VITAL AND HEALTH STATISTICS

Height and Weight of Adults Ages 18-74 Years by Socioeconomic and Geographic Variables United States

Height and weight measurements of adults ages 18-74 years in the United States, 1971-74, are presented and discussed by age, sex, and race for selected socioeconomic and geographic variables.

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Height and Weight of Adults Ages 18-74 Years by Socioeconomic and Geographic Variables

by Robinson Fulwood, M.S.P.H., Sidney Abraham, and Clifford Johnson, M.S.P.H., Division of Health Examination Statistics

Introduction

This report contains findings from the first National Health and Nutrition Examination Survey on height and weight measurements of adults ages 18-74 years in the United States, by socioeconomic and geographic variables. Previous reports based on the same survey present height and weight measures by age, sex, and race,[1] and weight measures by height and age.[2]

The first National Health and Nutrition Examination Survey was designed to collect measures of nutritional status and to gather information on the general health status of persons ages 1-74 years, as well as to compile more detailed health assessment data on persons ages 25-74 years. The survey utilized a scientifically representative sample of persons in the U.S. civilian noninstitutionalized population. A description of the plan, operation, and sample design of the survey has been published.[3]

The U.S. Bureau of the Census cooperated in the sample design, initial visits, and interviews at selected eligible households in the 65 primary sampling units throughout the United States.

Field data collection for the survey was started in April 1971 and was completed in June 1974. Of the 28,043 persons ages 1-74 years who were selected in the national probability sample to represent the 194 million persons of those ages in the U.S. civilian noninstitutionalized population, 20,749, or 74 percent, were examined. When adjustments were made for the differential sampling ratios used to ensure oversampling of preschool children, women of childbearing age, the elderly, and the poor, the effective examination response rate was 75 percent. Among persons ages 18-74 years for whom height and weight determinations were made, 13,645 were examined from the probability sample of 19,572 selected to represent the 128 million persons ages 18-74 years in the U.S. population. The unadjusted and effective adjusted examination response rates were each 70 percent. Appendix I presents further discussion of the sampling design, nonresponse, missing data, sampling error, and standard of data reliability.

In this report, the mean height and weight measures of adults ages 18-74 years are discussed by age, sex, and race in relationship to annual family income, educational level, urbanization status, and geographic region. Definitions of these variables are found in appendix II. Two kinds of statements appear throughout the text that concern differences in mean height or weight values: (1) statements based on results of tests of hypotheses or significance tests, and (2) statements based on observed differences (which are not tested for statistical significance but which may be of interest from a descriptive standpoint). To enable the reader to differentiate between the two types of statements, the terms "statistically significant" and "not statistically significant" are used to indicate all tested differences in the mean height or weight measures, and the term "observed" is used to indicate that the differences in the mean values may be of interest but were not tested for statistical significance.

To account for changes in the age distribution of the U.S. population from 1971 to 1974, the age-adjusted mean height or weight values (which are "observed") are used in all overall comparisons (ages 18-74 years). Appendix I contains a discussion of age adjustment. The standard errors of the mean height and weight measures are also found in appendix I, tables IV-VII. Throughout this report, the terms "mean" and "average" are used interchangeably.

Highlights

The average height and weight of adults ages 18-74 years in the U.S. civilian noninstitutionalized population, as measured by the first National Health and Nutrition Examination Survey, have been presented in previous reports[1,2] by demographic characteristics such as age, sex, and race. This report goes beyond the demographic discussion to include an analysis of differences in mean height and weight by selected socioeconomic and geographic variables.

This report presents statistically significant differences in mean height and weight values of males and females ages 18-74 years by socioeconomic and geographic variables. Observed differences (which may be of interest even though they may or may not be statistically significant) are also discussed.

Summary of important findings

- The observed mean height of males and females ages 18-74 years is directly related to income and educational levels. But interracial differences in age-adjusted mean height for the same population are less than 1 inch for each income and educational level.
- The heaviest females ages 18-74 years on the average were generally observed to be those with an income under $4,000 and with less than 9 years of education. Conversely, the heaviest males ages 18-74 years on the average were generally observed to be those with an income of $10,000 and over and with 12 years or more of education.
- The overall age-adjusted mean weight for males ages 18-74 years with 13 years or more of education is 9 pounds higher than for those with less than 9 years of education. The mean weight of females is inversely related to educational level. Females ages 18-74 years with 13 years or more of education average 10 pounds less than those with less than 9 years of education.
- Interracial differences in age-adjusted mean weight for males ages 18-74 years are less than 8 pounds for each income or educational level. Females ages 18-74 years, however, generally show differences of up to 16 pounds across income and educational levels. The magnitude of interracial differences for females decreases as educational level increases. This observation does not hold true as income increases.
- Females ages 18-74 years living in rural areas on the average were generally observed to be heavier than those living in urbanized areas; however, the differences for each age category are not statistically significant. On the average, males and females living in the Northeast region were observed to be the shortest, and those living in the Midwest were observed to be the heaviest.
- Males ages 65-74 years living in rural areas were found to be statistically taller than those living in urbanized areas; however, there is no statistically significant difference in males' mean height for any other age category. There is no statistically significant difference in height for females of any age category living in urbanized and rural areas.
- Males of each age category 35 years and over living in the South region were found to be statistically taller than those living in the Northeast region. Females of every age category living in the South region were found to be statistically taller than females living in the Northeast region.

