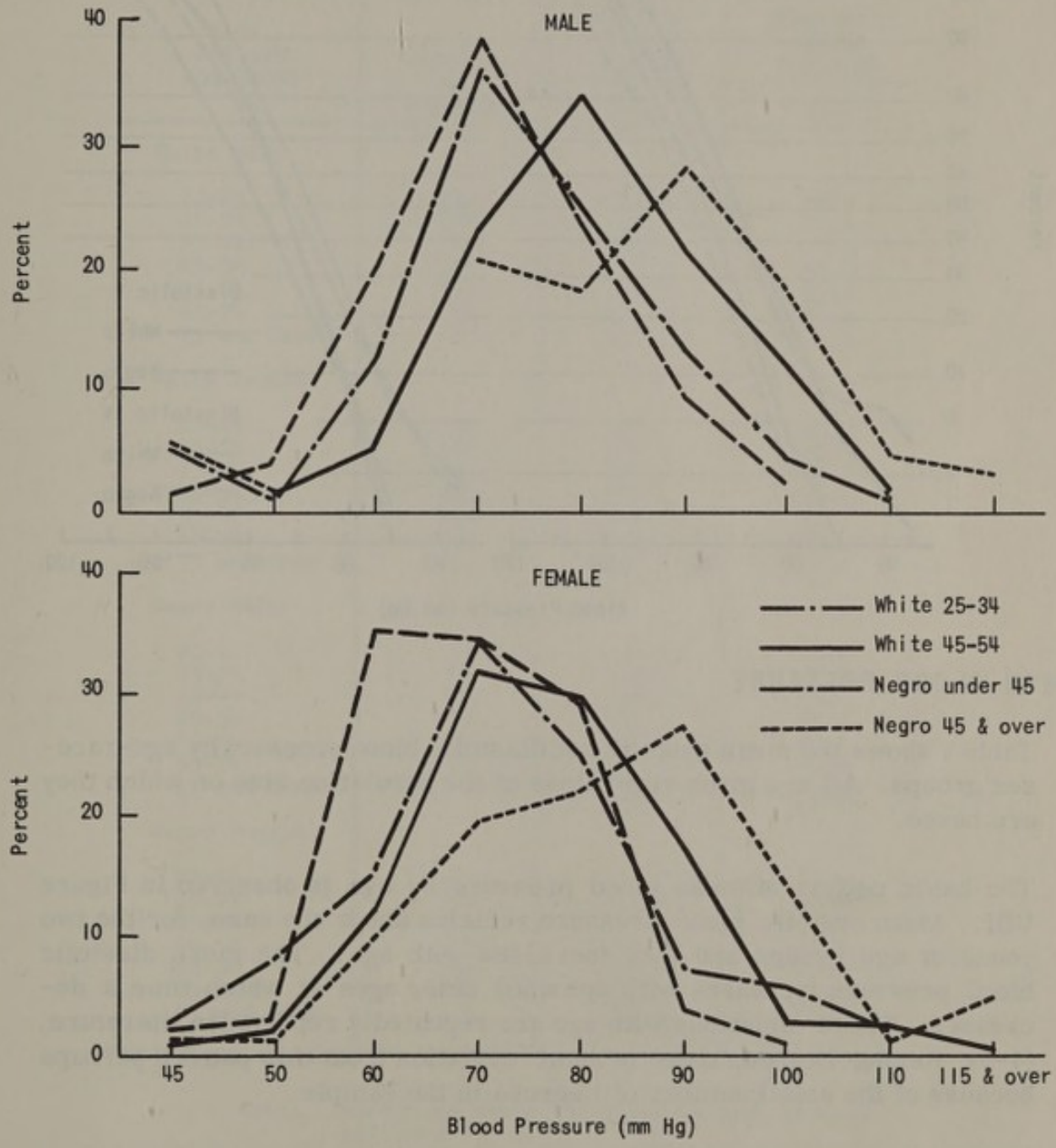
Figure V
CUMULATIVE DISTRIBUTION OF SYSTOLIC BLOOD PRESSURE (mm Hg)
BY SEX, RACE AND SELECTED AGE GROUPS



The distribution of diastolic blood pressure is shown in Tables 20 and 21, Appendix B. The frequency distribution is more pointed (leptokurtic) than the systolic blood pressure distribution.(Figure VI) The diastolic blood

Figure VI

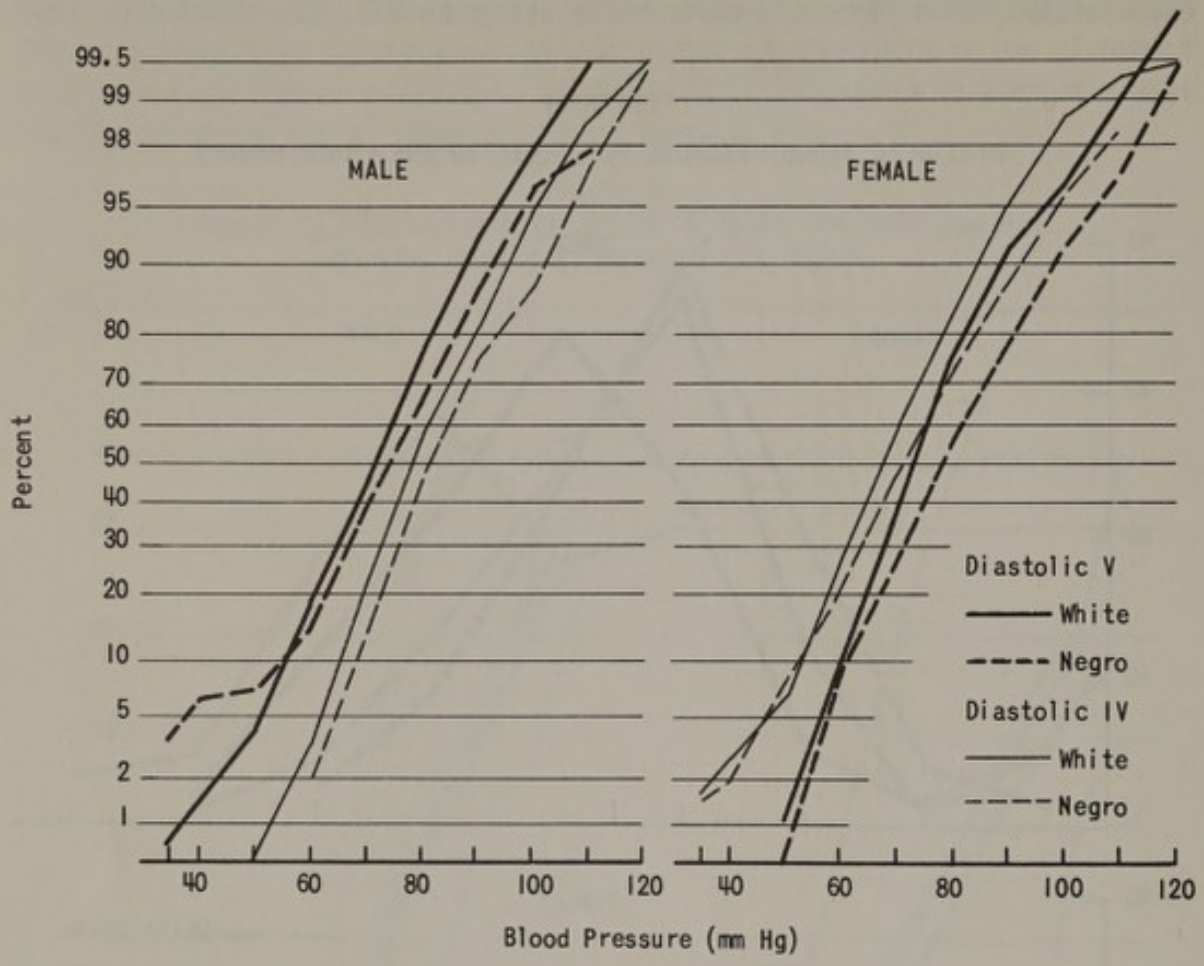
DIASTOLIC BLOOD PRESSURE FOR SELECTED AGE - RACE GROUPS



pressure distribution is normally distributed for the younger age groups. For older groups the distribution is closer to the logarithmic normal distribution. Diastolic phase IV blood pressure was also examined and the general shape of the cumulative curve is similar to the phase V readings. (Figure VII)

Figure VII

CUMULATIVE DISTRIBUTION OF DIASTOLIC IV AND V
BLOOD PRESSURE READINGS BY RACE



MEAN BLOOD PRESSURE

Table V shows the mean systolic and diastolic blood pressure by age-race-sex groups. All are given regardless of the population size on which they are based.

The basic pattern of mean blood pressure by age is observed in Figure VIII. Mean systolic blood pressure remains about the same for the two youngest age groups and then increases with age. The mean diastolic blood pressure increases with age until older ages at which time it decreases. These variations with age are repeatedly reported in literature. (4-5) Among Negroes there is some deviation from this pattern perhaps because of the small number of Negroes in the sample.

For both races men have higher mean systolic blood pressure than women up to the age group 55-64; thereafter women have higher mean systolic blood pressure than men. This is a decade later than has been observed in some other studies (5-6) but is similar to the pattern observed in the Health Examination Survey for United States as a whole. (7) Negroes' mean systolic blood pressure is higher than whites; the racial differences are larger in the older age groups.

Table V

MEAN SYSTOLIC AND DIASTOLIC BLOOD PRESSURE (mm Hg)
BY RACE, SEX AND AGE GROUP

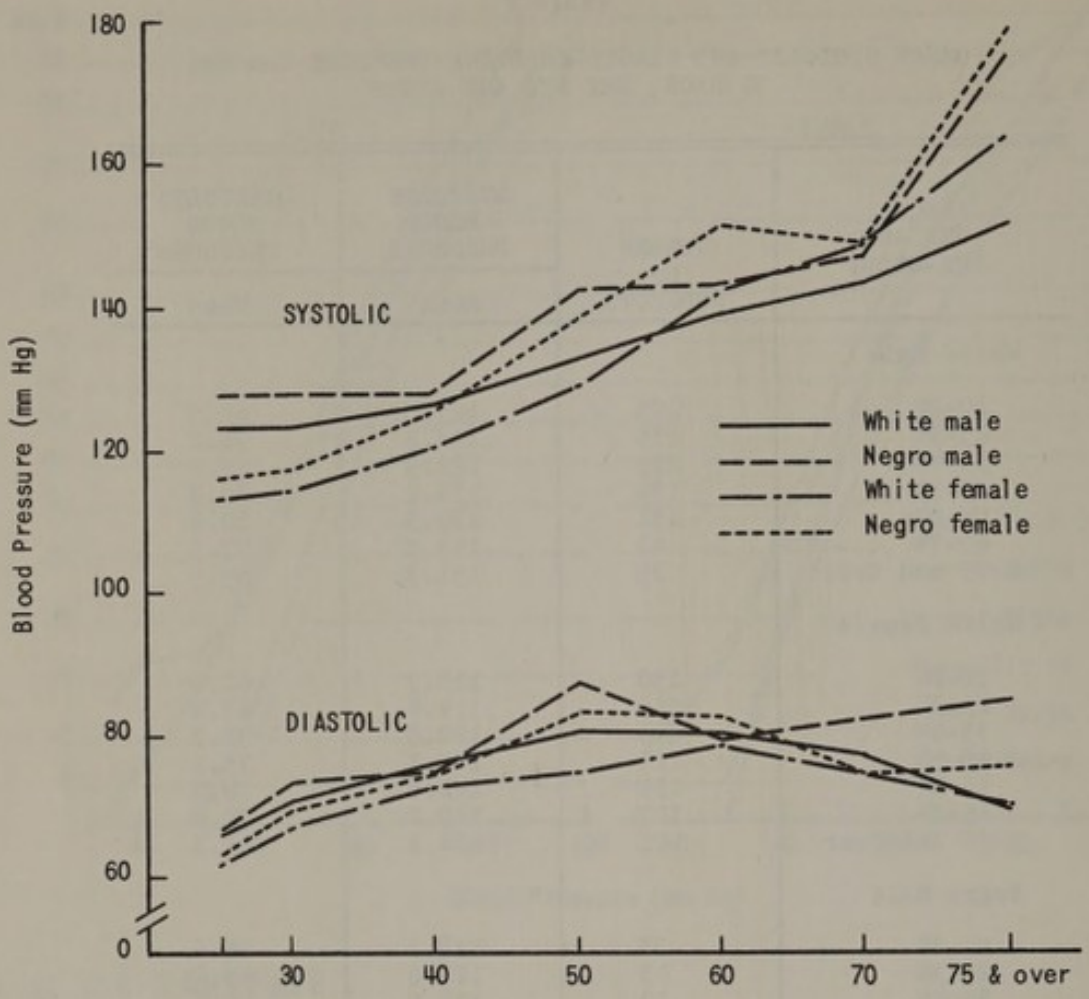
RACE, SEX AND AGE GROUP	NUMBER OF SUBJECTS	SYSTOLIC BLOOD PRESSURE	DIASTOLIC BLOOD PRESSURE
		Mean	Mean
White Male			
20-24	105	123.8	66.5
25-34	235	123.5	71.2
35-44	225	126.9	77.0
45-54	174	133.2	80.8
55-64	131	139.3	80.8
65-74	83	143.7	77.5
75 and Over	35	151.7	69.9
White Female			
20-24	150	113.7	62.0
25-34	259	114.4	67.4
35-44	229	120.3	73.3
45-54	211	129.1	75.1
55-64	139	142.6	78.7
65-74	107	149.0	74.9
75 and Over	71	164.1	71.1
Negro Male			
20-24	23	128.2	66.6
25-34	43	128.0	73.8
35-44	23	128.6	75.6
45-54	27	142.4	87.7
55-64	25	143.1	79.0
65-74	13	147.5	82.2
75 and Over	2	175.0	85.0
Negro Female			
20-24	21	116.0	63.4
25-34	44	117.7	70.0
35-44	43	125.6	75.2
45-54	30	138.8	83.8
55-64	32	151.8	82.9
65-74	8	148.9	75.3
75 and Over	7	177.9	75.7

Note: Underlined means are based on less than 10 persons.

Source: State of California, Department of Public Health, Bureau of Chronic Diseases, Alameda County Blood Pressure Study, 1966.

Figure VIII

MEAN SYSTOLIC AND DIASTOLIC BLOOD PRESSURE BY AGE



Mean diastolic blood pressure shows a consistent pattern for whites between the sexes - males have consistently higher mean blood pressure than females in all age groups up to the age of 75 years. The differences are smaller in the older age groups. The differences between the mean diastolic blood pressure of racial groups is smaller than for mean systolic blood pressure with Negroes still having higher mean blood pressure than whites.

Although age, race and sex differences of blood pressure levels are abundantly reported, statistical measures are seldom employed. Since this study population was a stratified sample of Alameda County population, it was possible to calculate sampling errors of the mean and to determine which means differ significantly for the various age-race-sex groups. In Table 22, Appendix B, the means and standard errors for the groups are presented and the significance of the differences can be calculated (see Appendix C). Significant differences are found for mean systolic blood pressure between the older and younger age groups.

PERCENTILE DISTRIBUTION

The use of percentile distributions can give a picture of blood pressure distribution without making any specific assumption about the form of the distribution. Figures IX and X show the median (50th percentile) and the two quartiles (25th and 75th percentile) of the distribution. For the whites the distributions are regular but among Negroes, because of small numbers, they do not have as regular a pattern.

Of special interest are those in the upper quartile of the blood pressure distribution for any age-race-sex group. These persons are at special risk even though some may not currently be classified as having high blood pressure or meet the definition of hypertension. In this monograph we are specifically interested in the relationship between blood pressure and selected socio-demographic variables. In most instances a comparison of the mean blood pressure readings of each category of a socio-demographic variable in a particular age-sex-race group will be made. However, this often means that certain categories will have small numbers, and differences in the means may not be apparent. If age could be eliminated as a variable, it was reasoned that those with higher blood pressure (75th percentile), regardless of the actual reading, might be differentially represented in a particular socio-demographic group. Table 23, Appendix B shows these percentile breaks for each age-race-sex group. These readings were rounded to the nearest mm Hg and used as cut-off points in tabulations which appear later in the monograph.

PREVALENCE OF HYPERTENSION

The prevalence of hypertension, borderline hypertension and normotension by age, race and sex appears in Table 24, Appendix B. The definition used for these classifications are those used by the National Health Examination Survey and are defined in Appendix D. Hypertension represents either elevated systolic (160 mm Hg and over) and/or elevated diastolic blood pressure (95 mm Hg and over). The proportion of the population with hypertension increases with age. (Figure XI) There are less women than men who are classified as hypertensive in the younger ages but this pattern reverses after 55 years. A larger proportion of Negroes have hypertension than do their white counterpart. These findings are in line with the earlier descriptions of the systolic blood pressure distributions and mean values.

COMPARISON OF FOUR SURVEYS

To compare distribution of blood pressure in Alameda County with other population groups in the United States, mean systolic and diastolic blood pressure data from the Health Examination Survey (8), Muscogee County, Georgia (9), and that of Evans County, Georgia (10) were utilized. The four surveys utilize samples of county or nationwide populations; the methodology for blood pressure measurement was generally similar to this

Figure IX

SYSTOLIC BLOOD PRESSURE PERCENTILES
ALAMEDA COUNTY BLOOD PRESSURE STUDY, 1966

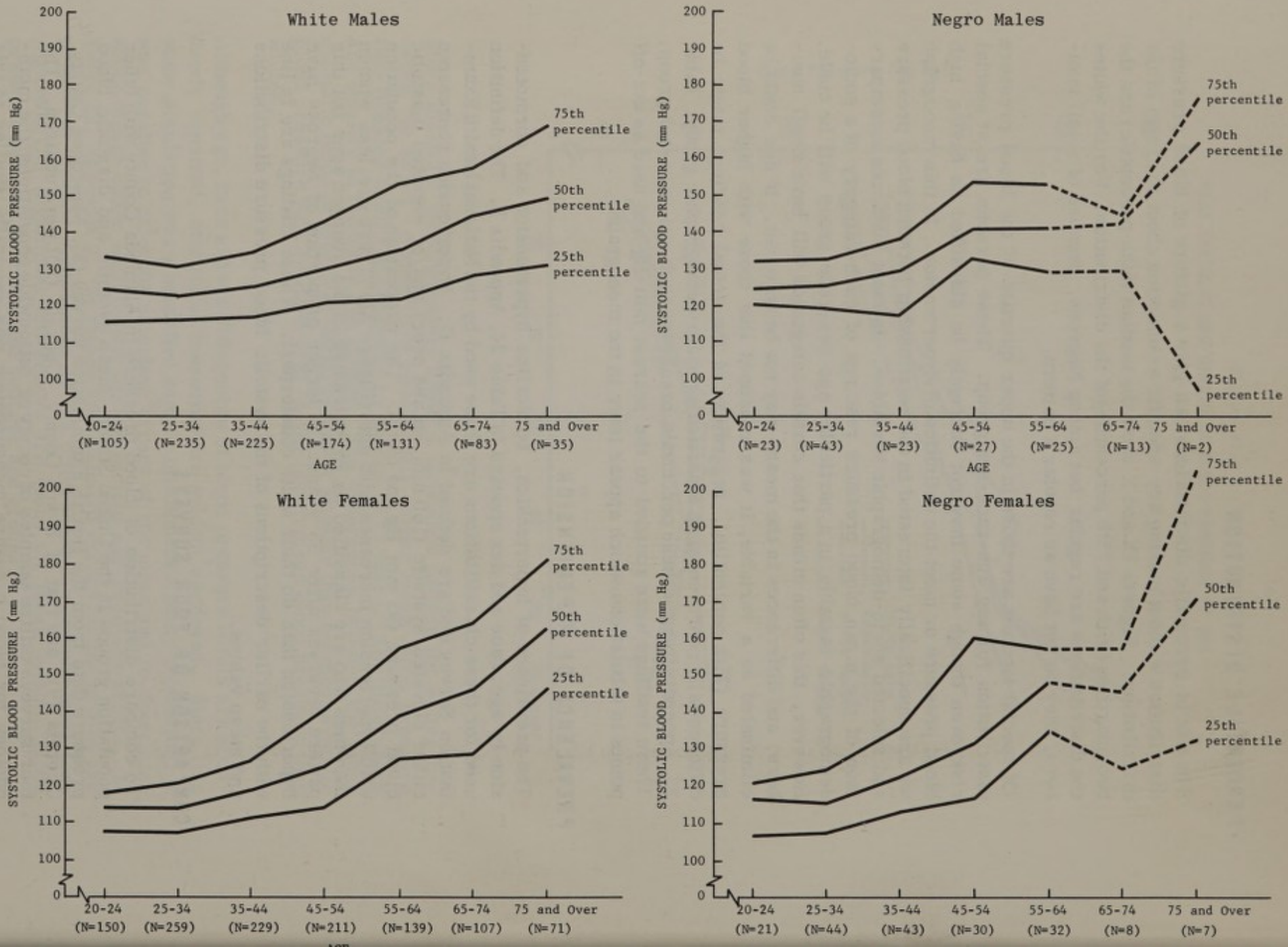


Figure X

DIASTOLIC BLOOD PRESSURE PERCENTILES
ALAMEDA COUNTY BLOOD PRESSURE STUDY, 1966

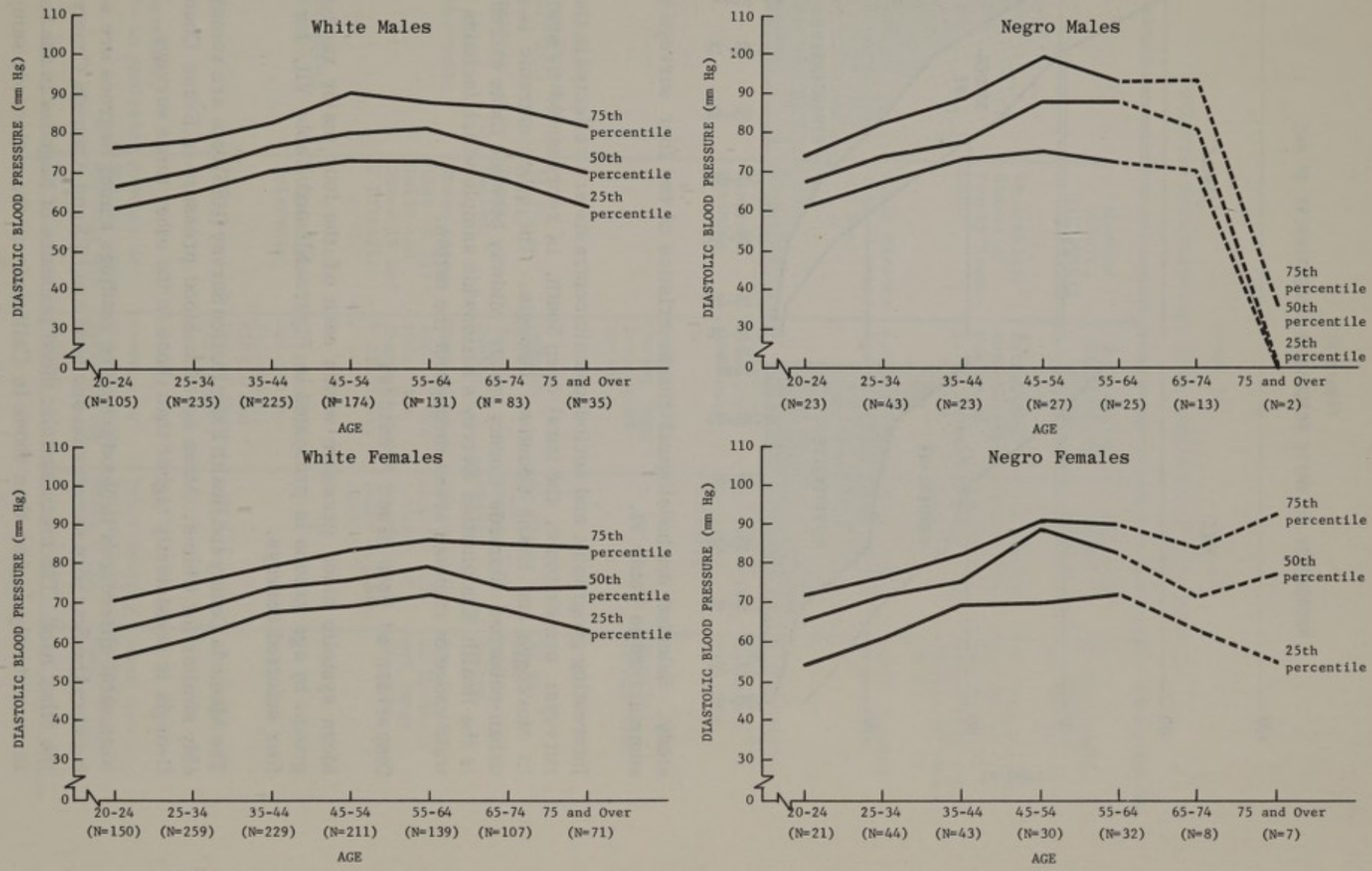
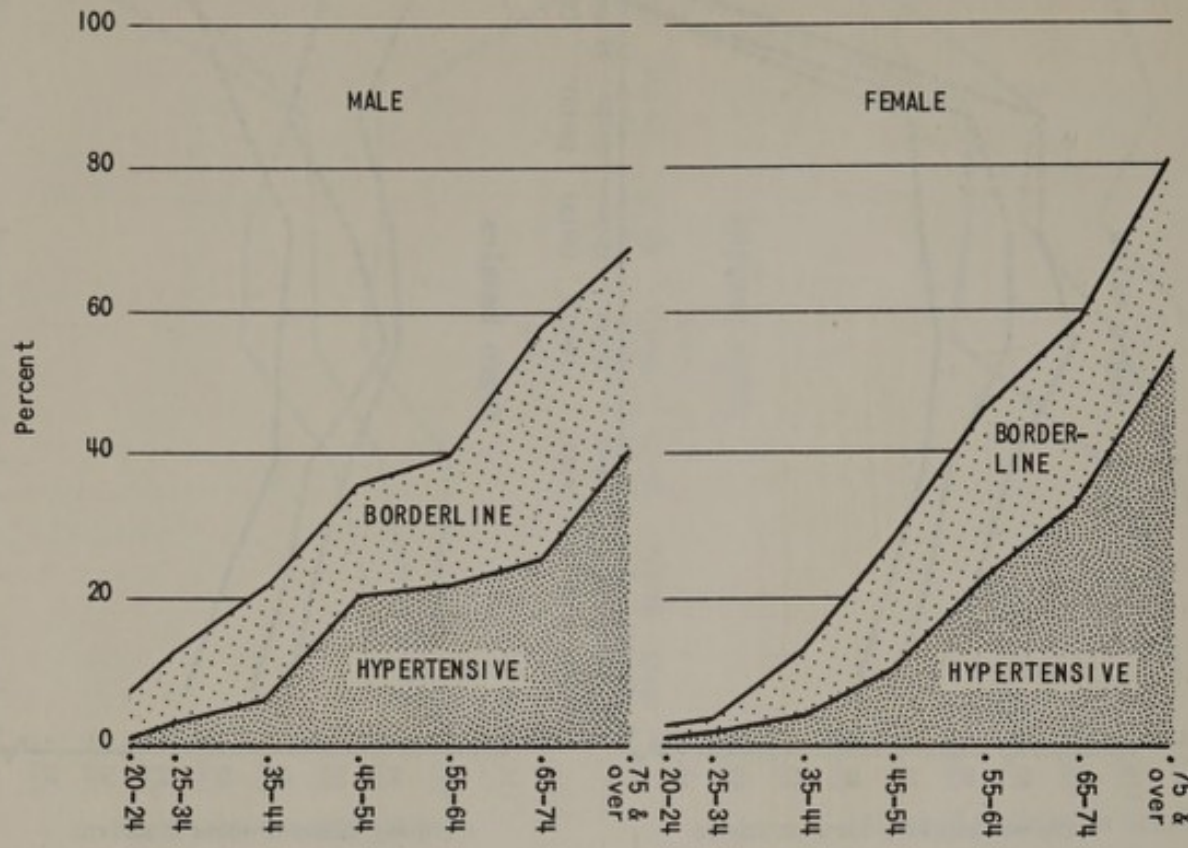


Figure XI

PROPORTION OF WHITE POPULATION HYPERTENSIVE BY AGE



study. Selected methodological characteristics of the four surveys are summarized in Table VI.

Interesting geographic and socioeconomic contrasts are reflected in these surveys: one extreme, the rural deep South, is represented by studies in Muscogee and Evans Counties, Georgia. The other extreme is the urban-suburban Alameda County study. Midway between these extremes is the Health Examination Survey's nationwide sample which includes the wide range of regional areas throughout the nation.

Comparison of Mean Blood Pressures

Mean systolic blood pressure within each of the four major race-sex groups by age groups is presented in Figure XII and Table VII, for the four selected surveys.

The Alameda County and Health Examination Survey (HES) data are remarkably similar for whites. Mean systolic blood pressure in Evans County, Georgia is consistently higher than those in the other three surveys.

Noticeable differences in blood pressure readings among Negroes are seen between the Southern surveys on one hand and HES and Alameda County on the other hand. The mean systolic blood pressure of Negroes in the South is consistently higher than those in California or the nationwide sample.

Table VI

SELECTED METHODOLOGICAL CHARACTERISTICS OF FOUR SURVEYS

	ALAMEDA COUNTY, CALIFORNIA	U.S. HEALTH EXAMINATION SURVEY	MUSCOGEE COUNTY, GEORGIA	EVANS COUNTY, GEORGIA
Sample Type	Probability Sample of County Households	Nationwide Probability Sample of 7,710 Persons	Two Percent Systematic Sample of County Residents	All Persons in County Aged 40-74 and 50 Percent Random Sample of Those 15-39
Size	2,575 Persons Aged 20 Years and Over	6,672 Persons Aged 18-79	1,162 Persons of All Ages	2,938 Persons Aged 15-74
Blood Pressure Observers Training	10 Nurses Special Standardized Training	62 Physicians No Special Training Mentioned	8 Nurses; 1 Physician Special Standardized Training	2 Physicians Special Standardized Training
Setting	Home	Mobile Clinic During Physical Examination	Home	Clinic During Physical Examination
Measurement of Blood Pressure				
Cuff Size	14 cm.	Unknown	13 cm.	14 cm.
Arm	Right	Left	Right	Left
Position	People Seated	People Seated	People Seated	People Seated
Measurements	Three Readings of Systolic and Phase IV and V Diastolic	Three Readings of Systolic and Phase IV and V Diastolic	Three Readings in Succession of Systolic and Phase V Diastolic	One Reading of Systolic and Phase V Diastolic
Measurements Recorded	At 5-Minute Intervals	At Irregular Intervals: Beginning, Middle and End of Physical Examination		
Measurements Used in Analysis	Average of the Readings: Systolic and Phase V Diastolic	Average of the Readings: Systolic and Phase V Diastolic	Third Reading; Systolic and Phase V Diastolic	First Reading Systolic and Phase V Diastolic

Table VII

MEAN SYSTOLIC BLOOD PRESSURE OF FOUR SELECTED SURVEYS BY RACE, SEX AND AGE

RACE, SEX AND AGE	SYSTOLIC BLOOD PRESSURE			
	Alameda County	U.S. Health Examination Survey	Muscogee County, Georgia	Evans County, Georgia
White Male				
15-24	na	na	122.7	126.8
18-24	na	122.3	na	na
20-24	123.8	na	na	na
25-34	123.5	124.5	121.5	128.6
35-44	126.9	127.9	123.8	131.4
45-54	133.2	133.2	132.6	142.9
55-64	139.3	139.7	144.8	150.4
65 and Over	146.1	na	147.5	na
65-74	143.7	147.1	na	160.2
75 and Over	151.7	154.1	na	na
White Female				
15-24	na	na	112.9	120.2
18-24	na	111.6	na	na
20-24	113.7	na	na	na
25-34	114.4	115.2	112.6	121.8
35-44	120.3	121.6	120.9	134.6
45-54	129.1	132.2	135.5	144.6
55-64	142.6	145.8	146.6	159.5
65 and Over	155.0	na	157.4	na
65-74	149.0	159.2	na	170.2
75 and Over	164.1	156.5	na	na
Negro Male				
15-24	na	na	126.5	128.5
18-24	na	119.0	na	na
20-24	128.2	na	na	na
25-34	128.0	127.4	132.9	135.7
35-44	128.6	134.7	142.8	142.1
45-54	142.4	139.0	150.6	160.0
55-64	143.1	148.3	166.7	167.6
65 and Over	151.1	na	146.8	na
65-74	147.5	158.3	na	175.5
75 and Over	a	156.5	na	na
Negro Female				
15-24	na	na	125.9	124.5
18-24	na	114.6	na	na
20-24	116.0	na	na	na
25-34	117.7	119.7	124.9	138.9
35-44	125.6	132.1	146.3	153.6
45-54	138.8	147.8	158.2	167.1
55-64	151.8	155.7	170.0	180.4
65 and Over	162.4	na	172.6	na
65-74	(148.9)	175.2	na	186.9
75 and Over	(177.9)	162.8	na	na

na Indicates data not available.

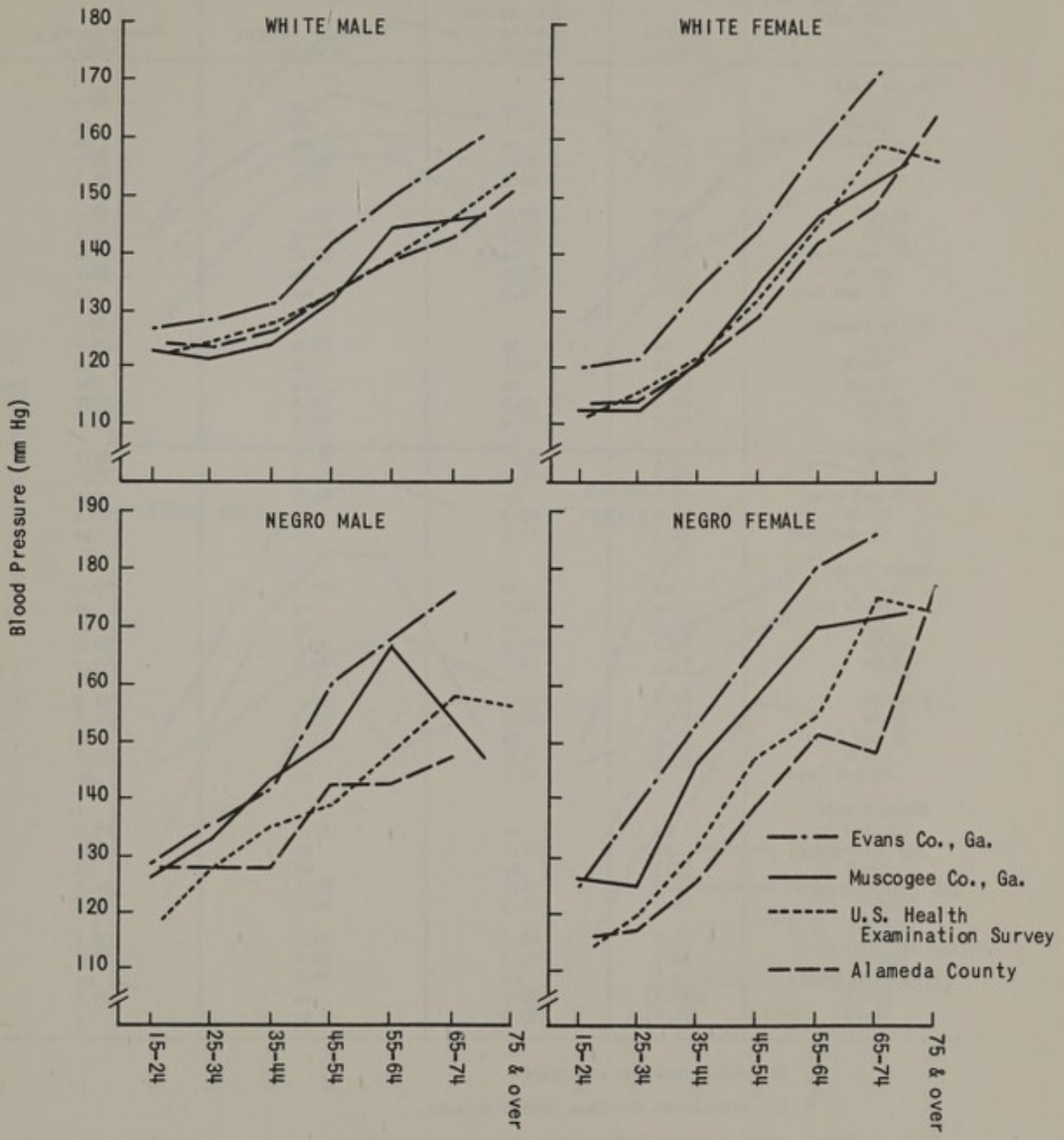
a Not calculated for less than 5 persons.

Note: Means based on 5-9 persons are in parentheses.
Means based on 10-24 persons are underlined.
From published data it cannot be determined what the size of each age-race-sex group of the National Health Survey is.

Source: Department of Health, Education, and Welfare, Public Health Service, Blood Pressure of Adults by Race and Area, United States, 1960-1962, Public Health Service Pub. No. 1000, Series 11, No. 5, Table 1, p. 10.
Comstock, G. W., "An Epidemiologic Study of Blood Pressure Levels in a Biracial Community in the Southern United States," American Journal of Hygiene, Vol. 65, No. 3, May 1957, Table 6, p. 286. (Muscogee County, Georgia.)
McDonough, J. R., Garrison, G. E., and Hames, C. G., "Blood Pressure and Hypertensive Heart Disease Among Negroes and Whites," Annals of Internal Medicine, Vol. 61, No. 2, August 1964, Table 3, p. 211. (Evans County, Georgia.)
State of California, Department of Public Health, Alameda County Blood Pressure Study, 1966.

Figure XII

MEAN SYSTOLIC BLOOD PRESSURE OF FOUR SELECTED SURVEYS
BY RACE, SEX AND AGE



Age-race-sex specific comparisons of mean diastolic blood pressure in the four surveys reveal patterns similar to systolic blood pressure but they are more pronounced.(Table VIII and Figure XIII) In Alameda County the mean blood pressure is consistently lower than that of the other surveys. The largest differences are seen among Negroes, with the Negroes in the South exhibiting higher mean diastolic blood pressure than those in Alameda County and HES; however, the same relationship was seen for the whites as well.

Table VIII

MEAN DIASTOLIC BLOOD PRESSURE OF FOUR SELECTED SURVEYS BY RACE, SEX AND AGE

RACE, SEX AND AGE	DIASTOLIC BLOOD PRESSURE			
	Alameda County	U.S. Health Examination Survey	Muscogee County, Georgia	Evans County, Georgia
White Male				
15-24	na	na	73.5	74.7
18-24	na	71.6	na	na
20-24	66.5	na	na	na
25-34	71.2	76.0	78.5	81.3
35-44	77.0	80.2	82.5	87.3
45-54	80.8	82.7	86.1	91.6
55-64	80.8	82.6	84.9	92.4
65 and Over	75.3	na	84.2	na
65-74	77.5	80.5	na	91.6
75 and Over	69.9	78.9	na	na
White Female				
15-24	na	na	66.3	85.4
18-24	na	69.1	na	na
20-24	62.0	na	na	na
25-34	67.4	72.5	72.3	79.9
35-44	73.3	77.0	76.9	87.8
45-54	75.1	81.1	82.5	89.3
55-64	78.7	84.2	82.3	93.4
65 and Over	73.4	na	81.8	na
65-74	74.9	83.3	na	90.5
75 and Over	71.1	79.1	na	na
Negro Male				
15-24	na	na	77.7	79.3
18-24	na	72.5	na	na
20-24	66.6	na	na	na
25-34	73.8	79.8	81.1	87.1
35-44	75.6	84.4	91.5	97.7
45-54	87.7	87.1	96.2	101.9
55-64	79.0	89.3	95.9	102.6
65 and Over	75.9	na	81.6	na
65-74	82.2	86.9	na	100.5
75 and Over	a	84.9	na	na
Negro Female				
15-24	na	na	78.3	78.9
18-24	na	71.5	na	na
20-24	63.4	na	na	na
25-34	70.0	76.6	80.1	91.8
35-44	75.2	85.3	90.5	98.8
45-54	83.8	89.9	93.6	102.3
55-64	82.9	91.9	96.6	104.7
65 and Over	75.5	na	88.6	na
65-74	(75.2)	89.7	na	103.3
75-79	(75.7)	82.9	na	na

na Indicates data not available.

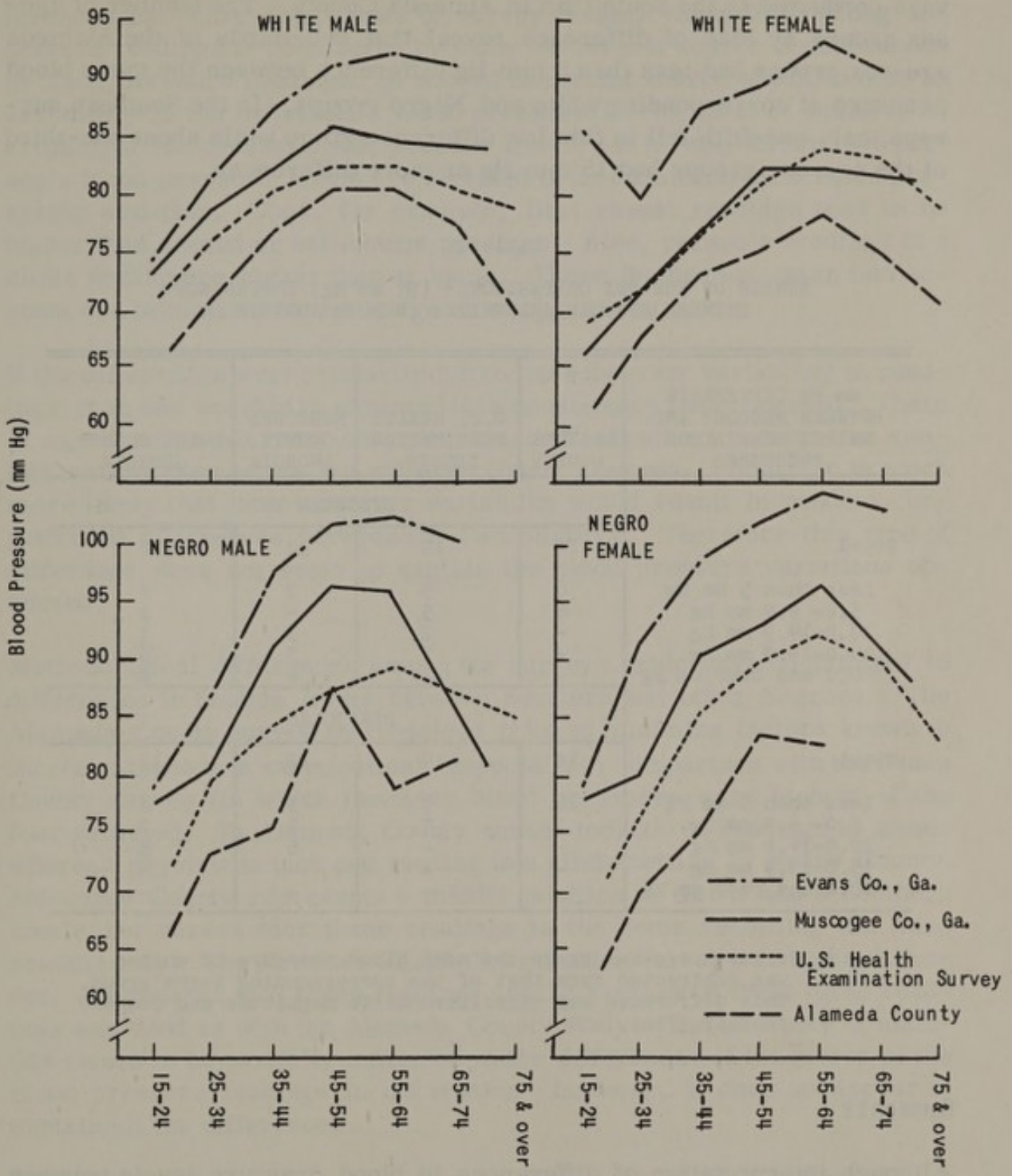
a Not calculated for less than 5 persons.

Note: Means based on 5-9 persons are in parentheses.
Means based on 10-24 persons are underlined.
From published data it cannot be determined what the size of each age-race-sex group of the National Health Survey is.