Methods of measurement

The first National Health and Nutrition Examination Survey was staffed with two highly trained examination teams and was equipped with two mobile examination centers, which could be moved to a central location in each of the primary sampling units. Selected sample persons for whom appointments could be made were brought into the examination centers. There, examinees changed from their street clothing into disposable paper examination uniforms and foam rubber slippers designed to facilitate and standardize various elements of the examination. Body measurements were made at various times of the day and in different seasons of the year; thus diurnal and seasonal variations in body measurements were not standardized. One's weight may vary between winter and summer and may fluctuate with recency of food and water intake and other daily activities.

Height

Height was measured with the examinee wearing disposable foam rubber slippers, standing erectly with feet together, back and heels against the upright bar of the height scale, and head approximately in the Frankfort horizontal plane. Assistance and demonstration were provided when necessary ("look straight ahead," "stand up tall," or "stand up real straight"). However, the examiner did not exert upward pressure on the subject's mastoid process to purposefully "stretch everyone in a standard manner," as is recommended by some.[3]

The equipment consisted of a level platform, to which was attached a vertical bar with a steel tape. Attached perpendicularly to the vertical bar was a horizontal measuring bar, which was brought down snugly on the examinee's head. A Polaroid camera was attached to another sliding bar in the same plane as the horizontal measuring bar. The camera recorded the subject's identification number next to the pointer on the scale, thereby giving a precise reading. The camera not only gave a permanent record, minimizing observer and recording errors, but, by always being in the same plane as the measuring bar, completely eliminated parallax. That is, if the pointer had been in the space in front of the scale, it would have been read too high if the observer had looked up at the scale from below, or too low if read down from above.

Weight

A Toledo self-balancing scale was used that mechanically prints weight to quarter-pound intervals directly onto the permanent record. Direct printing was used to minimize observer and recording errors. The scale was calibrated with a set of known weights, and any necessary fine adjustments were made at the beginning of each new examination location, approximately every month. The recorded weight was later transferred onto a punched card to the nearest quarter pound. The total weight of all clothing worn ranges from 0.20 to 0.62 pound, which was not deducted from weights presented in this report. Thus, weights shown here are 0.20 to 0.62 pound above nude weight recorded to the nearest quarter pound. The same examination clothing was used throughout the year, which eliminated seasonal variation in clothing weight.

Method of analysis

Observed and statistically significant differences in mean height and weight values are discussed separately. Only differences between the lowest and highest income and educational levels, between urbanized and rural areas, and between two geographic regions were tested for statistically significant differences by age within sex groups, as described in appendix I. The socioeconomic comparison of black and white persons is limited to a description of the observed age-adjusted mean values for each sex group because of the small numbers in many of the cells for black persons. Statistics are shown in the detailed tables for each age category only to convey an impression of the observed distribution.

Mean height and weight findings

As measured by the first National Health and Nutrition Examination Survey (NHANES I), the mean height and weight (without regard to socioeconomic or geographic variables) of males ages 18-74 years are 69.0 inches and 172 pounds, respectively. The corresponding values for females are 63.6 inches and 143 pounds. The mean height and weight for each of the four race-sex groups ages 18-74 years are 69.1 inches and 173 pounds for white males, 68.6 inches and 171 pounds for black males, 63.7 inches and 142 pounds for white females, and 63.7 inches and 156 pounds for black females.[1] Because successive birth cohorts of persons ages 18-74 years were observed to be taller, socioeconomic and geographic analyses were done by individual age categories.

Findings for height

Annual family income

Age.—The distribution of mean height in inches by annual family income, sex, and age is shown in table 1. Adults in each age category with an annual family income of $15,000 and over were observed to be consistently taller than those with an annual family income under $4,000. The differences range from 0.3 inch at ages 18-24 years to 2.1 inches at ages 65-74 years. Each successive birth cohort of adults was observed to be generally taller within each of the five income levels. Adjusting for age, adults ages 18-74 years with an annual income of $15,000 and over were observed to be 1.2 inches taller than those with an annual income under $4,000.

Sex and age.—Males of each age category were observed to be generally taller as annual family income increases from under $4,000 to $15,000 and over. The differences in males' height between the lowest and highest income levels range from 0.2 inch for the youngest, ages 18-24 years, to 1.6 inches for the oldest, ages 65-74 years (table A). Only males ages 55-64 and 65-74 years show statistically significant differences in mean height between the two income levels (figure 1). Among younger females (ages 18-44 years), the shortest were observed to be those in families with an annual income of $4,000-$6,999; among older females (ages 55 and over), the shortest were observed to be those in families with an annual income under $4,000. On the average, females in the lower income levels were observed to be shortest, regardless of age (figure 2). The absolute differences in mean height for females of each age category between the lowest and highest income levels range from 0.1 inch to 0.6 inch (table A). However, there is no statistically significant difference in mean height between the two income levels for females of any age category.

Race, sex, and age.—The distributions of mean height by annual family income, race, sex, and age are presented in tables 2 and 3. White males of ages 55-74 years with an annual income of $15,000 and over were observed to be taller on the average than their counterparts with an annual income under $4,000. Although the differences between the lowest and highest income levels are not large, white males ages 18-54 years were observed to be slightly taller at successive annual income levels from $4,000-$6,999 to $15,000 and over. Overall, white males ages 18-74 years were observed to be taller than black males ages 18-74 at the lowest and two uppermost income levels. The overall age-adjusted mean height of white males ages 18-74 years exceeds that of black males ages 18-74 years by 0.7 inch at the income level of $15,000 and over. This is the largest observed interracial difference for males (table B).

The observed differences in mean height by age across income levels for white females are small. Generally, the tallest white females were observed to be those with an annual income of $10,000-$14,999. White females ages 35-44 years and 65-74 years with an annual income of $15,000 and over were observed to be taller than those with an annual income under $4,000 by 1.0 inch and 0.6 inch, respectively (table A). Overall, white females ages 18-74 years with an annual income of $7,000 and over were observed to be taller than those with an annual income under $7,000. For ages 18-74 years, white females were observed to be shorter than black females at every income level except $7,000-$9,999; the interracial differences in the age-adjusted mean height range from 0.3 inch at under $4,000 per year to zero difference at $7,000-$9,999 per year to 0.3 inch at $15,000 and over per year (table B).