Source: Department of Health, Education, and Welfare, Public Health Service, Blood Pressure of Adults by Race and Area, United States, 1960-1962, Public Health Service Pub. No. 1000, Series 11, No. 5, Table 1, p. 10.
Comstock, G. W., "An Epidemiologic Study of Blood Pressure Levels in a Biracial Community in the Southern United States," American Journal of Hygiene, Vol. 65, No. 3, May 1957, Table 6, p. 286. (Muscogee County, Georgia.)
McDonough, J. R., Garrison, G. E., and Hames, C. G., "Blood Pressure and Hypertensive Heart Disease Among Negroes and Whites," Annals of Internal Medicine, Vol. 61, No. 2, August 1964, Table 3, p. 211. (Evans County, Georgia.)
State of California, Department of Public Health, Alameda County Blood Pressure Study, 1966.

Figure XIII

MEAN DIASTOLIC BLOOD PRESSURE OF FOUR SELECTED SURVEYS
BY RACE, SEX AND AGE



Observed Negro-White Differences in Blood Pressure Distributions

Not only do the surveys conducted in the South exhibit higher mean blood pressure for Negro males and females, but mean blood pressure differences between Negro and white persons are greater in these surveys than what was observed in the Alameda County survey. In all surveys, the Negro-White differences were smaller for diastolic than for systolic blood pressure, for younger persons than older persons and for females than males.

As can be seen from Table IX, the differences in mean blood pressure, expressed in mm Hg, between Negroes and whites is greater in the surveys conducted in the South than in Alameda County. The number of age-sex groups by size of difference reveal that two-thirds of the Alameda age-sex groups had less than 5 mm Hg difference between the mean blood pressure of corresponding white and Negro groups. In the Southern surveys, only one-fifth fell in this low difference group while about one-third of the age-sex groups had 15 mm Hg or more differences.

Table IX

NUMBER OF AGE-SEX COMPARISONS[1] (BY mm Hg) DIFFERENCE BETWEEN NEGROES AND WHITES IN FOUR SURVEYS

mm Hg DIFFERENCE BETWEEN NEGROES AND WHITES MEAN BLOOD PRESSURES	ALAMEDA COUNTY	U.S. HEALTH EXAMINATION SURVEY	MUSCOGEE COUNTY, GEORGIA	EVANS COUNTY, GEORGIA
	SYSTOLIC			
Total	12	14	12	12
Less than 5 mm Hg	6	5	2	2
5.0- 9.9 mm Hg	6	5	-	1
10.0-14.9 mm Hg	-	2	3	1
15.0-19.9 mm Hg	-	2	3	6
20.0 and Over mm Hg	-	-	4	2
	DIASTOLIC			
Total	12	14	12	12
Less than 5 mm Hg	10	7	3	2
5.0- 9.9 mm Hg	2	7	3	2
10.0-14.9 mm Hg	-	-	6	8
15.0-19.9 mm Hg	-	-	-	-
20.0 and Over mm Hg	-	-	-	-

[1] For each age-sex group the mean blood pressure of whites was subtracted from that of the corresponding Negro group. This difference was classified as to magnitude and counted in that group.

Comments

Although interpretation of differences in blood pressure levels between surveys is at best questionable and risky, several rather striking findings appeared. Negroes in Southern surveys have higher blood pressure than Negroes in the California or HES survey. Moreover, differences between Negro and white blood pressures are much greater in Southern surveys than in Alameda County or HES.

Two interpretations for these differences could be speculated: (1) either these differences are methodological artifact, or (2) they are "real" differences.

Methodological problems producing variability in blood pressure readings are, of course, numerous. Other than the obvious ones of sampling differences and other components of survey design, variability among observers readings is considered by many the largest source of differences in blood pressure readings. A second important source of differences is variability in the individual's blood pressure levels, part of which is an artifact of the measurement process itself. It is well known that person's blood pressure levels are elevated in an unfamiliar or tension provoking situation. Thus, for example, first casual readings tend to be higher than second or subsequent readings. Also, person's readings in a clinic setting are higher than at home. These factors are taken into account and minimized in the design of many surveys.

If the differences were primarily due to interobserver variability in readings, then one would have expected less consistency than observed. There is no indication that inter-observer variation in Southern surveys was similar among themselves but different from Alameda County. It is much more likely that inter-observer variability would result in random, unpatterned differences between the four surveys. Therefore this type of difference does not seem to explain the blood pressure variations observed.

Methodological differences among the surveys could have contributed to differences in tension levels between Southern and other Negroes. The Alameda County survey methodology tried to minimize factors known to increase tension in examinations, especially in comparison with the Evans County survey (in which the mean blood pressures were highest of the four surveys). In Alameda County nurses took three readings in homes whereas physicians took one reading in a clinic setting in Evans County. Muscogee County represents a middle position in that it was a Southern locale but nurses took three readings in the home recording the third reading only. The National Health Examination Survey was again different. A physician took three readings and the average of these three readings was used as with the Alameda County study. The interplay of methods seems to be partially reflected in the differences of the means of the blood pressure readings in the studies - however, it does not appear to explain all the differences.

The preceding points out the need to thoroughly explore and study sources of individual variability in blood pressure readings as has been suggested by the HES report: "....some of the difference in mean blood pressure between Negro and white examinees found by the Health Examination Survey reflects a greater tension by Negro examinees at the time of the examination."(11) This suggestion was based on indirect evidence. Third systolic readings are usually lower than first readings as the examinee is more comfortable and relaxed. The reasoning was that if Negroes' blood pressure dropped more between the first and third readings than whites,

this would indirectly imply greater tension on the part of Negro examinees. They found this to be the case: "the decrease was greater for the Negro examinee than for the white."(11)

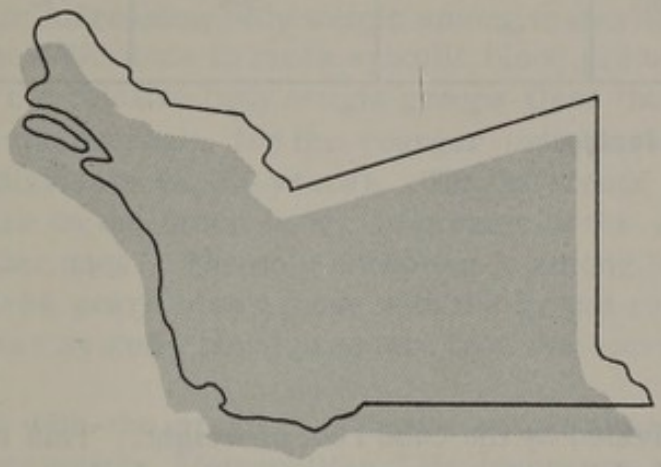
The second major interpretation of the Negro-White differences found among Southern and non-Southern surveys is that they may be "real" differences. Real differences in blood pressure levels could arise from variations in genetic and physical endowments of Negro emigrants from the South relative to those remaining in the South or from social-environmental factors of the regions associated with blood pressure levels.

The HES report indicated a preference for the latter interpretation. They found very similar prevalence of hypertension among white and Negro males living in giant metropolitan areas with family incomes of $2,000 or more (11.6 percent of the whites and 13.7 percent of Negroes).(12) Twice as much hypertension was seen in Negro as white males living in rural Southern areas with family incomes of less than $2,000 (15.4 percent of whites and 31.5 percent of Negroes). The report concluded:

> "The present report adds the information that Negro-White differentials appeared to vary in different milieus. For example, the prevalence of definite hypertension in the two races was much closer in the Northeast than in the South or West. It was closer in giant metropolitan areas than rural areas, and closer at incomes over $2,000 than at incomes less than $2,000. These are not, of course, entirely independent variables and the sample size of the HES is too small to separate them statistically, but there are clear indicators in the data that hypertension in Negroes (and especially for Negro men) is related to environment."(12)

Our findings are in agreement with those of HES. Not only does the blood pressure vary inversely with socioeconomic status but also the blood pressure of Negroes with medium-high standards of living is very similar to their white counterparts. The Negro-White differential in blood pressure appears to be reduced considerably in medium-high socioeconomic situations. Perhaps California Negroes in general live in much better socioeconomic situations than their rural Georgia counterparts. Perhaps the relatively low blood pressure readings of Negroes in our study is reflecting this to some extent.

Although the emphasis here has been on Negro-White differences for each survey, it should be remembered that the four surveys revealed differences of mean blood pressure for both whites and Negroes between surveys. The greatest differences were between the Evans County, Georgia Study and the Alameda County Study. But in general there was a gradation with Muscogee County, Georgia having levels higher than HES.



Blood Pressure and Biomedical Factors

The relationship between the level of blood pressure and several biomedical factors, indices of body weight and smoking status, were examined. The findings are presented in this section.

INDICES OF BODY WEIGHT

Body weight is known to be positively associated with the level of blood pressure.(4-13) Four indices of body weight were related to blood pressure - ponderal index, weight on scale and two measures of relative body weight. All indices are defined in Appendix D. These weight measures are highly intercorrelated and reflect only slightly different measures. The two relative body weight measures, Framingham index and Metropolitan Life Insurance body weight standard, correlate most highly while body weight on scale and the ponderal index have the smallest value.(Table X)

Table X

CORRELATION COEFFICIENTS BETWEEN FOUR INDICES OF BODY WEIGHT FOR STUDY POPULATION

INDICES	FRAMINGHAM INDEX	METROPOLITAN INDEX	WEIGHT
Ponderal Index[1]	-.876	-.947	-.540
Framingham Relative Body Weight		.984	.792
Metropolitan Life Insurance Body Weight Standard			.729

[1] Low values indicate heaviness.

Ponderal Index

The ponderal index is height divided by the cube root of weight. This index is not a direct measure of obesity but represents indirectly leanness as opposed to heaviness, the lowest numerical values of the index represent the heaviest individuals. A heavily muscled person has a low index value similar to an obese person and both would be considered heavy.

Johnson and Remington in a blood pressure survey of 2,927 white and Negro residents of Nassau, Bahama, found a positive relationship between heaviness and high blood pressure.(14) The relationship was especially noticeable among the Negroes; among the whites, differences were apparent but not as consistent perhaps because of the small sample size of the whites. Other investigators have demonstrated a similar relationship between ponderal index and blood pressure.

Tables 25 and 26 in Appendix B present the mean systolic and diastolic blood pressure by race, sex, age and ponderal index in Alameda County. The mean blood pressure increases as the ponderal index decreases, and for systolic blood pressure the increase in mean blood pressure among heavy individuals as compared to the leaner individuals is greater for whites.

Relative Body Weight Measures

Two different measures of relative body weight were used. Both indicate the percent over or under the "desirable" weight a person is relative to a predetermined standard for the person's sex-height group. One of the measures used in this study was based on the formula used in the Framingham study. The standard for each sex-height group was derived from the study population. The percent above or below the mean weight for each sex-height group was then computed for each individual. The other

was the formula developed by the Metropolitan Life Insurance Company. (Appendix D)

Mean systolic and diastolic blood pressure by relative weight according to the Framingham Relative Body Weight are presented in Tables 27 and 28, Appendix B. There seems to be a systematic increment in blood pressure with body weight. Mean systolic and diastolic blood pressure increase with increasing body weight among males and females in both age groups. The difference in mean systolic blood pressure between the two extremes of the relative body weight groups (less than 90 and 120+) is slightly less on the average, for the younger individuals (25-44 years) than the older individuals (45-64 years). The difference in mean diastolic blood pressure on the other hand, is greater in the younger individuals than in the older ones. The only exception is among Negro females in the age group 45-64 years where those with the lowest relative body weight have higher mean systolic blood pressure than the heavy group.

As with the previous relative weight index, differences in mean blood pressure by Metropolitan Life Insurance standard weight index are most clear-cut between extremes, particularly for whites and Negro males 25-44 years of age. (Tables 29 and 30, Appendix B) Mean blood pressure increases with the increase in relative body weight in all groups presented.

Body Weight

As with the other indicators, increased weight is associated with higher mean systolic and diastolic blood pressure. (Tables 31 and 32, Appendix B) The largest differences are seen among white persons between the highest weight group (160 lbs. and over for females; 205 lbs. and over for males) and other weight groups. Women exhibit a more erratic pattern than men. For example, among women mean blood pressure is higher in the lowest weight category (under 115 lbs.) than in the next highest weight category (115-124).

Correlations of Blood Pressure and Four Weight Indices

In examining the correlation coefficient of various indices of weight and systolic blood pressure, it was found that all four indices correlate significantly with systolic blood pressure among white males in each age group. (Table 33, Appendix B) None of the indices shows a significant correlation with systolic blood pressure among older Negro males (45 years and over).

For diastolic blood pressure, all four indices correlate significantly for white males of all age groups except that the coefficient for ponderal index among males 55-64 is not significant. There is only one significant correlation between indices of weight and diastolic blood pressure among the Negro males: ponderal index by diastolic in the age group 45 and over.

Women exhibit a less consistent pattern of correlations between blood pressure and weight indices.(Table 33, Appendix B) In younger females (under 35 for whites and under 45 for Negroes) systolic blood pressure is significantly correlated with all the weight indices among both races. In the older age groups (white females 55 years and over, Negro females 45 and older) there are no significant correlations between systolic blood pressure and any one of the weight indices. White females 35-44 have significant correlation coefficients between systolic blood pressure and both actual body weight, as measured directly on the scale and ponderal index.

Diastolic blood pressure only among white females in age groups under 45 correlate significantly with all four weight indices. In older white females or in Negro females, there is only one significant correlation coefficient between weight and diastolic blood pressure that for white females 55-64 years and body weight. Generally, the correlation coefficients between blood pressure and weight measures are smaller for females than males.

In conclusion, body weight as measured by four indices is significantly correlated with systolic blood pressure in the following race-sex groups: Negro females under 45, white males and white females below 55, while diastolic blood pressure is only significantly correlated with the weight indices among whites (males of all age groups and females under 45). No significant correlations are seen with either systolic or diastolic blood pressure among Negroes 45 and over.

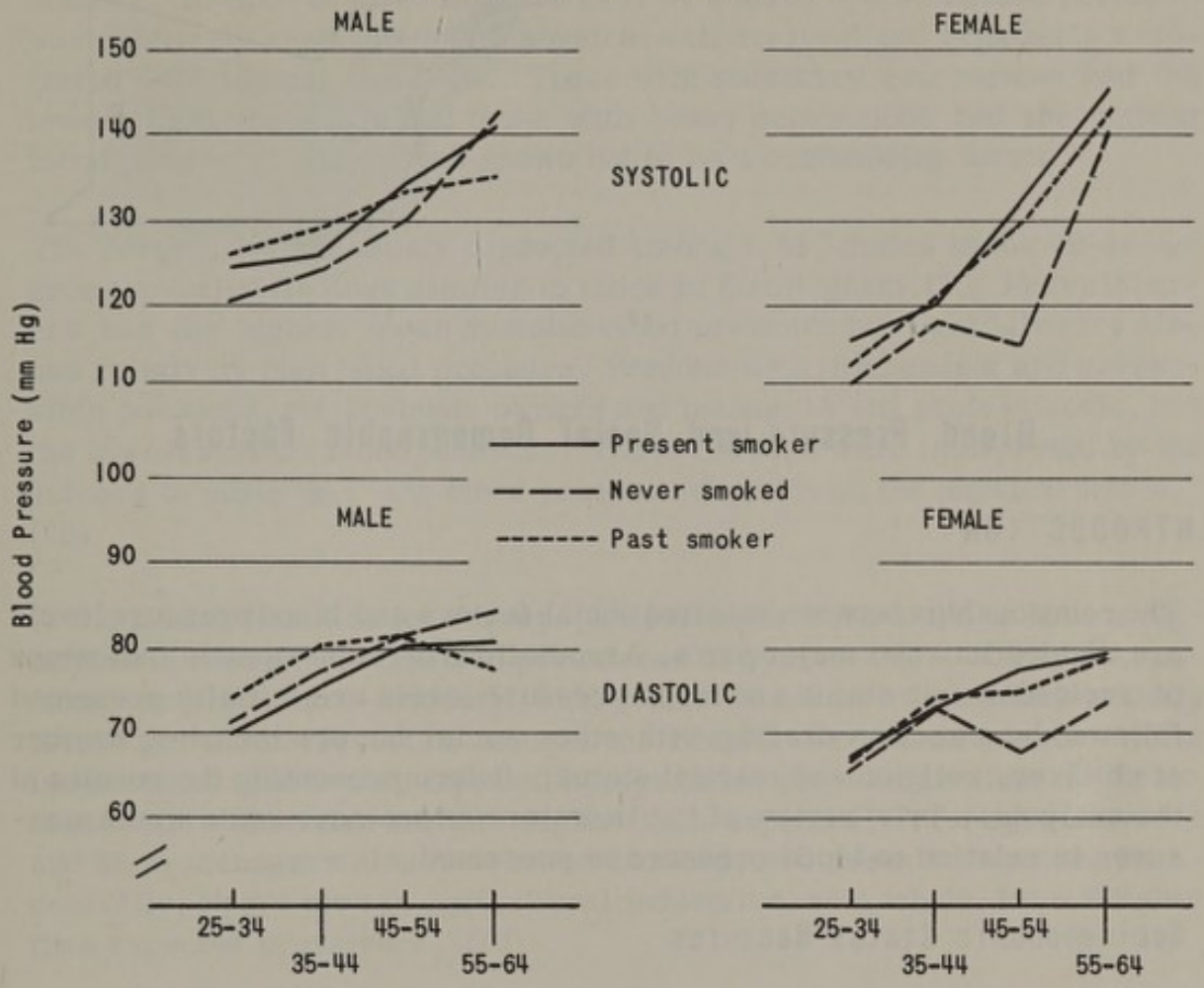
SMOKING STATUS

Cigarette smoking status was obtained from questions "Have you ever smoked cigarettes regularly?" If yes, "Do you smoke any cigarettes at the present time?"(Questions 6 and 7, Appendix A-II) Three categories of "current smoker", "past smoker" and "never smoked" were identified in the Alameda County population. Mean systolic and diastolic blood pressure by age, race and sex and smoking habit are presented in Tables 34 and 35, Appendix B.

It has been previously reported that cigarette smokers have lower mean blood pressures than nonsmokers.(15,16) Present data do not confirm this notion. If anything, the differences seen between smokers and nonsmokers are very small and some in the opposite direction, e.g., among white males under 55 years of age, current smokers have a mean systolic blood pressure of 2.6 to 4.2 mm Hg higher than nonsmokers, with diastolic blood pressure .9 to 1.3 mm Hg lower than nonsmokers.(Figure XIV) Similar trends for higher mean blood pressure among current smokers than never smoked are seen in young Negro males with the reversal in the older Negro males who have a higher mean systolic blood pressure among the never smoked group.

Figure XIV

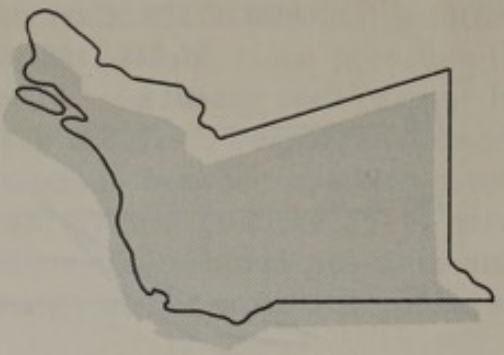
MEAN SYSTOLIC AND DIASTOLIC BLOOD PRESSURE (mm Hg)
BY SEX, AGE, RACE AND SMOKING STATUS



Perhaps the most interesting finding is the pattern among past smoker in comparison to the current and never smoked groups among younger males. Past smokers have higher mean blood pressure than either current or never smoked groups among white males in age groups under 45 years. The younger Negroes cannot be compared as they are based on very small numbers. How many of the past smokers have stopped smoking for health reasons is not known, but this may partially account for the higher mean readings.

Among females, current smokers and never smoked groups have similar mean blood pressure. Unlike males, past smokers have lower mean blood pressure than either current or never smoked in female groups, especially for systolic blood pressure. Somewhat higher mean systolic blood pressure is found among current smokers than past smokers for white females. By and large, among women, there is no consistent relationship between blood pressure and smoking for all age groups although there is some indication that the blood pressure of past smokers may be different from that of current smokers or nonsmokers.

PART II
RESULTS



Blood Pressure and Social Demographic Factors

INTRODUCTION

The relationships between selected social factors and blood pressure levels are divided into two major parts. Associations between various indicators of socioeconomic status and blood pressure levels are initially presented followed by a section dealing with other social factors including number of children, religion and marital status. Before presenting the results of the analysis, a brief review of the literature on socioeconomic status measures in relation to blood pressure is presented.

Socioeconomic Status Measures

Social factors other than demographic items, such as age, race and sex have seldom been examined in detail in population studies of blood pressure. Very little is known about the role of social factors in the etiology of high blood pressure. A few studies have included social factors but the social and cultural dimensions of the findings have not been explored.

Occupation, classified in terms of the level of physical activity, has produced conflicting results in relation to blood pressure. Miall and his colleagues in surveys of two Welsh communities, an agricultural community and a coal mining valley, reported higher blood pressure in males with "light" occupations (occupations were independently ranked as light or heavy), lower blood pressure in "heavy" occupations, and intermediate blood pressure in intermediate groups.(17) The same relationship was observed in a follow-up survey of these communities four years later.(18) However, the amount of increase in blood pressure levels between the two measurement periods was greatest among those in "heavy" occupations.

A study of 5,239 male employees in Birmingham, England revealed reversed relationships.(19) In this study each worker's job was classified in terms of the physical demands and separately in terms of the mental

demands by the person immediately above him in the hierarchy. Below the age of 40 there was no relationship between occupation and physical activity. In each of three decades over 40 years, systolic blood pressure was positively associated with physical activity level and negatively associated with mental demands. Those with sedentary occupations had the lowest blood pressure and those with heavy occupations had the highest blood pressure; weight was shown not to be a confounding factor.

The Bergen, Norway Study conducted among 1,680 males in the 40-44 age group revealed findings similar to those in Birmingham.(20) Heavy laborers had the highest mean systolic blood pressure but light laborers also had relatively high blood pressure. Persons with independent and responsible positions, the business owners and managers and professionals, had the lowest systolic blood pressure. These findings were interpreted by the authors to mean that "the blood pressure depends on the physical strain." (20)

In the Health Examination Survey, professionals were found to have a significantly lower than expected prevalence of hypertension. Other occupational findings were evidently interpreted in terms of physical activity levels and the survey staff thought the results were ambivalent: "White farmers had a lower than expected hypertension prevalence while the prevalence for white laborers was higher than expected, "...Negro farmers and farm managers also have lower than expected prevalence rates. Paradoxically, Negro men in agricultural industries, as a whole, have a higher than expected prevalence."(12)

A similar finding was reported in a study in Evans County, Georgia. Among Negroes, significantly lower mean systolic and diastolic blood pressure was observed among average-farm owners as compared to small-farm owners or sharecroppers.(10) Other surveys show no relationship between occupation and blood pressure levels.(21,22)

Perhaps the variation in classifications of occupations and the intermingling of dimensions (physical activity, socioeconomic status, etc.) contribute to these conflicting results. Two fairly consistent findings, of lower blood pressure among professional groups (but not all white collar workers with sedentary or light occupations) and higher status Negro farm owners (but not all Negroes in agriculture) suggests that some dimensions other than physical activity levels are involved.

Although the findings on the relationship between blood pressure and occupation are inconsistent, those on educational level and blood pressure are not. Several studies, all conducted in the United States, report lower blood pressure levels or prevalence of hypertension among those with higher educational attainment.(12,21,22)

In the National Health Examination Survey a relatively large number of social factors were related to blood pressure. Significantly lower than expected prevalence rates of hypertension were found among whites in the Western states, Negroes in the Northeastern states, divorced white persons, and Negro males who were working at the time of the Survey. Other indicators of socioeconomic status showed mixed results. Income was not related to hypertension but a trend toward lower rates was found among those with greater education; particularly for white females. In addition, Negroes with a very low educational level (less than 5 years) or income level (less than $2,000) had significantly higher rates of hypertension. Lower socioeconomic status groups appear to have higher prevalence rates of hypertension. Negro males had significantly higher rates of hypertension in rural areas than those in urban areas, especially in standard metropolitan statistical areas.

In this section six socioeconomic status measures are examined in relation to blood pressure level. They are: (1) family income; (2) education; (3-4) occupation, measured both in terms of the conventional classification of occupational groups and occupational prestige level; (5) socioeconomic status index based on family income, education and occupational groups; (6) and subjective social standing as reported by the respondent.

SOCIAL DEMOGRAPHIC FACTORS

Family Income

Mean blood pressures by income categories for the various age-race-sex groups are given in Tables 36 and 37, Appendix B. Among white females, there seem to be few and inconsistent differences in mean blood pressure by income level. For example, females 25-34 with high incomes ($15,000 and over) have lower mean systolic blood pressure than those with medium income ($8,000-9,999). However, in females 35-44, high incomes ($15,000 and over) have higher mean systolic blood pressure than those with medium-high incomes ($10,000-14,999). Also, correlation coefficients measuring the relationship between systolic blood pressure and family income for women are low except for females 45-54 years. (Table 38, Appendix B)

Among Negroes there are some consistent differences between blood pressure and family income level. Men under 45 and women over 45 with low income (less than $4,000) have higher mean systolic blood pressure than their medium or higher income counterparts. This trend for higher systolic blood pressure in lower income groups is greatest among young Negro males.

A reverse relationship is found for diastolic blood pressure and income among older Negro men. The mean diastolic blood pressure in Negro males 45 and over with high income ($8,000-9,999) is higher than in those

with less than $4,000 income. A highly significant correlation coefficient of .320 between diastolic blood pressure and income level for this group reinforces this finding.

In summary, family income is not associated with blood pressure among white persons. Whereas, among the Negro the elevated systolic blood pressure among low income groups seems to be present in males under 45 and females 45 and over. Among Negro males 45 and over, however, elevated diastolic blood pressure is observed among the high income groups. The inconsistency of the relationship between income and blood pressure between young and older Negro males is of note.

Education

High mean systolic blood pressure tends to be associated with low educational levels; low mean systolic blood pressure is seen among high educational levels in most age-sex groups both for Negroes and whites. (Tables 39 and 40, Appendix B) Exceptions are Negro males under 45 years and white females 35-44.

Eight years or less education is associated with higher mean systolic blood pressure in each Negro group except males under 45. Those with high school educations have systolic blood pressure from 7-9 mm Hg lower than those with grammar school educations.

The difference in mean systolic blood pressure between high and low educational levels are generally larger in the older age groups, as can be seen in Table XI.

Table XI

DIFFERENCE IN MEAN SYSTOLIC BLOOD PRESSURE (mm Hg) BETWEEN LOW AND HIGH EDUCATIONAL LEVELS[1] BY RACE, AGE AND SEX

RACE AND AGE	MALE	FEMALE
White		
25-34	4.3	3.0
35-44	5.4	-2.0
45-54	6.1	10.9
55-64	14.4	7.0
Negro		
Under 45	-0.5	12.8
45 and Over	8.9	7.7

[1] Mean pressure of highest education group was subtracted from mean pressure of lowest education group.

The inverse relationship between systolic blood pressure and educational level is also born out in that negative correlations are observed when the relationship between these variables are measured.(Table 38, Appendix B) The pattern is repeated when those in the upper quartile of the systolic blood pressure readings for each age-race-sex group are determined and then distributed by educational attainment. Lower educational groups have a disproportionately higher number with elevated systolic blood pressure and vice versa. For example, 36 percent of older Negro males with 8 or less years education have blood pressures in the upper quartile while in this same age-race-sex group with 9 or more years of school, 17 percent had elevated blood pressure.

Mean diastolic blood pressure is higher in the less educated young Negroes (male and female) than in the highly educated groups, (one or more years of college) but these differences are not statistically significant. However, they are consistent with the inverse relationship seen with systolic blood pressure and educational level. No other patterned differences in mean diastolic blood pressure by educational level are seen.

In summary, low educational level tends to be associated with elevated systolic blood pressure in most age-race-sex groups; the inverse relationship with educational levels appears most strongly with systolic blood pressure among white males, older Negroes and younger female Negroes. Diastolic blood pressure also tends to be higher in the less educated than educated groups among Negroes under 45. These findings are in accord with those reported by the National Health Examination Survey and other studies.

Occupation

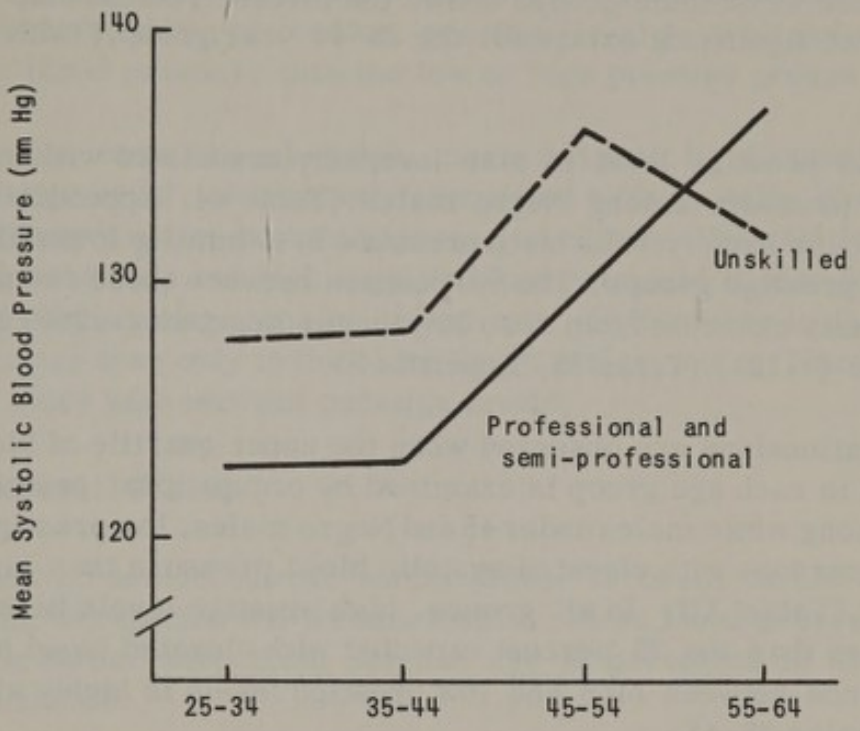
Only males are examined in the analysis of blood pressure and occupation. Females are excluded as "occupation" other than housewife applied to relatively few of them. Many females are employed full time but their occupation is seldom a significant indicator of their community status, standard of living, etc. Husband's occupation is a much better indicator of the socioeconomic status of a family.

Major Occupation Groups

Among currently working white males few consistent differences in mean blood pressure by occupation are evident although some differences are seen at the extremes of the occupational groups.(Table 41, Appendix B) Professional and semi-professional groups under 55 years tend to have lower systolic blood pressure than many other groups, especially the unskilled; these are not significant.(Figure XV)

Figure XV

MEAN SYSTOLIC BLOOD PRESSURE
FOR WHITE MALES BY AGE AND TWO OCCUPATIONS



For the analysis of Negro males the six occupational groupings are combined into two, because of small numbers - white collar and blue collar. Only currently working Negro males are included in this analysis. Blue collar workers have noticeably higher mean systolic blood pressure than white collar workers in both age groups (8.2 mm Hg in younger age groups and 13.3 mm Hg in older ones) and higher mean diastolic blood pressure only in the older age group. (Table 42, Appendix B) These differences are not significant but would probably be in a larger sample.

The correlation coefficient between systolic blood pressure and occupation (utilizing the entire range of occupational codes) is significant for young Negroes (-.268) but not for older ones (-.171) which was negative nonetheless. Examination of the proportion of Negro males who are white collar workers in the upper and lower systolic quartiles shows they have a smaller proportion than expected with elevated pressure (12 and 15 percent) and at least half (50 and 55 percent) fall in the lower systolic quartile in each 10-year race-sex group.

Occupational Prestige Level

An inverse relationship between mean systolic blood pressure and prestige level of occupation is found among young white males (under 45 years). (Table 43, Appendix B) Groups with low prestige occupations have higher

mean systolic blood pressure (about 5 mm Hg) than those with high prestige occupations. Correlation between prestige level and systolic pressure for these white male groups shows the inverse relationship but it is small and not significant except for the 35-44 year group.(Table 38, Appendix B)

Occupational prestige level is also inversely associated with mean systolic blood pressure among Negro males.(Table 44, Appendix B) High prestige groups have systolic blood pressure 8-10 mm Hg lower than medium or low prestige groups. The correlation between these two measures is significantly different from zero in younger Negroes (-.269) but not in older males (-.121).(Table 38, Appendix B)

Similar relationships are observed when the upper quartile of blood pressure levels in each age group is examined by occupational prestige categories. Among white males under 45 and Negro males, low prestige groups have more persons with elevated systolic blood pressure than high prestige groups.(Table XII) In all groups, high prestige levels have proportionately less than the 25 percent expected with elevated blood pressure. The difference between high and low prestige levels is highly significant for white males 35-44.

Table XII

PERCENT WITH ELEVATED SYSTOLIC BLOOD PRESSURE[1] (mm Hg)
BY OCCUPATIONAL PRESTIGE LEVELS FOR MALES BY RACE AND AGE

RACE AND AGE	OCCUPATIONAL PRESTIGE LEVEL		
	Low	Medium	High
White			
25-34	30	26	21
35-44	36	24	15
45-54	25	28	23
55-64	22	30	10
Negro			
25-44	32	16	
45-64	31	16	

[1] Defined as the upper quartile of each age-race-sex group.

Note: Medium and high occupational prestige level groups combined for Negro male.

Diastolic blood pressure differs from systolic blood pressure in its association with occupational prestige level, as has been repeatedly seen with other social factors. No relationship is observed among white males.

Older Negro males with medium prestige levels have higher mean diastolic blood pressure than those in either the low or high prestige levels. There is a slight and significant trend for the reverse among the younger Negro group as those of medium prestige level have slightly lower mean diastolic blood pressure than the low or high prestige groups.

In summary, occupational status, measured both by occupational groups and prestige level, is inversely associated with systolic blood pressure among younger males both in Negroes and whites. The relationship of low occupational status and high systolic blood pressure is also found but less strikingly among Negro males 45 and over. Differences in diastolic blood pressure are seen only in the older Negro males, among blue collar workers and those with medium prestige levels.

Socioeconomic Status

The index of socioeconomic status (SES), is based on the averaging of education, occupation and income levels. Mean blood pressure by socioeconomic status categories, sex and age is presented in Tables 45 and 46, Appendix B.

Higher mean systolic blood pressure tends to be found both for Negroes and whites in the low SES groups and lower mean pressure are seen in the high SES groups; no pattern is seen with diastolic blood pressure. These differences are larger for Negroes than whites and middle-aged white persons (35-54) than for older or younger white persons.(Table XIII)

Table XIII

DIFFERENCES IN SYSTOLIC BLOOD PRESSURE (mm Hg) BETWEEN LOW AND HIGH SES LEVELS[1] BY RACE, AGE AND SEX

RACE AND AGE	MALE	FEMALE
White		
25-34	2.8	3.3
35-44	6.5	2.9
45-54	5.3	12.6
55-64	3.0	1.1
Negro		
Under 45	8.0	5.2
45 and Over	12.7	a

[1] Mean systolic blood pressure of highest SES group was subtracted from mean of the lowest SES group.

[a] Mean not calculated for medium-high SES group because of small numbers.

Correlation coefficients paralleled the analysis of mean blood pressure and were significantly different from zero and negatively related for white males 35-44, white females 45-54 and Negro males under 45.(Table 38, Appendix B)

The most consistent pattern is the relatively high mean systolic blood pressure observed among low SES groups.(Figure XVI) Similarity in blood pressure levels between white and Negro males of medium-high SES levels is of note. This association can also be seen among males in the high proportion of each low SES group with elevated systolic blood pressure (upper quartile of blood pressure readings for their age-race-sex group), as can be seen in Table XIV. The difference between low and high SES with elevated systolic blood pressure is significant for white males 35-44 years of age.

Figure XVI

MEAN SYSTOLIC BLOOD PRESSURE (mm Hg)
FOR MALES BY AGE, RACE AND EXTREME SES LEVELS

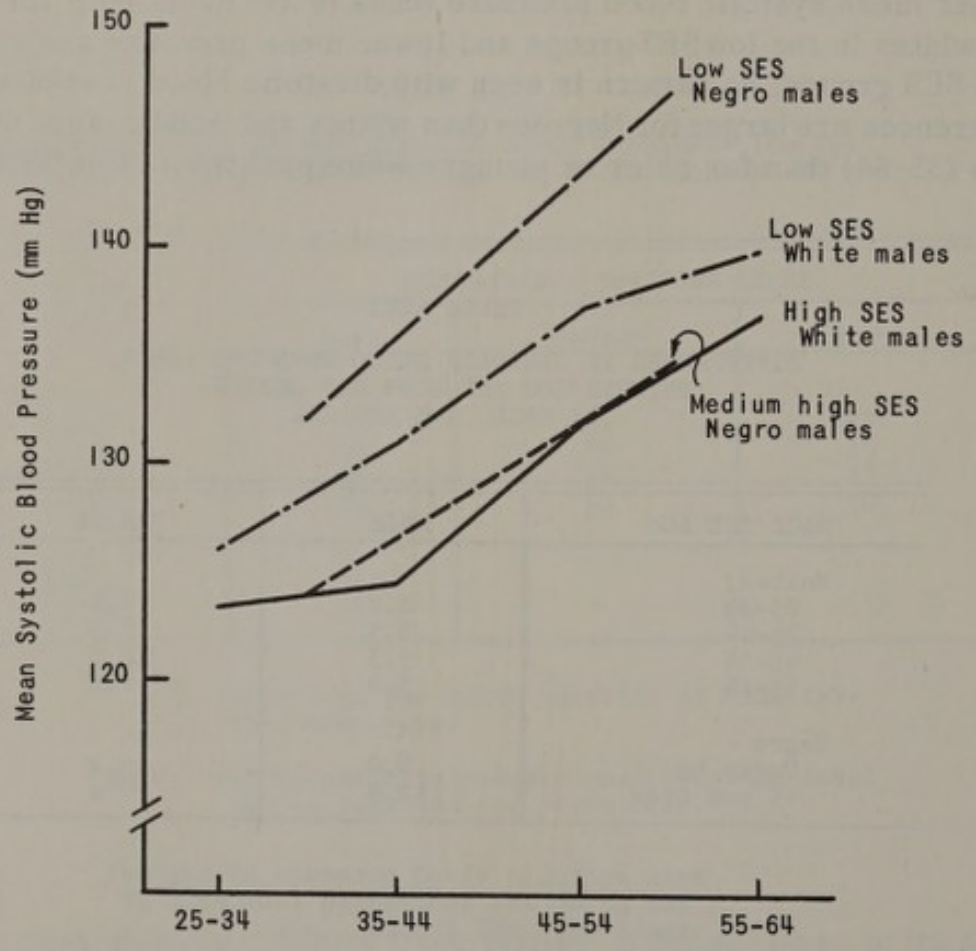


Table XIV

PERCENT WITH ELEVATED SYSTOLIC BLOOD PRESSURE[1] (mm Hg) BY SES LEVEL FOR MALES BY RACE AND AGE

RACE AND AGE	SES LEVEL		
	Low	Medium	High
White			
25-34	35	23	24
35-44	38	27	15
45-54	33	26	22
55-64	31	23	23
Negro			
25-44	37	13	
45-64	33	8	

[1] Defined as the upper quartile of each age-race-sex group.

Note: Medium and high occupational prestige level groups combined for Negro male.

In summary, socioeconomic status is inversely associated with systolic blood pressure among most age-race-sex groups. People in low socioeconomic groups tend to have elevated systolic blood pressure. No relationship is found between SES and diastolic blood pressure.

Summary: Socioeconomic Status Measures and Blood Pressure

SES and its various indicators are inversely associated with systolic blood pressure but not with diastolic blood pressure in many age-race-sex groups. Low SES and elevated systolic blood pressure are found in males more than females and Negroes more than whites.

The socioeconomic status measures examined - income, education, SES index, and for male occupational groups and occupational prestige - present a consistent pattern in their negative association with systolic blood pressure across the age-race-sex groups. Education and SES index were negatively associated with systolic blood pressure in almost all groups. Income was less consistent than other indicators as trends for higher blood pressure among low income groups were seen only with young Negro males and older Negro females. Among males, occupational prestige level was similar to other indicators in its negative association with systolic blood pressure.

Significant differences were found between extremes of the distribution, between high and low education or prestige level or SES than middle and low or middle and high. Elevated blood pressure levels were also seen most consistently in groups with absolutely low characteristics such as 8 years or less education, prestige scores of 5 or less. Perhaps the factors involved are operating in association with elevated systolic blood pressure primarily at absolutely low status levels. This idea fits with the more consistent associations found among Negroes than whites in the data for, as is well known, Negroes not only cluster at the lower end of status distributions but also have absolutely low socioeconomic levels.

Subjective Social Standing

Subjective social standing refers to the respondent's self-evaluation of his rank or level in the status structure or social classes. No noticeable differences in mean systolic or diastolic blood pressure by class standing is evident for white males or females (Tables 47 and 48, Appendix B); the slightly higher systolic blood pressure of middle class versus upper middle class among white males are statistically insignificant.

Among Negroes, the younger males and females also reveal small and insignificant differences by social class standing.(Tables 49 and 50, Appendix B) However, among male and female Negroes 45 and over, higher class standings have higher mean systolic blood pressure; these differences are not statistically significant. The correlation coefficient relating social standing and systolic blood pressure is significantly different for these Negro females (.261) and although high for Negro males (.229) not significantly different from zero.(Table 38, Appendix B) Equivalent correlations with diastolic blood pressure are extremely small not only for older Negroes but all other age-race-sex groups.

This positive relationship between subjective social class and systolic blood pressure among older Negroes is in the reverse direction from the negative association with the SES index previously reported. This is perplexing in terms of the usual correspondence found between SES and subjective standing in other studies. However, among older Negroes objective SES and subjective social standing are inversely correlated in this sample, as described earlier in Population Description.

Number of Children

The relationship between family size and blood pressure levels has been examined in several studies. An inverse relationship between number of children and blood pressure among females was initially reported from the Bergen, Norway Study;(20) those with two or more children had lower

blood pressure than those with one or none. Speculations on this finding revolved around some physiologic factor associated with pregnancy that was protective against the occurrence of hypertension. A similar study was later conducted in Wales by Miall and Oldham,(17) who found a similar relationship. However, Miall and Oldham also found the same to be true of husbands, males with smaller families had higher blood pressure than those with larger families. This finding ruled out the speculations about pregnancy. A survey in the West Indies(14) found no relationship between blood pressure and size of family. A second West Indian survey (23) found a curvilinear relationship with higher blood pressure - among those with no children or many children (10 or more). Scotch's Study(24) of rural and urban Zulu in South Africa revealed still another finding: a large number of children was associated with hypertension among urban Zulu females but not among rural Zulu females. Findings from these studies are certainly inconsistent and inconclusive at best.

Mean blood pressure by number of children for the various age-race-sex groups is presented in Tables 51 and 52, Appendix B. Few differences in mean blood pressure by number of own children are apparent and the observed differences are not consistent.

For example, among white females 25-34 those with no children have lower mean systolic blood pressure than those with one child or with three or more children. This relationship is reversed in white females 35-44 for whom those with no children have higher mean systolic blood pressure than those with three or more children. The correlation coefficients between systolic blood pressure and number of children among the various groups also were small and not significant.(Table 38, Appendix B)

The inverse correlation between number of children and blood pressure level seen in the Norwegian and Welsh data are not found in the data from Alameda County. In fact, no systematic relationship between blood pressure and family size is apparent.

Marital Status

Marital status is grouped into three categories reflecting married, single or never married, and those with disrupted marriages (separated, widowed and divorced). The separated, widowed and divorced are combined because of the small numbers in each category. With 70-80 percent or more married in each age-race-sex group, there are few persons in this sample in the other marital categories; this is particularly the case with Negro groups. Mean blood pressure of marital status categories is given in Tables 53 and 54, Appendix B. A tendency for those with disrupted marriages to have higher systolic blood pressure than the other marital status groups appears among the females. In some white groups similar trends appear for diastolic blood pressure but these are less consistent. A reversed pattern is seen among Negro males with married groups having slightly higher mean systolic blood pressure than those with disrupted marriages.