Educational level

Age.—The height of adults ages 18-74 years by educational level, sex, and age is shown in table 4. For each educational level, successive birth cohorts of adults were generally observed to be taller. On the

Table A. Differences in mean height and mean weight (with confidence limits) of adults ages 18-74 years between the lowest and highest annual family income and educational level, by race, sex, and age: United States, 1971-74

Race, sex, and age	Mean height						Mean weight					
	Differences in inches		95% confidence limits				Differences in pounds		95% confidence limits			
	Annual family income	Educational level	Annual family income		Educational level		Annual family income	Educational level	Annual family income		Educational level	
			Lower	Upper	Lower	Upper			Lower	Upper	Lower	Upper
ALL RACES												
Males												
18-24 years	0.2	3.2	−0.5	0.9	1.8	4.6	7	16	−1	15	6	26
25-34 years	0.8	1.6	−0.4	2.0	0.5	2.7	20	2	9	31	−14	18
35-44 years	0.6	1.5	−0.7	1.9	0.7	2.3	2	15	−15	19	8	22
45-54 years	0.9	1.2	0.0	1.8	0.6	1.8	16	10	6	26	4	16
55-64 years	0.9	1.0	0.0	1.8	0.3	1.7	17	3	6	28	−5	11
65-74 years	1.6	1.0	1.1	2.1	0.5	1.5	10	3	4	16	−2	8
Females												
18-24 years	−0.1	2.0	−0.8	0.6	1.4	2.6	−5	−4	−11	1	−12	4
25-34 years	0.5	1.4	−0.1	1.1	0.9	1.9	−15	−15	−23	−7	−22	−8
35-44 years	0.6	2.1	0.1	1.1	1.5	2.7	−17	−8	−25	−9	−17	1
45-54 years	0.3	1.2	−0.6	1.2	0.4	2.0	−12	−12	−23	−1	−21	−3
55-64 years	0.2	1.2	−0.5	0.9	0.4	2.0	−9	−16	−21	3	−25	−7
65-74 years	0.5	1.1	0.0	1.0	0.7	1.5	−7	−8	−14	-	−12	−4
White males												
18-24 years	-	3.3	−0.8	0.8	1.2	5.3	8	17	-	16	2	32
25-34 years	0.3	1.7	−0.8	1.4	0.6	2.8	18	1	11	25	−15	17
35-44 years	0.8	1.8	−0.5	2.1	1.0	2.6	1	17	−19	21	8	26
45-54 years	0.6	1.1	−0.8	2.0	0.4	1.8	19	10	7	31	3	17
55-64 years	1.1	1.1	0.2	2.0	0.4	1.8	18	2	6	30	−6	10
65-74 years	1.6	1.1	1.0	2.2	0.6	1.6	10	3	3	17	−2	8
White females												
18-24 years	−0.1	2.2	−0.8	0.6	1.4	3.0	−4	−4	−10	2	−13	5
25-34 years	0.4	1.5	−0.4	1.2	1.0	2.0	−13	−13	−21	−5	−21	−5
35-44 years	1.0	2.2	0.3	1.7	1.5	2.9	−11	−6	−22	-	−16	4
45-54 years	0.1	1.5	−1.0	1.2	0.6	2.4	−8	−6	−22	6	−17	5
55-64 years	0.4	1.4	−0.3	1.1	0.6	2.2	−5	−13	−17	7	−23	−3
65-74 years	0.6	1.2	0.1	1.1	0.8	1.6	−6	−7	−13	1	−11	−3
Age-adjusted values:												
Males, 18-74 years	0.7	1.7	---	---	---	---	12	9	---	---	---	---
Females, 18-74 years	0.4	1.5	---	---	---	---	−11	−10	---	---	---	---
White males, 18-74 years	0.6	1.8	---	---	---	---	13	9	---	---	---	---
White females, 18-74 years	0.4	1.7	---	---	---	---	−8	−8	---	---	---	---
Black males, 18-74 years	0.4	1.3	---	---	---	---	10	18	---	---	---	---
Black females, 18-74 years	0.4	0.8	---	---	---	---	−5	−13	---	---	---	---

NOTE: Negative signs indicate higher mean values for the lowest than for the highest annual family income or educational level.

average, the tallest adults within each age category are those at the highest educational level. The largest differences in mean height between the highest and lowest educational levels occur in the younger ages, among those under 35 years. Overall, adults with 13 years or more of education averaged 1.7 inches taller than those with less than 9 years of education.

Sex and age.—Males with 13 years or more of education were observed to be consistently taller than males at any other educational level for each age category (figure 3). The greatest difference in mean height, 3.2 inches, occurs between the lowest and highest educational levels for males ages 18-24 years. Males ages 25-34 and 35-44 years show differences of about 1.5 inches, and those ages 55-64 and 65-74 years show differences of 1.0 inch in mean height between the lowest and highest educational levels (table A). Overall, males ages 18-74 years with 13 years or more of education were 1.7 inches taller than those with less than 9 years of education.

Like males, successive cohorts of females with 13 years or more of education were observed to be taller than females at any other educational level (figure 4); the differences in the means between the lowest and highest educational levels for each age category from 18-24 years to 65-74 years are about 2 inches or less (table A). The mean height of females ages 18-74 years, like that of males, is directly related to educational level; on the average, females with 13 years or more of education were observed to be 1.5 inches taller than females with less than 9 years of education.