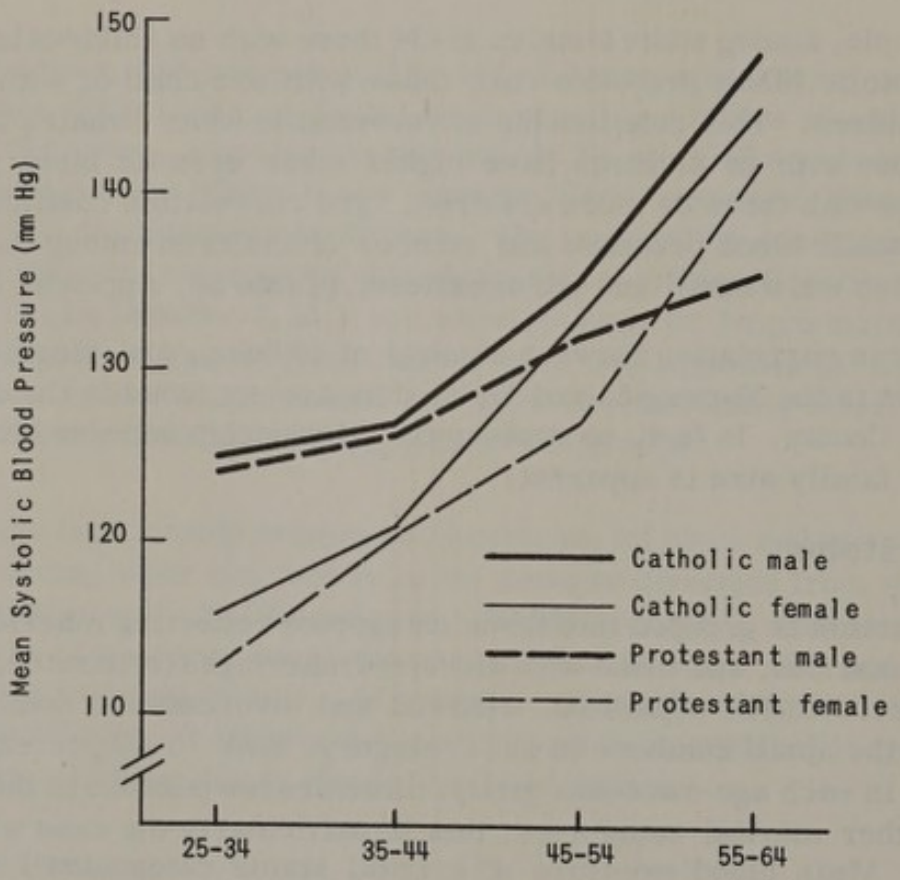
In general, the differences in mean blood pressure are few and small between the various marital categories and inconsistent in many cases. It is suggestive that those with disrupted marriages may have different blood pressure than the currently married which was also reported in the Health Examination Survey.

Religion

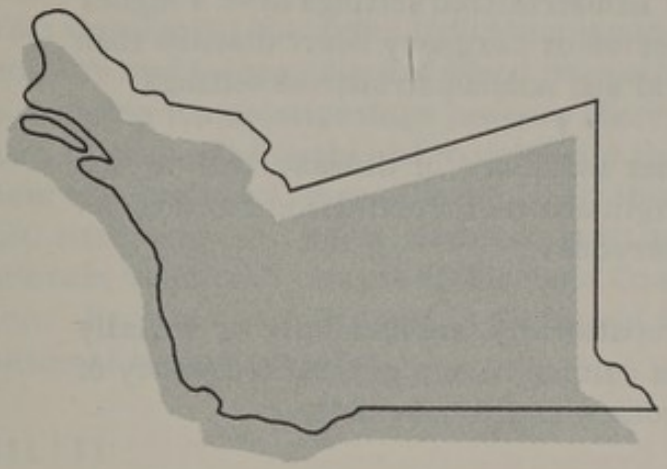
Mean blood pressure of white males and females in the different religious categories are found in Tables 55 and 56, Appendix B. Only data on whites are examined as most Negroes are Protestants. Catholics tend to have slightly higher mean blood pressure than Protestants. (Figure XVII) These differences are small and apparent only with systolic blood pressure in age groups 45 and over (both males and females) and with diastolic blood pressure in females under 45 years of age.

Figure XVII

MEAN SYSTOLIC BLOOD PRESSURE (mm Hg)
FOR WHITES BY RELIGION, AGE AND SEX



A trend for slightly higher blood pressure among Catholics than Protestants has been shown. This relationship may be a reflection of the previously shown association between high blood pressure and low SES levels as Catholics tend to be disproportionately located at the lower SES levels.



Blood Pressure and Sociocultural Mobility and Incongruity

INTRODUCTION

Sociocultural mobility and incongruity have been implicated as being associated with increased risk of coronary heart disease and hypertension.

Sociocultural mobility refers to changes in environment experienced by persons occasioned by geographical, occupational or status movement or social changes occurring in a given setting. Incongruity refers to discrepancies or lack of congruence in the sociocultural situation of an individual stemming from changes between his past and present or within the present. A large number and variety of incongruities can be listed but they are all relevant to a given context. For example, persons with a rural background who live in an urban area are termed incongruous but so are persons with an urban background who live in rural areas.

The epidemiological studies in this area of interest can be summarized as follows:

> "Studies which have sought to relate cardiovascular disease to factors of sociocultural change and incongruity suggest at least four general relationships.
>
> 1. Modern or urban and industrialized settings have a higher incidence of hypertension or coronary heart disease than do traditional or rural and nonindustrialized settings.
>
> 2. Migrants have a higher incidence of disease both at the migrants' place of origin and their destination than do non-migrants or stable persons.
>
> 3. Persons who are occupationally, residentially or socially mobile within a given culture have a greater frequency of disease than do persons who are nonmobile.
>
> 4. Among people who change from one cultural setting to another, those persons who do not adapt to the new setting (by retaining previous attitudes and behavior) have different disease experience than those who do adapt." (25)

Most of the studies focusing on hypertension have been made among nonliterate or nonindustrialized groups or cultures. Blood pressure levels of members of the group experiencing migration, modernity or other sociocultural changes expressive of urban industrialization have been compared with other group members who did not migrate or experience such change but maintained their traditional mode of life. The consistent findings are that those experiencing change or modernity have higher blood pressures than their stable nonchanging counterparts and that the blood pressure of those who are experiencing change rises with age while for those maintaining their traditional mode of life, blood pressure does not increase with age. Groups studied include: Zulu in South Africa(26-27), Brazilian Indians(28), Papago Indians of Arizona(25), Easter Islanders(29) and Highland Guatemalan Indians.(30) The change involved from a rural traditional mode of life to that of an urban industrialized culture is of course large, extreme and dramatic. Change or incongruity within the context of one culture or society such as ours is seldom as drastic although it may be the equivalent to a lesser degree.

Change and incongruity factors relevant within the American cultural context have been examined in relation to prevalence of coronary heart disease in several studies.(31-34) Males of urban background or high occupational or educational status, as well as those who have been geographically, residentially and occupationally mobile exhibited higher rates of

coronary heart disease than those with rural or low status backgrounds or the nonmobile. Syme and his colleagues coined the term "cultural mobility" to apply to the change and incongruity factors observed in a variety of consistent findings in these studies.(31)

Since in the Western countries elevated blood pressure is found to be associated with increased risk of coronary heart disease and since studies from developing countries indicate a positive relationship between cultural mobility and incongruity and blood pressure level, it would be interesting to examine the relationships between these social factors and blood pressure in Alameda County and to delineate their relationship to the development of coronary artery disease. For this reason mobility of residence, job, occupation and social status as well as several forms of incongruity relevant within the context of Alameda County were selected for examination. Each factor measured is discussed separately in relation to distribution of blood pressure.

MOBILITY

Residential/Geographical Mobility

The specific hypothesis proposed is that residential and geographical mobility is associated with elevated blood pressure. According to this hypothesis, therefore, nonmobile persons would have lower blood pressure levels than mobile persons.

Most physical movements are of short distance, within or between cities or towns rather than across state or regional lines. Short distance movement is usually less disruptive socially, psychologically and economically than the more extensive moves. It is possible that only extensive mobility involving a big change of environment (such as rural to urban migration or movement between states or regions) is socially stressful. To allow for this possibility both the amount of residential mobility (number of places lived in six months or longer) and geographical mobility (number of states lived in six months or longer) were examined in relation to distribution of blood pressure. (See Appendix D for further definition.) Of course these measures are not independent and overlap to some extent because a change of state is also counted as a change of place. The correlation coefficient between the number of places and states is very high (.868). The highly geographically mobile are also residentially mobile but there are also many persons who only move frequently from place to place within a state.

Mean blood pressure by amount of residential mobility is given in Tables 57 and 58, Appendix B. Among the various age-race-sex groups, the few differences in mean systolic or diastolic blood pressure by residential

mobility are not in support of the hypothesis being tested. For example, in only two groups, white males 35-44 years and white females 25-34 years, the mean systolic blood pressure is higher for highly mobile persons than the relatively stable group. No significant correlations were observed when systolic blood pressure and residential mobility were related.(Table 59, Appendix B) There is no evidence to support the hypothesis that residential mobility is associated with elevated blood pressure.

As with residential mobility, there is no apparent pattern of the mean blood pressure levels in the various age-race-sex groups and number of states lived (geographical mobility).(Tables 60 and 61, Appendix B) For example, nonmobile white males 45-54 tend to have higher mean systolic and diastolic blood pressure than their more mobile counterparts, but among white males 55-64 years, both the nonmobile and highly mobile have higher blood pressure than those in the medium mobile group. The correlation coefficients between systolic blood pressure and geographic mobility are small and approach zero.(Table 59, Appendix B)

The only noteworthy pattern is observed among older Negroes in whom geographical mobility is associated with increased blood pressure levels. (Table 62, Appendix B) Mobile Negro males have higher mean systolic and diastolic blood pressure than the nonmobile. Mobile Negro females on the other hand have lower systolic and diastolic pressure than the nonmobile.

Examination of mobility categories by lower and upper quartiles of blood pressure distribution among Negro males 45-64 years of age suggests that the geographically mobile groups contain fewer people with low blood pressure than was expected.(Table XV)

Table XV

PERCENT IN UPPER AND LOWER QUARTILES OF BLOOD PRESSURE AMONG NEGRO MALES 45-64 YEARS OF AGE BY GEOGRAPHICAL MOBILITY

NUMBER OF STATES LIVED	SYSTOLIC BLOOD PRESSURE		DIASTOLIC BLOOD PRESSURE	
	Lower Quartile	Upper Quartile	Lower Quartile	Upper Quartile
1-2	38	23	35	23
3 or More	16	32	16	28

Since this is the only group which consistently shows a relationship between geographical mobility and blood pressure the hypothesized relationship must be rejected.

Job/Occupational Mobility

Job and occupational mobility, like residential and geographical mobility, are not independent measures but overlap. The correlation coefficient when job and occupational mobility are related is large (.787). Job mobility refers to the number of specific periods of full-time employment for a given employer regardless of the kind of work or occupation involved. Occupational mobility or number of occupations worked at full time refers to changes in kind of work engaged in on a full-time basis. For example, a man working as a barber for two different employers at two periods of time has had two jobs but one occupation according to these definitions. A man employed first as a barber, then as a cook would be counted as having two jobs and two occupations.

Generally, a change in occupation or kind of work is considered a more extensive change than change of job (just as geographical mobility is a more extensive change of environment than residential mobility).

The specific hypothesis to be tested is that job and occupational mobility is associated with elevated blood pressure. The alternative hypothesis is that those with no change in job or occupation would have low blood pressure.

Mean blood pressure of persons in various job mobility categories is presented in Tables 63 and 64, Appendix B. The "n.a." category includes persons who have not held a full-time job for six months or longer such as students and housewives.

Examination of the tables indicates very few differences in mean blood pressure among the various job mobility groups in any age-race-sex group. In rare cases (white males 35-44 and Negro males under 45) the highly mobile tend to have slightly higher mean blood pressure than the less mobile. In other instances the moderately mobile or nonmobile tend to have slightly higher blood pressure than the highly mobile. Another reflection of the lack of a relationship is seen in the correlation analysis. The coefficients of correlation between systolic blood pressure and number of jobs for white males by 10-year age groups are so small they approach zero. No relationship is found between job mobility and blood pressure level and the few small differences seen are not consistent.

As with the data on job mobility, there are very few differences in mean blood pressure levels among occupational mobility categories and no patterned trends in support of the hypothesis. (Tables 65-67, Appendix B) The hypothesis of a positive relationship between occupational mobility and blood pressure must therefore be rejected on the basis of these data.

Social Mobility

Social mobility or change in social status is measured in terms of change in occupational prestige between childhood and adulthood (intergenerational mobility) and changes in prestige level since the assumption of adult occupational role (intragenerational mobility). Changes in social status since one's childhood, when the father's status determined the family level, are obtained by subtracting prestige level of father's occupation from that of respondent's current occupation. Similarly, intragenerational mobility or status changes since first regular full-time job, are obtained by subtracting prestige level of first full-time job from that of one's current job.

A person is considered upwardly mobile if his occupation has higher occupational prestige than his fathers (intergenerational mobility) or his present occupation has higher prestige than his first (intragenerational mobility). Nonmobility indicates no change in status and downwardly mobile indicates a lower prestige occupation currently than in past.

The two forms of mobility overlap somewhat as it is very common for people who are upwardly mobile relative to their fathers to have also increased their status level during their occupational lifetime. The two measures correlate moderately (.251) for the total study population. Intergenerational mobility is considered by many social scientists as a more strategic form of mobility than intragenerational mobility as it involves childhood and adult situations. Intragenerational mobility is important especially when the interest is in occupational careers and for that reason it is less applicable to females than males.

The specific hypothesis is that social mobility (direction unspecified) is associated with elevated blood pressure levels. This hypothesis will be tested both for intergenerational mobility and intragenerational mobility.

Intergenerational Mobility

The hypothesis of social mobility and blood pressure did not specify a direction (upward or downward). Two possible forms of association could occur: (1) one but not both directions could be related to blood pressure levels and (2) the amount or degree of mobility, irrespective of direction, could be related. Both possibilities were examined in the data.

Higher mean systolic blood pressure occurs among the downwardly mobile than the nonmobile or upwardly mobile for young white and Negro persons.(Tables 68 and 69, Appendix B) The association between intergenerational mobility and systolic blood pressure is most pronounced among young Negroes. It is also reflected in a highly significant negative correlation coefficient between systolic blood pressure and mobility (-.360) for

Negro males.[1] The negative correlation indicates that increasing downward mobility is associated with higher blood pressure and the reverse - increasing upward mobility is associated with lower blood pressure.

The blood pressure quartile analysis duplicates this finding. Downwardly mobile Negro males 25-44 years of age have disproportionately more with elevated systolic blood pressure and less with lower blood pressure than would be expected; the reverse being true of the upwardly and nonmobile groups.(Table XVI)

Table XVI

PERCENT IN UPPER AND LOWER QUARTILES OF SYSTOLIC BLOOD PRESSURE FOR NEGRO MALES 25-44 YEARS OF AGE BY INTERGENERATIONAL MOBILITY

INTERGENERATIONAL MOBILITY	LOWER QUARTILE	UPPER QUARTILE
Upwardly Mobile	43	19
Nonmobile	45	20
Downwardly Mobile	7	36

A quartile analysis by age of systolic blood pressure among intergenerational mobility categories was made for white males; four mobility categories were used with the upwardly mobile group being divided in two: moderately mobile (1 rank up in prestige) and highly mobile (2 or more ranks increase in prestige). In age groups below 55, a tendency is seen for the highly upwardly mobile to have less elevated blood pressure than other groups, particularly the nonmobile and downwardly mobile. The difference in the 35-44 year group between the highly upwardly mobile (18 percent) and downwardly mobile (35 percent) is significant.

The analysis thus far indicates that one but not both directions of mobility are associated with blood pressure. A check of the data were made to see if the degree or amount of mobility irrespective of direction was related to blood pressure. The correlation coefficients measuring the relationship between systolic blood pressure and amount of mobility (0-6 degrees) were small.(Table 59, Appendix B) The negative correlation indicates the less mobile had higher blood pressure which was also seen in the mean analysis.

In summary, there is some tendency among younger persons especially Negroes who are downwardly mobile to have higher systolic blood pressure than one or both of the other mobility groups.

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1 Thirteen mobility scores ranging from extensive downward mobility (-6 to -1), nonmobility and upward mobility (+1 to +6) were used in the correlation analysis.

Intragenerational Mobility

Downwardly mobile younger groups have higher mean systolic blood pressure than both other mobility groups similar to the findings seen with intergenerational mobility.(Tables 70 and 71, Appendix B) The mean systolic blood pressure differences between mobility groups are smaller however with intragenerational mobility than with intergenerational mobility. The largest difference is among older Negro males as the downwardly mobile group have systolic blood pressure 10-11 mm Hg higher than the other two groups.

The pattern becomes less consistent for diastolic blood pressure. A reverse pattern of lower diastolic pressure among the downwardly mobile than nonmobile or upwardly mobile is seen among young Negro males and females.

Intragenerational mobility appears to be less consistently related to blood pressure than intergenerational mobility except for systolic blood pressure among Negro males.

INCONGRUITY

Status Inconsistency

Status inconsistency refers to lack of fit in the level or rank of various statuses.[1] Persons whose major statuses are inconsistent such as high educational level and low income or low occupational level, or the reverse are thought to be in a conflictual situation relative to those whose statuses are consistent. Status inconsistency has been associated in several studies with social isolation, psychophysiological symptoms and political liberalism.(35-37)

Status inconsistency or lack of fit in rank of statuses represents incongruity in the present adult situation. In keeping with the general hypothesis, the specific hypothesis is that those with status inconsistency have higher blood pressure than those that are consistent.

The measure is based on education, occupation and income levels each of which is classified into three categories: high, medium and low, or 1-3 scale. Respondents' scores on each of the three items were obtained;

---

[1] Status incongruity and status crystallization are other terms sometimes used for this notion which has been measured in a variety of ways.

and subtractions were made between pair of items (occupation-education, occupation-income, education-income) resulting in three categories: consistent (all three items in the same rank), moderately inconsistent (two items same rank, the third one rank lower or higher) and sharply inconsistent (all items different or two items of the same rank and the third, two ranks above or below).[1]

Some nonpatterned and "inconsistent" differences in systolic blood pressure by status inconsistency category are found among whites. (Tables 72 and 73, Appendix B) The differences include: (1) lower mean systolic blood pressure for the sharply inconsistent males 25-34 years than consistent or moderately inconsistent ones, (2) higher mean systolic blood pressure for consistent females in 45-64 age groups than either inconsistent group, (3) the reverse situation in males 45-64 years with the consistent group having the lowest mean blood pressure. Most of the observed differences are not in a direction of supporting the hypothesis.

Some patterned differences are seen with mean systolic blood pressure among Negroes. Consistent females 45 years and older have higher systolic blood pressure than the sharply inconsistent. In other Negro groups, those consistent had slightly higher mean systolic blood pressure than those inconsistent.

The few patterned relationships between status inconsistency and blood pressure, primarily among Negroes, are not in support of the hypothesis which said that inconsistent groups will have higher blood pressure.

Status Tension

Status tension refers to a discrepancy between subjective and objective socioeconomic status. Subjective social standing, as previously discussed, corresponds with objectively derived levels of socioeconomic status but without complete overlap. Persons who think their class standing is higher or lower than their SES level suffer a discrepancy which has been labeled status tension. (22) High blood pressure was associated with status tension in a sample of 300 white males 45-54 years of age in one study; elevated blood pressure was found among those whose subjective standings were higher than their occupational statuses. (22)

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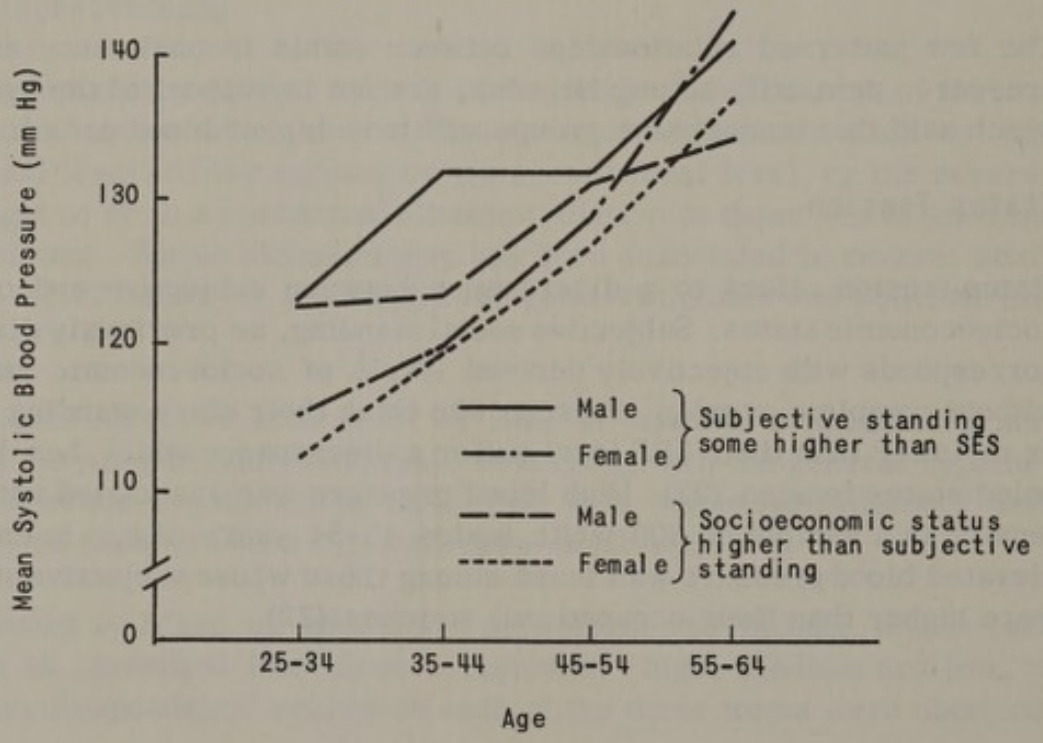
1 The procedure used for obtaining inconsistency scores is similar to that used by Elton Jackson, op. cit. The census has developed a measure of status inconsistency which also uses education, occupation and family income statuses. See U.S. Bureau of the Census, Methodology and Scores of Socio-economic Status, Working Paper No. 15, Washington, D.C., 1963.

The measure of status tension was obtained by subtracting socioeconomic status (divided into three categories of high, medium and low) from subjective social standing (divided into three categories) which yielded five values from -2 to +2. Negative values indicate a subjective social standing higher than objective SES, positive scores the reverse, and zero indicates correspondence or lack of status tension. The majority of white persons did not indicate status tension. Negro persons, especially those 45 and over, largely suffer from negative status tension, subjective class standing higher than their SES level, this was expected since the correlation coefficient relating blood pressure to both measures was negatively correlated to SES and positively correlated to subjective social standing.

Mean blood pressure by status tension categories are given in Tables 74 and 75, Appendix B. Higher mean systolic blood pressure is seen for white males 35-44 years of age with slightly negative status tension than for those with positive tension. Although the differences in mean systolic blood pressure are smaller, most other white groups show the same pattern - those with some negative status tension have higher pressure than those with positive status tension. (Figure XVIII)

Figure XVIII

MEAN SYSTOLIC BLOOD PRESSURE
FOR WHITES BY AGE, SEX AND STATUS TENSION



Higher mean systolic but not diastolic blood pressure tend to be associated with negative status tension among Negroes, except for females under 45 years of age. These differences are large but fail to reach significance at the 5 percent level. Those with greatest negative tension are different from those with no tension. In older Negroes the mean systolic blood pressure decreases as the two measures come more into agreement.

Thus, among most white and Negro age-sex groups there is a trend for negative status tension groups to have higher mean systolic blood pressure than positive status tension groups. Most of the differences are small but they are in the direction of previously reported associations.(22)

Traditionalism

The traditional - modern continuum as used in this study reflects on one extreme, persons who come from rural, low SES background, are poorly educated, relatively unskilled occupationally and belong to traditional religious groups, and at the other extreme, the modern group who are from urban, high SES backgrounds, are highly educated, with high prestige occupations and belong to less traditional religious groups or have no religion.

Traditionalism in an urban modern environment is a form of sociocultural incongruity. For example, Scotch found that among the Zulu the rural migrants to the city who retained traditional values and behaviors had higher blood pressure than those rural migrants to the city who adopted more urban modern values and practices.(24) Traditionalism in the context of Alameda County Study is a type of incongruity which is hypothesized to be associated with elevated blood pressure.

A traditionalism-modernity index was developed based on the respondent's occupational, educational, religious and residential history (rural-urban) statuses and three indicators of his background: father's occupation, father's education and generational status (number of generations his family had been in the United States).

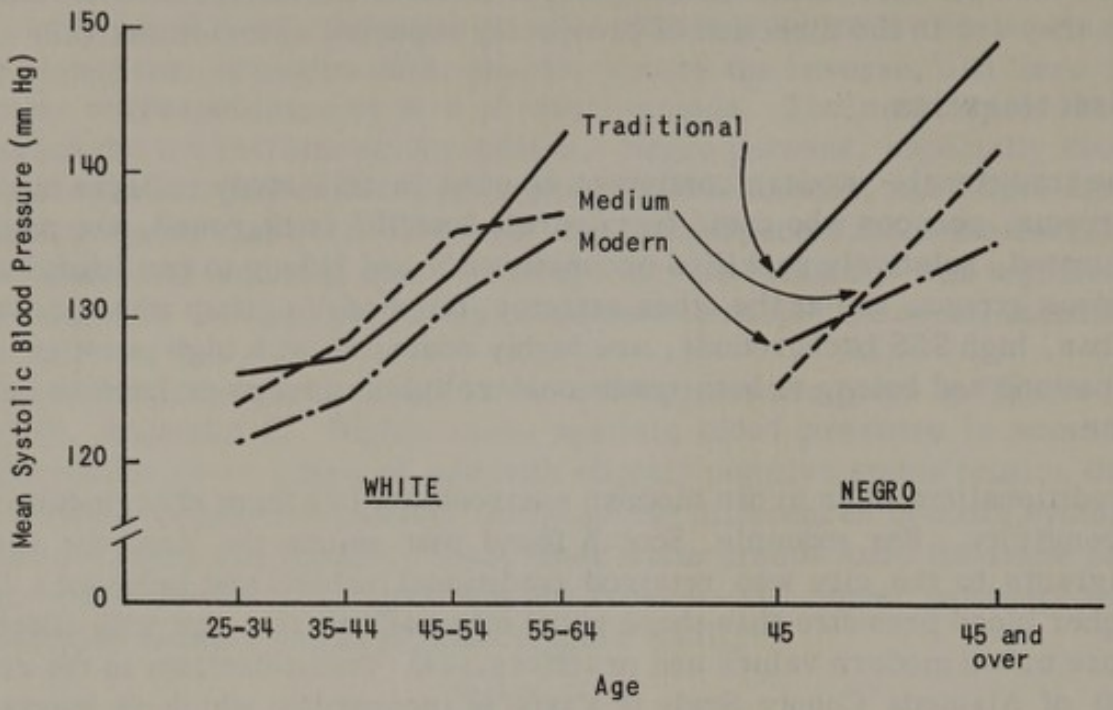
Each of the seven items was converted to a six-value scale of modern to traditional and respondents' scores on each item were summed to derive a total score from 7 (modern) to 42 (traditional). The distribution of scores was divided into approximate thirds to form three categories: modern, medium, traditional. (See Appendix D)

Since the traditionalism index utilizes four measures of past and present socioeconomic level (respondent's and father's occupational and educational levels), it is not independent of SES level. The correlation coefficient between SES index and traditionalism-modernity index is -.572.

Traditional males, white and Negro, have consistently higher mean systolic blood pressure than modern males.(Tables 76 and 77, Appendix B) However, for white males between 35-54 years of age, those with medium scores have slightly higher mean systolic blood pressure than traditionalists.(Figure XIX) The higher mean systolic blood pressure of traditional Negro males 45 and over was most striking (13.8 mm Hg higher than modern) and it also had a significant correlation coefficient of .259.(Table 59, Appendix B)

Figure XIX

MEAN SYSTOLIC BLOOD PRESSURE
FOR MALES BY RACE, AGE AND TRADITIONALISM-MODERNITY INDEX



Diastolic blood pressure differences by traditional-modern groups are generally inconsistent. The few differences are small and reversals are seen between adjacent 10-year age groups in white males. Medium score Negro males 45 and over have higher mean diastolic blood pressure than either their modern counterparts or the traditional group.

The proportion of each traditional-modern group in the upper quartile of systolic blood pressure suggests a similar pattern as with the mean blood pressure analysis among males.(Table XVII)

Table XVII

PERCENT WITH ELEVATED SYSTOLIC BLOOD PRESSURE[1] (mm Hg)
BY TRADITIONALISM-MODERNITY FOR MALES BY RACE AND AGE

RACE AND AGE	TRADITIONAL-MODERNITY		
	Modern	Medium	Traditional
White			
25-34	18	28	35
35-44	18	29	28
45-54	20	29	26
55-64	20	23	29
Negro			
25-44	18	24	37
45-64	10	29	32

[1] Defined as the upper quartile of each age-race-sex group.

Those in the upper quartile of systolic blood pressure are twice as frequent in the traditional as modern groups among younger Negro males and three times as frequent among the older Negro males. Differences in elevated diastolic blood pressure are found among older Negro males - 36 percent of traditionalists have elevated diastolic blood pressure but none of the modern groups.

In summary, there is a tendency for the more traditional males to have higher systolic but not diastolic blood pressure than the males classified as modern; this association is most pronounced among older Negro males. This trend may reflect the relationship between SES and systolic blood pressure however, for the traditionalism index is highly correlated with the SES index and by definition the traditionalists are in low SES groups.

Residential Incongruity

Rural background in an urban situation is one type of residential incongruity to be examined in relation to blood pressure. Two other forms of residential incongruity to be considered in this section for males are: regional area of childhood residence and educational-residential background.

In the context of Alameda County, rural and/or Southern backgrounds represent sociocultural incongruities relative to urban California. Although the Southern Region of the United States is undergoing social change, it is still primarily a traditional rural region with a generally low standard of living for Negroes.

Rural-Urban Background

Rural background was indicated by having previously lived on a farm while urban background indicated never having lived on a farm. The hypothesis is that persons with rural background who live in urban areas have some incongruity in their residential history and therefore would have higher blood pressure.

Mean blood pressure by rural-urban background for the various age-race-sex groups are given in Tables 78 and 79, Appendix B. Differences in mean systolic blood pressure of rural and urban persons appear among older white and Negro groups. A tendency for white persons (45-64 age groups) with rural background to have lower blood pressure than urban persons is consistently seen. In contrast, rural Negro persons (45 years and over) have higher systolic blood pressure than their urban counterparts. The latter is in a direction in support of the residential incongruity hypothesis but the former is not. With these contrasting patterns, the hypothesis as a whole has to be rejected.

Regional Area of Childhood Residence

From the general incongruity hypothesis, one would expect Southern childhood residence to be associated with higher blood pressure than persons from other regional areas of residence as a child.

Mean blood pressure differences by regional area of childhood residence are found among younger Negro males.(Tables 80 and 81, Appendix B) Older Negro males are predominantly from the South thereby making comparisons impossible. Young Negro males with Southern backgrounds have higher mean systolic and diastolic blood pressure than their Western equivalents. Those with Southern backgrounds have lower mean systolic blood pressure than those from the Northeast and North Central regions.

The high blood pressure of Southerners is also reflected in the proportion in the upper quartile of blood pressure among young Negro males. Thirty percent of those with Southern backgrounds are in the upper quartile of systolic blood pressure and 32 percent are in the upper quartile of diastolic blood pressure while only 17 percent of those with Western backgrounds are in the upper quartile of systolic or diastolic blood pressure.

Residential-Educational Background

The third form of incongruity to be considered, namely residential and educational background, combines educational level with rural-urban residence to yield four groups for Negro males and six for white males (three educational categories were used for whites, two for Negroes). Rural-low education represent the most extreme incongruity in an urban environment.

Among white males, those with high educational levels tend to have lower mean systolic blood pressure within their residential group, in all age groups.(Table 82, Appendix B) There is no consistent tendency for rural males with low educational levels to have the highest elevated systolic blood pressure. In the 45-54 year age group, urban high school graduates have a higher mean systolic blood pressure than does any other group. In the 55-64 year age group, urban persons of all education categories have similar mean blood pressure which also tend to be higher than rural males. Among Negro males, mean systolic blood pressure for the rural-low education group is highest.(Table 83, Appendix B)

Thus, among Negroes, especially males 45 and over, residential-educational background, another reflection of traditionalism, tends to be associated with higher mean systolic blood pressure. No relationship between residential incongruity and blood pressure was evident for white males.

SUMMARY

The general hypothesis that mobility-incongruity factors are associated with elevated blood pressure has been examined in terms of specific associations between several types of mobility and incongruity and blood pressure. Most analyses revealed no patterned difference in blood pressure by mobility-incongruity categories including residential, geographical, job and occupational mobility. Exceptions were primarily noted with systolic not diastolic blood pressure and among Negro groups. Patterned associations found among some age-race-sex groups include:

1. Intergenerational mobility: downward mobility is associated with elevated systolic blood pressure (younger white and Negro persons).

2. Intragenerational mobility: downward mobility is associated with higher systolic blood pressure (Negroes).

3. Status inconsistency: consistents tend to have higher systolic blood pressure than moderate or sharply inconsistents (Negroes).

4. Status tension: those with negative status tension have higher systolic blood pressure than those with positive or no status tension (most white and Negro groups).

5. Traditionalism-modernity: traditional males have higher systolic blood pressure than modern or medium males (white and Negro).

The status inconsistency finding was not compatible with the hypothesis - the incongruity hypothesis assumes higher blood pressure among inconsistents than consistents yet the reverse was seen in the data. This may be another reflection of the association between SES and systolic blood pressure since consistents tend to be from low or high SES levels with the inconsistents disproportionately from middle SES levels.

The interdependence of other factors and SES should be noted in examining the findings. Some associations including status tension and traditionalism may be reflections of the association between low SES and elevated systolic pressure rather than sociocultural incongruity.

In view of the lack of consistent relationships among mobility-incongruity factors and blood pressure, the general hypothesis as well as the specific hypotheses must be rejected except for Negroes. Downward social mobility as well as sociocultural incongruities like traditionalism, rural background and subjective social standing higher than SES level were associated with elevated systolic blood pressure among Negroes.

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PART III
APPENDICES

ALAMEDA COUNTY BLOOD PRESSURE STUDY
Blood Pressure Data Sheet

01- 1-6

7-14

FOR OFFICE USE

Address: _____
Number Street Apt. Town or City

Sex: 1 ☐ Male 2 ☐ Female 16

R: 1 ☐ W 2 ☐ N 3 ☐ O 4 ☐ Other _____ 17
specify 18-19 skip

Birthdate: _____ 20-25
Month (20-21) Day (22-23) Year (24-25)

Blood Pressure:

Pulse:

1. ____ (26-28) Systolic (29-31) IV Diast. (32-34) V. Diast. (35-37) Time 1: ____ hour:minute (38-41) 26-37 38-41

2. ____ (42-44) Systolic (45-47) IV Diast. (48-50) V. Diast. (51-53) Time 2: ____ hour:minute 42-53

3. ____ (54-56) Systolic (57-59) IV Diast. (60-62) V. Diast. (63-65) Time 3: ____ hour:minute 54-65

Height: _____ inches (66-68) 66-68

Weight: _____ pounds (69-71) 69-71

Are you taking any medicines or pills: ☐ Yes ☐ No ___ 72

If yes: What? _____

_____

Are you taking any medicines or pills for your blood pressure? ☐ Yes ☐ No 72

Do you have a particular doctor or clinic that you would call your regular doctor or clinic? ☐ Yes ☐ No

If yes, what is the name and address of your doctor or clinic?

Name: _____

Address: _____

Comments or notes:

1. (Observations)

Nurse _____ 73-74

2. R's activity

Date _____ 75-78

State of California
Department of Public Health

3-3-66
Form ChD-2986-1

02. 1-6

7-14

A-II

ALAMEDA COUNTY BLOOD PRESSURE STUDY

State of California
Department of Public Health
2151 Berkeley Way
Berkeley, California 94704
843-7900, Ext. 367

This is the questionnaire we are asking you to fill out for the Alameda County Blood Pressure Study. There are some questions about yourself, your health, your work, your family, and the places you have lived. Your household has been selected by scientific sampling procedures to participate in the survey. We appreciate your cooperation in this project.

Please answer the questions as frankly and accurately as you can. We are interested in your answers, so please don't talk about the questions with anyone else until you have finished. ALL INFORMATION OBTAINED IN THIS STUDY WILL BE KEPT CONFIDENTIAL. ONLY STATISTICAL SUMMARIES WILL BE USED; NO ONE WILL BE IDENTIFIED.

Most of the questions can be answered by simply placing an "X" in the box next to the answer that fits you best. For example:

Do you live in Alameda County? [X] Yes [ ] No

Begin with question 1 and be sure to answer each question. If there are any questions which you cannot answer by checking the boxes provided, please feel free to write an explanatory comment in the left margin. We want to thank you for your help. We think that you will find the questions interesting to answer.

YOUR HEALTH AND HABITS

1. Do you regularly see a medical doctor for a general checkup?

   1 ☐ YES 2 ☐ NO 20

2. When was the last time you went to a medical doctor just for a general checkup - even though you were feeling well and had not been sick?

   1 ☐ WITHIN THE LAST YEAR 2 ☐ 1 TO 5 YEARS 3 ☐ MORE THAN 5 YEARS 4 ☐ NEVER 21

3. When was the last time you went to a medical doctor because you were sick?

   1 ☐ WITHIN THE LAST YEAR 2 ☐ 1 TO 5 YEARS 3 ☐ MORE THAN 5 YEARS 4 ☐ NEVER 22

4. Have you ever been told by a medical doctor that you had any of the following conditions?

	NO	YES →	IF YES: At what age were you first told?	
A. HIGH BLOOD PRESSURE	☐	☐	→ _____	23-24
B. SUGAR DIABETES	☐	☐	→ _____	25-26
C. HEART ATTACK (CORONARY)	☐	☐	→ _____	27-28
D. STROKE	☐	☐	→ _____	29-30
E. KIDNEY STONES	☐	☐	→ _____	31-32
F. REPEATED KIDNEY INFECTIONS	☐	☐	→ _____	33-34
G. OTHER CHRONIC OR LONG STANDING KIDNEY DISEASE	☐	☐	→ _____	35-36

5. Are you: 1 ☐ MALE ☐ FEMALE

   Are you pregnant now?

   2 ☐ YES ☐ NO

   Have you passed the change of life (menopause)?

   3 ☐ YES ☐ NO 37

6. Have you ever smoked cigarettes regularly?

☐ YES ☐ NO → IF YOU HAVE NEVER SMOKED CIGARETTES, SKIP TO QUESTION 8

7. Do you smoke any cigarettes at the present time?

☐ YES → FOR PRESENT SMOKERS

In an average day, how many cigarettes do you usually smoke?

- ☐ LESS THAN 5
- ☐ ABOUT ½ PACK
- ☐ ABOUT 1 PACK
- ☐ ABOUT 1½ PACKS
- ☐ 2 PACKS OR MORE

How many years have you been smoking cigarettes?

_____ YEARS

☐ NO → FOR PAST SMOKERS

When you were smoking, how many cigarettes did you usually smoke in an average day?

- ☐ LESS THAN 5
- ☐ ABOUT ½ PACK
- ☐ ABOUT 1 PACK
- ☐ ABOUT 1½ PACKS
- ☐ 2 PACKS OR MORE

How many years did you smoke cigarettes before you stopped?

_____ YEARS

38 39 40-41

YOUR BLOOD RELATIVES' HEALTH

8. Do you know if any of your blood relatives have had high blood pressure?

	YES	NO	DON'T KNOW	
A. YOUR MOTHER	☐	☐	☐	42
B. YOUR FATHER	☐	☐	☐	43
C. YOUR CHILDREN	☐	☐	☐	44
D. YOUR BROTHERS OR SISTERS	☐	☐	☐	45

9. Is your mother alive?

1 ☐ YES → About how old is she? _____

2 ☐ NO → About how old was she when she died? _____ 47-48

What did she die of?

1 ☐ STROKE
2 ☐ CANCER
3 ☐ HEART DISEASE
4 ☐ HIGH BLOOD PRESSURE OR HARDENING OF THE ARTERIES
5 ☐ SUGAR DIABETES
6 ☐ OTHER (WHAT?) _____
7 ☐ DON'T KNOW

3 ☐ DON'T KNOW

46

49

10. Is your father alive?

1 ☐ YES → About how old is he? _____

2 ☐ NO → About how old was he when he died? _____ 51-52

What did he die of?

1 ☐ STROKE
2 ☐ CANCER
3 ☐ HEART DISEASE
4 ☐ HIGH BLOOD PRESSURE OR HARDENING OF THE ARTERIES
5 ☐ SUGAR DIABETES
6 ☐ OTHER (WHAT?) _____
7 ☐ DON'T KNOW

3 ☐ DON'T KNOW

50

53

YOUR WORK ACTIVITIES

1.2/03

3.19/DUP

Here are some questions about fulltime jobs you have held and the different kinds of work you have done.

11. Have you ever had a fulltime job (30 hours a week or more)?

1 ☐ YES 2 ☐ NO → IF YOU HAVE NEVER HAD A FULLTIME JOB, SKIP TO QUESTION 13. 20

12. Please list below all of the full-time jobs you have had for six months or more starting with your first full-time job. If you did the same kind of work for two or more companies or employers, list each job separately. If the kind of work you did for a company or employer changed, list each kind of work as a different job.

WHAT KIND OF WORK DID YOU DO ON THIS JOB EXACTLY? (FOR EXAMPLE: FILE CLERK IN AN INSURANCE COMPANY, LONGSHOREMAN WORKING OUT OF A HIRING HALL, OWNER-MANAGER OF A FLOWER SHOP.)	IN WHAT YEAR DID YOU START THIS JOB?	HOW MANY YEARS DID YOU WORK AT THIS JOB?	
First job _____	19____	____yrs	21-22
Next job _____	19____	____yrs	23-24
Next job _____	19____	____yrs	
Next job _____	19____	____yrs	
Next job _____	19____	____yrs	
Next job _____	19____	____yrs	25-26
Next job _____	19____	____yrs	27-28
Next job _____	19____	____yrs	
Next job _____	19____	____yrs	29-30
Next job _____	19____	____yrs	31

Continue on Next Page

YOUR WORK ACTIVITIES (Continued)

	KIND OF WORK DONE ON JOB	YEAR STARTED JOB	NUMBER OF YEARS WORKED
Next job		19__	____yrs
Next job		19__	____yrs
Next job		19__	____yrs
Next job		19__	____yrs
Next job		19__	____yrs
Next job		19__	____yrs
Next job		19__	____yrs
Next job		19__	____yrs

Now we are interested in the work activities you are doing at present.

13. For your present work activities which of the following descriptions fits you best?

1 ☐ I WORK FULL-TIME
2 ☐ I WORK PART-TIME
3 ☐ I AM KEEPING HOUSE (ONLY)
4 ☐ I AM RETIRED
5 ☐ I AM OUT OF WORK
☐ OTHER (WHAT?)_____ 32

14. What kind of work do you do, exactly? *(For those who are not working now: What kind of work did you do when you last worked?)*

_____ 33.34

15. About how many years have you done this kind of work?_____years 35.36

16. Considering everything, how satisfied are you with the kind of work you do? *(For those who are not working now: how satisfied were you with the kind of work you did when you last worked?)*

1 ☐ VERY SATISFIED
2 ☐ SOMEWHAT SATISFIED
3 ☐ NOT SATISFIED 37

17. Do you ever wish you had gotten into another line of work?

1 ☐ YES
2 ☐ NO 38

IF YES: What kind of work? Please describe it.

_____ 39.40

PLACES YOU HAVE LIVED

Here are some questions about places you have lived. Think back to the places you have lived and answer the following questions.

18. Where were you born?

1 ☐ IN THE UNITED STATES
Which city and state?_____

2 ☐ IN SOME OTHER COUNTRY
Which country?_____ 41 42-43

19. Have you ever lived on a farm?

☐ YES ☐ NO 44.45

About how old were you when you lived on a farm?

FROM _____ TO _____ YEARS OLD 46.47

20. What different towns and cities have you lived in for six months or more during your lifetime? Please list the towns and cities you have lived in for six months or more starting with the first town or city you lived in.

	Town or City	State or Foreign Country	About What Year Did You Move There?	About How Many Years Did you Live There?	
First			19____	____yrs	49
Next			19____	____yrs	
Next			19____	____yrs	50.51
Next			19____	____yrs	
Next			19____	____yrs	
Next			19____	____yrs	
Next			19____	____yrs	
Next			19____	____yrs	52.53
Next			19____	____yrs	
Next			19____	____yrs	54.55
Next			19____	____yrs	56.57
Next			19____	____yrs	
Next			19____	____yrs	58.59
Next			19____	____yrs	
Next			19____	____yrs	60.61
Next			19____	____yrs	
Next			19____	____yrs	62

21. Have you ever moved to a different town or city because of your health?

☐ YES ☐ NO 63

What health condition(s) made you move? _____

YOUR FAMILY

Here are some questions about your mother (or stepmother) and your father (or stepfather) with whom you lived while you were growing up. 1.2/04 3.19/DUP

22. Was your mother born in the United States?

☐ YES ☐ NO ☐ DON'T KNOW 20.21

In what country was she born? _____

Was your mother's father (your grandfather) born in the United States?

1 ☐ YES 2 ☐ NO 3 ☐ DON'T KNOW 22

Was your mother's mother (your grandmother) born in the United States?

1 ☐ YES 2 ☐ NO 3 ☐ DON'T KNOW 23

23. How far did your mother get in school?

1 ☐ NO SCHOOL 2 ☐ GRAMMAR SCHOOL 3 ☐ SOME HIGH SCHOOL

4 ☐ HIGH SCHOOL GRADUATE 5 ☐ SOME COLLEGE 6 ☐ COLLEGE GRADUATE 24

24. What is your mother's religion?

☐ PROTESTANT ☐ CATHOLIC ☐ JEWISH ☐ OTHER ☐ NONE 25

Which denomination? _____ What? _____

25. Was your father born in the United States?

☐ YES ☐ NO ☐ DON'T KNOW

In what country was he born? _____ 26-27

Was your father's father (your grandfather) born in the United States?

1 ☐ YES 2 ☐ NO 3 ☐ DON'T KNOW 28

Was your father's mother (your grandmother) born in the United States?

1 ☐ YES 2 ☐ NO 3 ☐ DON'T KNOW 29

26. How far did your father get in school?

1 ☐ NO SCHOOL 2 ☐ GRAMMAR SCHOOL 3 ☐ SOME HIGH SCHOOL

4 ☐ HIGH SCHOOL GRADUATE 5 ☐ SOME COLLEGE 6 ☐ COLLEGE GRADUATE 7 ☐ ADVANCED DEGREE 30

27. What is your father's religion?

☐ PROTESTANT ☐ CATHOLIC ☐ JEWISH ☐ OTHER ☐ NONE 31

Which denomination? _____ What? _____

28. What kind of work did your father do most of the time you were a teenager (13 to 19 years old)?

Describe as fully as you can what kind of work he did. For example: Grocery checker in a supermarket, sharecropper on a farm.

_____ 32-33

YOUR FEELINGS

Here are a few questions about how you feel about life in general.

29. How important is it to you personally to get ahead in life?

☐ 1 VERY IMPORTANT	☐ 2 FAIRLY IMPORTANT	☐ 3 NOT VERY IMPORTANT	☐ 4 DEFINITELY NOT IMPORTANT	34

30. Realistically speaking, how good do you think your own chances are of getting ahead?

☐ 1 EXCELLENT	☐ 2 GOOD	☐ 3 FAIR	☐ 4 NOT MUCH CHANCE	35

31. *Here are some statements. Please read each statement carefully and decide whether you mostly agree with it or mostly disagree with it. Answer all of them, even if you have to guess at some.*

	AGREE	DISAGREE	
a. Life is a continual attempt to live up to the things you believe in.	☐ 1	☐ 2	36
b. These days a person doesn't know whom he can count on.	☐	☐	37
c. Unemployment is a more serious problem than the newspapers play it up to be.	☐	☐	38
d. Most public officials (people in public office) are not really interested in the problems of the average man.	☐	☐	39
e. Nowadays a person has to live pretty much for today and let tomorrow take care of itself.	☐	☐	40
f. Being President of the United States is no job for a woman.	☐	☐	41
g. In spite of what some people say, the lot of the average man is getting worse, not better.	☐	☐	42
h. Most people don't really care what happens to the next fellow.	☐	☐	43

SOME FACTS ABOUT YOU

This is the last section for you to fill out.

32. What is the date of your birth? _____
month day year

33. Have you ever been married?

☐ YES ☐ NO → IF YOU HAVE NEVER BEEN MARRIED, SKIP TO QUESTION 36.

34. How many times have you been married, altogether?

_____ times 44

35. Are you now married, separated, divorced, or widowed? 45

☐ MARRIED → How long have you been married to your present spouse? _____ years 46-47

☐ SEPARATED

☐ DIVORCED

☐ WIDOWED

36. Do you have any children of your own?

☐ NO ☐ YES → IF YES: How many? _____ 48

37. Do you have any stepchildren or adopted children?

☐ NO ☐ YES → IF YES: How many? _____ 49

38. How many grades did you finish in school? CIRCLE LAST GRADE COMPLETED.

NONE

GRADE SCHOOL 1 2 3 4 5 6 7 8

HIGH SCHOOL 9 10 11 12 50-51

COLLEGE . . . . 1 2 3 4 5+ ADVANCED DEGREE

39. About how much was the total income, before taxes, of your family from all sources last year? (Do include the income of all other members of your immediate family who live in your household. If you live alone, consider yourself a one-member family.)

- ☐ 01 UNDER $2,000
- ☐ 02 $2,000 - $2,999
- ☐ 03 $3,000 - 3,999
- ☐ 04 $4,000 - 4,999
- ☐ 05 $5,000 - 5,999
- ☐ 06 $6,000 - 6,999
- ☐ 07 $7,000 - 7,999
- ☐ 08 $8,000 - 8,999
- ☐ 09 $9,000 - 9,999
- ☐ 10 $10,000 - 14,999
- ☐ 15 $15,000 - 24,000
- ☐ 25 $25,000 AND OVER

52-53

40. What is your religion?

☐ PROTESTANT ☐ CATHOLIC ☐ JEWISH ☐ OTHER ☐ NONE

54

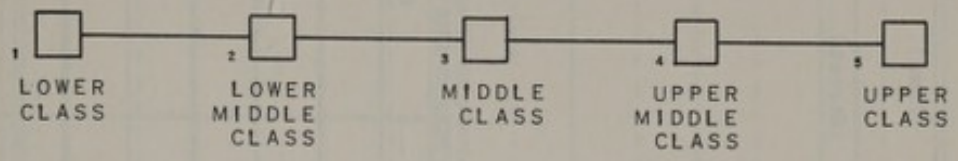
Which denomination? _____ What? _____

41. About how often do you go to church services?

- ☐ 1 NEVER
- ☐ 2 LESS THAN ONCE A YEAR
- ☐ 3 ONCE OR TWICE A YEAR
- ☐ 4 EVERY MONTH OR SO
- ☐ 5 ONCE OR TWICE A MONTH
- ☐ 6 EVERY WEEK

55

42. If you were asked to choose one of these names for your social standing in the community, which would you say fits you best?



56

FOR ALL WOMEN WHO HAVE BEEN MARRIED:

43. What kind of work does your husband usually do, exactly? *(If you are not presently married, please describe your former husband's usual occupation.)*

_____

57.58

44. How many grades did your husband finish in school? CIRCLE LAST GRADE COMPLETED.

NONE

GRADE SCHOOL 1 2 3 4 5 6 7 8

HIGH SCHOOL 9 10 11 12

COLLEGE . . . . . 1 2 3 4 5 + ADVANCED DEGREE

59.60

WHAT IS TODAY'S DATE?_____

61-64

65

You have now finished the questionnaire.
Thank you again for your help in this study.

California State Department of Public Health
ALAMEDA COUNTY BLOOD PRESSURE STUDY - 1966

HOUSEHOLD ENUMERATION

Control Number [ ] [ ] [ ]

1. WHAT IS THE NAME OF THE HEAD OF THIS HOUSEHOLD?
2. ARE THERE ANY OTHER PERSONS LIVING HERE? WHAT ARE THEIR NAMES?
3. HAVE I MISSED ANYONE? FOR EXAMPLE, A LODGER, A BABY, OR SOMEONE TEMPORARILY ABSENT?
4. For each person: HOW IS . . . . . RELATED TO THE HEAD OF THIS HOUSEHOLD?
   (If the answer is "son" or "daughter", ask:)
   IS . . . . . HEAD'S OWN CHILD? ADOPTED CHILD? STEP-CHILD? FOSTER CHILD?
5. If "son" or "daughter": IS . . . . . WIFE'S OWN CHILD? ADOPTED CHILD? STEP-CHILD? FOSTER CHILD?
6. If in doubt, ask sex.
7. For each person: HOW OLD WAS . . . . . ON HIS/HER LAST BIRTHDAY?
8. For each person aged 16 and over:
   IS . . . . . MARRIED, WIDOWED, DIVORCED, SEPARATED, OR SINGLE (NEVER MARRIED)?
   IS . . . . . EMPLOYED? LOOKING FOR WORK? RETIRED? KEEPING HOUSE? DOING SOMETHING ELSE (WHAT)?
   If employed, looking for work or retired: WHAT KIND OF WORK DOES (DID) . . . . . (USUALLY) DO?

Address: _____
(Town)
_____
(Number) (Street) (Apt.)

108

Person Number	Last Name	First Name	Initial	Relation To Head	Child's Relation To Wife	Sex	Age	TO BE COMPLETED FOR PERSONS AGED 16 AND OVER		
								Marital Status	Employment Status	Occupation
01										
02										
03										
04										
05										
06										
07										
08										
09										
10										

CIRCLE THE PERSON NUMBER OF THE INFORMANT

9. IS THIS A ☐ 1-family house? ☐ 2-family house? ☐ Apartment? ☐ Other (specify) _____

10. DO YOU OWN OR RENT YOUR HOME? ☐ Own ☐ Rent

11. HOW MANY ROOMS DO YOU HAVE? Count the kitchen but not the bathroom(s). Number of rooms _____

12. IS THERE A PHONE HERE? ☐ Yes ☐ No Phone Number _____

13. Race of Informant: ☐ White ☐ Negro ☐ Oriental ☐ Other (specify) _____

ENUMERATOR CALL RECORD

Calls	Enumerator	Date and Time	Outcome	Comments and Notes
1st				
2nd				
3rd				
4th				
5th				
6th				
7th				
8th				
9th				

STATE OF CALIFORNIA—HEALTH AND WELFARE AGENCY EDMUND G. BROWN, Governor

DEPARTMENT OF PUBLIC HEALTH
2151 BERKELEY WAY
BERKELEY 94704

A-IV

Dear

The California State Department of Public Health is conducting a study of blood pressure in adults of 1,500 representative families randomly selected in Alameda County, to determine whether blood pressure readings are related, among family members, to their way of life or their heredity. This study has the approval of the Alameda-Contra Costa County Medical Association.

We would like the adult members (persons 20 years of age and over) of your family to participate in this study and we are enclosing several questionnaires, one for each of you to complete. Within a few days, one of the State Health Department's licensed registered nurses will telephone you for an appointment to visit you at your convenience. She will have credentials to show you.

At that time she will measure the height, weight and blood pressure of each adult in your family. She will also pick up your questionnaires and help you complete them if necessary. The findings of the study and the answers you give us on the questionnaire, will be translated into numerical codes and kept confidential.

We thank you for your participation in this study and for any courtesies you extend to the nurse who will call on you.

Very sincerely yours,

Lester Breslow

Lester Breslow, M.D.
Director of Public Health

STATE OF CALIFORNIA—HEALTH AND WELFARE AGENCY

EDMUND G. BROWN, Governor

DEPARTMENT OF PUBLIC HEALTH
2151 BERKELEY WAY
BERKELEY 94704

A-V

Dear

Recently one of our graduate nurses working on the Alameda County Blood Pressure Study visited your home to obtain height, weight and blood pressure measurements and to pick up the questionnaires mailed to you previously which you were asked to complete. Since your questionnaire was not complete at the time of her visit, a stamped envelope was left for your convenience in returning the questionnaire to our office after completion. However, we have not yet received your completed questionnaire.

In case you have misplaced either the questionnaire or the return envelope, we are sending you another set for your completion and return. If, however, it has been difficult for you to find time to learn about this study and to complete your questionnaire, we would like to tell you more of the purpose and importance of this project. Please see the attached statement for further information and if you have any additional questions, please do not hesitate to call us at 843-7900, Extension 613.

We look forward to receiving your completed questionnaire shortly.

Sincerely yours,

Nemat O. Borhani, M.D., Chief
Bureau of Chronic Diseases

STATE OF CALIFORNIA—HEALTH AND WELFARE AGENCY EDMUND G. BROWN, Governor

DEPARTMENT OF PUBLIC HEALTH
2151 BERKELEY WAY
BERKELEY 94704

A-VI

Dear Doctor

As you probably know, the Alameda County Blood Pressure Study is currently underway. The study has the approval of the ACCMA. Attached is a copy of the article describing the study which appeared in the March 1966 issue of the Bulletin of the Alameda-Contra Costa Medical Association.

Of course, the study participant is not told the results of his blood pressure measurements by our project nurses; instead, he is advised that the results will be forwarded to his doctor or clinic. Since _____ reported you as his regular source of medical care, his pulse and blood pressure readings described on the following page(s) are being sent to you for reference.

If we can assist you further with more information, please do not hesitate to contact us (843-7900, Extension 326).

Sincerely yours,

Nemat O. Borhani, M.D., Chief
Bureau of Chronic Diseases

Attachs.

STATE OF CALIFORNIA—HEALTH AND WELFARE AGENCY

EDMUND G. BROWN, Governor

DEPARTMENT OF PUBLIC HEALTH
2151 BERKELEY WAY
BERKELEY 94704

A-VII

Dear

Thank you very much for your cooperation in the Alameda County Blood Pressure Study. This large research project has the approval of the Alameda-Contra Costa County Medical Association. To be successful, it needs the cooperation of many people. We are extremely grateful to the many households, like your own, all over Alameda County, who have already helped us in this important health study.

At this stage in our research, for more complete data analysis, we find it necessary to return to a small number of randomly selected households and remeasure the blood pressure of all adults who originally participated in the study. Yours is one of the households randomly selected. We hope you can assist us in accomplishing this final and essential study step.

Within a few days one of our staff will contact you to set an appointment at your convenience for one of the State Health Department's licensed registered nurses to visit you and remeasure the blood pressures of adults in your household.

Thank you for your past participation and for permitting us to visit you briefly again in the next few weeks.

Sincerely yours,

Nemat O. Borhani, M.D., Chief
Bureau of Chronic Diseases

Table 1

STUDY RESPONDENTS AND REFUSALS[1] BY RACE, SEX AND AGE

SEX AND AGE	TOTAL		WHITE		NEGRO		OTHER	
	Respondents	Refusals	Respondents	Refusals	Respondents	Refusals	Respondents	Refusals
	NUMBER							
Total	2,605	375[a]	2,183	210	342	28	80	9
Male	1,193	178	1,000	100	156	13	37	4
20-34	420	20	342	15	66	2	12	-
35-44	260	15	227	10	23	2	10	-
45-54	207	22	177	14	27	4	3	-
55-64	167	23	133	16	25	2	9	-
65 and Over	139	18	121	16	15	2	3	-
Unknown	-	80	-	29	-	1	-	4
Female	1,412	197	1,183	110	186	15	43	5
20-34	493	25	409	15	65	1	19	1
35-44	282	20	229	17	43	2	10	1
45-54	255	26	216	19	31	4	8	-
55-64	178	20	142	16	32	-	4	-
65 and Over	204	30	187	25	15	1	2	-
Unknown	-	76	-	18	-	7	-	3
	PERCENT							
Male, Age Known	100.0	100.0	100.0	100.0	100.0	(100.0)	100.0	-
20-34	35.2	20.4	34.2	21.1	42.3	(16.7)	32.4	-
35-44	21.8	15.3	22.7	14.1	14.7	(16.7)	27.0	-
45-54	17.4	22.4	17.7	19.7	17.3	(33.3)	8.1	-
55-64	14.0	23.5	13.3	22.5	16.0	(16.7)	24.3	-
65 and Over	11.7	18.4	12.1	22.5	9.6	(16.7)	8.1	-
Female, Age Known	100.0	100.0	100.0	100.0	100.0	b	100.0	b
20-34	34.9	20.7	34.6	16.3	34.9		44.2	
35-44	20.0	16.5	19.4	18.5	23.1		23.3	
45-54	18.1	21.5	18.3	20.7	16.7		18.6	
55-64	12.6	16.5	12.0	17.4	17.2		9.3	
65 and Over	14.4	24.8	15.8	27.2	8.1		4.7	

[1] Based on 196 households from which enumeration information was obtained.

[a] Includes 128 unknown race.
[b] Not calculated for less than 10 persons.

Note: Percents are rounded independently and may not add to totals.
Underlined percents are based on 25-49 persons.
Percents in parentheses are based on 10-24 persons.

Source: State of California, Department of Public Health, Bureau of Chronic Diseases, Alameda County Blood Pressure Study, 1966.

Table 2

NURSE OBSERVATIONS OF RESPONDENTS BY RACE AND SEX

NURSE NUMBER	TOTAL	WHITE		NEGRO		OTHER	
		Male	Female	Male	Female	Male	Female
	NUMBER						
Total Sample	2,575	988	1,166	156	185	37	43
1	314	124	135	16	28	6	5
2	241	96	108	13	19	3	2
3	540	209	237	39	44	6	5
4	290	114	135	12	13	9	7
5	191	78	96	7	6	1	3
6	260	95	123	16	16	4	6
7	233	78	108	19	21	3	4
8	169	59	81	15	12	1	1
9	220	83	96	13	17	4	7
10	117	52	47	6	9	-	3
	PERCENT						
Total Sample	100.0	38.4	45.3	6.1	7.2	1.4	1.7
1	100.0	39.5	43.0	5.1	8.9	1.9	1.6
2	100.0	39.8	44.8	5.4	7.9	1.2	0.8
3	100.0	38.7	43.9	7.2	8.1	1.1	0.9
4	100.0	39.3	46.6	4.1	4.5	3.1	2.4
5	100.0	40.8	50.3	3.7	3.1	0.5	1.6
6	100.0	36.5	47.3	6.2	6.2	1.5	2.3
7	100.0	33.5	46.4	8.2	9.0	1.3	1.7
8	100.0	34.9	47.9	8.9	7.1	0.6	0.6
9	100.0	37.7	43.6	5.9	7.7	1.8	3.2
10	100.0	44.4	40.2	5.1	7.7	-	2.6

Note: Percents are rounded independently and may not add to totals.

Source: State of California, Department of Public Health, Bureau of Chronic Diseases, Alameda County Blood Pressure Study, 1966.

Table 3

MEASUREMENT - REMEASUREMENT[1] DIFFERENCES IN SYSTOLIC AND DIASTOLIC V BLOOD PRESSURE (mm Hg) FOR THIRD READINGS

DIFFERENCE BETWEEN FIRST AND SECOND MEASUREMENT (mm Hg)	SYSTOLIC BLOOD PRESSURE				DIASTOLIC BLOOD PRESSURE			
	First Minus Second Measurement		Total		First Minus Second Measurement		Total	
	+	-	Number of Individuals	Percent	+	-	Number of Individuals	Percent
Total	65	70	150	100.0	62	71	150	100.0
0	-	-	15	10.0	-	-	17	11.3
2	12	11	23	15.3	11	16	27	18.0
4	9	10	19	12.7	11	11	22	14.7
6	5	9	14	9.3	7	9	16	10.7
8	7	10	17	11.3	7	6	13	8.7
10	11	5	16	10.7	4	5	9	6.0
12	3	5	8	5.3	5	8	13	8.7
14	5	7	12	8.0	8	1	9	6.0
16	3	2	5	3.3	4	4	8	5.3
18	4	3	7	4.7	1	3	4	2.7
20	1	3	4	2.7	1	2	3	2.0
22	2	1	3	2.0	-	1	1	0.7
24	-	1	1	0.7	1	1	2	1.3
26	1	2	3	2.0	-	-	-	-
28	-	-	-	-	-	-	-	-
≥30	2	1	3	2.0	2	4	6	4.0

[1] Remeasurement made between 1 to 5 months after original measurement.

Note: Percents are rounded independently and may not add to totals.

Source: State of California, Department of Public Health, Bureau of Chronic Diseases, Alameda County Blood Pressure Study, 1966.

Table 4

DIASTOLIC IV BLOOD PRESSURE (mm Hg) FOR WHITES BY AGE AND SEX

DIASTOLIC BLOOD PRESSURE	TOTAL	20-24	25-34	35-44	45-54	55-64	65 AND OVER	TOTAL	20-24	25-34	35-44	45-54	55-64	65 AND OVER	TOTAL	20-24	25-34	35-44	45-54	55-64	65 AND OVER
	Number							Percent							Percent						
	MALE																				
Total	954	104	234	220	159	125	112	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	10.9	24.5	23.1	16.7	13.1	11.7
Less than 45	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
45-54	5	3	-	-	-	-	2	0.5	2.9	-	-	-	-	1.8	a						
55-64	27	8	6	3	4	3	3	2.9	7.7	2.6	1.4	2.5	2.4	2.7	100.0	29.6	22.2	11.1	14.8	11.1	11.1
65-74	167	29	61	35	12	9	21	17.5	27.9	26.1	15.9	7.5	7.2	18.8	100.0	17.4	36.5	21.0	7.2	5.4	12.6
75-84	361	38	104	82	56	39	42	37.8	36.5	44.4	37.3	35.2	31.2	37.5	100.0	10.5	28.8	22.7	15.5	10.8	11.6
85-94	245	23	49	65	45	43	20	25.7	22.1	20.9	29.5	28.3	34.4	17.9	100.0	9.4	20.0	26.5	18.4	17.6	8.2
95-104	108	3	12	21	35	18	19	11.3	2.9	5.1	9.5	22.0	14.4	17.0	100.0	2.8	11.1	19.4	32.4	16.7	17.6
105-114	29	-	2	11	5	7	4	3.0	-	0.9	5.0	3.1	5.6	3.6	100.0	-	6.9	37.9	17.2	24.1	13.8
115-124	8	-	-	1	1	5	1	0.8	-	-	0.5	0.6	4.0	0.9	a						
125 and Over	4	-	-	2	1	1	-	0.4	-	-	0.9	0.6	0.8	-	a						
	FEMALE																				
Total	1,083	142	246	211	196	131	157	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	13.1	22.7	19.5	18.1	12.1	14.5
Less than 45	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
45-54	11	5	3	-	2	-	1	1.0	3.5	1.2	-	1.0	-	0.6	(100.0)	(45.5)	(27.3)	(-)	(18.2)	-	(9.1)
55-64	80	22	31	10	5	2	10	7.4	15.5	12.6	4.7	2.6	1.5	6.4	100.0	27.5	38.8	12.5	6.2	2.5	12.5
65-74	334	66	104	60	48	19	37	30.8	46.5	42.3	28.4	24.5	14.5	23.6	100.0	19.8	31.1	18.0	14.4	5.7	11.1
75-84	374	40	83	87	75	41	48	34.5	28.2	33.7	41.2	38.3	31.3	30.6	100.0	10.7	22.2	23.3	20.1	11.0	12.8
85-94	196	7	19	41	46	46	37	18.1	4.9	7.7	19.4	23.5	35.1	23.6	100.0	3.6	9.7	20.9	23.5	23.5	18.9
95-104	58	1	5	11	10	17	14	5.4	0.7	2.0	5.2	5.1	13.0	8.9	100.0	1.7	8.6	19.0	17.2	29.3	24.1
105-114	18	1	1	1	6	3	6	1.7	0.7	0.4	0.5	3.1	2.3	3.8	(100.0)	(5.6)	(5.6)	(5.6)	(33.3)	(16.7)	(33.3)
115-124	9	-	-	1	4	2	2	0.8	-	-	0.5	2.0	1.5	1.3	a						
125 and Over	3	-	-	-	-	1	2	0.3	-	-	-	-	0.8	1.3	a						

[a] Not calculated for less than 10 persons.

Note: Percents are rounded independently and may not add to totals.
Underlined percents are based on 25-49 persons.
Percents in parentheses are based on 10-24 persons.
No Diastolic IV Readings were obtained on 46 males and 100 females.

Source: State of California, Department of Public Health, Bureau of Chronic Diseases, Alameda County Blood Pressure Study, 1966.

Table 5

DIASTOLIC IV BLOOD PRESSURE (mm Hg) FOR NEGROES BY SEX AND TWO AGE GROUPS

DIASTOLIC BLOOD PRESSURE	MALE									FEMALE								
	Total	Under 45	45 and Over	Total	Under 45	45 and Over	Total	Under 45	45 and Over	Total	Under 45	45 and Over	Total	Under 45	45 and Over	Total	Under 45	45 and Over
	Number			Percent			Percent			Number			Percent			Percent		
Total	152	89	63	100.0	100.0	100.0	100.0	58.6	41.4	168	100	68	100.0	100.0	100.0	100.0	59.5	40.5
Less than 45	1	-	1	0.7	-	1.6	a			-	-	-	-	-	-	-	-	-
45-54	-	-	-	-	-	-	-	-	-	1	1	-	0.6	1.0	-	a		
55-64	2	1	1	1.3	1.1	1.6	a			13	13	-	7.7	13.0	-	(100.0)	(100.0)	-
65-74	19	13	6	12.5	14.6	9.5	(100.0)	(68.4)	(31.6)	32	19	13	19.0	19.0	19.1	100.0	59.4	40.6
75-84	50	37	13	32.9	41.6	20.6	100.0	74.0	26.0	49	36	13	29.2	36.0	19.1	100.0	73.5	26.5
85-94	40	25	15	26.3	28.1	23.8	100.0	62.5	37.5	38	19	19	22.6	19.0	27.9	100.0	50.0	50.0
95-104	21	9	12	13.8	10.1	19.0	(100.0)	(42.9)	(57.1)	22	8	14	13.1	8.0	20.6	(100.0)	(36.4)	(63.6)
105-114	15	3	12	9.9	3.4	19.0	(100.0)	(20.0)	(80.0)	9	3	6	5.4	3.0	8.8	a		
115-124	3	1	2	2.0	1.1	3.2	a			3	1	2	1.8	1.0	2.9	a		
125 and Over	1	-	1	0.7	-	1.6	a			1	-	1	0.6	-	1.5	a		

[a] Not calculated for less than 10 persons.

Note: Percents are rounded independently and may not add to totals.
Underlined percents are based on 25-49 persons.
Percents in parentheses are based on 10-24 persons.
No Diastolic IV Readings were obtained on 4 males and 18 females.

Source: State of California, Department of Public Health, Bureau of Chronic Diseases, Alameda County Blood Pressure Study, 1966.

Table 6

NUMBER OF BLOOD PRESSURE READINGS TAKEN BY SEX AND TYPE

NUMBER OF READINGS	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE
	Number			Percent		
	SYSTOLIC BLOOD PRESSURE					
Total with 1 or More Readings	2,575	1,181	1,394	100.0	100.0	100.0
Three Readings	2,570	1,181	1,389	99.8	100.0	99.6
Two Readings	3	-	3	0.1	-	0.2
One Reading	2	-	2	0.1	-	0.1
	DIASTOLIC V BLOOD PRESSURE					
Total with 1 or More Readings	2,575	1,181	1,394	100.0	100.0	100.0
Three Readings	2,450	1,134	1,316	95.1	96.0	94.4
Two Readings	89	34	55	3.5	2.9	3.9
One Reading	36	13	23	1.4	1.1	1.6

Note: Percents are rounded independently and may not add to totals.

Source: State of California, Department of Public Health, Bureau of Chronic Diseases, Alameda County Blood Pressure Study, 1966.

Table 7

NUMBER AND PERCENT OF PERSONS TAKING MEDICATION BY RACE, SEX AND AGE

AGE	TOTAL			WHITE			NEGRO		
	Total	Male	Female	Total	Male	Female	Total	Male	Female
	NUMBER								
Total	153[a]	51	102[a]	126	43	83	24	8	16
20-34	2	2	-	1	1	-	1	1	-
35-44	18	4	14	16	4	12	2	-	2
45-54	37	10	27	30	9	21	5	1	4
55-64	34	18	16	26	14	12	8	4	4
65 and Over	62	17	45	53	15	38	8	2	6
	PERCENT OF TOTAL STUDY GROUP								
Total	5.9	4.3	7.3	5.8	4.4	7.1	7.0	5.1	8.6
20-34	0.2	0.5	-	0.1	0.3	-	0.8	1.5	-
35-44	3.3	1.6	5.0	3.5	1.8	5.2	3.0	-	4.7
45-54	8.2	4.9	10.8	7.8	5.2	10.0	8.8	3.7	13.3
55-64	10.0	10.9	9.1	9.6	10.7	8.6	14.0	16.0	12.5
65 and Over	18.7	12.5	23.1	17.9	12.7	21.3	26.7	13.3	40.0

[a] Three women - other race took medication.

Source: State of California, Department of Public Health, Bureau of Chronic Diseases, Alameda County Blood Pressure Study, 1966.

Table 8

MEAN SYSTOLIC AND DIASTOLIC BLOOD PRESSURE (mm Hg) FOR RESPONDENTS REPORTING USE OF BLOOD PRESSURE MEDICATION BY RACE, SEX AND AGE

AGE	WHITE				NEGRO			
	Male		Female		Male		Female	
	No.	Mean	No.	Mean	No.	Mean	No.	Mean
	SYSTOLIC BLOOD PRESSURE							
20-34	1	a	-	-	1	a	-	-
35-44	4	a	12	137.8	-	-	2	a
45-54	9	156.0	21	147.3	1	a	4	a
55-64	14	159.2	12	165.5	4	a	4	a
65 and Over	15	152.1	38	168.5	2	a	6	189.3
	DIASTOLIC BLOOD PRESSURE							
20-34	1	a	-	-	1	a	-	-
35-44	4	a	12	81.0	-	-	2	a
45-54	9	89.3	21	83.2	1	a	4	a
55-64	14	95.1	12	85.8	4	a	4	a
65 and Over	15	66.5	38	76.4	2	a	6	67.8

[a] Not calculated for less than 5 persons.

Source: State of California, Department of Public Health, Bureau of Chronic Diseases, Alameda County Blood Pressure Study, 1966.

Table 9

SYSTOLIC BLOOD PRESSURE (mm Hg) FOR PERSONS TAKING MEDICATION BY RACE, SEX AND AGE

SYSTOLIC BLOOD PRESSURE	WHITE										NEGRO					
	Male					Female					Male			Female		
	Total	20-44	45-54	55-64	65 and Over	Total	20-44	45-54	55-64	65 and Over	Total	Under 45	45 and Over	Total	Under 45	45 and Over
	NUMBER															
Total	43	5	9	14	15	83	12	21	12	38	8	1	7	16	2	14
Less than 114	10	3	1	2	4	17	5	8	1	3	4	1	3	6	2	4
115-124	5	1	-	3	1	10	1	5	1	3	-	-	-	1	-	1
125-134	4	-	1	1	2	3	2	-	-	1	2	-	2	-	-	-
135-144	5	1	3	1	-	9	1	2	2	4	-	-	-	1	-	1
145-164	5	-	1	3	1	17	2	1	3	11	1	-	1	1	-	1
165 and Over	14	-	3	4	7	27	1	5	5	16	1	-	1	7	-	7
	PERCENT OF TOTAL STUDY GROUP															
Total	4.4	1.5	5.2	10.7	12.7	7.1	2.9	10.0	8.6	21.3	5.1	1.1	10.4	8.6	1.9	18.2
Less than 114	6.5	2.7	(5.9)	(12.5)	a	4.4	1.6	14.3	a	a	(33.3)	(10.0)	a	12.2	4.8	a
115-124	1.9	0.5	-	(14.3)	(8.3)	3.7	0.5	10.4	(6.2)	(20.0)	-	-	-	2.1	-	(9.1)
125-134	1.6	-	2.2	3.3	(10.0)	1.8	2.6	-	-	(4.8)	4.9	-	(15.4)	-	-	-
135-144	3.5	1.2	11.5	(5.0)	-	8.0	2.8	8.0	7.7	16.0	-	-	-	(5.6)	-	a
145-164	4.2	-	3.6	(12.5)	2.6	13.1	(13.3)	3.4	8.3	22.0	(4.3)	-	(6.7)	3.4	-	(5.0)
165 and Over	21.9	-	(25.0)	(20.0)	(29.2)	28.4	a	(28.6)	(30.0)	27.1	(7.1)	-	(9.1)	(33.3)	-	(36.8)

[a] Not calculated for less than 10 persons.

Note: Underlined percents are based on 25-49 persons.
Percents in parentheses are based on 10-24 persons.

Source: State of California, Department of Public Health, Bureau of Chronic Diseases, Alameda County Blood Pressure Study, 1966.

Table 10

DIASTOLIC BLOOD PRESSURE (mm Hg) FOR PERSONS TAKING MEDICATION BY RACE, SEX AND AGE

DIASTOLIC BLOOD PRESSURE	WHITE										NEGRO					
	Male					Female					Male			Female		
	Total	20-44	45-54	55-64	65 and Over	Total	20-44	45-54	55-64	65 and Over	Total	Under 45	45 and Over	Total	Under 45	45 and Over
	NUMBER															
Total	43	5	9	14	15	83	12	21	12	38	8	1	7	16	2	14
Less than 64	15	3	-	-	12	30	6	3	2	19	2	-	2	5	1	4
65-74	10	1	3	4	2	23	-	10	4	9	4	1	3	5	1	4
75-84	3	-	-	3	-	8	2	3	2	1	-	-	-	3	-	3
85-94	4	-	3	1	-	6	1	3	1	1	-	-	-	-	-	-
95 and Over	11	1	3	6	1	16	3	2	3	8	2	-	2	3	-	3
	PERCENT OF TOTAL STUDY GROUP															
Total	4.4	1.5	5.2	10.7	12.7	7.1	2.9	10.0	8.6	21.3	5.1	1.1	10.4	8.6	1.9	18.2
Less than 64	8.4	2.2	-	-	(52.2)	9.6	2.6	8.8	(15.4)	50.0	(9.1)	-	a	13.5	3.6	a
65-74	3.5	0.6	7.5	12.9	5.3	6.3	-	14.9	12.9	16.4	8.7	5.9	(21.4)	9.6	2.7	(26.7)
75-84	1.0	-	-	6.5	-	2.6	1.4	4.8	3.8	2.4	-	-	-	6.8	-	(17.6)
85-94	2.7	-	8.1	3.4	-	4.8	2.9	8.1	3.3	(4.2)	-	-	-	-	-	-
95 and Over	14.3	(4.5)	12.0	(35.3)	(7.7)	28.1	(23.1)	(18.2)	(23.1)	(40.0)	(8.7)	-	(11.8)	(13.0)	-	(20.0)

[a] Not calculated for less than 10 persons.

Note: Percents in parentheses are based on 10-24 persons.
Underlined percents are based on 25-49 persons.

Source: State of California, Department of Public Health, Bureau of Chronic Diseases, Alameda County Blood Pressure Study, 1966.

Table 11

AVERAGE PULSE PRESSURE BY SEX

AVERAGE PULSE PRESSURE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE
	NUMBER			PERCENT		
Total	2,401	1,129	1,272	100.0	100.0	100.0
Less than 60	62	42	20	2.6	3.7	1.6
60-69	414	234	180	17.2	20.7	14.1
70-79	807	370	437	33.6	32.7	34.3
80-89	743	335	408	30.9	29.7	32.1
90-99	288	122	166	12.0	10.8	13.0
100-109	70	21	49	2.9	1.9	3.9
110 and Over	17	5	12	0.7	0.4	1.0

Note: Percents are rounded independently and may not add to totals.

Source: State of California, Department of Public Health, Bureau of Chronic Diseases, Alameda County Blood Pressure Study, 1966.

Table 12

STUDY POPULATION BY WHETHER BLOOD PRESSURE READINGS WERE RECORDED, BY RACE, SEX AND AGE

SEX AND AGE	ALL RACES			WHITE			NEGRO			OTHER		
	Total	With Blood Pressure Readings	Without Blood Pressure Readings	Total	With Blood Pressure Readings	Without Blood Pressure Readings	Total	With Blood Pressure Readings	Without Blood Pressure Readings	Total	With Blood Pressure Readings	Without Blood Pressure Readings
	MALE											
Total	1,193	1,181	12	1,000	988	12	156	156	-	37	37	-
20-24	133	133	-	105	105	-	23	23	-	5	5	-
25-34	287	285	2	237	235	2	43	43	-	7	7	-
35-44	260	258	2	227	225	2	23	23	-	10	10	-
45-54	207	204	3	177	174	3	27	27	-	3	3	-
55-64	167	165	2	133	131	2	25	25	-	9	9	-
65-74	101	99	2	85	83	2	13	13	-	3	3	-
75 and Over	38	37	1	36	35	1	2	2	-	-	-	-
	FEMALE											
Total	1,412	1,394	18	1,183	1,166	17	186	185	1	43	43	-
20-24	181	181	-	150	150	-	21	21	-	10	10	-
25-34	312	312	-	259	259	-	44	44	-	9	9	-
35-44	282	282	-	229	229	-	43	43	-	10	10	-
45-54	255	249	6	216	211	5	31	30	1	8	8	-
55-64	178	175	3	142	139	3	32	32	-	4	4	-
65-74	122	117	5	112	107	5	8	8	-	2	2	-
75 and Over	82	78	4	75	71	4	7	7	-	-	-	-

Source: State of California, Department of Public Health, Bureau of Chronic Diseases, Alameda County Blood Pressure Study, 1966.

Table 13

STUDY POPULATION WITH BLOOD PRESSURE READINGS BY FAMILY INCOME, EDUCATION, SEX, RACE AND AGE

SEX, RACE AND AGE	TOTAL	FAMILY INCOME							EDUCATION					
		Less Than $4,000	$4,000-5,999	$6,000-7,999	$8,000-9,999	$10,000-14,999	$15,000 and Over	Unknown	8 Years or Less	Some High School	High School Graduate	Some College	4 Years or More College	Unknown
	NUMBER													
Total	2,575	500	360	410	454	530	243	78	473	466	731	441	448	16
Male	1,181	190	161	205	223	260	117	25	227	187	305	206	249	7
Female	1,394	310	199	205	231	270	126	53	246	279	426	235	199	9
White Male	988	145	118	156	191	239	116	23	172	151	254	170	236	5
20-24	105	32	23	17	17	8	4	4	5	11	22	37	29	1
25-34	235	29	29	48	52	61	13	3	13	36	54	45	86	1
35-44	225	5	21	32	51	78	33	5	25	37	66	35	62	-
45-54	174	10	10	23	34	61	33	3	26	32	63	22	29	2
55-64	131	12	12	25	27	26	25	4	36	23	36	19	16	1
65 and Over	118	57	23	11	10	5	8	4	67	12	13	12	14	-
White Female	1,166	229	150	162	205	252	123	45	182	215	371	205	187	6
20-24	150	37	31	24	23	21	6	8	-	23	43	48	33	3
25-34	259	21	30	51	51	73	26	7	17	45	94	42	60	1
35-44	229	9	17	33	61	75	29	5	25	40	95	39	29	1
45-54	211	22	29	25	40	51	34	10	36	38	79	34	24	-
55-64	139	40	21	16	22	21	14	5	36	33	26	19	25	-
65 and Over	178	100	22	13	8	11	14	10	68	36	34	23	16	1
Negro Male	156	36	35	42	28	14	-	1	48	30	43	29	4	2
Under 45	89	12	25	24	18	10	-	-	8	18	33	25	4	1
45 and Over	67	24	10	18	10	4	-	1	40	12	10	4	-	1
Negro Female	185	73	41	36	21	9	-	5	53	56	47	21	5	3
Under 45	108	35	27	22	14	7	-	3	16	36	33	17	4	2
45 and Over	77	38	14	14	7	2	-	2	37	20	14	4	1	1
Other Races, Male	37	9	8	7	4	7	1	1	7	6	8	7	9	-
Under 45	22	3	5	5	3	4	1	1	1	4	3	5	9	-
45 and Over	15	6	3	2	1	3	-	-	6	2	5	2	-	-
Other Races, Female	43	8	8	7	5	9	3	3	11	8	8	9	7	-
Under 45	29	5	6	5	3	6	2	2	6	7	4	6	6	-
45 and Over	14	3	2	2	2	3	1	1	5	1	4	3	1	-
	PERCENT													
Total	100.0	19.4	14.0	15.9	17.6	20.6	9.4	3.0	18.4	18.1	28.4	17.1	17.4	0.6
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	(100.0)
Male	45.9	38.0	44.7	50.0	49.1	49.1	48.1	32.1	48.0	40.1	41.7	46.7	55.6	(43.8)
Female	54.1	62.0	55.3	50.0	50.9	50.9	51.9	67.9	52.0	59.9	58.3	53.3	44.4	(56.2)
White Male	38.4	29.0	32.8	38.0	42.1	45.1	47.7	29.5	36.4	32.4	34.7	38.5	52.7	(31.2)
20-24	4.1	6.4	6.4	4.1	3.7	1.5	1.6	5.1	1.1	2.4	3.0	8.4	6.5	(6.2)
25-34	9.1	5.8	8.1	11.7	11.5	11.5	5.3	3.8	2.7	7.7	7.4	10.2	19.2	(6.2)
35-44	8.7	1.0	5.8	7.8	11.2	14.7	13.6	6.4	5.3	7.9	9.0	7.9	13.8	-
45-54	6.8	2.0	2.8	5.6	7.5	11.5	13.6	3.8	5.5	6.9	8.6	5.0	6.5	(12.5)
55-64	5.1	2.4	3.3	6.1	5.9	4.9	10.3	5.1	7.6	4.9	4.9	4.3	3.6	(6.2)
65 and Over	4.6	11.4	6.4	2.7	2.2	0.9	3.3	5.1	14.2	2.6	1.8	2.7	3.1	-
White Female	45.3	45.8	41.7	39.5	45.2	47.5	50.6	57.7	38.5	46.1	50.8	46.5	41.7	(37.5)
20-24	5.8	7.4	8.6	5.9	5.1	4.0	2.5	10.3	-	4.9	5.9	10.9	7.4	(18.8)
25-34	10.1	4.2	8.3	12.4	11.2	13.8	10.7	9.0	3.6	9.7	12.8	9.5	13.4	(6.2)
35-44	8.9	1.8	4.7	8.0	13.4	14.2	11.9	6.4	5.3	8.6	13.0	8.8	6.5	(6.2)
45-54	8.2	4.4	8.1	6.1	8.8	9.6	14.0	12.8	7.6	8.2	10.8	7.7	5.4	-
55-64	5.4	8.0	5.8	3.9	4.8	4.0	5.8	6.4	7.6	7.1	3.6	4.3	5.6	-
65 and Over	6.9	20.0	6.1	3.2	1.8	2.1	5.8	12.8	14.4	7.7	4.7	5.2	3.6	(6.2)
Negro Male	6.1	7.2	9.7	10.2	6.2	2.6	-	1.3	10.1	6.4	5.9	6.6	0.9	(12.5)
Under 45	3.5	2.4	6.9	5.9	4.0	1.9	-	-	1.7	3.9	4.5	5.7	0.9	(6.2)
45 and Over	2.6	4.8	2.8	4.4	2.2	0.8	-	1.3	8.5	2.6	1.4	0.9	-	(6.2)
Negro Female	7.2	14.6	11.4	8.8	4.6	1.7	-	6.4	11.2	12.0	6.4	4.8	1.1	(18.8)
Under 45	4.2	7.0	7.5	5.4	3.1	1.3	-	3.8	3.4	7.7	4.5	3.9	0.9	(12.5)
45 and Over	3.0	7.6	3.9	3.4	1.5	0.4	-	2.6	7.8	4.3	1.9	0.9	0.2	(6.2)
Other Races, Male	1.4	1.8	2.2	1.7	0.9	1.3	0.4	1.3	1.5	1.3	1.1	1.6	2.0	-
Under 45	0.9	0.6	1.4	1.2	0.7	0.8	0.4	1.3	0.2	0.9	0.4	1.1	2.0	-
45 and Over	0.6	1.2	0.8	0.5	0.2	0.6	-	-	1.3	0.4	0.7	0.5	-	-
Other Races, Female	1.7	1.6	2.2	1.7	1.1	1.7	1.2	3.8	2.3	1.7	1.1	2.0	1.6	-
Under 45	1.1	1.0	1.7	1.2	0.7	1.1	0.8	2.6	1.3	1.5	0.5	1.4	1.3	-
45 and Over	0.5	0.6	0.6	0.5	0.4	0.6	0.4	1.3	1.1	0.2	0.5	0.7	0.2	-

Note: Percents are rounded independently and may not add to totals.
Percents in parentheses are based on 10-24 persons.