Race, sex, and age.—On the average, the taller white males of each age category (as was the case for all males) were observed to be those with 13 years or more of education (table 5). White males ages 18-24 years show the largest observed difference in mean height, 3.3 inches, as educational level increases from less than 9 years to 13 years or more. Observed differences in mean height between the lowest and

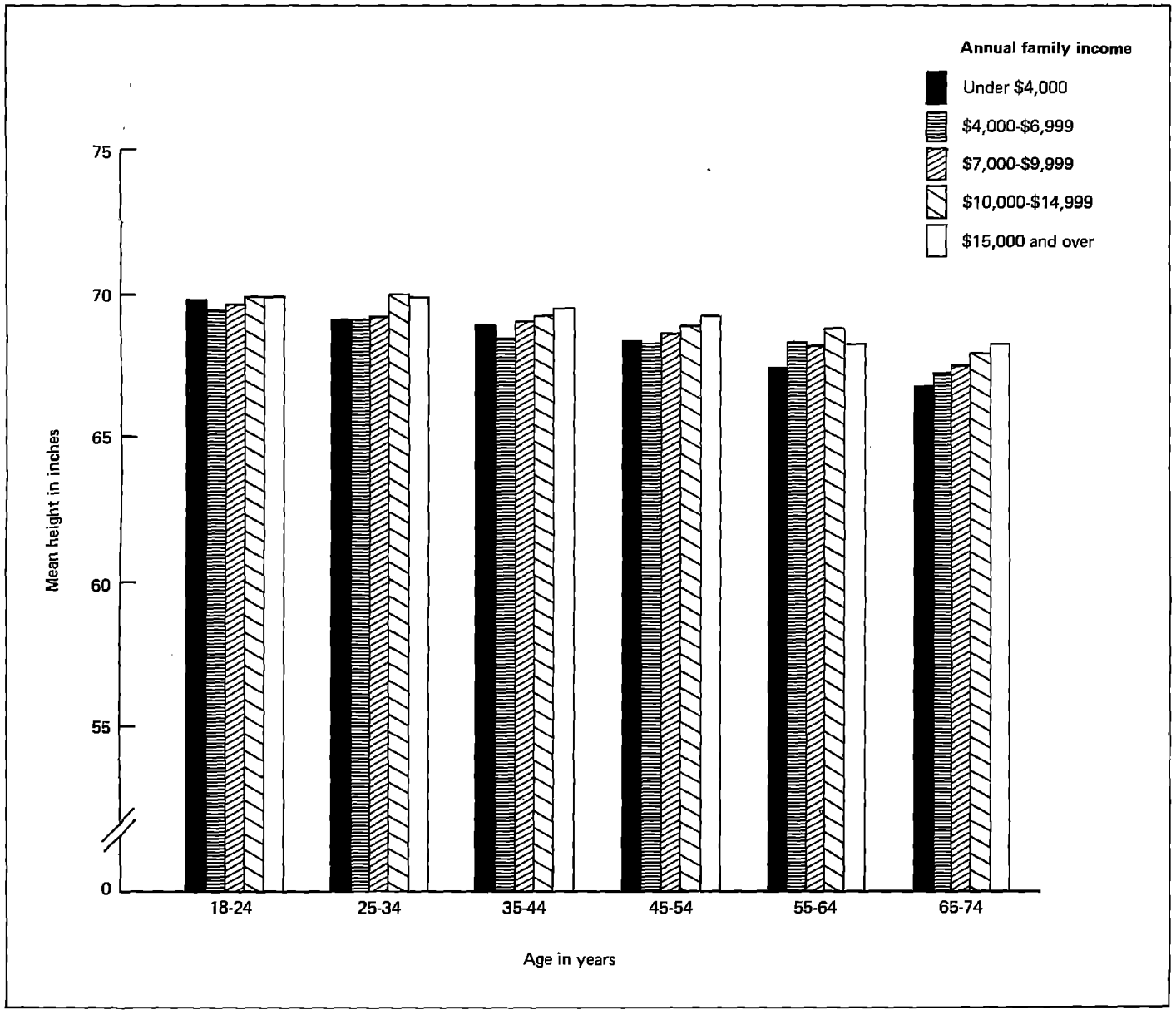

Figure 1. Mean height of males ages 18-74 years by age and annual family income: United States, 1971-74

highest educational levels for white males of other age groups are less than 2 inches (table A). Overall, white males ages 18-74 years with less than 9 years of education were observed to be 1.8 inches shorter than their counterparts with 13 years or more of education. Black males ages 18-74 years with 13 years or more of education were observed to be taller on the average than black males at any other educational level; however, compared with the difference of 1.8 inches for white males ages 18-74 years, black males ages 18-74 years with 13 years or more of education were 1.3 inches taller than those with less than 9 years of education (table A). Interracial differences in mean height for males are less than 1 inch (table B).

White females were observed to be consistently taller at each higher educational level for each successive age category (table 6). The largest observed differences in mean height between the lowest and highest educational levels, 2.2 inches, occur for white females ages 18-24 and 35-44 years. The mean differences for other age groups are less than 1.6 inches (table A). The overall age-adjusted average height of white and black females ages 18-74 years changes by 1.7 inches and 0.8 inch, respectively, between the lowest and highest educational levels (table A). The overall observed interracial differences range from 0.8 inch (black females taller than white females ages 18-74 years) at less than 9 years of education to virtually no difference (0.1 inch) in mean height at 13 years or more of education.