Source: State of California, Department of Public Health, Bureau of Chronic Diseases, Alameda County Blood Pressure Study, 1966.

Table 14

STUDY POPULATION WITH BLOOD PRESSURE READINGS BY ACTIVITY STATUS, SEX, RACE AND AGE

SEX, RACE AND AGE	TOTAL	ACTIVITY STATUS												
		Keeping House	Unemployed Retired Student Etc.	Unknown	Currently Employed									
					Total	White Collar				Blue Collar				Unknown
						Total	Professional and Semi-Professional	Managers Officials and Proprietors	Clerical and Sales	Total	Skilled	Semi-Skilled	Unskilled	
	NUMBER													
Total	2,575	682	391	6	1,496	814	293	159	362	678	191	214	273	4
Male	1,181	-	236	3	942	449	189	129	131	492	187	150	155	1
Female	1,394	682	155	3	554	365	104	30	231	186	4	64	118	3
White Male	988	-	198	3	787	406	177	119	110	381	169	116	96	-
20-24	105	-	37	1	67	25	13	2	10	42	11	20	11	-
25-34	235	-	37	-	198	106	63	16	27	92	40	32	20	-
35-44	225	-	10	1	214	116	57	34	25	98	47	32	19	-
45-54	174	-	5	1	168	79	27	28	24	89	39	22	28	-
55-64	131	-	17	-	114	64	15	30	19	50	27	7	16	-
65 and Over	118	-	92	-	26	16	2	9	5	10	5	3	2	-
White Female	1,166	600	128	3	435	328	93	28	207	105	4	46	55	2
20-24	150	46	36	1	67	53	14	-	39	13	1	4	8	1
25-34	259	161	10	-	88	75	22	3	50	13	-	7	6	-
35-44	229	127	7	2	93	71	20	4	47	22	1	13	8	-
45-54	211	90	8	-	113	82	24	13	45	31	1	12	18	-
55-64	139	71	10	-	58	36	11	5	20	21	1	9	11	1
65 and Over	178	105	57	-	16	11	2	3	6	5	-	1	4	-
Negro Male	156	-	31	-	125	29	7	6	16	95	16	28	51	1
Under 45	89	-	14	-	75	21	7	2	12	54	8	20	26	-
45 and Over	67	-	17	-	50	8	-	4	4	41	8	8	25	1
Negro Female	185	66	22	-	97	25	7	1	17	72	-	13	59	-
Under 45	108	41	9	-	58	23	6	-	17	35	-	7	28	-
45 and Over	77	25	13	-	39	2	1	1	-	37	-	6	31	-
Other Races, Male	37	-	7	-	30	14	5	4	5	16	2	6	8	-
Under 45	22	-	5	-	17	10	5	1	4	7	1	2	4	-
45 and Over	15	-	2	-	13	4	-	3	1	9	1	4	4	-
Other Races, Female	43	16	5	-	22	12	4	1	7	9	-	5	4	1
Under 45	29	12	2	-	15	9	3	1	5	5	-	4	1	1
45 and Over	14	4	3	-	7	3	1	-	2	4	-	1	3	-
	PERCENT													
Total	100.0	26.5	15.2	0.2	58.1	31.6	11.4	6.2	14.1	26.3	7.4	8.3	10.6	0.2
Total	100.0	100.0	100.0	a	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	a
Male	45.9	-	60.4		63.0	55.2	64.5	81.1	36.2	72.6	97.9	70.1	56.8	
Female	54.1	100.0	39.6		37.0	44.8	35.5	18.9	63.8	27.4	2.1	29.9	43.2	
White Male	38.4	-	50.6		52.6	49.9	60.4	74.8	30.4	56.2	88.5	54.2	35.2	
20-24	4.1	-	9.5		4.5	3.1	4.4	1.3	2.8	6.2	5.8	9.3	4.0	
25-34	9.1	-	9.5		13.2	13.0	21.5	10.1	7.5	13.6	20.9	15.0	7.3	
35-44	8.7	-	2.6		14.3	14.2	19.5	21.4	6.9	14.5	24.6	15.0	7.0	
45-54	6.8	-	1.3		11.2	9.7	9.2	17.6	6.6	13.1	20.4	10.3	10.3	
55-64	5.1	-	4.3		7.6	7.9	5.1	18.9	5.2	7.4	14.1	3.3	5.9	
65 and Over	4.6	-	23.5		1.7	2.0	0.7	5.7	1.4	1.5	2.6	1.4	0.7	
White Female	45.3	88.0	32.7		29.1	40.3	31.7	17.6	57.2	15.5	2.1	21.5	20.1	
20-24	5.8	6.7	9.2		4.5	6.5	4.8	-	10.8	1.9	0.5	1.9	2.9	
25-34	10.1	23.6	2.6		5.9	9.2	7.5	1.9	13.8	1.9	-	3.3	2.2	
35-44	8.9	18.6	1.8		6.2	8.7	6.8	2.5	13.0	3.2	0.5	6.1	2.9	
45-54	8.2	13.2	2.0		7.6	10.1	8.2	8.2	12.4	4.6	0.5	5.6	6.6	
55-64	5.4	10.4	2.6		3.9	4.4	3.8	3.1	5.5	3.1	0.5	4.2	4.0	
65 and Over	6.9	15.4	14.6		1.1	1.4	0.7	1.9	1.7	0.7	-	0.5	1.5	
Negro Male	6.1	-	7.9		8.4	3.6	2.4	3.8	4.4	14.0	8.4	13.1	18.7	
Under 45	3.5	-	3.6		5.0	2.6	2.4	1.3	3.3	8.0	4.2	9.3	9.5	
45 and Over	2.6	-	4.3		3.3	1.0	-	2.5	1.1	6.0	4.2	3.7	9.2	
Negro Female	7.2	9.7	5.6		6.5	3.1	2.4	0.6	4.7	10.6	-	6.1	21.6	
Under 45	4.2	6.0	2.3		3.9	2.8	2.0	-	4.7	5.2	-	3.3	10.3	
45 and Over	3.0	3.7	3.3		2.6	0.2	0.3	0.6	-	5.5	-	2.8	11.4	
Other Races, Male	1.4	-	1.8		2.0	1.7	1.7	2.5	1.4	2.4	1.0	2.8	2.9	
Under 45	0.9	-	1.3		1.1	1.2	1.7	0.6	1.1	1.0	0.5	0.9	1.5	
45 and Over	0.6	-	0.5		0.9	0.5	-	1.9	0.3	1.3	0.5	1.9	1.5	
Other Races, Female	1.7	2.3	1.3		1.5	1.5	1.4	0.6	1.9	1.3	-	2.3	1.5	
Under 45	1.1	1.8	0.5		1.0	1.1	1.0	0.6	1.4	0.7	-	1.9	0.4	
45 and Over	0.5	0.6	0.8		0.5	0.4	0.3	-	0.6	0.6	-	0.5	1.1	

a Not calculated for less than 10 persons.

Note: Percents are rounded independently and may not add to totals.

Source: State of California, Department of Public Health, Bureau of Chronic Diseases, Alameda County Blood Pressure Study, 1966.

Table 15

STUDY POPULATION WITH BLOOD PRESSURE READINGS BY SELECTED CHARACTERISITCS, SEX, RACE AND AGE

SEX, RACE AND AGE	TOTAL	SOCIOECONOMIC STATUS				NUMBER OF OWN CHILDREN					MARITAL STATUS				RELIGION					SUBJECTIVE SOCIAL STANDING			
		Low	Medium	High	Unknown	None	One	Two	Three or More	Unknown	Married	Divorced Separated Widowed	Never Married	Unknown	Protestant	Catholic	Other Religions	Agnostic Atheist	Unknown	Lower Class Lower Middle	Middle Class	Upper Class Upper Middle	Unknown
	NUMBER																						
Total	2,575	872	988	621	94	710	478	606	734	47	1,862	436	274	3	1,489	741	71	250	24	247	1,512	680	136
Male	1,181	375	470	309	27	370	199	275	316	21	916	102	162	1	616	352	36	164	13	127	688	300	66
Female	1,394	497	518	312	67	340	279	331	418	26	946	334	112	2	873	389	35	86	11	120	824	380	70
White Male	988	263	411	290	24	304	162	243	264	15	787	72	129	-	481	330	28	139	10	95	589	254	50
20-24	105	37	50	14	4	82	13	6	2	2	44	4	57	-	38	33	6	27	1	14	53	33	5
25-34	235	51	88	93	3	82	38	64	49	2	185	11	39	-	116	65	7	46	1	22	147	54	12
35-44	225	39	95	86	5	44	32	53	94	2	194	20	11	-	113	80	5	24	3	21	135	58	11
45-54	174	33	86	51	4	38	30	51	50	5	153	11	10	-	83	62	5	22	2	16	110	41	7
55-64	131	36	56	35	4	26	22	40	39	4	115	9	7	-	71	42	3	13	2	14	77	31	9
65 and Over	118	67	36	11	4	32	27	29	30	-	96	17	5	-	60	48	2	7	1	8	67	37	6
White Female	1,166	347	467	297	55	281	229	292	347	17	817	254	93	2	700	358	27	73	8	82	725	301	58
20-24	150	38	77	25	10	88	33	17	9	3	93	9	48	-	80	34	7	26	3	14	91	33	12
25-34	259	49	92	110	8	48	43	63	104	1	222	22	14	1	142	94	6	16	1	15	170	67	7
35-44	229	37	116	67	9	31	31	65	96	6	190	34	5	-	130	83	4	11	1	19	150	53	7
45-54	211	51	94	53	13	37	45	62	63	4	157	44	9	1	130	71	3	6	1	16	137	50	8
55-64	139	59	50	25	5	29	33	39	37	1	90	43	6	-	95	36	2	5	1	6	83	42	8
65 and Over	178	113	38	17	10	48	44	46	38	2	65	102	11	-	123	40	5	9	1	12	94	56	16
Negro Male	156	98	47	9	2	56	31	26	37	6	101	27	27	1	125	16	-	12	3	21	79	42	14
Under 45	89	46	34	8	1	36	17	18	16	2	53	11	24	1	70	9	-	8	2	18	45	17	9
45 and Over	67	52	13	1	1	20	14	8	21	4	48	16	3	-	55	7	-	4	1	3	34	25	5
Negro Female	185	137	35	4	9	44	45	33	54	9	96	77	12	-	157	21	-	4	3	26	72	75	12
Under 45	108	71	28	4	5	23	32	14	34	5	59	37	12	-	89	15	-	2	2	19	47	36	6
45 Years and Over	77	66	7	-	4	21	13	19	20	4	37	40	-	-	68	6	-	2	1	7	25	39	6
Other Races, Male	37	14	12	10	1	10	6	6	15	-	28	3	6	-	10	6	8	13	-	11	20	4	2
Under 45	22	6	6	9	1	6	5	2	9	-	18	-	4	-	4	2	6	10	-	5	13	4	-
45 and Over	15	8	6	1	-	4	1	4	6	-	10	3	2	-	6	4	2	3	-	6	7	-	2
Other Races, Female	43	13	16	11	3	15	5	6	17	-	33	3	7	-	16	10	8	9	-	12	27	4	-
Under 45	29	7	12	8	2	12	4	3	10	-	22	-	7	-	9	7	6	7	-	7	20	2	-
45 and Over	14	6	4	3	1	3	1	3	7	-	11	3	-	-	7	3	2	2	-	5	7	2	-
	PERCENT																						
Total	100.0	33.9	38.4	24.1	3.6	27.6	18.6	23.5	28.5	1.8	72.3	16.9	10.6	0.1	57.8	28.8	2.8	9.7	0.9	9.6	58.7	26.4	5.3
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	a	100.0	100.0	100.0	100.0	(100.0)	100.0	100.0	100.0	100.0
Male	45.9	43.0	47.6	49.8	28.7	52.1	41.6	45.4	43.1	44.7	49.2	23.4	59.1		41.4	47.5	50.7	65.6	(54.2)	51.4	45.5	44.1	48.5
Female	54.1	57.0	52.4	50.2	71.3	47.9	58.4	54.6	56.9	55.3	50.8	76.6	40.9		58.6	52.5	49.3	34.4	(45.8)	48.6	54.5	55.9	51.5
White Male	38.4	30.2	41.6	46.7	25.5	42.8	33.9	40.1	36.0	31.9	42.3	16.5	47.1		32.3	44.5	39.4	55.6	(41.7)	38.5	39.0	37.4	36.8
20-24	4.1	4.2	5.1	2.3	4.3	11.5	2.7	1.0	0.3	4.3	2.4	0.9	20.8		2.6	4.5	8.4	10.8	(4.2)	5.7	3.5	4.9	3.7
25-34	9.1	5.8	8.9	15.0	3.2	11.5	7.9	10.6	6.7	4.3	9.9	2.5	14.2		7.8	8.8	9.9	18.4	(4.2)	8.9	9.7	7.9	8.8
35-44	8.7	4.5	9.6	13.8	5.3	6.2	6.7	8.7	12.8	4.3	10.4	4.6	4.0		7.6	10.8	7.0	9.6	(12.5)	8.5	8.9	8.5	8.1
45-54	6.8	3.8	8.7	8.2	4.3	5.4	6.3	8.4	6.8	10.6	8.2	2.5	3.6		5.6	8.4	7.0	8.8	(8.3)	6.5	7.3	6.0	5.1
55-64	5.1	4.1	5.7	5.6	4.3	3.7	4.6	6.6	5.3	8.5	6.2	2.1	2.6		4.8	5.7	4.2	5.2	(8.3)	5.7	5.1	4.6	6.6
65 and Over	4.6	7.7	3.6	1.8	4.3	4.5	5.6	4.8	4.1	-	5.2	3.9	1.8		4.0	6.5	2.8	2.8	(4.2)	3.2	4.4	5.4	4.4
White Female	45.3	39.8	47.3	47.8	58.5	39.6	47.9	48.2	47.3	36.2	43.9	58.3	33.9		47.0	48.3	38.0	29.2	(33.3)	33.2	47.9	44.3	42.6
20-24	5.8	4.4	7.8	4.0	10.6	12.4	6.9	2.8	1.2	6.4	5.0	2.1	17.5		5.4	4.6	9.9	10.4	(12.5)	5.7	6.0	4.9	8.8
25-34	10.1	5.6	9.3	17.7	8.5	6.8	9.0	10.4	14.2	2.1	11.9	5.0	5.1		9.5	12.7	8.4	6.4	(4.2)	6.1	11.2	9.9	5.1
35-44	8.9	4.2	11.7	10.8	9.6	4.4	6.5	10.7	13.1	12.8	10.2	7.8	1.8		8.7	11.2	5.6	4.4	(4.2)	7.7	9.9	7.8	5.1
45-54	8.2	5.8	9.5	8.5	13.8	5.2	9.4	10.2	8.6	8.5	8.4	10.1	3.3		8.7	9.6	4.2	2.4	(4.2)	6.5	9.1	7.4	5.9
55-64	5.4	6.8	5.1	4.0	5.3	4.1	6.9	6.4	5.0	2.1	4.8	9.9	2.2		6.4	4.9	2.8	2.0	(4.2)	2.4	5.5	6.2	5.9
65 and Over	6.9	13.0	3.8	2.7	10.6	6.8	9.2	7.6	5.2	4.3	3.5	23.4	4.0		8.3	5.4	7.0	3.6	(4.2)	4.9	6.2	8.2	11.8
Negro Male	6.1	11.2	4.8	1.4	2.1	7.9	6.5	4.3	5.0	12.8	5.4	6.2	9.9		8.4	2.2	-	4.8	(12.5)	8.5	5.2	6.2	10.3
Under 45	3.5	5.3	3.4	1.3	1.1	5.1	3.6	3.0	2.2	4.3	2.8	2.5	8.8		4.7	1.2	-	3.2	(8.3)	7.3	3.0	2.5	6.6
45 and Over	2.6	6.0	1.3	0.2	1.1	2.8	2.9	1.3	2.9	8.5	2.6	3.7	1.1		3.7	0.9	-	1.6	(4.2)	1.2	2.2	3.7	3.7
Negro Female	7.2	15.7	3.5	0.6	9.6	6.2	9.4	5.4	7.4	19.1	5.2	17.7	4.4		10.5	2.8	-	1.6	(12.5)	10.5	4.8	11.0	8.8
Under 45	4.2	8.1	2.8	0.6	5.3	3.2	6.7	2.3	4.6	10.6	3.2	8.5	4.4		6.0	2.0	-	0.8	(8.3)	7.7	3.1	5.3	4.4
45 and Over	3.0	7.6	0.7	-	4.3	3.0	2.7	3.1	2.7	8.5	2.0	9.2	-		4.6	0.8	-	0.8	(4.2)	2.8	1.7	5.7	4.4
Other Races, Male	1.4	1.6	1.2	1.6	1.1	1.4	1.3	1.0	2.0	-	1.5	0.7	2.2		0.7	0.8	11.3	5.2	-	4.5	1.3	0.6	1.5
Under 45	0.9	0.7	0.6	1.4	1.1	0.8	1.0	0.3	1.2	-	1.0	-	1.5		0.3	0.3	8.4	4.0	-	2.0	0.9	0.6	-
45 and Over	0.6	0.9	0.6	0.2	-	0.6	0.2	0.7	0.8	-	0.5	0.7	0.7		0.4	0.5	2.8	1.2	-	2.4	0.5	-	1.5
Other Races, Female	1.7	1.5	1.6	1.8	3.2	2.1	1.0	1.0	2.3	-	1.8	0.7	2.6		1.1	1.3	11.3	3.6	-	4.9	1.8	0.6	-
Under 45	1.1	0.8	1.2	1.3	2.1	1.7	0.8	0.5	1.4	-	1.2	-	2.6		0.6	0.9	8.4	2.8	-	2.8	1.3	0.3	-
45 and Over	0.5	0.7	0.4	0.5	1.1	0.4	0.2	0.5	1.0	-	0.6	0.7	-		0.5	0.4	2.8	0.8	-	2.0	0.5	0.3	-

a Not calculated for less than 10 persons.

Note: Percents are rounded independently and may not add to totals.
Underlined percents are based on 25-49 persons.
Percents in parentheses are based on 10-24 persons.

Source: State of California, Department of Public Health, Bureau of Chronic Diseases, Alameda County Blood Pressure Study, 1966.

Table 16

DISTRIBUTION OF FAMILY INCOME OF HEADS OF HOUSEHOLDS BY RACE

FAMILY INCOME	RACE											
	Total	White	Negro	Other	Total	White	Negro	Other	Total	White	Negro	Other
	NUMBER				PERCENT				PERCENT			
Total	1,432	1,198	200	34	100.0	100.0	100.0	100.0	100.0	83.7	14.0	2.4
Less than $2,000	127	94	31	2	8.9	7.8	15.5	5.9	100.0	74.0	24.4	1.6
$ 2,000-3,999	200	151	44	5	14.0	12.6	22.0	14.7	100.0	75.5	22.0	2.5
$ 4,000-5,999	214	160	47	7	14.9	13.4	23.5	20.6	100.0	74.8	22.0	3.3
$ 6,000-7,999	219	172	41	6	15.3	14.4	20.5	17.6	100.0	78.5	18.7	2.7
$ 8,000-9,999	229	202	22	5	16.0	16.9	11.0	14.7	100.0	88.2	9.6	2.2
$10,000-14,999	269	250	13	6	18.8	20.9	6.5	17.6	100.0	92.9	4.8	2.2
$15,000-24,999	90	89	-	1	6.3	7.4	-	2.9	100.0	98.9	-	1.1
$25,000 and Over	36	36	-	-	2.5	3.0	-	-	100.0	100.0	-	-
Unknown	48	44	2	2	3.4	3.7	1.0	5.9	100.0	91.7	4.2	4.2

Note: Percents are rounded independently and may not add to totals.
Underlined percents are based on 25-49 persons.

Source: State of California, Department of Public Health, Bureau of Chronic Diseases, Alameda County Blood Pressure Study, 1966.

Table 17

STUDY POPULATION BY RACE, SEX AND PLACE OF BIRTH

PLACE OF BIRTH	TOTAL			WHITE			NEGRO			OTHER		
	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female
	NUMBER											
Total	2,605	1,193	1,412	2,183	1,000	1,183	342	156	186	80	37	43
U.S. Born	2,256	1,029	1,227	1,889	863	1,026	332	151	181	35	15	20
Northeast	174	80	94	170	77	93	4	3	1	-	-	-
North Central	493	231	262	466	216	250	27	15	12	-	-	-
South Atlantic	59	27	32	48	25	23	11	2	9	-	-	-
South Central	478	210	268	214	94	120	263	116	147	1	-	1
California	759	354	405	717	331	386	22	14	8	20	9	11
Other West	289	125	164	270	118	152	5	1	4	14	6	8
U.S. Unknown	4	2	2	4	2	2	-	-	-	-	-	-
Foreign Born	331	154	177	281	129	152	5	3	2	45	22	23
Unknown	18	10	8	13	8	5	5	2	3	-	-	-
	PERCENT											
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
U.S. Born	86.6	86.3	86.9	86.5	86.3	86.7	97.1	96.8	97.3	43.8	40.5	46.5
Northeast	6.7	6.7	6.7	7.8	7.7	7.9	1.2	1.9	0.5	-	-	-
North Central	18.9	19.4	18.6	21.3	21.6	21.1	7.9	9.6	6.5	-	-	-
South Atlantic	2.3	2.3	2.3	2.2	2.5	1.9	3.2	1.3	4.8	-	-	-
South Central	18.3	17.6	19.0	9.8	9.4	10.1	76.9	74.4	79.0	1.2	-	2.3
California	29.1	29.7	28.7	32.8	33.1	32.6	6.4	9.0	4.3	25.0	24.3	25.6
Other West	11.1	10.5	11.6	12.4	11.8	12.8	1.5	0.6	2.2	17.5	16.2	18.6
U.S. Unknown	0.2	0.2	0.1	0.2	0.2	0.2	-	-	-	-	-	-
Foreign Born	12.7	12.9	12.5	12.9	12.9	12.8	1.5	1.9	1.1	56.2	59.5	53.5
Unknown	0.7	0.8	0.6	0.6	0.8	0.4	1.5	1.3	1.6	-	-	-
	PERCENT											
Total	100.0	45.8	54.2	100.0	45.8	54.2	100.0	45.6	54.4	100.0	46.2	53.8
U.S. Born	100.0	45.6	54.4	100.0	45.7	54.3	100.0	45.5	54.5	100.0	42.9	57.1
Northeast	100.0	46.0	54.0	100.0	45.3	54.7	a			-	-	-
North Central	100.0	46.9	53.1	100.0	46.4	53.6	100.0	55.6	44.4	-	-	-
South Atlantic	100.0	45.8	54.2	100.0	52.1	47.9	(100.0)	(18.2)	(81.8)	-	-	-
South Central	100.0	43.9	56.1	100.0	43.9	56.1	100.0	44.1	55.9	a		
California	100.0	46.6	53.4	100.0	46.2	53.8	(100.0)	(63.6)	(36.4)	(100.0)	(45.0)	(55.0)
Other West	100.0	43.3	56.7	100.0	43.7	56.3	a			100.0	(42.9)	(57.1)
U.S. Unknown	a			a			-	-	-	-	-	-
Foreign Born	100.0	46.5	53.5	100.0	45.9	54.1	a			100.0	48.9	51.1
Unknown	(100.0)	(55.6)	(44.4)	(100.0)	(61.5)	(38.5)	a			-	-	-

[a] Not calculated for less than 10 persons.

Note: Percents are rounded independently and may not add to totals.
Underlined percents are based on 25-49 persons.
Percents in parentheses are based on 10-24 persons.

Source: State of California, Department of Public Health, Bureau of Chronic Diseases, Alameda County Blood Pressure Study, 1966.

Table 18

STUDY POPULATION BY RACE, SEX AND NUMBER OF YEARS LIVED IN PRESENT TOWN OR CITY

NUMBER OF YEARS IN PRESENT TOWN OR CITY	TOTAL	WHITE			NEGRO			OTHER		
		Total	Male	Female	Total	Male	Female	Total	Male	Female
	NUMBER									
Total	2,605	2,183	1,000	1,183	342	156	186	80	37	43
Less than 1	173	160	74	86	9	4	5	4	2	2
1-5	878	751	356	395	89	44	45	38	14	24
6-10	391	335	161	174	48	18	30	8	4	4
11 or More	1,141	919	403	516	192	89	103	30	17	13
Unknown	22	18	6	12	4	1	3	-	-	-
	PERCENT									
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Less than 1	6.6	7.3	7.4	7.3	2.6	2.6	2.7	5.0	5.4	4.7
1-5	33.7	34.4	35.6	33.4	26.0	28.2	24.2	47.5	37.8	55.8
6-10	15.0	15.3	16.1	14.7	14.0	11.5	16.1	10.0	10.8	9.3
11 or More	43.8	42.1	40.3	43.6	56.1	57.1	55.4	37.5	45.9	30.2
Unknown	0.8	0.8	0.6	1.0	1.2	0.6	1.6	-	-	-

Note: Percents are rounded independently and may not add to totals.
Underlined percents are based on 25-49 persons.

Source: State of California, Department of Public Health, Bureau of Chronic Diseases, Alameda County Blood Pressure Study, 1966.

Table 19

SYSTOLIC BLOOD PRESSURE FOR WHITES BY AGE AND SEX

SYSTOLIC BLOOD PRESSURE	TOTAL	20-24	25-34	35-44	45-54	55-64	65-74	75 AND OVER	TOTAL	20-24	25-34	35-44	45-54	55-64	65-74	75 AND OVER	TOTAL	20-24	25-34	35-44	45-54	55-64	65-74	75 AND OVER
	Number								Percent								Percent							
	MALE																							
Total	988	105	235	225	174	131	83	35	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	10.6	23.8	22.8	17.6	13.3	8.4	3.5
Less than 95	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
95-104	15	1	8	4	-	1	1	-	1.5	1.0	3.4	1.8	-	0.8	1.2	-	(100.0)	(6.7)	(53.3)	(26.7)	-	(6.7)	(6.7)	-
105-114	139	20	40	39	17	15	6	2	14.1	19.0	17.0	17.3	9.8	11.4	7.2	5.7	100.0	14.4	28.8	28.1	12.2	10.8	4.3	1.4
115-124	265	33	81	72	46	21	9	3	26.8	31.4	34.5	32.0	26.4	16.0	10.8	8.6	100.0	12.5	30.6	27.2	17.4	7.9	3.4	1.1
125-134	246	34	63	54	45	30	15	5	24.9	32.4	26.8	24.0	25.9	22.9	18.1	14.3	100.0	13.8	25.6	22.0	18.3	12.2	6.1	2.0
135-144	141	16	34	30	26	20	11	4	14.3	15.2	14.5	13.3	14.9	15.3	13.3	11.4	100.0	11.3	24.1	21.3	18.4	14.2	7.8	2.8
145-154	75	1	7	17	16	13	15	6	7.6	1.0	3.0	7.6	9.2	9.9	18.1	17.1	100.0	1.3	9.3	22.7	21.3	17.3	20.0	8.0
155-164	43	-	1	2	12	11	14	3	4.4	-	0.4	0.9	6.9	8.4	16.9	8.6	100.0	-	2.3	4.7	27.9	25.6	32.6	7.0
165-174	29	-	1	5	7	8	2	6	2.9	-	0.4	2.2	4.0	6.1	2.4	17.1	100.0	-	3.4	17.2	24.1	27.6	6.9	20.7
175-184	20	-	-	1	4	5	7	3	2.0	-	-	0.4	2.3	3.8	8.4	8.6	(100.0)	-	-	(5.0)	(20.0)	(25.0)	(35.0)	(15.0)
185 and Over	15	-	-	1	1	7	3	3	1.5	-	-	0.4	0.6	5.3	3.6	8.6	(100.0)	-	-	(6.7)	(6.7)	(46.7)	(20.0)	(20.0)
	FEMALE																							
Total	1,166	150	259	229	211	139	107	71	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	12.9	22.2	19.6	18.1	11.9	9.2	6.1
Less than 95	11	3	4	3	1	-	-	-	0.9	2.0	1.5	1.3	0.5	-	-	-	(100.0)	(27.3)	(36.4)	(27.3)	(9.1)	-	-	-
95-104	93	18	37	21	16	1	-	-	8.0	12.0	14.3	9.2	7.6	0.7	-	-	100.0	19.4	39.8	22.6	17.2	1.1	-	-
105-114	283	65	100	63	39	8	8	-	24.3	43.3	38.6	27.5	18.5	5.8	7.5	-	100.0	23.0	35.3	22.3	13.8	2.8	2.8	-
115-124	272	45	79	69	48	16	12	3	23.3	30.0	30.5	30.1	22.7	11.5	11.2	4.2	100.0	16.5	29.0	25.4	17.6	5.9	4.4	1.1
125-134	170	13	28	37	39	32	16	5	14.6	8.7	10.8	16.2	18.5	23.0	15.0	7.0	100.0	7.6	16.5	21.8	22.9	18.8	9.4	2.9
135-144	112	5	8	23	25	26	17	8	9.6	3.3	3.1	10.0	11.8	18.7	15.9	11.3	100.0	4.5	7.1	20.5	22.3	23.2	15.2	7.1
145-154	66	-	2	4	19	20	10	11	5.7	-	0.8	1.7	9.0	14.4	9.3	15.5	100.0	-	3.0	6.1	28.8	30.3	15.2	16.7
155-164	64	1	1	7	10	16	18	11	5.5	0.7	0.4	3.1	4.7	11.5	16.8	15.5	100.0	1.6	1.6	10.9	15.6	25.0	28.1	17.2
165-174	32	-	-	1	4	9	9	9	2.7	-	-	0.4	1.9	6.5	8.4	12.7	100.0	-	-	3.1	12.5	28.1	28.1	28.1
175-184	29	-	-	-	8	3	6	12	2.5	-	-	-	3.8	2.2	5.6	16.9	100.0	-	-	-	27.6	10.3	20.7	41.4
185 and Over	34	-	-	1	2	8	11	12	2.9	-	-	0.4	0.9	5.8	10.3	16.9	100.0	-	-	2.9	5.9	23.5	32.4	35.3

Note: Percents are rounded independently and may not add to totals.
Underlined percents are based on 25-49 persons.
Percents in parentheses are based on 10-24 persons.

Source: State of California, Department of Public Health, Bureau of Chronic Diseases, Alameda County Blood Pressure Study, 1966.

Table 20

SYSTOLIC AND DIASTOLIC BLOOD PRESSURE FOR NEGROES BY SEX AND TWO AGE GROUPS

SYSTOLIC AND DIASTOLIC BLOOD PRESSURE	MALE									FEMALE								
	Total	Under 45	45 and Over	Total	Under 45	45 and Over	Total	Under 45	45 and Over	Total	Under 45	45 and Over	Total	Under 45	45 and Over	Total	Under 45	45 and Over
	Number			Percent			Percent			Number			Percent			Percent		
	SYSTOLIC BLOOD PRESSURE																	
Total	156	89	67	100.0	100.0	100.0	100.0	57.1	42.9	185	108	77	100.0	100.0	100.0	100.0	58.4	41.6
Less than 95	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
95-104	2	1	1	1.3	1.1	1.5	a			12	11	1	6.5	10.2	1.3	(100.0)	(91.7)	(8.3)
105-114	10	9	1	6.4	10.1	1.5	(100.0)	(90.0)	(10.0)	37	31	6	20.0	28.7	7.8	100.0	83.8	16.2
115-124	34	27	7	21.8	30.3	10.4	100.0	79.4	20.6	48	37	11	25.9	34.3	14.3	100.0	77.1	22.9
125-134	41	28	13	26.3	31.5	19.4	100.0	68.3	31.7	20	9	11	10.8	8.3	14.3	(100.0)	(45.0)	(55.0)
135-144	32	13	19	20.5	14.6	28.4	100.0	40.6	59.4	18	9	9	9.7	8.3	11.7	(100.0)	(50.0)	(50.0)
145-154	14	6	8	9.0	6.7	11.9	(100.0)	(42.9)	(57.1)	20	7	13	10.8	6.5	16.9	(100.0)	(35.0)	(65.0)
155-164	9	2	7	5.8	2.2	10.4	a			9	2	7	4.9	1.9	9.1	a		
165-174	7	2	5	4.5	2.2	7.5	a			7	1	6	3.8	0.9	7.8	a		
175-184	3	1	2	1.9	1.1	3.0	a			3	-	3	1.6	-	3.9	a		
185 and Over	4	-	4	2.6	-	6.0	a			11	1	10	5.9	0.9	13.0	(100.0)	(9.1)	(90.9)
	DIASTOLIC BLOOD PRESSURE																	
Total	156	89	67	100.0	100.0	100.0	100.0	57.1	42.9	185	108	77	100.0	100.0	100.0	100.0	58.4	41.6
Less than 35	6	3	3	3.8	3.4	4.5	a			3	2	1	1.6	1.9	1.3	a		
35-44	3	2	1	1.9	2.2	1.5	a			1	1	-	0.5	0.9	-	a		
45-54	2	1	1	1.3	1.1	1.5	a			9	8	1	4.9	7.4	1.3	a		
55-64	11	11	-	7.1	12.4	-	(100.0)	(100.0)	-	24	17	7	13.0	15.7	9.1	(100.0)	(70.8)	(29.2)
65-74	46	32	14	29.5	36.0	20.9	100.0	69.6	30.4	52	37	15	28.1	34.3	19.5	100.0	71.2	28.8
75-84	34	22	12	21.8	24.7	17.9	100.0	64.7	35.3	44	27	17	23.8	25.0	22.1	100.0	61.4	38.6
85-94	31	12	19	19.9	13.5	28.4	100.0	38.7	61.3	29	8	21	15.7	7.4	27.3	100.0	27.6	72.4
95-104	16	4	12	10.3	4.5	17.9	(100.0)	(25.0)	(75.0)	17	6	11	9.2	5.6	14.3	(100.0)	(35.3)	(64.7)
105-114	5	2	3	3.2	2.2	4.5	a			3	2	1	1.6	1.9	1.3	a		
115-124	2	-	2	1.3	-	3.0	a			3	-	3	1.6	-	3.9	a		
125 and Over	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

[a] Not calculated for less than 10 persons.

Note: Percents are rounded independently and may not add to totals.
Underlined percents are based on 25-49 persons.
Percents in parentheses are based on 10-24 persons.

Source: State of California, Department of Public Health, Bureau of Chronic Diseases, Alameda County Blood Pressure Study, 1966.

Table 21

DIASTOLIC BLOOD PRESSURE FOR WHITES BY AGE AND SEX

DIASTOLIC BLOOD PRESSURE	TOTAL	20-24	25-34	35-44	45-54	55-64	65-74	75 AND OVER	TOTAL	20-24	25-34	35-44	45-54	55-64	65-74	75 AND OVER	TOTAL	20-24	25-34	35-44	45-54	55-64	65-74	75 AND OVER
	Number								Percent								Percent							
	MALE																							
Total	988	105	235	225	174	131	83	35	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	10.6	23.8	22.8	17.6	13.3	8.4	3.5
Less than 35	7	1	1	2	-	2	-	1	0.7	1.0	0.4	0.9	-	1.5	-	2.9	a							
35-44	7	3	2	-	-	1	-	1	0.7	2.9	0.9	-	-	0.8	-	2.9	a							
45-54	30	12	11	-	3	-	3	1	3.0	11.4	4.7	-	1.7	-	3.6	2.9	100.0	40.0	36.7	-	10.0	-	10.0	3.3
55-64	134	29	47	26	10	5	8	9	13.6	27.6	20.0	11.6	5.7	3.8	9.6	25.7	100.0	21.6	35.1	19.4	7.5	3.7	6.0	6.7
65-74	288	30	90	59	40	31	27	11	29.1	28.6	38.3	26.2	23.0	23.7	32.5	31.4	100.0	10.4	31.2	20.5	13.9	10.8	9.4	3.8
75-84	297	25	56	89	59	46	18	4	30.1	23.8	23.8	39.6	33.9	35.1	21.7	11.4	100.0	8.4	18.9	30.0	19.9	15.5	6.1	1.3
85-94	148	4	22	34	37	29	17	5	15.0	3.8	9.4	15.1	21.3	22.1	20.5	14.3	100.0	2.7	14.9	23.0	25.0	19.6	11.5	3.4
95-104	57	1	6	11	21	9	6	3	5.8	1.0	2.6	4.9	12.1	6.9	7.2	8.6	100.0	1.8	10.5	19.3	36.8	15.8	10.5	5.3
105-114	15	-	-	1	4	6	4	-	1.5	-	-	0.4	2.3	4.6	4.8	-	(100.0)	-	-	(6.7)	(26.7)	(40.0)	(26.7)	-
115-124	4	-	-	2	-	2	-	-	0.4	-	-	0.9	-	1.5	-	-	a							
125 and Over	1	-	-	1	-	-	-	-	0.1	-	-	0.4	-	-	-	-	a							
	FEMALE																							
Total	1,166	150	259	229	211	139	107	71	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	12.9	22.2	19.6	18.1	11.9	9.2	6.1
Less than 35	20	6	1	2	2	1	3	5	1.7	4.0	0.4	0.9	0.9	0.7	2.8	7.0	(100.0)	(30.0)	(5.0)	(10.0)	(10.0)	(5.0)	(15.0)	(25.0)
35-44	15	6	5	-	1	1	1	1	1.3	4.0	1.9	-	0.5	0.7	0.9	1.4	(100.0)	(40.0)	(33.3)	-	(6.7)	(6.7)	(6.7)	(6.7)
45-54	42	16	8	3	5	4	1	5	3.6	10.7	3.1	1.3	2.4	2.9	0.9	7.0	100.0	38.1	19.0	7.1	11.9	9.5	2.4	11.9
55-64	237	51	92	39	26	7	13	9	20.3	34.0	35.5	17.0	12.3	5.0	12.1	12.7	100.0	21.5	38.8	16.5	11.0	3.0	5.5	3.8
65-74	367	46	90	78	67	31	39	16	31.5	30.7	34.7	34.1	31.8	22.3	36.4	22.5	100.0	12.5	24.5	21.3	18.3	8.4	10.6	4.4
75-84	302	21	50	76	62	52	23	18	25.9	14.0	19.3	33.2	29.4	37.4	21.5	25.4	100.0	7.0	16.6	25.2	20.5	17.2	7.6	6.0
85-94	126	3	10	22	37	30	13	11	10.8	2.0	3.9	9.6	17.5	21.6	12.1	15.5	100.0	2.4	7.9	17.5	29.4	23.8	10.3	8.7
95-104	41	-	3	7	7	9	12	3	3.5	-	1.2	3.1	3.3	6.5	11.2	4.2	100.0	-	7.3	17.1	17.1	22.0	29.3	7.3
105-114	12	1	-	2	3	3	1	2	1.0	0.7	-	0.9	1.4	2.2	0.9	2.8	(100.0)	(8.3)	-	(16.7)	(25.0)	(25.0)	(8.3)	(16.7)
115-124	3	-	-	-	1	1	1	-	.3	-	-	-	0.5	0.7	0.9	-	a							
125 and Over	1	-	-	-	-	-	-	1	.1	-	-	-	-	-	-	1.4	a							

a Not calculated for less than 10 persons.

Note: Percents are rounded independently and may not add to totals.
Underlined percents are based on 25-49 persons.
Percents in parentheses are based on 10-24 persons.

Source: State of California, Department of Public Health, Bureau of Chronic Diseases, Alameda County Blood Pressure Study, 1966.

Table 22

MEANS AND SAMPLING ERRORS FOR SYSTOLIC AND DIASTOLIC BLOOD PRESSURE BY RACE, SEX AND AGE

RACE, SEX AND AGE	SYSTOLIC BLOOD PRESSURE		DIASTOLIC BLOOD PRESSURE	
	Mean	Sampling Error	Mean	Sampling Error
White Male				
20-24	123.8	6.19	66.5	5.12
25-34	123.5	2.84	71.2	3.84
35-44	126.9	5.71	77.0	3.77
45-54	133.2	6.13	80.8	5.98
55-64	139.3	7.66	80.8	6.06
65 and Over	146.1	8.77	75.3	6.02
White Female				
20-24	113.7	3.41	62.0	8.56
25-34	114.4	2.63	67.4	2.16
35-44	120.3	3.73	73.3	3.23
45-54	129.1	6.46	75.1	3.53
55-64	142.6	8.70	78.7	4.56
65 and Over	155.0	8.22	73.4	5.28
Negro Male				
Under 45	128.2	4.62	72.4	4.05
45 and Over	144.6	7.95	81.8	8.83
Negro Female				
Under 45	120.5	4.34	70.8	4.74
45 and Over	148.8	12.35	81.8	7.28
All Other	122.5	7.96	73.9	4.29

Source: State of California, Department of Public Health, Bureau of Chronic Diseases, Alameda County Blood Pressure Study, 1966.

Table 23

BLOOD PRESSURE PERCENTILES (25th, 75th) FOR RACE, SEX AND AGE

RACE, SEX AND AGE	SYSTOLIC		DIASTOLIC	
	25th	75th	25th	75th
White Male				
20-24	115.9	132.9	61.0	76.6
25-34	116.6	131.2	64.7	78.8
35-44	117.4	134.9	70.6	83.5
45-54	121.1	143.2	73.5	90.2
55-64	121.9	153.2	73.5	88.1
65-74	128.3	158.1	68.4	87.4
75 and Over	131.5	169.2	61.5	82.0
White Female				
20-24	108.2	118.1	56.9	70.4
25-34	107.7	120.6	61.1	74.8
35-44	111.0	127.1	67.6	79.6
45-54	113.9	141.4	69.2	83.6
55-64	127.6	152.1	72.0	86.8
65-74	128.9	164.2	68.6	85.1
75 and Over	145.9	181.5	63.4	84.6
Negro Male				
20-24	120.2	131.8	61.6	74.5
25-34	119.2	132.2	67.9	82.2
35-44	117.5	138.2	73.2	89.8
45-54	133.0	153.8	75.5	98.8
55-64	129.5	153.2	72.8	92.8
65-74	129.4	144.9	70.2	93.5
75 and Over	81.5	176.0	1.0	36.0
Negro Female				
20-24	107.0	120.8	54.5	71.8
25-34	107.5	124.0	61.0	76.8
35-44	113.8	135.2	69.2	82.5
45-54	117.5	160.0	69.8	91.8
55-64	134.0	157.0	72.0	90.5
65-74	125.0	157.0	63.0	84.0
75 and Over	132.5	210.0	55.5	92.5

Note: Underlined values are based on less than 10 persons.

Source: State of California, Department of Public Health, Bureau of Chronic Diseases, Alameda County Blood Pressure Study, 1966.