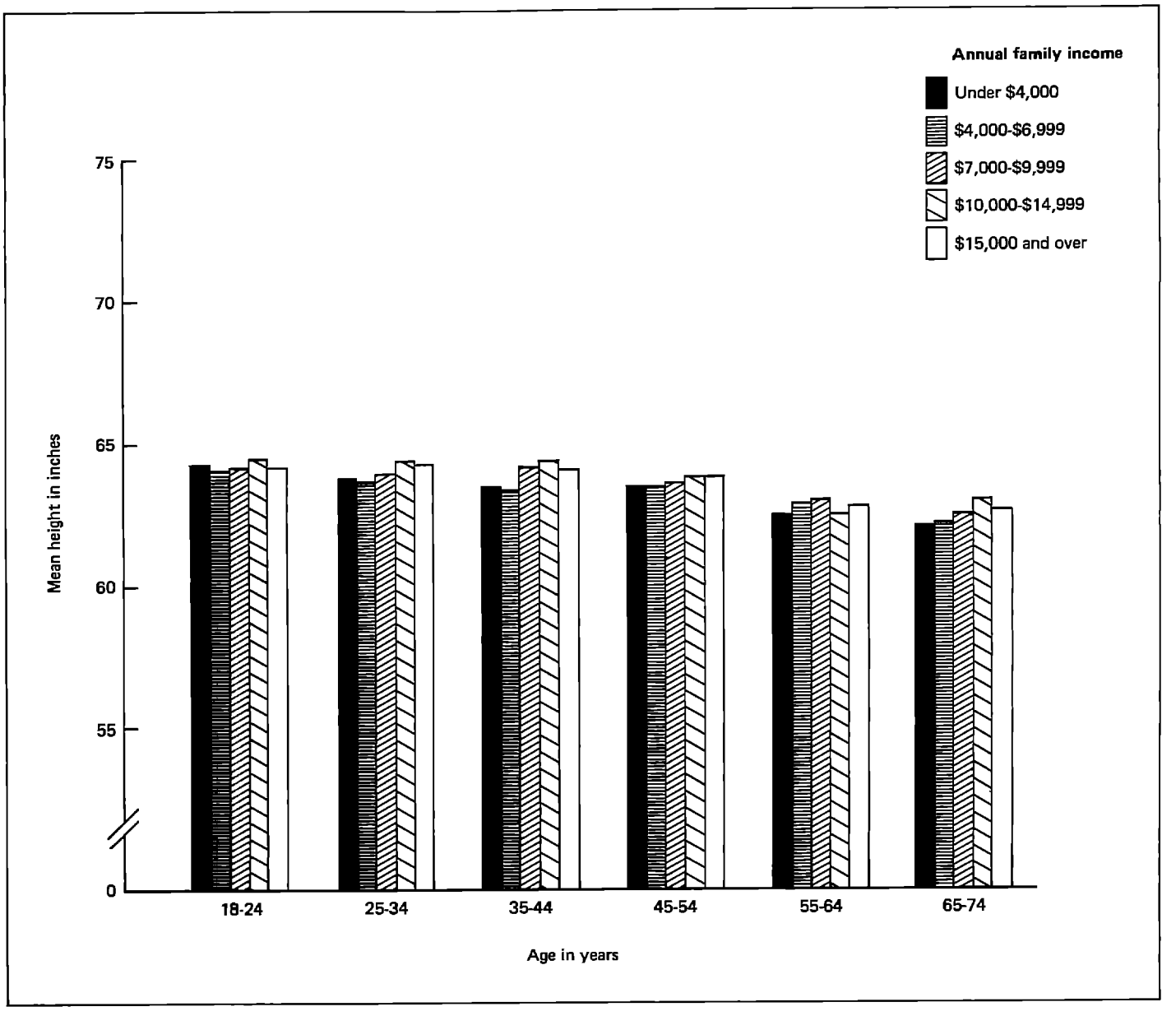

Figure 2. Mean height of females ages 18-74 years by age and annual family income: United States, 1971-74

Observed interracial differences in height for females ages 18-74 years decrease as educational level increases (table B).

Urbanization status

Age.—The mean height of adults ages 18-74 years by urbanization status, sex, and age is presented in table 7. The mean height of adults is about the same for each age as the level of urbanization changes; the small observed differences could probably be accounted for by sampling variation. As shown in table 7, the observed average height of adults ages 18-74 years is not related to urbanization status.

Sex and age.—Observed differences in mean height for males of each age group as urbanization status changes are less than 1 inch. This finding is also true for females (table C). Although males ages 65-74 years living in rural areas were only 0.5 inch taller than those living in urbanized areas, this difference is statistically significant. There are no statistically significant differences in mean height between urbanized and rural dwellers for females of any of the six age categories. Overall, the age-adjusted mean height for males and females ages 18-74 years is generally the same for urbanized and rural dwellers (table 7).

Race, sex, and age.—For white males of each age category, the observed mean height remains generally the same as urbanization status changes from urbanized to rural (table 8). The largest observed differ-

Table B. Interracial differences in age-adjusted mean height and mean weight of adults ages 18-74 years, by sex and selected socioeconomic and geographic variables: United States, 1971-74

Selected socioeconomic and geographic variables	Mean height		Mean weight	
	Differences in inches		Differences in pounds	
	Males	Females	Males	Females
Annual family income				
Under $4,000	0.5	−0.3	−4	−13
$4,000-$6,999	−0.1	−0.1	2	−12
$7,000-$9,999	-	-	−3	−11
$10,000-$14,999	0.3	−0.2	5	−12
$15,000 and over	0.7	−0.3	−2	−16
Educational level				
Less than 9 years	-	−0.8	3	−14
9-11 years	−0.5	−0.3	-	−16
12 years	0.5	0.3	4	−11
13 years or more	0.5	0.1	−7	−9
Urbanization status				
Urbanized area	0.3	-	2	−13
Urban area	0.9	−0.2	5	−23
Rural area	0.5	-	1	−15
Geographic region				
Northeast	−0.2	-	−5	−12
Midwest	0.9	0.3	2	−8
South	0.8	0.1	2	−19
West	−0.1	−0.4	−4	−13