Table 24

PREVALENCE OF HYPERTENSIVES, BORDERLINES AND NORMOTENSIVES[1] BY RACE, SEX AND AGE

AGE	WHITE								NEGRO							
	Male				Female				Male				Female			
	Total	Hyper-tensive	Border-line	Normo-tensive	Total	Hyper-tensive	Border-line	Normo-tensive	Total	Hyper-tensive	Border-line	Normo-tensive	Total	Hyper-tensive	Border-line	Normo-tensive
	NUMBER															
Total	988	121	149	718	1,166	141	145	880	156	31	31	94	185	32	31	122
20-24	105	1	7	97	150	1	3	146	23	1	2	20	21	-	1	20
25-34	235	7	19	209	259	4	5	250	43	2	8	33	44	3	2	39
35-44	225	15	34	176	229	9	21	199	23	4	2	17	43	5	6	32
45-54	174	35	28	111	211	21	38	152	27	11	6	10	30	10	6	14
55-64	131	28	24	79	139	32	32	75	25	8	7	10	32	8	13	11
65-74	83	21	27	35	107	36	27	44	13	3	6	4	8	2	3	3
75 and Over	35	14	10	11	71	38	19	14	2	2	-	-	7	4	-	3
	PERCENT															
Total	100.0	12.2	15.1	72.7	100.0	12.1	12.4	75.5	100.0	19.9	19.9	60.3	100.0	17.3	16.8	65.9
20-24	100.0	1.0	6.7	92.4	100.0	0.7	2.0	97.3	(100.0)	(4.3)	(8.7)	(87.0)	(100.0)	-	(4.8)	(95.2)
25-34	100.0	3.0	8.1	88.9	100.0	1.5	1.9	96.5	100.0	4.7	18.6	76.7	100.0	6.8	4.5	88.6
35-44	100.0	6,7	15.1	78.2	100.0	3.9	9.2	86.9	(100.0)	(17.4)	(8.7)	(73.9)	100.0	11.6	14.0	74.4
45-54	100.0	20.1	16.1	63.8	100.0	10.0	18.0	72.0	100.0	40.7	22.2	37.0	100.0	33.3	20.0	46.7
55-64	100.0	21.4	18.3	60.3	100.0	23.0	23.0	54.0	100.0	32.0	28.0	40.0	100.0	25.0	40.6	34.4
65-74	100.0	25.3	32.5	42.2	100.0	33.6	25.2	41.1	(100.0)	(23.1)	(46.2)	(30.8)	a			
75 and Over	100.0	40.0	28.6	31.4	100.0	53.5	26.8	19.7	a				a			
	PERCENT															
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
20-24	10.6	0.8	4.7	13.5	12.9	0.7	2.1	16.6	14.7	3.2	6.5	21.3	11.4	-	3.2	16.4
25-34	23.8	5.8	12.8	29.1	22.2	2.8	3.4	28.4	27.6	6.5	25.8	35.1	23.8	9.4	6.5	32.0
35-44	22.8	12.4	22.8	24.5	19.6	6.4	14.5	22.6	14.7	12.9	6.5	18.1	23.2	15.6	19.4	26.2
45-54	17.6	28.9	18.8	15.5	18.1	14.9	26.2	17.3	17.3	35.5	19.4	10.6	16.2	31.2	19.4	11.5
55-64	13.3	23.1	16.1	11.0	11.9	22.7	22.1	8.5	16.0	25.8	22.6	10.6	17.3	25.0	41.9	9.0
65-74	8.4	17.4	18.1	4.9	9.2	25.5	18.6	5.0	8.3	9.7	19.4	4.3	4.3	6.2	9.7	2.5
75 and Over	3.5	11.6	6.7	1.5	6.1	27.0	13.1	1.6	1.3	6.5	-	-	3.8	12.5	-	2.5

[1] Hypertensive - Systolic - 160 mm Hg and over or Diastolic - 95 mm Hg and over.
Normotensive - Systolic - under 140 mm Hg and Diastolic - under 90 mm Hg.
Borderline - remainder of values.

[a] Not calculated for less than 10 persons.

Note: Percents are rounded independently and may not add to totals.
Underlined percents are based on 25-49 persons.
Percents in parentheses are based on 10-24 persons.

Source: State of California, Department of Public Health, Bureau of Chronic Diseases, Alameda County Blood Pressure Study, 1966.

Table 25

MEAN SYSTOLIC BLOOD PRESSURE (mm Hg) BY RACE, SEX, AGE AND PONDERAL INDEX[1]

AGE AND PONDERAL INDEX	WHITE				NEGRO			
	Male		Female		Male		Female	
	No.	Mean	No.	Mean	No.	Mean	No.	Mean
25-44								
Heavy	114	130.8	121	121.5	14	131.9	39	124.6
Moderately Heavy	152	125.6	117	116.7	21	128.7	21	119.7
Moderately Light	127	122.1	168	116.1	17	126.3	17	116.6
Light	67	120.3	82	113.7	14	126.1	10	121.9
Unknown	-	-	-	-	-	-	-	-
45-64								
Heavy	108	141.9	140	139.3	18	148.3	42	143.9
Moderately Heavy	100	134.0	107	133.7	12	141.5	12	158.3
Moderately Light	71	130.1	75	127.2	13	142.2	5	a
Light	26	132.9	26	132.8	9	a	2	a
Unknown	-	-	2	a	-	-	1	a

[1] Ponderal index = height ÷ $\sqrt[3]{\text{weight}}$

[a] Not calculated for less than 10 persons.

Source: State of California, Department of Public Health, Bureau of Chronic Diseases, Alameda County Blood Pressure Study, 1966.

Table 26

MEAN DIASTOLIC BLOOD PRESSURE (mm Hg) BY RACE, SEX, AGE AND PONDERAL INDEX[1]

AGE AND PONDERAL INDEX	WHITE				NEGRO			
	Male		Female		Male		Female	
	No.	Mean	No.	Mean	No.	Mean	No.	Mean
25-44								
Heavy	114	78.4	121	74.9	14	80.8	39	73.1
Moderately Heavy	152	74.6	117	70.4	21	78.1	21	72.6
Moderately Light	127	72.2	168	68.3	17	71.5	17	71.8
Light	67	68.7	82	66.4	14	66.1	10	72.0
Unknown	-	-	-	-	-	-	-	-
45-64								
Heavy	108	83.6	140	77.9	18	89.0	42	83.6
Moderately Heavy	100	80.0	107	76.4	12	82.0	12	87.1
Moderately Light	71	78.6	75	74.1	13	83.4	5	a
Light	26	78.3	26	77.0	9	a	2	a
Unknown	-	-	2	a	-	-	1	a

[1] Ponderal Index = height ÷ $\sqrt[3]{\text{weight}}$

[a] Not calculated for less than 10 persons.

Source: State of California, Department of Public Health, Bureau of Chronic Diseases, Alameda County Blood Pressure Study, 1966.

Table 27

MEAN SYSTOLIC BLOOD PRESSURE (mm Hg) BY RACE, SEX, AGE AND FRAMINGHAM RELATIVE BODY WEIGHT[1]

AGE AND FRAMINGHAM RELATIVE BODY WEIGHT	WHITE				NEGRO			
	Male		Female		Male		Female	
	No.	Mean	No.	Mean	No.	Mean	No.	Mean
25-44								
1- 89	86	119.4	170	115.2	19	123.3	22	117.0
90- 99	126	122.6	152	115.9	15	130.9	20	117.4
100-109	143	126.5	85	117.5	16	128.7	14	123.3
110-119	67	126.5	26	119.3	8	a	10	128.8
120 and Over	37	139.8	53	125.3	8	a	21	125.7
Unknown	1	a	2	a	-	-	-	-
45-64								
1- 89	37	131.7	69	130.3	13	136.2	7	152.7
90- 99	89	131.6	101	129.4	9	142.6	6	149.0
100-109	90	135.5	84	138.0	17	142.6	9	137.0
110-119	55	140.2	52	134.8	4	a	10	145.3
120 and Over	34	144.8	42	145.9	9	a	29	146.8
Unknown	-	-	2	a	-	-	1	a

[1] See Appendix D: Definitions of Variables.

[a] Not calculated for less than 10 persons.

Source: State of California, Department of Public Health, Bureau of Chronic Diseases, Alameda County Blood Pressure Study, 1966.

Table 28

MEAN DIASTOLIC BLOOD PRESSURE (mm Hg) BY RACE, SEX, AGE AND FRAMINGHAM RELATIVE BODY WEIGHT[1]

AGE AND FRAMINGHAM RELATIVE BODY WEIGHT	WHITE				NEGRO			
	Male		Female		Male		Female	
	No.	Mean	No.	Mean	No.	Mean	No.	Mean
25-44								
1- 89	86	68.2	170	67.8	19	67.7	22	68.3
90- 99	126	72.8	152	69.2	15	73.3	20	73.6
100-109	143	75.5	85	70.3	16	77.4	14	70.6
110-119	67	74.7	26	72.7	8	a	10	80.2
120 and Over	37	84.2	53	78.4	8	a	21	74.0
Unknown	1	a	2	a	-	-	-	-
45-64								
1- 89	37	78.9	69	75.2	13	76.2	7	86.1
90- 99	89	78.4	101	74.3	9	85.3	6	79.2
100-109	90	80.0	84	77.4	17	84.0	9	80.9
110-119	55	83.1	52	78.9	4	a	10	85.1
120 and Over	34	87.6	42	79.4	9	a	29	84.4
Unknown	-	-	2	a	-	-	1	a

[1] See Appendix D: Definitions of Variables.

[a] Not calculated for less than 10 persons.

Source: State of California, Department of Public Health, Bureau of Chronic Diseases, Alameda County Blood Pressure Study, 1966.

Table 29

MEAN SYSTOLIC BLOOD PRESSURE (mm Hg) BY RACE, SEX, AGE AND METROPOLITAN LIFE INSURANCE BODY WEIGHT STANDARDS[1]

AGE AND METROPOLITAN LIFE INSURANCE BODY WEIGHT STANDARDS	WHITE				NEGRO			
	Male		Female		Male		Female	
	No.	Mean	No.	Mean	No.	Mean	No.	Mean
25-44								
Underweight	11	113.7	14	114.9	1	a	3	a
Normal	173	121.6	247	115.3	29	125.2	28	115.8
Moderately Overweight	108	124.2	83	115.9	13	129.8	14	119.9
Markedly Overweight	158	130.7	130	121.1	23	131.0	41	126.0
Unknown	10	123.9	14	123.6	-	-	1	a
45-64								
Underweight	8	a	5	a	2	a	1	a
Normal	85	132.4	104	128.1	19	138.5	10	149.7
Moderately Overweight	73	133.5	79	131.0	7	a	3	a
Markedly Overweight	131	140.0	152	139.8	22	143.9	46	146.0
Unknown	8	a	10	134.9	2	a	2	a

[1] See Appendix D: Definitions of Variables.

[a] Not calculated for less than 10 persons.

Source: State of California, Department of Public Health, Bureau of Chronic Diseases, Alameda County Blood Pressure Study, 1966.

Table 30

MEAN DIASTOLIC BLOOD PRESSURE (mm Hg) BY RACE, SEX, AGE AND METROPOLITAN LIFE INSURANCE BODY WEIGHT STANDARDS[1]

AGE AND METROPOLITAN LIFE INSURANCE BODY WEIGHT STANDARDS	WHITE				NEGRO			
	Male		Female		Male		Female	
	No.	Mean	No.	Mean	No.	Mean	No.	Mean
25-44								
Underweight	11	68.4	14	68.1	1	a	3	a
Normal	173	70.8	247	67.8	29	70.1	28	69.6
Moderately Overweight	108	74.2	83	70.0	13	74.5	14	72.9
Markedly Overweight	158	77.6	130	74.0	23	80.7	41	74.5
Unknown	10	77.1	14	79.2	-	-	1	a
45-64								
Underweight	8	a	5	a	2	a	1	a
Normal	85	79.2	104	73.7	19	78.9	10	81.8
Moderately Overweight	73	78.1	79	75.5	7	a	3	a
Markedly Overweight	131	83.9	152	78.7	22	85.3	46	84.7
Unknown	8	a	10	76.7	2	a	2	a

[1] See Appendix D: Definitions of Variables.

[a] Not calculated for less than 10 persons.

Source: State of California, Department of Public Health, Bureau of Chronic Diseases, Alameda County Blood Pressure Study, 1966.

Table 31

MEAN SYSTOLIC AND DIASTOLIC BLOOD PRESSURE (mm Hg)
FOR MALES BY RACE, AGE AND WEIGHT

WEIGHT IN POUNDS	WHITE				NEGRO			
	25-44		45-64		25-44		45-64	
	No.	Mean	No.	Mean	No.	Mean	No.	Mean
	SYSTOLIC BLOOD PRESSURE							
Under 145	69	118.0	31	130.6	8	a	10	133.8
145-164	99	123.7	85	130.7	17	128.0	14	144.3
165-184	153	125.0	96	137.2	21	129.1	11	144.0
185-204	87	126.1	66	136.6	13	128.8	10	143.1
205 and Over	52	136.4	27	151.0	7	a	7	a
	DIASTOLIC BLOOD PRESSURE							
Under 145	69	70.1	31	76.9	8	a	10	78.1
145-164	99	70.4	85	77.9	17	70.9	14	82.1
165-184	153	73.8	96	80.8	21	75.3	11	79.3
185-204	87	77.2	66	82.3	13	75.8	10	87.8
205 and Over	52	81.3	27	91.0	7	a	7	a

[a] Not calculated for less than 10 persons.

Source: State of California, Department of Public Health, Bureau of Chronic Diseases, Alameda County Blood Pressure Study, 1966.

Table 32

MEAN SYSTOLIC AND DIASTOLIC BLOOD PRESSURE (mm Hg)
FOR FEMALES BY RACE, AGE AND WEIGHT

WEIGHT IN POUNDS	WHITE				NEGRO			
	25-44		45-64		25-44		45-64	
	No.	Mean	No.	Mean	No.	Mean	No.	Mean
	SYSTOLIC BLOOD PRESSURE							
Under 115	77	115.7	28	137.6	12	118.3	3	a
115-129	154	114.6	90	127.8	17	116.8	7	a
130-144	136	116.7	98	134.5	19	117.8	8	a
145-159	49	118.0	67	135.4	13	132.2	13	140.6
160 and Over	72	124.6	66	141.2	26	123.6	31	149.2
	DIASTOLIC BLOOD PRESSURE							
Under 115	77	69.5	28	78.5	12	72.0	3	a
115-129	154	67.0	90	73.8	17	70.3	7	a
130-144	136	70.4	98	75.4	19	73.1	8	a
145-159	49	69.7	67	78.6	13	72.1	13	81.3
160 and Over	72	77.3	66	79.0	26	74.3	31	85.3

[a] Not calculated for less than 10 persons.

Source: State of California, Department of Public Health, Bureau of Chronic Diseases, Alameda County Blood Pressure Study, 1966.

Table 33

CORRELATION COEFFICIENTS OF SYSTOLIC AND DIASTOLIC BLOOD AND SELECTED WEIGHT INDICATORS BY RACE, SEX AND AGE

RACE, SEX AND AGE GROUP	PONDERAL INDEX			FRAMINGHAM RELATIVE BODY WEIGHT			METROPOLITAN INDEX			WEIGHT		
		Correlation Coefficient			Correlation Coefficient			Correlation Coefficient			Correlation Coefficient	
	No.	Systolic	Diastolic	No.	Systolic	Diastolic	No.	Systolic	Diastolic	No.	Systolic	Diastolic
White Male												
20-34	340	-.235[a]	-.140[a]	340	.305[a]	.206[a]	334	.302[a]	.190[a]	340	.314[a]	.224[a]
35-44	224	-.376[a]	-.280[a]	224	.438[a]	.349[a]	220	.452[a]	.364[a]	225	.356[a]	.309[a]
45-54	174	-.216[b]	-.251[a]	174	.304[a]	.302[a]	172	.299[a]	.297[a]	174	.321[a]	.296[a]
55-64	131	-.218[a]	-.118	131	.253[a]	.188[b]	125	.247[a]	.187[b]	131	.232[a]	.210[b]
Negro Male												
Under 45	89	-.137	-.194	89	.210	.183	87	.210	.211	89	.249[b]	.113
45 and Over	67	-.103	-.329[b]	67	.193	.199	64	.203	.216	67	.187	.228
White Female												
20-34	405	-.306[a]	-.182[a]	406	.365[a]	.229[a]	398	.333[a]	.198[a]	409	.358[a]	.224[a]
35-44	225	-.122	-.188[a]	221	.089	.146[b]	216	.111	.158[b]	229	.159[b]	.177[b]
45-54	208	-.271[a]	-.046	209	.237[a]	.059	204	.267[a]	.048	211	.183[a]	.061
55-64	135	-.013	-.144	137	.008	.139	133	.000	.144	138	.115	.170[b]
Negro Female												
Under 45	107	-.200[b]	-.137	107	.218[b]	.160	106	.216[b]	.166	108	.211[b]	.123
45 and Over	74	-.130	-.051	76	.083	.108	72	.154	.136	76	.081	.116

[a] Significant at 1 percent level.
[b] Significant at 5 percent level.

Source: State of California, Department of Public Health, Bureau of Chronic Diseases, Alameda County Blood Pressure Study, 1966.

Table 34

MEAN SYSTOLIC AND DIASTOLIC BLOOD PRESSURE (mm Hg) FOR MALES
BY AGE, RACE AND SMOKING STATUS

SMOKING STATUS	WHITE								NEGRO			
	25-34		35-44		45-54		55-64		Under 45		45 and Over	
	No.	Mean	No.	Mean	No.	Mean	No.	Mean	No.	Mean	No.	Mean
	SYSTOLIC BLOOD PRESSURE											
Current Smoker	125	123.9	126	126.8	93	134.6	57	140.6	72	128.3	28	142.9
Past Smoker	45	126.4	51	129.2	40	133.5	36	135.1	3	a	18	145.8
Never Smoked	64	121.0	46	124.2	39	130.4	37	142.2	13	126.1	20	145.9
Unknown	1	a	2	a	2	a	1	a	1	a	1	a
	DIASTOLIC BLOOD PRESSURE											
Current Smoker	125	69.9	126	75.6	93	80.5	57	81.0	72	73.2	28	83.2
Past Smoker	45	74.5	51	80.6	40	81.1	36	77.6	3	a	18	75.6
Never Smoked	64	71.2	46	76.8	39	81.4	37	84.6	13	66.8	20	85.4
Unknown	1	a	2	a	2	a	1	a	1	a	1	a

[a] Not calculated for less than 10 persons.

Source: State of California, Department of Public Health, Bureau of Chronic Diseases, Alameda County Blood Pressure Study, 1966.

Table 35

MEAN SYSTOLIC AND DIASTOLIC BLOOD PRESSURE (mm Hg) FOR FEMALES
BY AGE, RACE AND SMOKING STATUS

SMOKING STATUS	WHITE								NEGRO			
	25-34		35-44		45-54		55-64		Under 45		45 and Over	
	No.	Mean	No.	Mean	No.	Mean	No.	Mean	No.	Mean	No.	Mean
	SYSTOLIC BLOOD PRESSURE											
Current Smoker	112	116.0	102	120.1	91	131.9	37	144.7	58	121.1	23	142.3
Past Smoker	37	111.5	33	118.0	26	115.9	15	139.8	7	122.0	8	164.9
Never Smoked	108	113.6	93	121.2	94	130.0	86	142.4	41	119.4	45	149.1
Unknown	2	a	1	a	-	-	1	a	2	a	1	a
	DIASTOLIC BLOOD PRESSURE											
Current Smoker	112	67.6	102	72.8	91	77.4	37	79.3	58	71.8	23	83.0
Past Smoker	37	66.3	33	72.9	26	68.3	15	73.4	7	77.7	8	87.1
Never Smoked	108	67.4	93	73.7	94	74.8	86	79.4	41	68.3	45	80.0
Unknown	2	a	1	a	-	-	1	a	2	a	1	a

[a] Not calculated for less than 5 persons.

Source: State of California, Department of Public Health, Bureau of Chronic Diseases, Alameda County Blood Pressure Study, 1966.

Table 36

MEAN SYSTOLIC AND DIASTOLIC BLOOD PRESSURE (mm Hg) FOR WHITES, 25-64, BY AGE GROUP, SEX AND FAMILY INCOME

FAMILY INCOME	MALE								FEMALE							
	25-34		35-44		45-54		55-64		25-34		35-44		45-54		55-64	
	No.	Mean	No.	Mean	No.	Mean	No.	Mean	No.	Mean	No.	Mean	No.	Mean	No.	Mean
	SYSTOLIC BLOOD PRESSURE															
Less than $4,000	29	122.2	5	a	10	136.6	12	137.2	21	113.8	9	a	22	144.0	40	143.8
$ 4,000-5,999	29	123.4	21	127.9	10	139.0	12	140.8	30	112.8	17	118.3	29	130.0	21	141.6
$ 6,000-7,999	48	125.0	32	126.3	23	134.5	25	142.4	51	114.9	33	123.2	25	126.8	16	139.1
$ 8,000-9,999	52	124.1	51	129.1	34	132.9	27	136.0	51	116.4	61	120.9	40	127.6	22	144.3
$10,000-14,999	61	122.0	78	126.8	61	134.3	26	143.8	73	113.9	75	117.9	51	125.7	21	144.8
$15,000 and Over	13	128.4	33	124.1	33	128.9	25	135.2	26	111.2	29	125.7	34	125.9	14	136.0
Unknown	3	a	5	a	3	a	4	a	7	a	5	a	10	133.3	5	a
	DIASTOLIC BLOOD PRESSURE															
Less than $4,000	29	71.7	5	a	10	80.8	12	79.8	21	65.1	9	a	22	77.9	40	78.7
$ 4,000-5,999	29	73.0	21	75.9	10	86.5	12	74.7	30	68.3	17	73.9	29	77.3	21	78.3
$ 6,000-7,999	48	67.7	32	75.7	23	79.5	25	80.8	51	67.3	33	74.7	25	68.9	16	77.5
$ 8,000-9,999	52	72.2	51	77.1	34	81.2	27	79.9	51	68.0	61	72.4	40	75.9	22	77.6
$10,000-14,999	61	71.0	78	78.0	61	81.6	26	84.3	73	67.7	75	72.7	51	74.5	21	82.6
$15,000 and Over	13	76.7	33	76.7	33	78.5	25	82.7	26	64.7	29	75.8	34	74.4	14	79.3
Unknown	3	a	5	a	3	a	4	a	7	a	5	a	10	81.3	5	a

[a] Not calculated for less than 10 persons.

Source: State of California, Department of Public Health, Bureau of Chronic Diseases, Alameda County Blood Pressure Study, 1966.

Table 37

MEAN SYSTOLIC AND DIASTOLIC BLOOD PRESSURE (mm Hg)
FOR NEGROES BY SEX, TWO AGE GROUPS AND FAMILY INCOME

FAMILY INCOME	MALE				FEMALE			
	Under 45		45 and Over		Under 45		45 and Over	
	No.	Mean	No.	Mean	No.	Mean	No.	Mean
	SYSTOLIC BLOOD PRESSURE							
Less Than $4,000	12	135.2	24	143.4	35	120.1	38	152.6
$ 4,000-5,999	25	129.0	10	153.1	27	122.1	14	148.5
$ 6,000-7,999	24	128.6	18	143.2	22	119.4	14	141.6
$ 8,000-9,999	18	125.4	10	145.5	14	121.9	7	150.4
$10,000 and Over	10	121.8	4	a	7	114.1	2	a
Unknown	-	-	1	a	3	a	2	a
	DIASTOLIC BLOOD PRESSURE							
Less Than $4,000	12	75.9	24	71.4	35	69.9	38	79.3
$ 4,000-5,999	25	67.3	10	89.8	27	68.6	14	87.1
$ 6,000-7,999	24	73.2	18	85.1	22	71.9	14	83.6
$ 8,000-9,999	18	75.2	10	90.4	14	74.9	7	83.6
$10,000 and Over	10	74.1	4	a	7	67.9	2	a
Unknown	-	-	1	a	3	a	2	a

[a] Not calculated for less than 5 persons.

Source: State of California, Department of Public Health, Bureau of Chronic Diseases, Alameda County Blood Pressure Study, 1966.

Table 38

CORRELATION COEFFICIENTS OF SYSTOLIC BLOOD PRESSURE
AND SELECTED SOCIAL DEMOGRAPHIC FACTORS BY RACE, SEX AND AGE

RACE, SEX AND AGE	FAMILY INCOME		EDUCATION		OCCUPATIONAL PRESTIGE		SES INDEX		SUBJECTIVE SOCIAL STANDING		NUMBER OF OWN CHILDREN		RELIGION	
	Number	Correlation Coefficient	Number	Correlation Coefficient	Number	Correlation Coefficient	Number	Correlation Coefficient	Number	Correlation Coefficient	Number	Correlation Coefficient	Number	Correlation Coefficient
White Male														
20-34	333	-.004	338	-.072	337	-.095	235[a]	-.050	323	.036	336	.011	338	.011
35-44	220	-.038	225	-.198[b]	224	-.138[c]	225	-.153[c]	214	-.007	223	.059	222	-.025
45-54	171	-.130	172	-.121	172	-.039	174	-.043	167	-.140	169	.030	172	.032
55-64	127	-.024	130	-.086	130	.035	131	-.046	122	-.109	127	.113	129	.169
White Female														
20-34	394	.084	258[a]	-.092	na	na	251[a]	-.124	390	.043	405	.083	405	.083
35-44	224	.020	228	-.002	na	na	220	.021	222	.050	223	-.156[c]	228	.037
45-54	201	-.217[b]	211	-.167[c]	na	na	198	-.299[b]	203	-.004	207	-.047	210	.116
55-64	134	-.034	139	-.066	na	na	134	-.048	131	-.006	138	.001	138	.019
Negro Male														
Under 45	89	-.170	88	.032	88	-.269[c]	89	-.219[b]	80	.078	87	-.100	87	.003
45 and Over	66	-.025	66	-.227	66	-.121	67	-.152	62	.229	63	-.086	66	-.176
Negro Female														
Under 45	105	-.031	106	-.188	na	na	103	-.097	102	-.061	103	.029	106	-.115
45 and Over	75	-.140	76	-.110	na	na	73	-.183	71	.261[c]	73	.024	76	.001

na Not applicable.

[a] 25-34 year age group.
[b] Significant at 1 percent level.
[c] Significant at 5 percent level.

Source: State of California, Department of Public Health, Bureau of Chronic Diseases, Alameda County Blood Pressure Study, 1966.

Table 39

MEAN SYSTOLIC AND DIASTOLIC BLOOD PRESSURE (mm Hg) FOR WHITES, 25-64, BY AGE GROUP, SEX AND EDUCATION

EDUCATION	MALE								FEMALE							
	25-34		35-44		45-54		55-64		25-34		35-44		45-54		55-64	
	No.	Mean	No.	Mean	No.	Mean	No.	Mean	No.	Mean	No.	Mean	No.	Mean	No.	Mean
	SYSTOLIC BLOOD PRESSURE															
8 Years or Less	13	126.2	25	128.6	26	133.9	36	141.9	17	115.2	25	118.3	36	132.7	36	146.5
Some High School	36	124.4	37	130.5	32	132.2	23	139.7	45	113.8	40	118.9	38	130.6	33	137.4
High School Graduate	54	124.8	66	128.7	63	138.1	36	139.1	94	115.9	95	122.7	79	130.9	26	142.5
Some College	45	123.9	35	125.1	22	128.2	19	145.7	42	114.3	39	117.1	34	124.3	19	148.0
4 or More Years College	86	121.9	62	123.2	29	127.8	16	127.5	60	112.2	29	120.3	24	121.8	25	139.7
Unknown	1	a	-	-	2	a	1	a	1	a	1	a	-	-	-	-
	DIASTOLIC BLOOD PRESSURE															
8 Years or Less	13	71.1	25	80.4	26	81.2	36	80.8	17	67.0	25	72.1	36	72.9	36	80.9
Some High School	36	68.2	37	77.5	32	80.2	23	80.1	45	67.6	40	71.5	38	74.7	33	74.8
High School Graduate	54	70.1	66	77.7	63	81.7	36	83.4	94	68.2	95	74.8	79	78.0	26	78.7
Some College	45	72.4	35	73.2	22	81.8	19	81.9	42	67.6	39	73.3	34	72.7	19	81.0
4 or More Years College	86	72.4	62	76.6	29	78.7	16	77.2	60	65.9	29	71.1	24	73.2	25	79.2
Unknown	1	a	-	-	2	a	1	a	1	a	1	a	-	-	-	-

[a] Not calculated for less than 10 persons.

Source: State of California, Department of Public Health, Bureau of Chronic Diseases, Alameda County Blood Pressure Study, 1966.

Table 40

MEAN SYSTOLIC AND DIASTOLIC BLOOD PRESSURE (mm Hg)
FOR NEGROES BY SEX, TWO AGE GROUPS AND EDUCATION

EDUCATION	MALE				FEMALE			
	Under 45		45 and Over		Under 45		45 and Over	
	No.	Mean	No.	Mean	No.	Mean	No.	Mean
	SYSTOLIC BLOOD PRESSURE							
8 Years or Less	8	127.2	40	148.6	16	127.6	37	152.6
1-4 Years High School	51	128.6	22	139.7	69	120.6	34	144.9
1 or More Years College	29	127.7	4	a	21	114.8	5	145.4
Unknown	1	a	1	a	2	a	1	a
	DIASTOLIC BLOOD PRESSURE							
8 Years or Less	8	74.1	40	81.3	16	75.1	37	82.8
1-4 Years High School	51	75.6	22	82.0	69	70.8	34	79.5
1 or More Years College	29	66.4	4	a	21	68.0	5	88.0
Unknown	1	a	1	a	2	a	1	a

a Not calculated for less than 5 persons.

Source: State of California, Department of Public Health, Bureau of Chronic Diseases, Alameda County Blood Pressure Study, 1966.

Table 41

MEAN SYSTOLIC AND DIASTOLIC BLOOD PRESSURE (mm Hg) FOR CURRENTLY WORKING WHITE MALES, 25-64, BY AGE GROUP AND OCCUPATIONAL CLASSIFICATION

OCCUPATION	25-34		35-44		45-54		55-64	
	No.	Mean	No.	Mean	No.	Mean	No.	Mean
	SYSTOLIC BLOOD PRESSURE							
Professional and Semi-professional	63	122.9	57	123.0	27	130.1	15	136.9
Managers, Officials and Proprietors	16	124.4	34	125.6	28	135.9	30	141.8
Clerical, Sales	27	125.1	25	132.0	24	133.7	19	134.9
Skilled	40	124.7	47	130.4	39	130.5	27	145.4
Semi-skilled	31	123.3	32	125.7	22	135.0	6	a
Unskilled	21	127.8	19	128.7	28	136.5	17	132.2
	DIASTOLIC BLOOD PRESSURE							
Professional and Semi-professional	63	72.5	57	75.5	27	80.0	15	79.9
Managers, Officials and Proprietors	16	73.7	34	73.4	28	82.7	30	80.9
Clerical, Sales	27	73.6	25	80.6	24	81.1	19	74.0
Skilled	40	67.9	47	79.7	39	80.4	27	84.8
Semi-skilled	31	69.5	32	77.1	22	81.3	6	a
Unskilled	21	71.1	19	75.5	28	80.0	17	78.5

[a] Not calculated for less than 10 persons.

Source: State of California, Department of Public Health, Bureau of Chronic Diseases, Alameda County Blood Pressure Study, 1966.

Table 42

MEAN SYSTOLIC AND DIASTOLIC BLOOD PRESSURE (mm Hg) FOR CURRENTLY WORKING NEGRO MALES BY TWO AGE GROUPS AND WHITE COLLAR-BLUE COLLAR GROUPING[1]

OCCUPATIONAL GROUPING	UNDER 45		45 AND OVER	
	No.	Mean	No.	Mean
	SYSTOLIC BLOOD PRESSURE			
White Collar	21	122.2	8	132.9
Blue Collar	54	130.4	41	146.2
Unknown	-	-	1	a
	DIASTOLIC BLOOD PRESSURE			
White Collar	21	74.8	8	74.1
Blue Collar	54	72.4	41	88.2
Unknown	-	-	1	a

[1] White collar includes professional, semi-professional and technical, proprietors, managers and officials, clerical and sales workers. Blue collar includes skilled, semi-skilled and unskilled occupations.

[a] Not calculated for less than 5 persons.

Source: State of California, Department of Public Health, Bureau of Chronic Diseases, Alameda County Blood Pressure Study, 1966.

Table 43

MEAN SYSTOLIC AND DIASTOLIC BLOOD PRESSURE (mm Hg) FOR WHITE MALES, 25-64 BY AGE GROUP AND OCCUPATIONAL PRESTIGE SCORE

OCCUPATIONAL PRESTIGE SCORE	25-34		35-44		45-54		55-64	
	No.	Mean	No.	Mean	No.	Mean	No.	Mean
	SYSTOLIC BLOOD PRESSURE							
Low 5 or Less	28	128.0	28	130.1	29	134.4	20	134.9
6	43	123.7	36	129.5	32	131.4	20	136.4
7	83	123.3	100	126.3	76	134.4	64	142.9
High 8 or More	80	122.2	60	124.8	35	132.1	26	137.2
Unknown	1	a	1	a	2	a	1	a
	DIASTOLIC BLOOD PRESSURE							
Low 5 or Less	28	70.9	28	78.4	29	79.6	20	81.2
6	43	68.0	36	79.2	32	79.5	20	82.2
7	83	71.9	100	75.6	76	81.9	64	80.6
High 8 or More	80	72.1	60	77.2	35	80.7	26	81.3
Unknown	1	a	1	a	2	a	1	a

[a] Not calculated for less than 10 persons.

Source: State of California, Department of Public Health, Bureau of Chronic Diseases, Alameda County Blood Pressure Study, 1966.

Table 44

MEAN SYSTOLIC AND DIASTOLIC BLOOD PRESSURE (mm Hg) FOR NEGRO MALES BY TWO AGE GROUPS AND OCCUPATIONAL PRESTIGE SCORE

OCCUPATIONAL PRESTIGE SCORE	UNDER 45		45 AND OVER	
	No.	Mean	No.	Mean
	SYSTOLIC BLOOD PRESSURE			
Low 5 or Less	37	131.5	41	146.8
6	21	129.8	11	147.6
High 7 or More	30	123.0	14	135.9
Unknown	1	a	1	a
	DIASTOLIC BLOOD PRESSURE			
Low 5 or Less	37	74.8	41	79.9
6	21	68.2	11	91.9
High 7 or More	30	72.9	14	79.4
Unknown	1	a	1	a

[a] Not calculated for less than 5 persons.

Source: State of California, Department of Public Health, Bureau of Chronic Diseases, Alameda County Blood Pressure Study, 1966.

Table 45

MEAN SYSTOLIC AND DIASTOLIC BLOOD PRESSURE (mm Hg) FOR WHITES, 25-64, BY AGE GROUP, SEX AND SOCIOECONOMIC STATUS

SOCIOECONOMIC STATUS	MALE								FEMALE							
	25-34		35-44		45-54		55-64		25-34		35-44		45-54		55-64	
	No.	Mean	No.	Mean	No.	Mean	No.	Mean	No.	Mean	No.	Mean	No.	Mean	No.	Mean
	SYSTOLIC BLOOD PRESSURE															
Low	51	126.2	39	131.0	33	137.2	36	139.9	49	116.7	37	118.0	51	136.0	59	142.4
Medium	88	122.5	95	127.3	86	133.2	56	140.3	92	113.5	116	121.1	94	127.9	50	142.8
High	93	123.4	86	124.5	51	131.9	35	136.9	110	113.4	67	120.9	53	123.4	25	141.3
Unknown	3	a	5	a	4	a	4	a	8	a	9	a	13	133.7	5	a
	DIASTOLIC BLOOD PRESSURE															
Low	51	69.1	39	78.5	33	80.6	36	79.7	49	67.8	37	71.4	51	77.3	59	78.3
Medium	88	70.3	95	77.4	86	81.1	56	82.8	92	67.5	116	74.7	94	74.1	50	78.9
High	93	73.3	86	75.8	51	80.9	35	79.5	110	66.5	67	72.4	53	73.4	25	80.9
Unknown	3	a	5	a	4	a	4	a	8	a	9	a	13	81.5	5	a

[a] Not calculated for less than 10 persons.

Source: State of California, Department of Public Health, Bureau of Chronic Diseases, Alameda County Blood Pressure Study, 1966.

Table 46

MEAN SYSTOLIC AND DIASTOLIC BLOOD PRESSURE (mm Hg)
FOR NEGROES BY SEX, TWO AGE GROUPS AND SOCIOECONOMIC STATUS[1]

SOCIO-ECONOMIC STATUS	MALE				FEMALE			
	Under 45		45 and Over		Under 45		45 and Over	
	No.	Mean	No.	Mean	No.	Mean	No.	Mean
	SYSTOLIC BLOOD PRESSURE							
Low	46	132.0	52	147.3	71	122.1	66	149.7
Medium-High	42	124.0	14	134.6	32	116.9	7	137.6
Unknown	1	a	1	a	5	120.4	4	a
	DIASTOLIC BLOOD PRESSURE							
Low	46	72.5	52	81.9	71	71.7	66	81.7
Medium-High	42	72.4	14	81.3	32	68.7	7	81.9
Unknown	1	a	1	a	5	71.8	4	a

[1] See Appendix D: Definitions of Variables.

[a] Not calculated for less than 5 persons.

Source: State of California, Department of Public Health, Bureau of Chronic Diseases, Alameda County Blood Pressure Study, 1966.

Table 47

MEAN SYSTOLIC BLOOD PRESSURE (mm Hg) FOR WHITES, 25-64, BY AGE GROUP, SEX AND SUBJECTIVE SOCIAL STANDING

SUBJECTIVE SOCIAL STANDING	25-34		35-44		45-54		55-64	
	No.	Mean	No.	Mean	No.	Mean	No.	Mean
	MALE							
Lower/Lower Middle	22	126.3	21	123.8	16	136.6	14	140.8
Middle	146	123.3	134	128.4	110	134.6	77	142.2
Upper Middle/Upper	54	123.5	58	125.1	41	129.2	31	134.4
Unknown	12	122.2	11	125.6	7	a	9	a
	FEMALE							
Lower/Lower Middle	15	114.3	19	118.8	16	130.9	6	a
Middle	170	114.3	150	120.1	137	129.4	83	140.6
Upper Middle/Upper	67	114.4	53	121.8	50	128.2	42	143.5
Unknown	7	a	7	a	8	a	8	a

[a] Not calculated for less than 10 persons.

Source: State of California, Department of Public Health, Bureau of Chronic Diseases, Alameda County Blood Pressure Study, 1966.

Table 48

MEAN DIASTOLIC BLOOD PRESSURE (mm Hg) FOR WHITES, 25-64, BY AGE GROUP, SEX AND SUBJECTIVE SOCIAL STANDING

SUBJECTIVE SOCIAL STANDING	25-34		35-44		45-54		55-64	
	No.	Mean	No.	Mean	No.	Mean	No.	Mean
	MALE							
Lower/Lower Middle	22	70.8	21	76.0	16	76.6	14	82.2
Middle	147	70.9	135	77.3	110	82.4	77	81.9
Upper Middle	43	71.8	53	76.2	41	78.2	28	81.0
Upper	11	71.3	5	a	-	-	3	a
Unknown	12	72.9	11	75.5	7	a	9	a
	FEMALE							
Lower/Lower Middle	15	69.0	19	72.4	16	80.4	6	a
Middle	170	66.7	150	73.2	137	74.9	83	78.8
Upper Middle	62	68.3	49	73.9	42	74.3	35	79.3
Upper	5	a	4	a	8	a	7	a
Unknown	7	a	7	a	8	a	8	a

[a] Not calculated for less than 10 persons.

Source: State of California, Department of Public Health, Bureau of Chronic Diseases, Alameda County Blood Pressure Study, 1966.

Table 49

MEAN SYSTOLIC BLOOD PRESSURE (mm Hg) FOR NEGROES
BY TWO AGE GROUPS, SEX AND SUBJECTIVE SOCIAL STANDING

SUBJECTIVE SOCIAL STANDING	UNDER 45		45 AND OVER	
	No.	Mean	No.	Mean
	MALE			
Lower/Lower Middle	18	127.5	3	a
Middle	45	127.0	34	142.8
Upper Middle/Upper	17	132.4	25	149.7
Unknown	9	127.4	5	135.8
	FEMALE			
Lower/Lower Middle	19	120.1	7	129.3
Middle	47	122.6	25	144.8
Upper Middle/Upper	36	117.2	39	156.5
Unknown	6	124.8	6	138.0

[a] Not calculated for less than 5 persons.

Source: State of California, Department of Public Health, Bureau of Chronic Diseases, Alameda County Blood Pressure Study, 1966.

Table 50

MEAN DIASTOLIC BLOOD PRESSURE (mm Hg) FOR NEGROES
BY SEX, TWO AGE GROUPS AND SUBJECTIVE SOCIAL STANDING

SUBJECTIVE SOCIAL STANDING	MALE				FEMALE			
	Under 45		45 and Over		Under 45		45 and Over	
	No.	Mean	No.	Mean	No.	Mean	No.	Mean
Lower/Lower Middle	18	68.7	3	a	19	73.6	7	73.1
Middle	45	73.6	34	83.9	47	71.1	25	84.5
Upper Middle	11	75.5	10	84.4	22	71.3	19	86.3
Upper	6	76.7	15	81.5	14	71.1	20	78.0
Unknown	9	67.7	5	66.0	6	57.2	6	79.3

[a] Not calculated for less than 5 persons.

Source: State of California, Department of Public Health, Bureau of Chronic Diseases, Alameda County Blood Pressure Study, 1966.

Table 51

MEAN SYSTOLIC AND DIASTOLIC BLOOD PRESSURE FOR WHITES, 25-64, BY AGE GROUP, SEX AND NUMBER OF OWN CHILDREN

NUMBER OF OWN CHILDREN	MALE								FEMALE							
	25-34		35-44		45-54		55-64		25-34		35-44		45-54		55-64	
	No.	Mean	No.	Mean	No.	Mean	No.	Mean	No.	Mean	No.	Mean	No.	Mean	No.	Mean
	SYSTOLIC BLOOD PRESSURE															
None	82	123.4	44	128.4	38	131.6	26	133.4	48	111.6	31	125.1	37	128.4	29	150.7
1	38	122.5	32	123.9	30	132.6	22	143.7	43	117.0	31	120.1	45	133.4	33	134.5
2	64	123.8	53	125.6	51	134.9	40	138.8	63	112.8	65	121.7	62	126.7	39	142.2
3 or More	49	124.3	94	128.0	50	133.1	39	143.0	104	115.5	96	117.9	63	128.0	37	142.3
Unknown	2	a	2	a	5	a	4	a	1	a	6	a	4	a	1	a
	DIASTOLIC BLOOD PRESSURE															
None	82	71.5	44	76.4	38	79.4	26	77.5	48	65.5	31	74.4	37	73.2	29	80.1
1	38	69.3	32	76.7	30	80.0	22	83.5	43	68.0	31	72.1	45	78.4	33	75.0
2	64	71.4	53	75.2	51	81.8	40	80.1	63	65.6	65	74.3	62	74.7	39	80.5
3 or More	49	71.2	94	78.3	50	80.8	39	83.4	104	69.1	96	72.2	63	74.1	37	79.0
Unknown	2	a	2	a	5	a	4	a	1	a	6	a	4	a	1	a

[a] Not calculated for less than 10 persons.

Source: State of California, Department of Public Health, Bureau of Chronic Diseases, Alameda County Blood Pressure Study, 1966.

Table 52

MEAN SYSTOLIC AND DIASTOLIC BLOOD PRESSURE (mm Hg) FOR NEGROES BY SEX, TWO AGE GROUPS AND NUMBER OF OWN CHILDREN

NUMBER OF OWN CHILDREN	UNDER 45				45 AND OVER			
	Male		Female		Male		Female	
	No.	Mean	No.	Mean	No.	Mean	No.	Mean
	SYSTOLIC BLOOD PRESSURE							
None	36	128.7	23	124.3	20	145.1	21	147.0
1	17	132.4	32	121.2	14	150.9	13	142.2
2	18	124.2	14	114.4	8	135.5	19	151.3
3 or More	16	126.4	34	120.5	21	143.1	20	147.5
Unknown	2	a	5	115.4	4	a	4	a
	DIASTOLIC BLOOD PRESSURE							
None	36	67.5	23	74.7	20	80.6	21	81.7
1	17	80.7	32	69.2	14	88.9	13	77.8
2	18	73.0	14	62.6	8	74.5	19	85.6
3 or More	16	72.7	34	72.8	21	80.1	20	82.8
Unknown	2	a	5	73.0	4	a	4	a

[a] Not calculated for less than 5 persons.

Source: State of California, Department of Public Health, Bureau of Chronic Diseases, Alameda County Blood Pressure Study, 1966.

Table 53

MEAN SYSTOLIC AND DIASTOLIC BLOOD PRESSURE (mm Hg) FOR WHITES, 25-64, BY AGE GROUP, SEX AND MARITAL STATUS

MARITAL STATUS	MALE								FEMALE							
	25-34		35-44		45-54		55-64		25-34		35-44		45-54		55-64	
	No.	Mean	No.	Mean	No.	Mean	No.	Mean	No.	Mean	No.	Mean	No.	Mean	No.	Mean
	SYSTOLIC BLOOD PRESSURE															
Married	185	123.7	194	126.1	153	132.3	115	139.3	222	114.1	190	120.3	157	127.6	90	139.4
Divorced, Separated, Widowed	11	120.9	20	128.7	11	147.9	9	a	22	118.3	34	120.5	44	133.3	43	148.3
Never Married	39	123.5	11	137.5	10	130.6	7	a	14	112.6	5	a	9	a	6	a
Unknown	-	-	-	-	-	-	-	-	1	a	-	-	1	a	-	-
	DIASTOLIC BLOOD PRESSURE															
Married	185	70.7	194	76.7	153	80.4	115	81.0	222	67.3	190	73.2	157	74.7	90	78.3
Divorced, Separated, Widowed	11	74.2	20	75.6	11	89.5	9	a	22	67.6	34	73.5	44	76.2	43	80.7
Never Married	39	72.3	11	84.6	10	77.7	7	a	14	67.6	5	a	9	a	6	a
Unknown	-	-	-	-	-	-	-	-	1	a	-	-	1	a	-	-

[a] Not calculated for less than 10 persons.