NOTE: Negative signs indicate higher mean values for black persons than for white persons.

ences (less than 1 inch) are found in age categories 55 years and over. These differences parallel the findings for males in general. Generally, the shortest white or black males lived in urban areas; however, there is little observed interracial difference in mean height of males who lived in urbanized or rural areas (table B). Overall, the largest racial difference in mean height, 0.9 inch, was observed for urban areas. On the average, white males ages 18-74 years were observed to be taller than black males at each level of urbanization status; however, the observed differences in mean height are less than 1 inch.

As observed for white males, the mean height of white females remains fairly stable for each age category as urbanization status varies (table 9). The observed differences between urbanized and rural areas are negligible. Overall, the age-adjusted mean height of black females ages 18-74 years equals or exceeds that of white females ages 18-74 years; the opposite is true for black males ages 18-74 years. There is little observed interracial difference in mean height for both sex groups ages 18-74 years (table B).

Geographic region

Age.—The distribution of mean height by geographic region, sex, and age is presented in table 10. The observed mean height of adults varies slightly for each age category across geographic regions. The largest of all observed differences, 1.4 inches, occurs for adults ages 55-64 years living in the Northeast and South regions. Overall, the observed regional difference in mean height for adults ages 18-74 years is less than 1 inch.

Sex and age.—Males and females of each age category show small observed regional differences in mean height. On the average, males of each age category living in the Northeast were observed to be shorter than those living in any other region; this finding is also true for females. For each age category 35 years and over, the mean height of males living in the Northeast is statistically different from those living in the South: The differences in mean height range from 1.0 inch at ages 65-74 years to 1.4 inches at ages 55-64 years (table C). The mean height of females of each age category living in the Northeast region is significantly different from those living in the South region.

Race, sex, and age.—The distribution of males' mean height by geographic region, race, and age is shown in table 11. The observed differences between the Northeast and South regions are generally larger for white males for each age group than for black males (table C). On the average, white males ages 18-74 years living in the Midwest and South were observed to be taller than black males in these regions by 0.9 inch and 0.8 inch, respectively; black males ages 18-74 years were observed to be taller than white

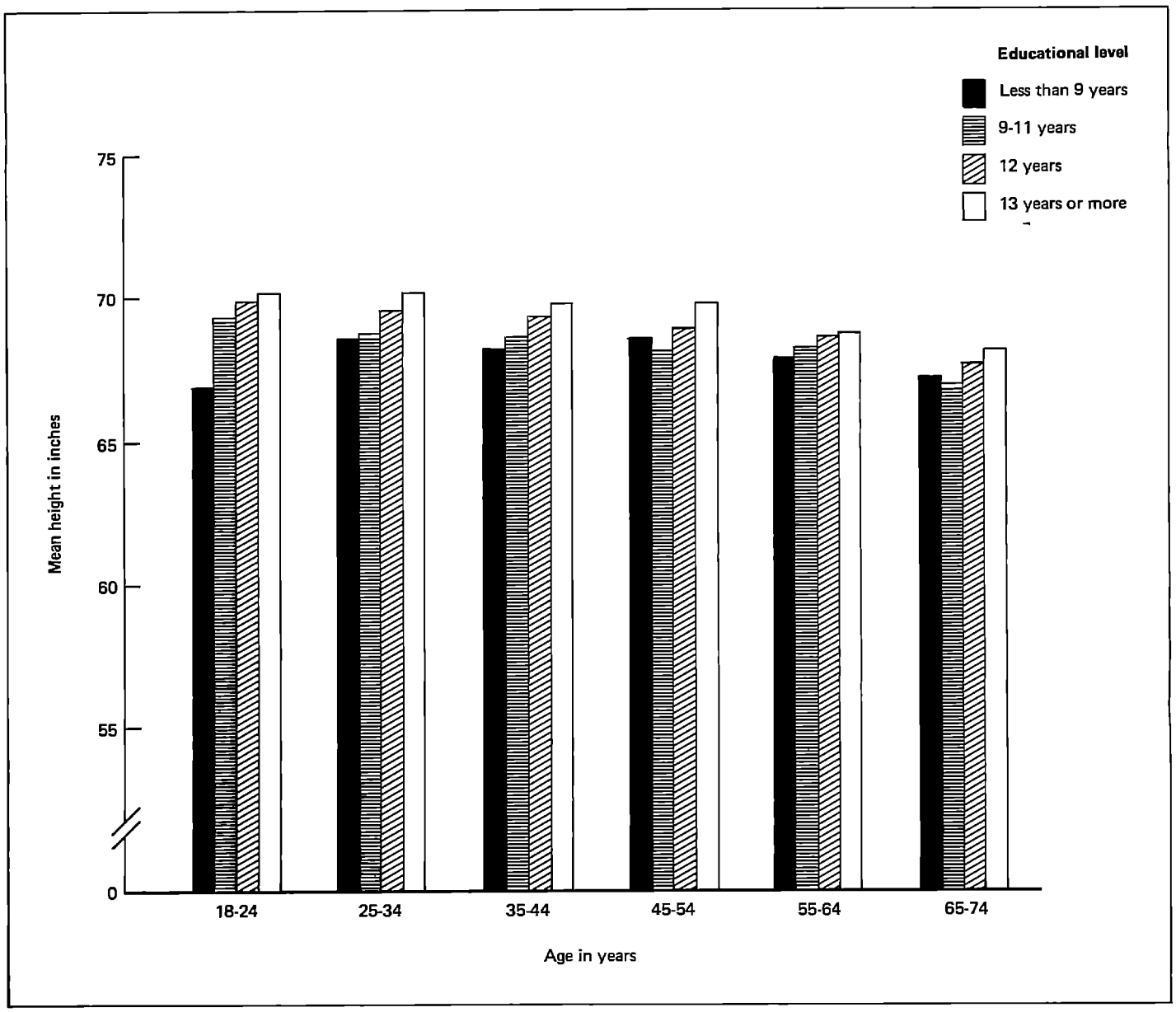

Figure 3. Mean height of males ages 18-74 years by age and educational level: United States, 1971-74

males living in the other regions by only 0.2 inch or less (table B).