Source: State of California, Department of Public Health, Bureau of Chronic Diseases, Alameda County Blood Pressure Study, 1966.

Table 54

MEAN SYSTOLIC AND DIASTOLIC BLOOD PRESSURE (mm Hg)
FOR NEGROES BY SEX, TWO AGE GROUPS AND MARITAL STATUS

MARITAL STATUS	MALE				FEMALE			
	Under 45		45 and Over		Under 45		45 and Over	
	No.	Mean	No.	Mean	No.	Mean	No.	Mean
	SYSTOLIC BLOOD PRESSURE							
Married	53	128.8	48	145.2	59	119.6	37	144.4
Separated, Divorced, Widowed	11	123.5	16	142.4	37	121.8	40	152.9
Never Married	24	129.5	3	a	12	120.8	-	-
Unknown	1	a	-	-	-	-	-	-
	DIASTOLIC BLOOD PRESSURE							
Married	53	72.1	48	80.4	59	69.9	37	81.8
Separated, Divorced, Widowed	11	78.4	16	85.4	37	72.5	40	81.8
Never Married	24	70.7	3	a	12	70.0	-	-
Unknown	1	a	-	-	-	-	-	-

[a] Not calculated for less than 5 persons.

Source: State of California, Department of Public Health, Bureau of Chronic Diseases, Alameda County Blood Pressure Study, 1966.

Table 55

MEAN SYSTOLIC BLOOD PRESSURE (mm Hg) FOR WHITES, 25-64, BY AGE GROUP, SEX AND RELIGION

RELIGION	25-34		35-44		45-54		55-64	
	No.	Mean	No.	Mean	No.	Mean	No.	Mean
	MALE							
Protestant	116	124.0	113	126.6	83	132.0	71	135.7
Catholic	65	125.1	80	127.2	62	135.1	42	148.3
Other Religions	7	a	5	a	5	a	3	a
Agnostic/Atheist	46	121.0	24	128.9	22	135.4	13	137.2
Unknown	1	a	3	a	2	a	2	a
	FEMALE							
Protestant	142	113.1	130	120.5	130	127.3	95	142.1
Catholic	94	116.3	83	121.0	71	132.8	36	145.1
Other Religions	6	a	4	a	3	a	2	a
Agnostic/Atheist	16	116.6	11	115.5	6	a	5	a
Unknown	1	a	1	a	1	a	1	a

[a] Not calculated for less than 10 persons.

Source: State of California, Department of Public Health, Bureau of Chronic Diseases, Alameda County Blood Pressure Study, 1966.

Table 56

MEAN DIASTOLIC BLOOD PRESSURE (mm Hg) FOR WHITES, 25-64, BY AGE GROUP, SEX AND RELIGION

RELIGION	25-34		35-44		45-54		55-64	
	No.	Mean	No.	Mean	No.	Mean	No.	Mean
	MALE							
Protestant	116	71.7	113	76.1	83	80.0	71	79.2
Catholic	65	70.0	80	77.8	62	82.3	42	84.3
Other Religions	7	a	5	a	5	a	3	a
Agnostic/Atheist	46	70.8	24	79.3	22	81.6	13	81.2
Unkown	1	a	3	a	2	a	2	a
	FEMALE							
Protestant	142	66.2	130	72.5	130	75.1	95	79.3
Catholic	94	69.1	83	75.1	71	75.4	36	81.5
Other Religions	6	a	4	a	3	a	2	a
Agnostic/Atheist	16	67.0	11	68.2	6	a	5	a
Unknown	1	a	1	a	1	a	1	a

[a] Not calculated for less than 10 persons.

Source: State of California, Department of Public Health, Bureau of Chronic Diseases, Alameda County Blood Pressure Study, 1966.

Table 57

MEAN SYSTOLIC AND DIASTOLIC BLOOD PRESSURE (mm Hg) FOR WHITES, 25-64, BY AGE GROUP, SEX AND NUMBER OF PLACES[1] LIVED IN

NUMBER OF PLACES LIVED IN	MALE								FEMALE							
	25-34		35-44		45-54		55-64		25-34		35-44		45-54		55-64	
	No.	Mean	No.	Mean	No.	Mean	No.	Mean	No.	Mean	No.	Mean	No.	Mean	No.	Mean
	SYSTOLIC BLOOD PRESSURE															
1-4	76	123.7	55	126.4	46	134.2	51	142.6	94	115.2	86	122.3	87	130.7	50	142.8
5-8	108	124.6	111	126.9	80	135.9	42	137.1	117	113.2	98	118.6	79	130.3	63	142.8
9 or More	50	121.0	57	127.6	46	128.2	37	138.0	47	115.6	43	120.3	45	123.6	26	141.4
Unknown	1	a	2	a	2	a	1	a	1	a	2	a	-	-	-	-
	DIASTOLIC BLOOD PRESSURE															
1-4	76	70.4	55	77.6	46	81.5	51	83.2	94	68.3	86	75.8	87	75.8	50	79.2
5-8	108	70.6	111	76.9	80	82.0	42	78.5	117	67.1	98	70.8	79	75.4	63	79.0
9 or More	50	73.6	57	76.4	46	78.1	37	81.3	47	66.3	43	74.0	45	73.1	26	77.3
Unknown	1	a	2	a	2	a	1	a	1	a	2	a	-	-	-	-

[1] Number of different towns or cities lived in six months or longer.

[a] Not calculated for less than 10 persons.

Source: State of California, Department of Public Health, Bureau of Chronic Diseases, Alameda County Blood Pressure Study, 1966.

Table 58

MEAN SYSTOLIC AND DIASTOLIC BLOOD PRESSURE (mm Hg) FOR NEGROES BY SEX, TWO AGE GROUPS AND NUMBER OF PLACES[1] LIVED IN

NUMBER OF PLACES LIVED IN	MALE				FEMALE			
	Under 45		45 and Over		Under 45		45 and Over	
	No.	Mean	No.	Mean	No.	Mean	No.	Mean
	SYSTOLIC BLOOD PRESSURE							
1-4	45	127.2	30	144.2	75	119.6	42	144.7
5 or More	43	129.2	34	144.4	31	122.8	34	153.6
Unknown	1	a	3	a	2	a	1	a
	DIASTOLIC BLOOD PRESSURE							
1-4	45	72.2	30	79.3	75	70.6	42	85.0
5 or More	43	72.6	34	82.7	31	71.6	34	77.6
Unknown	1	a	3	a	2	a	1	a

1 Number of different towns or cities lived in six months or longer.

a Not calculated for less than 5 persons.

Source: State of California, Department of Public Health, Bureau of Chronic Diseases, Alameda County Blood Pressure Study, 1966.

Table 59

CORRELATION COEFFICIENTS OF SYSTOLIC BLOOD PRESSURE AND SELECTED SOCIOCULTURAL MOBILITY AND INCONGRUITY FACTORS BY RACE, SEX AND AGE

RACE, SEX AND AGE	RESIDENTIAL MOBILITY		GEOGRAPHICAL MOBILITY		INTERGENERATIONAL MOBILITY[1]		INTRAGENERATIONAL MOBILITY[1]		TRADITIONALISM	
	Number	Correlation Coefficient	Number	Correlation Coefficient	Number	Correlation Coefficient	Number	Correlation Coefficient	Number	Correlation Coefficient
White Male										
20-34	232[a]	-.108	338	-.097	314	.038	308	.047	338	.093
35-44	221	-.040	223	-.054	200	-.022	223	.066	224	.068
45-54	170	-.121	172	-.082	156	-.035	172	-.057	172	.020
55-64	129	-.077	130	.039	119	.119	130	.099	130	.116
White Female										
20-34	405	-.067	405	-.066	370	-.108[b]	312	-.109	401	.073
35-44	227	.014	227	.044	205	.063	210	.063	227	.008
45-54	211	-.105	211	-.015	186	.018	191	.060	210	.088
55-64	139	-.018	138	.005	126	-.021	122	-.089	138	-.020
Negro Male										
Under 45	88	.002	88	-.087	77	.054	84	.075	88	.142
45 and Over	64	.025	65	.223	57	-.254	66	-.017	66	.259[b]
Negro Female										
Under 45	106	.018	106	.025	86	-.033	76	-.110	105	.214[b]
45 and Over	76	.115	76	-.110	60	-.018	69	.191	76	.096

1 Amount of mobility regardless of direction (upward or downward).

a 25-34 year age group.
b Significant at 5 percent level.

Source: State of California, Department of Public Health, Bureau of Chronic Diseases, Alameda County Blood Pressure Study, 1966.

Table 60

MEAN SYSTOLIC BLOOD PRESSURE (mm Hg) FOR WHITES, 25-64, BY AGE GROUP, SEX AND GEOGRAPHICAL MOBILITY[1]

NUMBER OF STATES LIVED IN	25-34		35-44		45-54		55-64	
	No.	Mean	No.	Mean	No.	Mean	No.	Mean
	MALE							
1	71	124.0	59	128.2	39	136.8	42	142.5
2	63	123.7	71	126.5	63	133.2	41	135.4
3	47	124.7	41	125.6	38	132.8	15	135.7
4 or More	53	121.8	52	127.2	32	130.1	32	142.7
Unknown	1	a	2	a	2	a	1	a
	FEMALE							
1	80	116.0	79	120.2	70	129.7	30	141.0
2	82	114.3	74	121.9	66	131.0	52	141.6
3	50	112.7	33	118.6	42	125.0	19	145.7
4 or More	46	113.5	41	119.1	33	128.9	37	143.8
Unknown	1	a	2	a	-	-	1	a

[1] Number of states lived in six month or longer.

[a] Not calculated for less than 10 persons.

Source: State of California, Department of Public Health, Bureau of Chronic Diseases, Alameda County Blood Pressure Study, 1966.

Table 61

MEAN DIASTOLIC BLOOD PRESSURE (mm Hg) FOR WHITES, 25-64, BY AGE GROUP, SEX AND GEOGRAPHICAL MOBILITY[1]

NUMBER OF STATES LIVED IN	25-34		35-44		45-54		55-64	
	No.	Mean	No.	Mean	No.	Mean	No.	Mean
	MALE							
1	71	70.5	59	77.7	39	83.5	42	83.7
2	63	70.1	71	77.9	63	79.7	41	77.1
3	47	72.6	41	75.0	38	80.0	15	80.5
4 or More	53	72.0	52	76.4	32	80.8	32	83.0
Unknown	1	a	2	a	2	a	1	a
	FEMALE							
1	80	67.8	79	73.3	70	75.8	30	81.0
2	82	67.4	74	75.3	66	74.2	52	80.7
3	50	68.3	33	72.8	42	74.8	19	73.2
4 or More	46	65.7	41	70.1	33	76.1	37	77.0
Unknown	1	a	2	a	-	-	1	a

[1] Number of states lived in six months or longer.

[a] Not calculated for less than 10 persons.

Source: State of California, Department of Public Health, Bureau of Chronic Diseases, Alameda County Blood Pressure Study, 1966.

Table 62

MEAN SYSTOLIC AND DIASTOLIC BLOOD PRESSURE (mm Hg) FOR NEGROES BY SEX, TWO AGE GROUPS AND GEOGRAPHICAL MOBILITY[1]

NUMBER OF STATES LIVED IN	MALE				FEMALE			
	Under 45		45 and Over		Under 45		45 and Over	
	No.	Mean	No.	Mean	No.	Mean	No.	Mean
	SYSTOLIC BLOOD PRESSURE							
1-2	55	128.8	34	141.5	70	118.7	42	151.8
3 or More	33	127.2	31	148.1	36	122.9	34	144.8
Unknown	1	a	2	a	2	a	1	a
	DIASTOLIC BLOOD PRESSURE							
1-2	55	72.6	34	78.3	70	71.5	42	84.8
3 or More	33	72.2	31	85.4	36	69.5	34	77.8
Unknown	1	a	2	a	2	a	1	a

[1] Number of states lived in six months or longer.

[a] Not calculated for less than 5 persons.

Source: State of California, Department of Public Health, Bureau of Chronic Diseases, Alameda County Blood Pressure Study, 1966.

Table 63

MEAN SYSTOLIC AND DIASTOLIC BLOOD PRESSURE (mm Hg) FOR WHITES, 25-64, BY AGE GROUP, SEX AND JOB MOBILITY[1]

JOB MOBILITY	MALE								FEMALE							
	25-34		35-44		45-54		55-64		25-34		35-44		45-54		55-64	
	No.	Mean	No.	Mean	No.	Mean	No.	Mean	No.	Mean	No.	Mean	No.	Mean	No.	Mean
	SYSTOLIC BLOOD PRESSURE															
Nonmobile	70	121.8	68	125.0	62	134.8	53	140.3	110	114.8	76	120.5	66	124.8	53	142.5
Moderately Mobile	91	125.0	89	127.7	63	132.4	38	143.4	72	114.3	75	119.7	62	133.5	33	143.5
Highly Mobile	71	123.8	65	128.0	46	132.9	39	134.7	30	112.1	58	120.1	63	126.9	35	144.4
Na	3	a	3	a	3	a	1	a	47	115.1	20	122.4	20	136.2	18	137.8
	DIASTOLIC BLOOD PRESSURE															
Nonmobile	70	70.4	68	74.4	62	81.8	53	83.3	110	68.2	76	73.7	66	74.9	53	80.0
Moderately Mobile	91	71.9	89	77.5	63	80.3	38	77.7	72	66.1	75	71.1	62	74.0	33	77.6
Highly Mobile	71	71.1	65	78.8	46	80.7	39	81.4	30	65.4	58	73.5	63	75.4	35	81.0
Na	3	a	3	a	3	a	1	a	47	68.8	20	79.0	20	79.0	18	72.7

Na Not applicable and not available.

1 Job mobility refers to number of full-time jobs held six months or longer.

a Not calculated for less than 10 persons.

Source: State of California, Department of Public Health, Bureau of Chronic Diseases, Alameda County Blood Pressure Study, 1966.

Table 64

MEAN SYSTOLIC AND DIASTOLIC BLOOD PRESSURE (mm Hg) FOR NEGROES BY SEX, TWO AGE GROUPS AND JOB MOBILITY[1]

JOB MOBILITY	MALE				FEMALE			
	Under 45		45 and Over		Under 45		45 and Over	
	No.	Mean	No.	Mean	No.	Mean	No.	Mean
	SYSTOLIC BLOOD PRESSURE							
Nonmobile	27	125.9	11	149.0	36	121.0	21	151.8
Mobile	56	129.3	55	143.7	39	121.1	47	147.2
Na	6	127.7	1	a	33	119.1	9	150.0
	DIASTOLIC BLOOD PRESSURE							
Nonmobile	27	72.3	11	82.3	36	68.6	21	78.2
Mobile	56	73.7	55	82.2	39	71.7	47	82.7
Na	6	60.8	1	a	33	72.2	9	85.8

Na Not applicable and not available.

1 Job mobility refers to number of full-time jobs held six months or longer.

a Not calculated for less than 5 persons.

Source: State of California, Department of Public Health, Bureau of Chronic Diseases, Alameda County Blood Pressure Study, 1966.

Table 65

MEAN SYSTOLIC BLOOD PRESSURE (mm Hg) FOR WHITES, 25-64, BY AGE GROUP, SEX AND NUMBER OF OCCUPATIONS[1]

NUMBER OF OCCUPATIONS	25-34		35-44		45-54		55-64	
	No.	Mean	No.	Mean	No.	Mean	No.	Mean
	MALE							
1	50	121.6	23	126.3	15	129.4	17	138.6
2	62	124.4	49	126.1	23	132.0	18	137.8
3	57	125.0	54	125.2	36	134.7	22	143.9
4	36	122.3	43	127.5	45	135.7	30	148.2
5 or More	28	124.3	53	129.6	51	131.8	43	132.3
Na	2	a	3	a	4	a	1	a
	FEMALE							
1	109	115.7	68	118.9	73	126.9	50	144.1
2	72	111.7	68	121.5	43	129.3	31	139.9
3	19	115.3	44	119.6	42	133.5	18	148.4
4	12	114.1	24	120.4	16	124.7	13	139.2
5 or More	1	a	5	a	17	122.5	9	a
Na	46	115.0	20	122.4	20	136.2	18	137.8

Na Not applicable and not available.

[1] Number of occupations (different kinds of work or different two-digit occupational codes) worked at full time six months or longer.

[a] Not calculated for less than 10 persons.

Source: State of California, Department of Public Health, Bureau of Chronic Diseases, Alameda County Blood Pressure Study, 1966.

Table 66

MEAN DIASTOLIC BLOOD PRESSURE (mm Hg) FOR WHITES, 25-64, BY AGE GROUP, SEX AND NUMBER OF OCCUPATIONS[1]

NUMBER OF OCCUPATIONS	25-34		35-44		45-54		55-64	
	No.	Mean	No.	Mean	No.	Mean	No.	Mean
	MALE							
1	50	71.7	23	75.9	15	78.8	17	79.8
2	62	71.1	49	75.9	23	83.6	18	81.0
3	57	69.6	54	74.7	36	81.3	22	86.0
4	36	71.6	43	79.2	45	82.6	30	84.3
5 or More	28	73.0	53	78.8	51	78.4	43	76.9
Na	2	a	3	a	4	a	1	a
	FEMALE							
1	109	68.4	68	72.2	73	74.8	50	79.6
2	72	65.3	68	73.8	43	72.9	31	77.8
3	19	66.3	44	71.9	42	77.6	18	81.9
4	12	65.8	24	72.7	16	72.9	13	81.0
5 or More	1	a	5	a	17	73.9	9	a
Na	46	69.0	20	78.9	20	79.0	18	72.7

Na Not applicable and not available.

[1] Number of occupations (different kinds of work or different two-digit occupational codes) worked at full time for six months or longer.

[a] Not calculated for less than 10 persons.

Source: State of California, Department of Public Health, Bureau of Chronic Diseases, Alameda County Blood Pressure Study, 1966.

Table 67

MEAN SYSTOLIC AND DIASTOLIC BLOOD PRESSURE (mm Hg) FOR NEGROES BY SEX, TWO AGE GROUPS AND OCCUPATIONAL MOBILITY[1]

OCCUPATIONAL MOBILITY	MALE				FEMALE			
	Under 45		45 and Over		Under 45		45 and Over	
	No.	Mean	No.	Mean	No.	Mean	No.	Mean
	SYSTOLIC BLOOD PRESSURE							
Nonmobile	42	128.4	24	144.3	53	121.8	31	147.4
Mobile	41	128.0	42	144.8	22	119.3	37	149.6
Na	6	127.7	1	a	33	119.1	9	150.0
	DIASTOLIC BLOOD PRESSURE							
Nonmobile	42	72.5	24	83.1	53	69.9	31	80.1
Mobile	41	74.1	42	81.0	22	70.9	37	82.3
Na	6	60.8	1	a	33	72.2	9	85.8

Na Not applicable and not available.

1 Number of occupations (different kinds of work or different two digit occupational codes) worked at full time for six months or more.

a Not calculated for less than 5 persons.

Source: State of California, Department of Public Health, Bureau of Chronic Diseases, Alameda County Blood Pressure Study, 1966.

Table 68

MEAN SYSTOLIC AND DIASTOLIC BLOOD PRESSURE (mm Hg) FOR WHITES, 25-64, BY AGE GROUP, SEX AND INTERGENERATIONAL MOBILITY[1]

INTERGENERATIONAL MOBILITY	MALE								FEMALE							
	25-34		35-44		45-54		55-64		25-34		35-44		45-54		55-64	
	No.	Mean	No.	Mean	No.	Mean	No.	Mean	No.	Mean	No.	Mean	No.	Mean	No.	Mean
	SYSTOLIC BLOOD PRESSURE															
Upwardly Mobile	109	122.5	97	126.7	83	132.1	59	142.4	112	112.5	103	121.1	97	126.1	62	141.3
Nonmobile	69	123.4	69	127.8	44	135.5	41	135.7	74	115.5	67	118.5	58	130.4	30	147.1
Downwardly Mobile	42	125.0	34	128.6	29	133.0	19	141.0	50	116.5	35	121.3	31	134.3	34	144.0
Unknown	15	127.4	25	122.6	18	132.7	12	133.8	23	115.3	24	121.1	25	131.1	13	134.5
	DIASTOLIC BLOOD PRESSURE															
Upwardly Mobile	109	71.8	97	77.1	83	79.1	59	82.0	112	67.2	103	74.5	97	73.8	62	77.8
Nonmobile	69	70.6	69	76.6	44	83.0	41	76.9	74	66.8	67	72.4	58	76.5	30	78.7
Downwardly Mobile	42	70.4	34	76.5	29	80.6	19	85.1	50	68.0	35	72.7	31	78.6	34	82.6
Unknown	15	71.9	25	77.8	18	83.7	12	81.5	23	68.5	24	71.0	25	73.0	13	73.5

[1] Intergenerational mobility refers to changes in occupational rank from father to son.

Source: State of California, Department of Public Health, Bureau of Chronic Disease, Alameda County Blood Pressure Study, 1966.

Table 69

MEAN SYSTOLIC AND DIASTOLIC BLOOD PRESSURE (mm Hg) FOR NEGROES BY TWO AGE GROUPS, SEX AND INTERGENERATIONAL MOBILITY[1]

INTERGENERATIONAL MOBILITY	MALE				FEMALE			
	Under 45		45 and Over		Under 45		45 and Over	
	No.	Mean	No.	Mean	No.	Mean	No.	Mean
	SYSTOLIC BLOOD PRESSURE							
Upwardly Mobile	29	123.9	24	142.7	36	119.9	19	152.7
Nonmobile	25	124.8	16	153.7	24	118.8	26	145.8
Downwardly Mobile	23	134.2	17	140.9	26	126.0	15	148.4
Unknown	12	134.2	10	140.9	22	116.6	17	149.4
	DIASTOLIC BLOOD PRESSURE							
Upwardly Mobile	29	72.7	24	82.7	36	71.2	19	81.8
Nonmobile	25	69.2	16	89.2	24	65.6	26	84.8
Downwardly Mobile	23	73.0	17	70.9	26	74.9	15	77.7
Unknown	12	77.3	10	86.5	22	70.9	17	80.9

[1] Intergenerational mobility refers to changes in occupational rank from father to son.

Source: State California, Department of Public Health, Bureau of Chronic Diseases, Alameda County Blood Pressure Study, 1966.

Table 70

MEAN SYSTOLIC AND DIASTOLIC BLOOD PRESSURE (mm Hg) FOR WHITES, 25-64, BY AGE GROUP, SEX AND INTRAGENERATIONAL MOBILITY[1]

INTRAGENERATIONAL MOBILITY	MALE								FEMALE							
	25-34		35-44		45-54		55-64		25-34		35-44		45-54		55-64	
	No.	Mean	No.	Mean	No.	Mean	No.	Mean	No.	Mean	No.	Mean	No.	Mean	No.	Mean
	SYSTOLIC BLOOD PRESSURE															
Upwardly Mobile	86	124.3	103	127.3	99	132.2	69	141.9	40	111.6	46	123.0	52	130.6	24	138.5
Nonmobile	120	122.8	97	126.4	49	135.0	48	137.0	161	114.6	144	119.8	118	127.3	83	145.3
Downwardly Mobile	26	125.5	23	128.0	24	134.5	13	136.2	12	117.1	20	116.2	21	131.1	15	140.6
Unknown	3	a	2	a	2	a	1	a	46	115.3	19	122.6	20	133.6	17	136.6
	DIASTOLIC BLOOD PRESSURE															
Upwardly Mobile	86	73.1	103	77.0	99	80.5	69	82.6	40	66.1	46	75.5	52	74.4	24	77.8
Nonmobile	120	70.9	97	76.8	49	81.8	48	79.0	161	66.9	144	73.0	118	74.6	83	80.7
Downwardly Mobile	26	66.7	23	77.7	24	80.5	13	80.7	12	72.0	20	64.5	21	77.6	15	78.2
Unknown	3	a	2	a	2	a	1	a	46	69.1	19	78.7	20	77.6	17	70.9

[1] Intragenerational mobility refers to changes in occupational rank between respondent's first job and last job.

[a] Not calculated for less than 10 persons.

Source: State of California, Department of Public Health, Bureau of Chronic Diseases, Alameda County Blood Pressure Study, 1966.

Table 71

MEAN SYSTOLIC AND DIASTOLIC BLOOD PRESSURE (mm Hg) FOR NEGROES BY TWO AGE GROUPS, SEX AND INTRAGENERATIONAL MOBILITY[1]

INTRAGENERATIONAL MOBILITY	MALE				FEMALE			
	Under 45		45 and Over		Under 45		45 and Over	
	No.	Mean	No.	Mean	No.	Mean	No.	Mean
	SYSTOLIC BLOOD PRESSURE							
Upwardly Mobile	25	126.2	26	141.0	12	115.4	19	157.1
Nonmobile	36	128.0	21	142.2	44	121.6	31	142.9
Downwardly Mobile	23	130.3	19	152.2	20	123.0	19	149.8
Unknown	5	129.4	1	a	32	119.3	8	149.5
	DIASTOLIC BLOOD PRESSURE							
Upwardly Mobile	25	78.4	26	81.7	12	69.5	19	84.6
Nonmobile	36	73.7	21	80.0	44	73.7	31	78.8
Downwardly Mobile	23	66.9	19	83.9	20	63.6	19	83.8
Unknown	5	58.6	1	a	32	71.8	8	82.0

[1] Intragenerational mobility refers to changes in occupational rank between respondent's first and last job.

[a] Not calculated for less than 5 persons.

Source: State of California, Department of Public Health, Bureau of Chronic Diseases, Alameda County Blood Pressure Study, 1966.

Table 72

MEAN SYSTOLIC AND DIASTOLIC BLOOD PRESSURE (mm Hg) FOR WHITES, 25-64, BY AGE GROUP, SEX AND STATUS INCONSISTENCY

STATUS INCONSISTENCY	MALE								FEMALE							
	25-34		35-44		45-54		55-64		25-34		35-44		45-54		55-64	
	No.	Mean	No.	Mean	No.	Mean	No.	Mean	No.	Mean	No.	Mean	No.	Mean	No.	Mean
	SYSTOLIC BLOOD PRESSURE															
Consistent	66	124.8	77	126.3	44	129.7	40	137.2	61	113.8	48	119.1	43	130.7	38	145.2
Moderately Inconsistent	111	124.7	98	127.6	82	136.1	58	139.4	122	114.7	122	120.4	101	127.6	63	141.9
Sharply Inconsistent	54	120.1	43	126.6	44	132.8	29	141.8	37	111.4	41	122.1	42	125.8	21	142.9
	DIASTOLIC BLOOD PRESSURE															
Consistent	66	72.4	77	77.6	44	79.5	40	79.4	61	67.2	48	72.8	43	75.9	38	79.7
Moderately Inconsistent	111	70.4	98	77.2	82	81.5	58	81.3	122	67.4	122	72.8	101	73.3	63	80.4
Sharply Inconsistent	54	71.5	43	75.5	44	81.4	29	82.5	37	64.4	41	74.1	42	75.9	21	80.3

Source: State of California, Department of Public Health, Bureau of Chronic Diseases, Alameda County Blood Pressure Study, 1966.

Table 73

MEAN SYSTOLIC AND DIASTOLIC BLOOD PRESSURE (mm Hg)
FOR NEGROES BY TWO AGE GROUPS, SEX AND STATUS INCONSISTENCY

STATUS INCONSISTENCY	MALE				FEMALE			
	Under 45		45 and Over		Under 45		45 and Over	
	No.	Mean	No.	Mean	No.	Mean	No.	Mean
	SYSTOLIC BLOOD PRESSURE							
Consistent	9	130.0	30	147.5	23	121.6	32	154.6
Moderately Inconsistent	51	128.8	29	142.1	51	120.7	29	147.0
Sharply Inconsistent	26	126.0	7	142.4	14	119.6	12	133.8
	DIASTOLIC BLOOD PRESSURE							
Consistent	9	78.3	30	77.7	23	75.0	32	79.8
Moderately Inconsistent	51	74.6	29	83.6	51	67.7	29	82.6
Sharply Inconsistent	26	68.7	7	92.0	14	73.4	12	82.2

Source: State of California, Department of Public Health, Bureau of Chronic Diseases, Alameda County Blood Pressure Study, 1966.

Table 74

MEAN SYSTOLIC AND DIASTOLIC BLOOD PRESSURE (mm Hg) FOR WHITES, 25-64, BY AGE GROUP, SEX AND STATUS TENSION[1]

STATUS TENSION	MALE								FEMALE							
	25-34		35-44		45-54		55-64		25-34		35-44		45-54		55-64	
	No.	Mean	No.	Mean	No.	Mean	No.	Mean	No.	Mean	No.	Mean	No.	Mean	No.	Mean
	SYSTOLIC BLOOD PRESSURE															
Subjective Standing Much Higher	7	a	5	a	5	a	4	a	7	a	2	a	7	a	15	141.0
Subjective Standing Some Higher	49	123.4	41	131.8	37	131.8	38	141.0	58	115.4	48	120.2	56	128.9	52	143.3
Subjective Standing Same	113	123.7	126	126.6	102	134.8	63	141.5	126	114.0	137	120.9	107	127.6	53	142.0
Socioeconomic Status Higher	53	122.9	38	123.4	21	131.0	14	134.2	55	112.6	27	119.6	21	127.2	9	a
	DIASTOLIC BLOOD PRESSURE															
Subjective Standing Much Higher	7	a	5	a	5	a	4	a	7	a	2	a	7	a	15	76.9
Subjective Standing Some Higher	49	68.3	41	79.8	37	80.7	38	81.0	58	68.6	48	74.0	56	74.0	52	80.3
Subjective Standing Same	113	72.0	126	76.3	102	81.3	63	82.1	126	66.6	137	73.9	107	74.7	53	78.0
Socioeconomic Status Higher	53	71.7	38	77.1	21	80.0	14	81.0	55	66.8	27	72.0	21	76.2	9	a

[1] Discrepancy between subjective social standing and socioeconomic status.

[a] Not calculated for less than 10 persons.

Source: State of California, Department of Public Health, Bureau of Chronic Diseases, Alameda County Blood Pressure Study, 1966.

Table 75

MEAN SYSTOLIC AND DIASTOLIC BLOOD PRESSURE (mm Hg)
FOR NEGROES BY TWO AGE GROUPS, SEX AND STATUS TENSION[1]

STATUS TENSION[1]	MALE				FEMALE			
	Under 45		45 and Over		Under 45		45 and Over	
	No.	Mean	No.	Mean	No.	Mean	No.	Mean
	SYSTOLIC BLOOD PRESSURE							
Subjective Standing Much Higher	11	135.0	23	151.7	22	119.8	36	157.1
Subjective Standing Some Higher	26	129.5	28	143.7	46	121.2	22	145.0
Subjective Standing Same	30	126.4	7	134.4	25	119.6	7	130.9
Socioeconomic Status Higher	13	124.4	4	a	6	116.3	3	a
	DIASTOLIC BLOOD PRESSURE							
Subjective Standing Much Higher	11	75.0	23	83.0	22	72.6	36	81.9
Subjective Standing Some Higher	26	73.1	28	83.2	46	71.9	22	84.5
Subjective Standing Same	30	74.5	7	83.0	25	70.4	7	78.3
Socioeconomic Status Higher	13	67.4	4	a	6	68.8	3	a

[1] Discrepancy between subjective social standing and socioeconomic status.

[a] Not calculated for less than 5 persons.

Source: State of California, Department of Public Health, Bureau of Chronic Diseases, Alameda County Blood Pressure Study, 1966.

Table 76

MEAN SYSTOLIC AND DIASTOLIC BLOOD PRESSURE (mm Hg) FOR WHITE MALES, 25-64, BY AGE GROUP AND TRADITIONALISM-MODERNITY INDEX

TRADITIONALISM-MODERNITY INDEX	25-34		35-44		45-54		55-64	
	No.	Mean	No.	Mean	No.	Mean	No.	Mean
	SYSTOLIC BLOOD PRESSURE							
Modern	99	121.7	71	124.6	39	131.1	25	135.8
Medium	75	123.9	77	128.6	48	135.8	43	136.9
Traditional	60	126.3	76	127.3	85	133.0	62	142.9
	DIASTOLIC BLOOD PRESSURE							
Modern	99	72.5	71	75.4	39	80.4	25	80.2
Medium	75	69.9	77	78.2	48	82.9	43	80.8
Traditional	60	70.5	76	77.3	85	79.9	62	81.7

Source: State of California, Department of Public Health, Bureau of Chronic Diseases, Alameda County Blood Pressure Study, 1966.

Table 77

MEAN SYSTOLIC AND DIASTOLIC BLOOD PRESSURE (mm Hg) FOR NEGRO MALES BY TWO AGE GROUPS, AND TRADITIONALISM-MODERNITY INDEX

TRADITIONALISM-MODERNITY INDEX	UNDER 45		45 AND OVER	
	No.	Mean	No.	Mean
	SYSTOLIC BLOOD PRESSURE			
Modern	32	128.1	10	135.0
Medium	34	125.1	19	141.6
Traditional	22	133.0	37	148.8
	DIASTOLIC BLOOD PRESSURE			
Modern	32	71.6	10	74.7
Medium	34	73.7	19	87.5
Traditional	22	71.7	37	80.8

Source: State of California, Department of Public Health, Bureau of Chronic Diseases, Alameda County Blood Pressure Study, 1966.

Table 78

MEAN SYSTOLIC BLOOD PRESSURE (mm Hg) FOR WHITES, 25-64, BY URBAN-RURAL BACKGROUND, SEX AND AGE

SEX AND AGE	SYSTOLIC BLOOD PRESSURE			
	Urban		Rural	
	No.	Mean	No.	Mean
Male				
25-34	136	123.1	98	124.3
35-44	136	127.2	88	126.5
45-54	93	135.0	79	131.5
55-64	66	142.8	64	136.2
Female				
25-34	173	114.9	82	113.4
35-44	147	120.7	80	120.0
45-54	130	131.5	81	125.1
55-64	77	144.5	61	140.5

Source: State of California, Department of Public Health, Bureau of Chronic Diseases, Alameda County Blood Pressure Study, 1966.

Table 79

MEAN SYSTOLIC AND DIASTOLIC BLOOD PRESSURE (mm Hg) FOR NEGROES, BY URBAN-RURAL BACKGROUND, SEX AND TWO AGE GROUPS

SEX AND AGE GROUP	SYSTOLIC BLOOD PRESSURE				DIASTOLIC BLOOD PRESSURE			
	Urban		Rural		Urban		Rural	
	No.	Mean	No.	Mean	No.	Mean	No.	Mean
Male								
Under 45	49	127.1	39	129.5	49	74.2	39	70.2
45 and Over	29	139.7	36	147.9	29	83.6	36	79.4
Female								
Under 45	65	119.5	41	122.1	65	69.9	41	72.4
45 and Over	34	145.7	42	151.1	34	80.4	42	82.7

Source: State of California, Department of Public Health, Bureau of Chronic Diseases, Alameda County Blood Pressure Study, 1966.

Table 80

MEAN SYSTOLIC AND DIASTOLIC BLOOD PRESSURE (mm Hg) FOR WHITE MALES, 25-64, BY AGE AND REGIONAL AREA OF CHILDHOOD RESIDENCE

REGIONAL AREA LIVED AS CHILD	25-34		35-44		45-54		55-64	
	No.	Mean	No.	Mean	No.	Mean	No.	Mean
	SYSTOLIC BLOOD PRESSURE							
Northeast and North Central	57	122.8	66	128.1	56	131.8	33	138.8
South	22	122.8	29	124.3	25	133.0	8	a
West	126	123.9	105	127.5	78	134.2	67	139.3
Outside U.S.	25	125.8	24	124.2	12	136.6	22	143.2
Unknown	5	a	1	a	3	a	1	a
	DIASTOLIC BLOOD PRESSURE							
Northeast and North Central	57	70.6	66	77.6	56	80.1	33	80.3
South	22	71.7	29	78.8	25	78.4	8	a
West	126	70.6	105	76.2	78	82.2	67	83.0
Outside U.S.	25	74.9	24	76.3	12	81.2	22	79.4
Unknown	5	a	1	a	3	a	1	a

[a] Not calculated for less than 10 persons.

Source: State of California, Department of Public Health, Bureau of Chronic Diseases, Alameda County Blood Pressure Study, 1966.

Table 81

MEAN SYSTOLIC AND DIASTOLIC BLOOD PRESSURE (mm Hg) FOR NEGRO MALES BY TWO AGE GROUPS AND REGIONAL AREA OF CHILDHOOD RESIDENCE

REGIONAL AREA LIVED AS CHILD	UNDER 45		45 AND OVER	
	No.	Mean	No.	Mean
	SYSTOLIC BLOOD PRESSURE			
Northeast and North Central	14	134.3	7	139.1
South	46	129.3	55	145.8
West	28	123.2	3	a
Outside U.S. and Unknown	1	a	2	a
	DIASTOLIC BLOOD PRESSURE			
Northeast and North Central	14	66.3	7	84.1
South	46	76.9	55	81.2
West	28	68.1	3	a
Outside U.S. and Unknown	1	a	2	a

[a] Not calculated for less than 5 persons.

Source: State of California, Department of Public Health, Bureau of Chronic Diseases, Alameda County Blood Pressure Study, 1966.

Table 82

WHITE MALES[1] BY EDUCATION, RURAL-URBAN BACKGROUND[2], 25-64, BY AGE GROUP AND SYSTOLIC BLOOD PRESSURE (mm Hg)

AGE AND SYSTOLIC BLOOD PRESSURE	EDUCATION					
	11 Years or Less		High School Graduate		College	
	Rural	Urban	Rural	Urban	Rural	Urban
25-34						
Total	30	19	22	30	43	87
Less than 115	5	5	3	6	8	20
115-124	12	4	8	11	13	31
125 and Over	13	10	11	13	22	36
35-44						
Total	38	23	19	47	30	66
Less than 115	10	1	4	8	7	13
115-124	4	8	5	15	11	27
125 and Over	24	14	10	24	12	26
45-54						
Total	33	25	24	39	22	29
Less than 115	11	10	11	8	8	13
115-124	15	10	10	13	8	15
125 and Over	7	5	3	18	6	1
55-64						
Total	32	26	17	19	14	21
Less than 115	10	6	6	8	2	4
115-124	12	9	7	2	10	10
125 and Over	10	11	4	9	2	7
	PERCENT					
25-34						
Total	100.0	(100.0)	(100.0)	100.0	100.0	100.0
Less than 115	16.7	(26.3)	(13.6)	20.0	18.6	23.0
115-124	40.0	(21.1)	(36.4)	36.7	30.2	35.6
125 and Over	43.3	(52.6)	(50.0)	43.3	51.2	41.4
35-44						
Total	100.0	(100.0)	(100.0)	100.0	100.0	100.0
Less than 115	26.3	(4.3)	(21.1)	17.0	23.3	19.7
115-124	10.5	(34.8)	(26.3)	31.9	36.7	40.9
125 and Over	63.2	(60.9)	(52.6)	51.1	40.0	39.4
45-54						
Total	100.0	100.0	(100.0)	100.0	(100.0)	100.0
Less than 115	33.3	40.0	(45.8)	20.5	(36.4)	44.8
115-124	45.5	40.0	(41.7)	33.3	(36.4)	51.7
125 and Over	21.2	20.0	(12.5)	46.2	(27.3)	3.4
55-64						
Total	100.0	100.0	(100.0)	(100.0)	(100.0)	(100.0)
Less than 115	31.2	23.1	(35.3)	(42.1)	(14.3)	(19.0)
115-124	37.5	34.6	(41.2)	(10.5)	(71.4)	(47.6)
125 and Over	31.2	42.3	(23.5)	(47.4)	(14.3)	(33.3)

1 Nineteen persons with either education or rural-urban background unknown are not included.

2 See Appendix D: Definition of Variables.

Note: Underlined percents are based on 25-49 persons.
Percents in parentheses are based on 10-24 persons.

Source: State of California, Department of Public Health, Bureau of Chronic Diseases, Alameda County Blood Pressure Study, 1966.

Table 83

NEGRO MALES[1] BY TWO AGE GROUPS, EDUCATION, RURAL-URBAN BACKGROUND[2] AND SYSTOLIC BLOOD PRESSURE (mm Hg)

RURAL-URBAN BACKGROUND, SYSTOLIC BLOOD PRESSURE	UNDER 45		45 AND OVER		UNDER 45		45 AND OVER	
	11 Years or Less	12 Years or More	8 Years or Less	9 Years or More	11 Years or Less	12 Years or More	8 Years or Less	9 Years or More
	NUMBER				PERCENT			
Rural								
Total	18	20	28	6	(100.0)	(100.0)	100.0	a
Less than 115	1	4	2	2	(5.6)	(20.0)	7.1	
115-124	9	11	16	3	(50.0)	(55.0)	57.1	
125 and Over	8	5	10	1	(44.4)	(25.0)	35.7	
Urban								
Total	8	41	11	18	a	100.0	(100.0)	(100.0)
Less than 115	1	4	2	3		9.8	(18.2)	(16.6)
115-124	5	29	6	12		70.7	(54.5)	(66.7)
125 and Over	2	8	3	3		19.5	(27.3)	(16.6)

1 Six persons with either education or rural-urban background unknown are not included.
2 See Appendix D: Definition of Variables.

a Percents not calculated for less than 10 persons.

Note: Percents in parentheses are based on 10-24 persons.
Underlined percents are based on 25-49 persons.

Source: State of California, Department of Public Health, Bureau of Chronic Diseases, Alameda County Blood Pressure Study, 1966.

APPENDIX C

NOTES ON STATISTICAL METHODOLOGY

SAMPLE DESIGN

Alameda County was divided into 25 strata on the basis of median income as given in the 1960 Census, and 40 blocks were chosen from each stratum with probability proportionate to size. Each set of 40 blocks was randomly subdivided into two sets of 20 blocks each, for the purpose of calculating sampling errors. Housing units were selected by a procedure designed to yield four units per block on the basis of 1960 Census data, and to adjust that number appropriately if the blocks had more or less housing units than in 1960.

SAMPLING ERROR

Since the estimates presented in this monograph are based on a sample, they may differ from the figures that would have been obtained if every household in Alameda County had been seen. Variation of this type can be measured and is commonly referred to as sampling variation. The sampling error is a measure of this variation.

Because of the design of the sample it is easier to calculate the coefficient of variation and since:

$$\text{Coefficient of Variation} = \frac{\text{Standard Error}}{\text{Mean}}$$

the standard error can be obtained as a product of the estimate by the coefficient of variation. After simplification appropriate to the sample design is made, the formula for calculation of the coefficient of variation is:

$$\text{Coefficient of Variation } \hat{(Y)} = \sqrt{\frac{\sum_i \left[(A'_i - A''_i) - \hat{Y} (B'_i - B''_i) \right]^2}{\sum_i (A'_i + A''_i)}}$$

Where:

$A'_i = \sum_j' \sum_k y_{ijk}$ = the total for the characteristics y of all units in the blocks of the <u>first</u> subsample of the ith stratum.

$A''_i = \sum_j'' \sum_k y_{ijk}$ = as above but for the <u>second</u> subsample.

$B_i' = \sum_j' m_{ij}$ = the total number of units in the blocks of the first subsample of the ith stratum.

$B_i'' = \sum_j'' m_{ij}$ = as above but for the second subsample.

The above formula is applicable whether the unit of analysis is the household or the individual. The symbols A_i', A_i'', B_i', B_i'' stand for "household" or "individual".

The same formula also is used for calculating the coefficient of variation of a proportion instead of a mean; for this purpose, y_{ijk} is replaced by d_{ijk} = 1 or 0, indicating whether the kth unit of the jth block in the ith stratum has the qualitative characteristic or not.

Setting Bounds Around a Single Estimate

Two standard errors on either side of the estimate provide confidence limits within which the population value would fall most of the time (95 percent) if many other similar samples were picked, similar interviews and measurements were made, similar procedures were followed and the same estimates were made.

Deciding If Two Estimates Are Actually Different

If the confidence limits (2 S.E.) of the two estimates being compared do not overlap then the two estimates are statistically significantly different. (Confidence interval method.) However, when they do overlap a more exact method of testing to determine whether the two estimates are different must be used.

The usual critical ratio test can be applied.

$$z = \frac{\bar{x} - \bar{y}}{\sqrt{\sigma_{\bar{x}}^2 + \sigma_{\bar{y}}^2}}$$

Where:

$\bar{x}$ = mean of first sample
$\bar{y}$ = mean of second sample
$\sigma_{\bar{x}}$ = standard error of $\bar{x}$
$\sigma_{\bar{y}}$ = standard error of $\bar{y}$

The difference is significant at the 5 percent level if $z > 2.0$ and is significant at the 1 percent level if $z > 2.6$.

Proportions can be compared in the same way. (Note: Both the confidence interval and the critical ratio methods are only applicable when comparing means or proportions from independent samples.)

Table 22, Appendix B shows the standard errors for mean systolic and diastolic blood pressure by age-race-sex.

COEFFICIENTS OF CORRELATION

Since the correlation coefficient measures the relationship between variables and is devoid of any units or labels, it allows comparisons to be made between various social factors and blood pressure. This measured relationship does not imply cause or effect.

The coefficients of correlation shown in the text and tables were computed using the following formula:

$$r = \frac{N\Sigma XY - (\Sigma X)(\Sigma Y)}{\sqrt{[N\Sigma X^2 - (\Sigma X)^2][N\Sigma Y^2 - (\Sigma Y)^2]}}$$

In this monograph, coefficients of correlation are presented measuring the relationship between blood pressure and various social factors as well as the relationship between the social factors themselves. Text Tables II and III, pp. 30 and 31 and Appendix B, Tables 33, 38 and 59 present these measurements.

Appendix Table 30a in "Introduction to Statistical Analysis" by W. J. Dixon and F. J. Massey, Jr., was used to test for significance of the coefficients of correlation.

APPENDIX D

DEFINITIONS OF VARIABLES

Variables and factors defined in this section are organized in five major topics; biomedical items, blood pressure, occupation, mobility and incongruity, and social demographic items. The detailed outline follows:

A. Biomedical Items

1. Height
2. Weight
3. Framingham relative body weight
4. Metropolitan standard body weight
5. Ponderal index
6. Pulse rate
7. Smoking status

B. Blood Pressure

1. Systolic blood pressure
2. Mean systolic blood pressure
3. Phase IV diastolic blood pressure
4. Phase V diastolic blood pressure
5. Mean diastolic blood pressure
6. Hypertensive-normotensive-borderline groups

C. Occupation

1. Occupation
2. Occupational groups
3. White collar
4. Blue collar
5. Occupational prestige
6. Father's occupation
7. Job
8. First regular full-time job
9. Number of jobs
10. Number of occupations

D. Mobility and Incongruity

1. Geographic mobility
2. Intragenerational mobility
3. Intergenerational mobility
4. Job mobility
5. Number of places lived
6. Occupational mobility

D. Mobility and Incongruity (Continued)

7. Residential incongruity
8. Residential mobility
9. Status inconsistency
10. Status tension
11. Traditionalism-modernity index

E. Social Demographic Items

1. Age
2. Birthplace
3. Education
4. Employed
5. Family income
6. Household
7. Head of household
8. Marital status
9. Number of own children
10. Number of step/adopted children
11. Race
12. Regional area
13. Religion
14. Rural background
15. Socioeconomic status
16. Subjective social standing
17. Urban background

A. Biomedical Items

Height: Number of inches of height without shoes to the nearest quarter inch as measured by portable steel measuring bar.

Weight: Number of pounds in indoor clothing as measured by bathroom scales.

Framingham relative body weight: Respondent's weight divided by average weight for his height-sex group in Study population multiplied by 100.

Metropolitan standard body weight: Respondent's weight divided by Metropolitan Life Insurance Company's Standard Body Weight for his height-sex group multiplied by 100.

Note: Standard body weight used was the midpoint for medium frame weight for a given height-sex group. See p. 5, "New Weight Standards for Men and Women," Overweight, Its Prevention and Significance, 1960 Statistical Bulletin, Metropolitan Life Insurance Company.

Ponderal index: Respondent's height in inches divided by cube root of his weight. Standard categories are: heavy = less than 12.00, moderately heavy = 12.00-12.49, moderately light = 12.50-12.99, light = 13.00 or more.

Pulse rate: The number of pulsations per minute of the radial artery felt at the wrist.

Smoking status: Cigarette smoking status indicated by three categories: current cigarette smoker, past cigarette smoker and never smoked cigarettes. Categories obtained from answers to Questions 6 and 7; "Have you ever smoked cigarettes regularly?" If yes, "Do you smoke any cigarettes at the present time?" followed by a question on amount smoked.

B. Blood Pressure

Systolic blood pressure: The onset of Korotkoff sounds, the first appearance of faint, clear tapping sounds which gradually increase in intensity.

Mean systolic blood pressure: Average of the systolic readings obtained by summing the values of each reading and dividing by the number of readings.

Phase IV diastolic blood pressure: The period marked by the distinct, abrupt muffling of sound so that a soft, blowing quality is heard.

Phase V diastolic blood pressure: The point at which sounds disappear.

Mean diastolic blood pressure: Average of the phase V diastolic readings obtained by summing the values of each reading and dividing by the number of readings.

Hypertensive-normotensive-borderline groups:

Hypertensive: Systolic 160 mm Hg or over or diastolic 95 mm Hg or over.
Normotensive: Systolic below 140 mm Hg and diastolic below 90 mm Hg.
Borderline: Systolic below 160 mm Hg and diastolic below 95 mm Hg but not simultaneously below both 140 and 90 mm Hg.

See Department of Health, Education, and Welfare, Public Health Service, Hypertension and Hypertensive Heart Disease, Public Health Service Publication No. 1000, Series 11, No. 13, p. 4.

C. Occupation

Occupation: Two-digit code referring to specific kind of work. First digit refers to one of the nine major occupational groupings used. (See Occupational groups.) Based on answers to Questions 12, 14, 17, 28 or 43.

Occupational groups: Two-digit code of occupations adapted from the U.S. Census codes of occupation. The first digit refers to one of nine major occupational groups which are:

1. Professional workers
2. Semi-professional and technical workers
3. Proprietors, managers and officials
4. Clerical and sales and kindred workers
5. Craftsmen, foremen and kindred workers
6. Operatives and kindred workers
7. Farming and fishing occupations
8. Service workers
9. Laborers and kindred workers

White collar: Includes professional, semi-professional and technical workers, proprietors, managers and officials, clerical and sales workers. (Coded 1-4 of Occupational groups.)

Blue collar: Includes skilled, semi-skilled and unskilled occupations. (Coded 5-9 of Occupational groups.)

Occupational prestige: Prestige ranking of occupation which ranges from a low of 2 to a high of 9; it is based on the National Opinion Research Center Study of occupational prestige code (as predicted by the 1949 North-Hatt Study of prestige and other socioeconomic variables). See Albert J. Reiss, Jr., et al., Occupational and Social Status, New York, The Free Press of Glencoe, 1961, Appendix B.

Father's occupation: Answer to Question 28, "What kind of work did your father do most of the time you were a teen-ager (13 to 19 years old)?" Coded in terms of two-digit occupational code.

Job: A full-time (30 hours a week or more) period of employment for a specific employer held for 6 months or more.

First regular full-time job: First job worked 30 hours a week or more, held for 6 months or more.

Number of jobs: Total number of full-time jobs, 30 hours a week or more, held 6 months or more. The same kind of work done for two

or more employers is counted as separate jobs. Also, a change in kind of work for the same employer is counted as a separate job.

Number of occupations: Total number of occupations held at which the person worked full time, 30 hours a week or more, held for 6 months or more. The number of employers for same type of work is not counted, but change in kind of work even for the same employer is counted as another occupation.

D. Mobility and Incongruity

Geographic mobility: Number of states lived in 6 months or more, based on Question 20.

Intragenerational mobility: Changes in occupational rank between respondent's first regular job and last job. Score obtained by subtracting prestige ranking of first job from prestige ranking of last job. Values vary between -6 to -1, 0, +1 to +6. Negative scores indicate downward mobility, positive scores upward mobility and "0" nonmobility.

Intergenerational mobility: Changes in occupational rank from father to son. Score obtained by subtracting prestige ranking of father's occupation from prestige ranking of respondent's last occupation. Values vary between -6 to -1, 0, +1 to +6. Negative scores indicate downward mobility, positive scores upward mobility and "0" nonmobility.

Job mobility: Number of full-time jobs (periods of employment at a certain kind of work for a specific employer) held 6 months or longer. (See Number of jobs under Occupation.)

Number of places lived: Number of towns, cities or farms lived in 6 months or longer since birth.

Occupational mobility: Number of occupations (different kinds of work or different two-digit occupational codes) worked at full time for 6 months or more.

Residential incongruity: Lack of fit or incongruity between childhood and adult residence. Measured either in terms of region of country lived or rural-urban background. In the context of Alameda County, Southern childhood residence or rural background represents residential incongruity while North Central, Northeastern and Western childhood residence or urban background represent residential congruity.

Residential mobility: Amount of residential movement as indicated by number of places lived in since birth which is categorized as non-mobile (few number of places lived), medium mobile and highly mobile (large number of places lived).

Status inconsistency: Refers to lack of fit in the level or rank of various statuses; the measure was based on discrepancies between education, occupation and income levels. (These items are defined under Social Demographic Items and Occupation.) Each factor was classified into three categories of high, medium and low or 1-3.

		EDUCATION	OCCUPATION	FAMILY INCOME
1.	High	1 or more years of college	Professional, semiprofessional, managers, officials and proprietors	$9,000 or more
2.	Medium	11-12 years of school	Clerical, sales workers, foremen and skilled workers	$6,000-8,999
3.	Low	10 or less years of school	Semiskilled, unskilled, farm and service workers	Less than $6,000

Respondents' scores (1-3) on each item were obtained. Subtractions were made of each pair of items (occupation-education, occupation-income, education-income) resulting in three categories: consistents (all three items same rank), moderately inconsistent (two items same rank, the third item one rank lower or higher) and sharply inconsistent (all items different rank; or two items of the same rank and the third item two ranks above or below).

Status tension: Discrepancy between subjective social standing and objective SES level. The measure of status tension was obtained by subtracting an individual's socioeconomic level from his subjective social standing level. (These items are defined under Social Demographic Items.) Each item was divided into three categories of high, medium and low and the subtraction yielded five possible values from -2 to +2.

Values of each category are:

	OBJECTIVE SES SCORE	SUBJECTIVE SOCIAL STANDING
High	80-100	Upper middle or upper class
Medium	55-79	Middle class
Low	7-54	Lower middle or lower class

Negative values indicate a perceived standing higher than the objective level, positive scores the reverse and "0" correspondence or lack of status tension.

Traditionalism-modernity index: A traditionalism-modernity index was devised to reflect the sociocultural orientation of persons based on a cluster of seven current and past positions or statuses. This ad hoc index was strictly experimental and unvalidated, and should be judged on that basis. Reflections of current sociocultural orientation were tapped by occupational and educational levels and religion. Indications of culture of orientation, or childhood background, were rural-urban background, generational status (number of generations the family had been in the United States), and father's occupational and educational levels. Each status was classified into six categories from modern to traditional. The value of each item was summed yielding a range from 7-42. The six categories of each of the seven factors are as follows:

SCORE	OCCUPATION	EDUCATION	RELIGION	RURAL-URBAN BACKGROUND	GENERATIONAL STATUS	FATHER'S OCCUPATION	FATHER'S EDUCATION
1 Modern	Professional and semi-professional	College graduate or more	No religion reported	Never lived on farm	3rd generation; 1 of 4 grand-parents U.S. born; parents and respondent U.S. born	Professional, proprietors, managers, officials	College graduate
2	Proprietors, managers, officials	1-3 years college	Protestant	Lived on farm less than 5 years	3rd generation; 2 of 4 grand-parents foreign born; parents and respondent U.S. born	Clerical, sales	1-3 years college
3	Clerical and sales workers	High school graduate	Sects and cults, Mormons, 7th Day Adventists	Lived on farm 5-9 years	3rd generation; 3 of 4 grand-parents foreign born; parents and respondent U.S. born	Craftsmen, foremen and kindred workers	High school graduate
4	Craftsmen, foremen and kindred workers	9-11 years school	Jewish	Lived on farm 10-14 years	2nd generation; one parent foreign born; respondent U.S. born	Operatives and kindred workers	9-11 years school
5	Operatives and kindred workers	6-8 years school	Non-Christian faiths	Lived on farm 15-24 years	2nd generation; both parents foreign born; respondent U.S. born	Service workers and laborers	Grammer school
6 Traditional	Farming, fishing, service workers and laborers	5 or less years school	Catholic; Roman and Eastern Orthodox	25 or more years on farm	1st generation; respondent foreign born	Farming or fishing	No school

E. Social Demographic Items

Age: Number of years of age obtained by subtracting respondent's birthdate from date of interview.

Birthplace: State of birth if born in the United States. Answer to Question 18, "Where were you born?" U.S. or some other country. If U.S. name city and state.

Education: Number of years of school completed. Answer to Question 38, "How many grades did you finish in school?"

Employed: Working includes paid work as an employee for someone else, working for one's self in one's own business or professional practice or in farming, and unpaid work in a family business or farm. Work around the house and volunteer or unpaid work such as for the Church, Red Cross, etc., is not counted as working.

Family income: Total income before taxes of family from all sources for last year, including income of all other members of immediate family who live in household. (Based on answers to Question 39.)

Household: A private household is defined as a group of persons sharing the same dwelling and having common arrangements for the provision of at least one principal meal a day. A person living alone (on his own) is also considered a private household. According to this definition, resident domestic servants, employees and other persons living together and sharing meals are considered to be members of the household. Only persons permanently sharing the dwelling and food arrangements are considered members of the household. A roomer or lodger who does not eat with the family at that address is enumerated separately and considered a separate household at the same address.

Head of household: The member of the household who is accepted by all other household members as responsible for major household decisions is considered to be head of the household. In the case of married couples, the husband is considered to be head of the household. If two persons of different sex have an equal claim, the male member is considered the head; with persons of the same sex, the elder member is considered to be head of the household.

Marital status: Categories include single (never married), married, separated, divorced, widowed. Latter four obtained from answer to Question 35, "Are you now married, separated, divorced or widowed?" which was asked of those saying they have ever been married. Never married was obtained from "No" answers to Question 33.

Number of own children: Answer to Question 36, "Do you have any children of your own?" If yes, "How many?"

Number of step/adopted children: Answer to Question 37, "Do you have any stepchildren or adopted children?" If answer yes, "How many?"

Race: White includes Caucasian, Mexican-American, Mexican and Spanish-speaking groups. Negro includes Negro. Oriental includes Japanese, Chinese and Korean. Other includes such groups as American Indian, Polynesian and Malaysian. When three racial groups are used in the analysis, Oriental is included with Other, unless otherwise specified.

Regional area - Based on Questions 18 or 20:

North East: Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Pennsylvania.

North Central: East North Central - Michigan, Ohio, Illinois, Indiana, Wisconsin. West North Central - Minnesota, Iowa, Missouri, North Dakota, South Dakota, Nebraska, Kansas.

South: South Atlantic - Delaware, Maryland, District of Columbia, Virginia, West Virginia, North Carolina, South Carolina, Georgia, Florida. South Central - Kentucky, Tennessee, Alabama, Mississippi, Arkansas, Louisiana, Oklahoma, Texas.

West: Mountain - Montana, Idaho, Wyoming, Colorado, New Mexico, Arizona, Utah, Nevada. Pacific - Washington, Oregon, California, Hawaii, Alaska.

Religion: Answer to Question 40, "What is your religion?" Protestant, Catholic, Jewish, Other, None.

Rural background: Indicated by having lived on a farm at some time. "Yes" answer to Question 19, "Have you ever lived on a farm?"

Socioeconomic status: Index based on occupation, education and income scores combined to form scale from low of 7 to high of 100. Married women's SES scores were based on their husband's educational, occupational and family income statuses.

An individual's score on each of the three factors divided by the total number of values of that factor; the three proportions were added together, divided by 3 and then multiplied by 100 to obtain the scores from 7 to 100. There were: 9 occupational values, the first digit of the occupational groups; 19 educational values including no school, each year of school completed through 17 (5 or more years of college) and advanced college degree; 12 values for family income including under $2,000, $2,000-9,999 in units of one thousand dollars, $10,000-14,999, $15,000-24,999 and $25,000 and over.

Subjective social standing: The social class or social standing in the community to which persons assign themselves. Answer to Question 42, "If you were asked to choose one of these names for your social standing in the community, which would you say fits you best? Lower class, lower middle class, middle class, upper middle class or upper class."

Urban background: Indicated by never living on a farm. "No" answers to Question 19, "Have you ever lived on a farm?"

APPENDIX E

OBSERVER DIFFERENCES IN THE MEASUREMENT OF BLOOD PRESSURE BY NURSES

The interpretation of casual blood pressure readings as precise measurements has been discredited on many grounds. Nevertheless, the differentiation of meaningful gradations in blood pressure levels for epidemiological and diagnostic purposes requires that the degree of precision of measurements be carefully analyzed.

The design of the Alameda County Blood Pressure Study allowed scrutiny of the problem of observer-associated error, and yielded information on the effects of training and experience on observer's blood pressure recording techniques. The fact that the observers were graduate nurses could be of special interest since nurses frequently read blood pressure.

The study anticipated that observer factors might introduce a bias in the data, and sought to mitigate this effect by adhering to recommended techniques and incorporating precautions against factors which could compound observer errors in design.

During the training, there were three test measurement sessions in which the nurses recorded the blood pressure of subjects. These sessions, plus a fourth which was scheduled midway through the field work, provided the data presented here.

Tests during the training period were specifically designed to examine the problem of inter-observer variability. The questions to be answered by analysis of the data were:

- Did the nurses' readings differ significantly?
- Which nurses differed?
- How large were the differences among nurses' readings?
- Did the same nurses differ consistently from test to test?
- Was there improvement in agreement from test to test?
- Could any aspect of the measurement problem be identified as giving continued trouble or as improving?
- What implications did the findings have for the study?
- How might observer error be controlled?

TEST SESSIONS

Subjects were seated at tables placed around a room and the nurses moved from subject to subject according to a prescribed order. (A ten by ten latin square design was used to determine the order of reading.) During the first two tests, the nurses carried sphygmomanometers with them so

any error due to instruments was associated with the nurses' variation. During the last two tests, the instruments were left with the subjects and instrument error was subsumed under subject variation.

The test sessions were held at convenient times during the training without regard to time of day or preserving equal time intervals between the tests. The first test was given before any training, the second on the succeeding day after some training, the third after more training and one week of practice field work, and the last midway through the actual field work. Before the training began, only one of the ten nurses had previously read phase IV diastolic blood pressure (muffling), though all of them had experience taking systolic and phase V diastolic readings. A considerable amount of training time was devoted to classification of phase IV diastolic reading.

Nine of the same subjects participated in the first two tests, but in the final tests other subjects were used. About half the subjects were men and half were women and most of them were relatively young (20-35 years). The sessions took from 45 minutes to an hour, a time span in which one would expect to observe variations in individual blood pressure. The mean blood pressure of the subjects in each test session are shown in Table 1.

Table 1

MEAN BLOOD PRESSURE (mm Hg) OF THE TEN SUBJECTS PARTICIPATING IN EACH TEST BY BLOOD PRESSURE PHASE

	SYSTOLIC	DIASTOLIC IV	DIASTOLIC V
Test 1	121.8	87.7	80.7
Test 2	116.4	85.7	78.1
Test 3	124.6	84.7	78.2
Test 4	114.7	78.3	73.6

An experimental design was selected to facilitate an initial analysis of the variation between the nurses' readings according to the statistical model of the latin square. This design prescribed a randomized order in which the ten nurses all took blood pressure measurements on ten subjects in ten periods of reading during each test session. By this model the total variation in blood pressure could be mathematically separated into variation associated with subject, nurse, order of reading and random error by making the assumption that these sources of variation were independent.

VARIATION RECORDED FOR SUBJECTS

Three sets of subjects were involved in the four tests. Optimally, the measurements would have been repeated on the same set of subjects each time so that the variability among the subjects would have been more constant. In spite of this qualification, some observations are relevant.

In tests 1 and 2, the average standard deviations and the range of these deviations look remarkably similar (Tables 2 and 3) and one might guess that the decreases in the third and fourth tests could simply be due to the different subjects involved. However, tests 1 and 2 were on successive days, with only a few hours practice in between, while tests 3 and 4 were respectively one week and three months later. Different individuals have extreme (widest or narrowest) ranges of readings on the two tests involving the same subjects. (Table 3) The assumption that the reduction in standard deviations and ranges was due to reduction of observer error and not merely to population differences seems to be justified in spite of the similarities between test 1 and test 2.

Table 2

AVERAGE OF THE SUBJECTS' STANDARD DEVIATIONS (mm Hg) OF BLOOD PRESSURE READINGS BY BLOOD PRESSURE PHASE AND TEST

	SYSTOLIC	DIASTOLIC IV	DIASTOLIC V
Test 1	5.8	7.3	7.0
Test 2	5.7	7.6	6.6
Test 3	4.8	7.2	6.0
Test 4	5.4	4.2	5.3

Table 3

LOW AND HIGH SUBJECTS' STANDARD DEVIATIONS (mm Hg) OF BLOOD PRESSURE READINGS BY BLOOD PRESSURE PHASE AND TEST

	SYSTOLIC	DIASTOLIC IV	DIASTOLIC V
Test 1	4.2*-7.2*	6.2- 9.5*	3.2*-13.1*
Test 2	4.2*-7.9*	6.0-10.6*	4.3*-11.7*
Test 3	1.9 -6.6	4.0-13.2	2.3 -10.1
Test 4	3.9 -6.4	2.1- 7.0	3.6 - 6.7

* High and low standard deviation errors registered for different subjects in Test 1 and Test 2.

NURSE VARIATION

Four aspects of nurse variation in obtaining blood pressure readings were examined: 1) a comparison of nurse-associated variations with total variation, 2) nurses' tendencies to read either high or low, 3) digit preference, and 4) problems of measuring phase IV and V readings. Certain assumptions and adjustments were necessary in dealing with the data. During the test sessions the nurses were instructed to make only one attempt to

read each subject's blood pressure. Because of these instructions observations were missed occassionally. Since some tests cannot be performed if missing values are present, the best estimate for these values were computed.(1) The assumption that the distribution of blood pressure in a population is normal is commonly made, and was made for part of this analysis as well. Though the nurses recorded their readings by 2 mm intervals, the data were also assumed to be continuous. No attempt was made to correct for instrument errors even though this could have increased nurse variation in the first two tests since the instrument remained with the nurse.

Comparison of Nurse-Associated Variation With Total Variation

An analysis of variance for a ten by ten latin square for each phase of blood pressure was performed after each test according to the standard procedure.(2) Thus the constant differences among subjects and order of reading, which may be large, are eliminated in the analysis of the differences among nurses. Table 4 shows the F-ratios for each phase and test.

Table 4

F-RATIOS OF NURSES' VARIATION BY TEST AND BLOOD PRESSURE PHASE

	SYSTOLIC	DIASTOLIC IV	DIASTOLIC V
Test 1	1.436	8.779[a]	5.959[a]
Test 2	5.821[a]	16.391[a]	7.957[a]
Test 3	0.917	4.162[a]	1.747
Test 4	1.405	0.863	2.174[b]

[a] Significant at the 1 percent level.
[b] Significant at the 5 percent level.

Nurse variation was highly significant in the diastolic phases in the first test, while agreement on systolic readings was close. During the second test there was wide variation in the nurses' readings on every phase. The later two tests showed markedly reduced variation. This pattern suggests that the heavy emphasis on mastering the diastolic IV measurement between test 1 and test 2 was confusing to the nurses, but that subsequent practice brought their readings into closer agreement. The nature of the nurses' bias required further investigation. Other means of contrasting the data were meant to explore observer-related errors.

Nurses' Tendencies to Read High or Low

Whether the differences observed in the nurses' readings introduced a systematic bias by nurse from test to test can be partially examined by

comparing the mean of each nurses' ten readings with the overall mean for each blood pressure phase of the tests. The magnitude and the direction of the nurses' differences are exhibited in Tables 5 and 6.

Table 5

SUM OF ABSOLUTE DEVIATIONS (mm Hg) BETWEEN EACH NURSE'S MEANS AND THE OVERALL MEAN FOR ALL BLOOD PRESSURE PHASES AND TESTS

NURSE NUMBER	ALL TESTS		TEST 1	TEST 2	TEST 3	TEST 4
	Deviation	Percent				
Total	313.42	100.0	95.13	112.65	62.42	43.22
1	20.75	6.6	8.77	4.49	3.08	4.41
2	23.00	7.3	3.38	6.85	5.42	7.35
3	33.36	10.6	16.99	6.26	6.37	3.74
4	52.55	16.8	5.84	28.84	8.22	9.65
5	31.46	10.0	13.09	12.65	2.85	2.87
6	29.85	9.5	7.61	9.06	9.85	3.33
7	25.35	8.1	7.04	12.55	2.94	2.82
8	17.45	5.6	6.56	3.43	3.91	3.55
9	28.91	9.2	12.18	11.16	2.43	3.14
10	50.74	16.2	13.67	17.36	17.35	2.36

Nurse 4 and nurse 10 had particularly high deviations (52.55 and 50.74 mm Hg respectively), while nurse 8 was closest to the overall means (total deviation of 17.45 mm Hg). The nurses' deviations showed a general decrease between the first two tests and the last test. The variation within each nurse's readings (due in large part to subject differences) was great enough that the differences between nurses' means only reached the point of statistical significance according to the t-test(3) in the second test for those nurses reporting extreme means. These deviations can, however, be viewed as indicators of tendencies.

High deviations were often associated with a tendency to report blood pressure higher or lower than the mean. Nurses 4 and 6 showed strong tendencies to read low; nurses 5 and 10 almost consistently read high. Tendencies to read high or low did not usually alter the reading of all phases to the same degree.(Table 6) Nurse 1, for example, had approximately even high and low deviations when the three blood pressure phases are considered together (9.86 mm high, 10.89 mm low), but nearly all (96.2 percent) of her systolic deviations were low, while only 5.6 percent of her diastolic IV deviations were low. Similar inconsistent patterns are evident for several other nurses and might be attributable to response rates or hearing acuity. For example, nurse 1 heard the initial systolic sounds later, and recorded that they faded out sooner, indicating that her hearing might be less acute than, say nurse 2's. The scattered pattern in Table 6 indicates, however, that there were other sources of bias.

Table 6

PERCENT OF TOTAL OF ABSOLUTE DEVIATIONS BETWEEN NURSE MEAN AND OVERALL MEAN WHICH WERE NEGATIVE BY BLOOD PRESSURE PHASE

NURSE NUMBER	TOTAL	SYSTOLIC	DIASTOLIC IV	DIASTOLIC V
All Nurses	50.0	50.0	50.0	50.0
1	52.5	96.2	5.6	24.8
2	43.9	0.0	86.9	2.4
3	41.7	59.8	65.5	0.0*
4	94.2	71.9	100.0	100.0
5	10.8*	0.0	9.1*	16.5*
6	97.0	90.2	100.0	100.0
7	73.1	47.1	94.2	67.7
8	41.5	9.5	65.5	40.7
9	42.6	21.7	27.0	70.7
10	3.6*	19.5	0.0*	1.6*

Note: Underlined percents are based on deviations indicating a tendency for the nurse to read 2 mm or more lower than overall mean.
Starred percents are based on deviations indicating a tendency for the nurse to read 2 mm or more higher than overall mean.

Digit Preference

Preference for the digit 0, and to lesser extents for the digits 2 and 8, has been established, (4,5) and is corroborated by our data. Choice of 0 was lessened as the training progressed, but 6 continued to be underreported. (Table 7) However, this digit preference is not pronounced in this study especially when compared to some other studies.

Table 7

PERCENT DISTRIBUTION OF TERMINAL DIGITS IN RECORDING BLOOD PRESSURE MEASUREMENTS BY TEST

	TERMINAL DIGITS					ODD DIGITS
	0	2	4	6	8	
All Tests	27.6	20.4	16.6	13.3	20.0	2.1
Test 1	33.5	21.8	12.7	10.9	16.5	4.6
Test 2	24.9	15.9	17.6	17.0	20.8	3.8
Test 3	30.1	18.8	16.3	13.8	21.0	-
Test 4	22.1	25.0	19.6	11.4	21.8	-

Most individual nurses showed patterns similar to the overall pattern. Preferences changed over the four tests and the same improvement evident from Table 7 for the total group was also true for most individual

nurses. Nurses' preference over the four tests is shown in Table 8. Terminal digit preference in the 2,575 sets of blood pressure readings for the Alameda County Blood Pressure Study sample is shown in Part I, page 9, Figure I.

Table 8

PERCENT DISTRIBUTION OF TERMINAL DIGITS IN RECORDING BLOOD PRESSURE MEASUREMENTS BY NURSE

NURSE NUMBER	TERMINAL DIGITS					ODD DIGITS
	0	2	4	6	8	
All Nurses	27.6*	20.4	16.6	13.3	20.0	2.1
1	35.1*	22.8	16.7	8.8	16.7	-
2	27.9*	20.2	18.3	13.5	20.2	-
3	13.8	30.2*	12.1	18.1	25.0	0.9
4	29.2*	29.2*	11.5	4.4	23.9	1.8
5	28.1*	14.9	15.8	21.9	19.3	-
6	30.2*	23.6	17.0	13.2	15.1	0.9
7	20.3	19.5	16.9	19.5	23.7*	-
8	27.0*	18.0	24.3	12.6	18.0	-
9	30.4*	9.6	17.4	7.0	18.3	17.4
10	34.7*	16.1	16.1	13.6	19.5	-

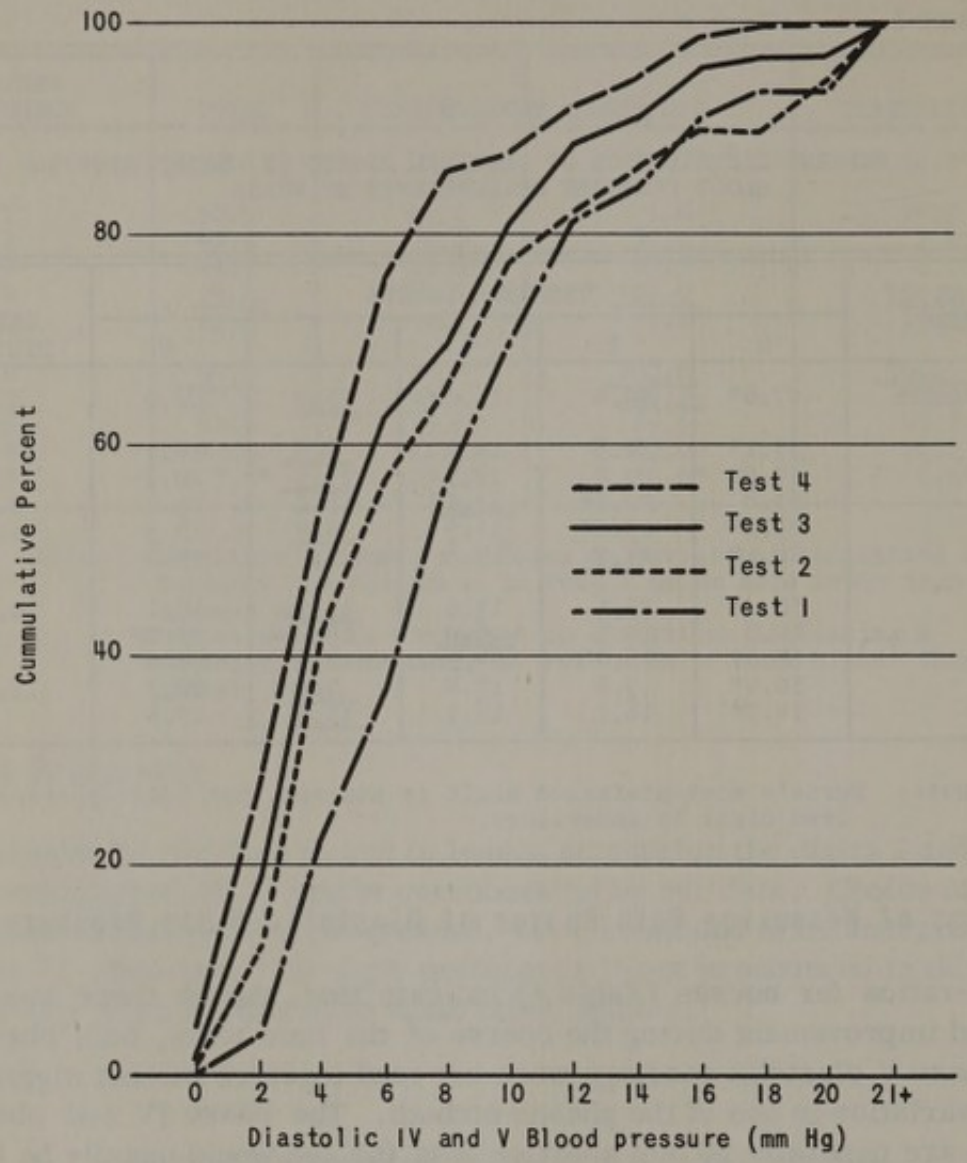
Note: Nurse's most-preferred digit is starred, her least-preferred even digit is underlined.

Problems of Measuring Both Phases of Diastolic Blood Pressure

The F-ratios for nurses (Table 4) indicate that, though there was pronounced improvement during the course of the four tests, both phase IV and phase V diastolic readings were not read together without significant nurse variation in one of the phases or both. The phase IV and phase V sounds are generally 10 mm apart or less, (6) and would usually be heard close to one another by a blood pressure observer. After distinguishing the sounds, the observer must make a judgment about where the moving mercury column stood when they were heard, remember both figures, then, when the column is completely lowered, record them. This latitude for observer error compounds the fact that muffling of sound is not always recognized and the disappearance of sound depends on the auditory acuity of the observer. Since the instructions were to make only one attempt to read the blood pressure, nurses failed to record one or other diastolic reading 68 times out of 800 possible readings. This is compared to 4 out of 400 systolic readings which were left blank. On the first test, five of the subjects had reported differences between the two phases exceeding 20 mm Hg, while in test 4 there were no readings this large. Figure 1 shows the cummulative percent distribution of the differences by test and illustrates the ability of the nurses to perceive smaller differences more easily after training.

Figure 1

CUMMULATIVE PERCENT DISTRIBUTION OF DIFFERENCES
BETWEEN DIASTOLIC IV AND V BLOOD PRESSURE READINGS (mm Hg) BY TEST



EFFECTS OF ORDER OF MEASUREMENT

Previous studies which have reported blood pressure ranges have noted a tendency for blood pressure to fall over the course of several measurements.(7) This effect has been documented when there is a single observer and the subjects are undergoing examinations, and is strongest for the systolic phase. Our data from multiple observers and subjects in more situations shows no clear-cut trend for reduction or elevation of blood pressure over the time span of the tests. The F-ratios for order(8) indicated that order made a significant difference in the diastolic V phase of test 1 and in the systolic and diastolic V phases of test 2. None of these phases, however, registered a significant score by Kendall's statistic S for monotonic trend which was computed for each individual in

each phase.(9) A score of 25 represents a significantly decreasing individual blood pressure over the 10 readings; a score of -25 represents significantly increasing blood pressure. Other positive or negative scores can be considered stronger or weaker trends, according to their magnitude. Systolic scores did show more decreases than diastolic scores, diastolic scores were as likely to increase as decrease.(Table 9)

For this total study sample, the differences between the first and third readings showed an increase of about 3 mm Hg for systolic blood pressure and a slight decrease for phase V diastolic readings, Part I, p. 21, Figure II.

Table 9

DISTRIBUTION OF KENDALL'S S SCORES FOR INDIVIDUALS IN ALL TESTS BY BLOOD PRESSURE PHASE

SCORE	SYSTOLIC	DIASTOLIC IV	DIASTOLIC V
25+ (decrease)	2	0	3
15 - 24	6	5	3
5 - 14	16	4	7
-5 - +14 (no change)	12	14	12
-15 - -6	4	13	9
-25 - -16	0	3	3
Less than -25 (increase)	0	1	3

CONCLUSIONS

Since it was known that individual blood pressures are highly variable, several ways were tried to distinguish measurement errors from true variation by isolating systematic variation among the nurses. The sources of variation were not entirely separable, but some indicators were used to examine if observer bias could have affected the data.

A. The nurses had stronger preferences for certain terminal digits. Zero was the most popular digit and six was least popular. This tendency was less pronounced in the survey results than previous studies have reported.

B. The difficulty of recognizing and recording two phases of diastolic blood pressure, which are close together and less clearly delineated than the "appearance" of the systolic pressure, introduced significant amounts of confusion in the early training period. This was reflected in the data from the test sessions. Though both diastolic phases were measured in the field work to comply with recommended practice, only phase V diastolic was analyzed since other studies used only phase V. The nurses' increased awareness that the disappearance

Table 10

MEAN SYSTOLIC AND DIASTOLIC BLOOD PRESSURE (mm Hg) BY RACE, SEX, AGE AND NURSE

NURSE NUMBER	WHITE										NEGRO			
	Male					Female					Male		Female	
	20-34	35-44	45-54	55-64	65 and Over	20-34	35-44	45-54	55-64	65 and Over	20-44	45 and Over	20-44	45 and Over
	SYSTOLIC BLOOD PRESSURE													
Total	123.6	126.9	133.2	139.3	146.1	114.1	120.3	129.1	142.6	155.0	128.2	144.6	120.5	148.8
1	122.6	127.1	126.4	133.5	153.9	113.4	112.9	125.5	134.8	150.2	a	148.4	111.6	154.8
2	124.3	130.9	135.5	141.8	144.8	116.0	122.2	126.4	137.7	162.3	134.6	142.7	122.2	146.8
3	125.9	124.0	131.9	150.1	148.7	115.1	121.2	135.0	144.0	160.1	127.6	149.8	118.2	159.7
4	120.9	124.0	139.2	139.2	150.9	114.5	120.5	126.1	139.9	157.0	126.2	a	115.1	a
5	125.0	128.0	126.2	131.9	138.7	114.6	120.4	123.7	134.0	147.7	a	148.0	a	143.8
6	124.1	124.9	134.5	139.0	142.2	112.0	122.3	129.1	138.2	146.2	127.3	139.8	124.7	142.7
7	119.7	122.2	131.6	138.6	144.7	112.9	122.3	126.2	144.9	158.1	126.2	137.0	120.9	157.4
8	123.9	132.2	140.7	142.1	136.8	112.8	124.0	143.4	143.6	151.5	130.7	137.2	141.0	a
9	121.3	132.0	131.3	139.0	142.8	114.1	119.3	129.3	156.1	158.6	132.8	138.1	122.5	139.4
10	126.7	128.2	a	123.1	142.1	115.7	129.2	129.6	149.9	a	a	a	123.3	a
	DIASTOLIC BLOOD PRESSURE													
Total	69.7	77.0	80.8	80.8	75.3	65.4	73.3	75.1	78.7	73.4	72.4	81.8	70.8	81.8
1	68.8	78.3	79.9	82.6	76.5	66.2	71.4	76.7	81.1	63.4	a	75.6	76.2	86.6
2	73.2	81.6	85.1	84.5	82.2	69.3	76.2	75.8	81.0	86.1	81.4	96.7	74.2	86.5
3	68.9	74.4	80.1	79.8	75.3	64.5	73.8	74.4	78.9	73.6	74.0	87.5	64.5	78.6
4	68.9	71.3	82.2	79.4	73.2	66.2	72.3	73.8	73.8	67.9	76.7	a	66.7	a
5	73.8	78.7	76.8	79.9	78.1	66.7	75.9	76.3	78.3	77.4	a	78.6	a	82.0
6	66.5	76.4	80.7	82.4	78.8	65.4	71.6	75.7	81.7	74.9	65.4	76.8	75.0	87.3
7	67.3	74.9	77.3	83.1	77.3	63.7	75.1	75.8	77.6	77.9	61.8	81.0	68.2	82.1
8	71.4	77.9	84.8	74.3	63.4	62.5	66.2	67.3	80.0	67.8	67.7	57.6	68.0	a
9	69.2	80.9	76.0	81.2	69.8	63.6	76.8	76.5	79.3	72.6	82.0	88.0	76.9	80.6
10	71.2	79.3	a	77.4	77.4	68.6	72.4	77.4	78.3	a	a	a	75.0	a

[a] Not calculated for less than 5 persons.

Note: Means based on 5-9 persons are underlined.

Source: State of California, Department of Public Health, Bureau of Chronic Diseases, Alameda County Blood Pressure Study, 1966.

of the diastolic sounds occur after the muffling phase may have increased their sensitivity to the last sounds, and, may also have contributed to the generally low diastolic V readings reported by the study. (Table 10)

C. Differences in reaction times or hearing acuity may have accounted for some nurses' deviations from the overall means, but this, by itself, can't account for the whole pattern of variation.

D. Whether the tendency of some nurses to read high or low could be the result of subject-nurse interaction cannot be determined. However, when the nurses remeasured in test 2 the same subjects they had measured in test 1, significant differences in their readings were present, which might at least indicate an unstable "degree" of interaction.

E. The magnitude of most nurses' high or low deviations, though great enough to affect statistical tests, was only a few millimeters away from the overall means. This effect was greatly reduced since much analysis was planned in terms of grouping blood pressure into larger intervals.

The most outstanding implication from the test session data is the improvement in observer agreement as the tests proceeded. Tests 1 and 2, performed before the training was completed and before nurses had any field experience, showed more observer error in every aspect of evaluation than the latter two tests. Improvement between test 3 and test 4 was almost as uniform. Training and practice were obviously valuable for increasing the validity of the field measurements. Although there were some statistically significant differences measured, the magnitude of these differences were not substantially important.

The training directed toward standardizing blood pressure measurements was effort well spent in increasing the reliability of the Alameda County Blood Pressure Study's data. Several difficulties were isolated by the preliminary testing, and improvements and continuing weaknesses were uncovered. An estimate of the confidence which could be placed in the measurements affected the analysis of the study data in that the data did not need to be corrected for nurse variation.

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1. Cochran, W. G., and Cox, G. M., Experimental Designs (Second Edition), New York, John Wiley and Sons, Inc., 1957, pp. 125-127. The estimate is found by iteration of the formula $\frac{r(R+C+T)-2G}{(r-1)(r-2)}$, where R is the sum of the row of the missing value, C is the sum of the column of the missing value, T is the sum of the nurse's other readings, G is the grand total and r is the number of rows and columns.

2. Ibid., pp. 121-124. Sums of squares (s.s.) of rows, columns and treatments (order, subject and nurse, in this case) are computed and a correction equal to G^2/r^2 applied. The error s.s. is found by subtraction. Mean squares are obtained by dividing each s.s. by the corresponding number of degrees of freedom, and a degree of freedom (d.f.) is subtracted from the error d.f. for each missing value. The F-ratio is the quotient of the row, column or treatment mean square and the error mean square.

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8. Computed by same procedures as F-ratios for nurses (see 2 above).

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APPENDIX F

INDEX OF TABLES AND FIGURES

APPENDIX F
INDEX OF TABLES AND FIGURES, Continued

SUBJECT		BLOOD PRESSURE		
	POPULATION	Systolic	Diastolic	MISC.
Occupational Prestige Level	152,153	64,147,152, 153	152,153	
Place of Birth	131			
Ponderal Index	54,139	139,143	139,143	
Pulse Pressure				22,125
Region of Childhood	185,186	185,186	185,186	
Religion	129	70,147,163	163	
Residential Mobility	164,165	164-166	164,165	
Rural-Urban Background	183,184	183,184, 187,188	184	
Sample Description	5,115,126, 132			
Socioeconomic Status	30,31,129	65-67,147, 154,155	154,155	
Smoking Status	144	57,144	57,144	
Status Inconsistency	177,178	177,178	177,178	
Status Tension	179,180	179,180	80,179,180	
Subjective Social Standing	31,129	147,156,157	156,158	
Traditionalism-Modernity Index	181,182	80,82,166, 181,182	82,181,182	
Weight	54,142	142,143	142,143	