The distribution of females' mean height by geographic region, race, and age is shown in table 12. The regional differences in height are 1 inch or less within each of the six age categories for white females. On the average, the taller white females of each age category generally lived in the South, and the shortest white females lived in the Northeast. The largest regional difference in mean height, 1.5 inches, was observed for black females ages 55-64 years living in the Northeast and South regions (table C). Generally, black females living in the West were observed to be taller than those living in any other region; those living in the Northeast were generally the shortest (table 12). The age-adjusted mean height of white females ages 18-74 years equals or exceeds that of black females ages 18-74 years in every region except the West. The interracial differences in the age-adjusted mean height for males and females ages 18-74 years for each geographic region are generally of the same magnitude as those found for urbanization status (table B).

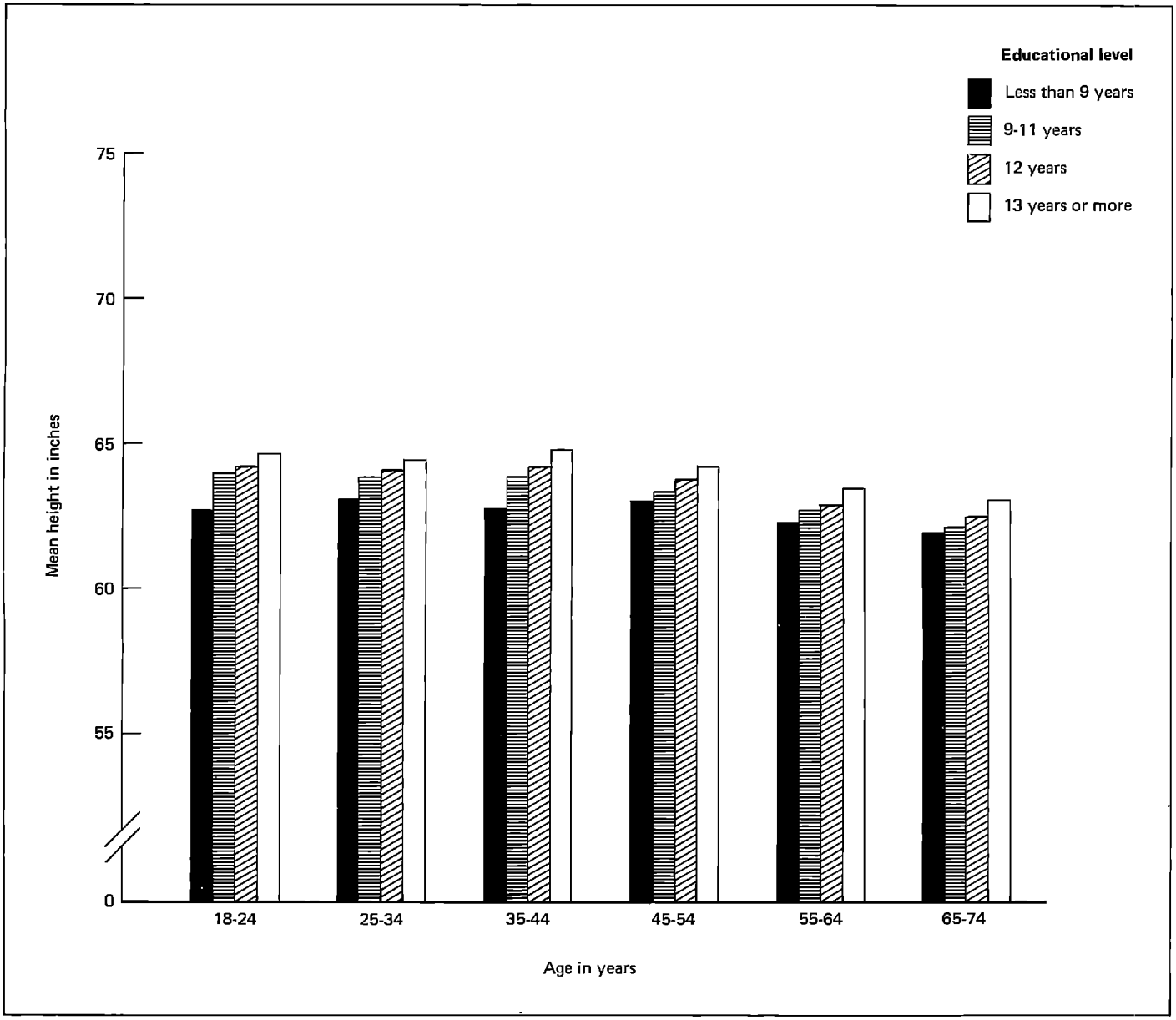

Figure 4. Mean height of females ages 18-74 years by age and educational level: United States, 1971-74

Table C. Differences in mean height and mean weight (with confidence limits) of adults ages 18-74 years between urbanized and rural areas and between the Northeast and South regions, by race, sex, and age: United States, 1971-74

Race, sex, and age	Mean height						Mean weight					
	Differences in inches		95% confidence limits				Differences in pounds		95% confidence limits			
	Urbanized and rural areas	Northeast and South regions	Urbanized and rural areas		Northeast and South regions		Urbanized and rural areas	Northeast and South regions	Urbanized and rural areas		Northeast and South regions	
			Lower	Upper	Lower	Upper			Lower	Upper	Lower	Upper
ALL RACES												
Males												
18-24 years	0.2	−0.2	−0.6	1.0	−1.0	0.6	-	−2	−8	8	−11	7
25-34 years	−0.2	−0.7	−0.7	0.3	−1.5	0.1	−9	-	−16	−2	−9	9
35-44 years	0.1	−1.2	−0.4	0.6	−1.9	−0.5	-	−2	−6	6	−10	6
45-54 years	−0.2	−1.1	−0.8	0.4	−1.8	−0.4	-	4	−6	6	−4	12
55-64 years	−0.5	−1.4	−1.1	0.1	−2.2	−0.6	−3	4	−9	3	−3	11
65-74 years	−0.5	−1.0	−0.8	−0.2	−1.4	−0.6	−4	-	−8	-	−5	5
Females												
18-24 years	-	−0.7	−0.4	0.4	−1.1	−0.3	−3	−4	−6	-	−8	-
25-34 years	-	−0.4	−0.3	0.3	−0.8	0.0	−2	−4	−6	2	−8	-
35-44 years	−0.1	−0.8	−0.5	0.3	−1.3	−0.3	−3	−5	−7	1	−13	3
45-54 years	0.2	−0.8	−0.2	0.6	−1.3	−0.3	−3	-	−9	3	−8	8
55-64 years	−0.4	−1.0	−0.9	0.1	−1.4	−0.6	−4	−5	−10	2	−12	2
65-74 years	−0.3	−0.7	−0.7	0.1	−1.1	−0.3	−5	-	−10	-	−6	6
White males												
18-24 years	0.3	−0.3	−0.5	1.1	−1.3	0.7	−1	−2	−10	8	−13	9
25-34 years	−0.2	−0.7	−0.7	0.3	−1.6	0.2	−8	−2	−14	−2	−10	6
35-44 years	-	−1.3	−0.5	0.5	−1.9	−0.7	-	2	−6	6	−7	11
45-54 years	−0.1	−1.4	−0.7	0.5	−2.2	−0.6	−1	2	−7	5	−7	11
55-64 years	−0.5	−1.7	−1.2	0.2	−2.7	−0.7	−4	−4	−11	3	−13	5
65-74 years	−0.5	−1.1	−0.9	−0.1	−1.6	−0.6	−4	−1	−9	1	−7	5
Black males												
18-24 years	−0.6	0.3	−2.4	1.2	−1.6	2.2	5	−2	−12	22	−18	14
25-34 years	0.3	−0.3	−1.8	2.4	−2.2	1.6	−20	31	−89	49	−43	105
35-44 years	1.3	0.3	−0.5	3.1	−2.5	3.1	−5	−25	−24	14	−42	−8
45-54 years	−0.4	−0.4	−1.5	0.7	−1.6	0.8	−13	10	−31	5	−3	23
55-64 years	−0.1	0.2	−1.4	1.2	−1.4	1.8	9	-	−20	38	−42	42
65-74 years	0.2	−0.6	−0.7	1.1	−1.3	0.1	−8	10	−20	4	−2	22
White females												
18-24 years	0.1	−0.7	−0.3	0.5	−1.2	−0.2	−4	−1	−8	-	−6	4
25-34 years	−0.1	−0.7	−0.5	0.3	−1.1	−0.3	−4	−1	−9	1	−7	5
35-44 years	-	−0.8	−0.4	0.4	−1.3	−0.3	−4	−3	−9	1	−12	6
45-54 years	0.3	−0.7	−0.1	0.7	−1.3	−0.1	−2	4	−7	3	−3	11
55-64 years	−0.4	−0.9	−0.9	0.1	−1.4	−0.4	−5	−2	−11	1	−9	5
65-74 years	−0.4	−0.7	−0.8	0.0	−1.1	−0.3	−5	1	−10	-	−6	8
Black females												
18-24 years	−0.5	−1.1	−1.1	0.1	−2.0	−0.2	−5	−11	−13	3	−26	4
25-34 years	0.8	0.4	0.1	1.5	−0.6	1.4	10	−8	−1	21	−21	5
35-44 years	−0.5	−0.7	−1.4	0.4	−1.7	0.3	−16	−9	−35	3	−25	7
45-54 years	−0.2	−1.3	−1.7	1.3	−2.7	0.1	−25	2	−53	3	−32	36
55-64 years	−0.7	−1.5	−1.7	0.3	−3.2	0.2	−1	−18	−20	18	−49	13
65-74 years	0.4	0.2	−0.3	1.1	−0.8	1.2	1	6	−18	20	−19	31
Age-adjusted values:												
Males, 18-74 years	−0.2	−0.9	---	---	---	---	−3	-	---	---	---	---
Females, 18-74 years	−0.1	−0.8	---	---	---	---	−3	−3	---	---	---	---
White males, 18-74 years	−0.1	−1.0	---	---	---	---	−2	−1	---	---	---	---
White females, 18-74 years	0.2	−0.8	---	---	---	---	−4	-	---	---	---	---
Black males, 18-74 years	0.1	-	---	---	---	---	−5	5	---	---	---	---
Black females, 18-74 years	−0.2	−0.7	---	---	---	---	−6	−7	---	---	---	---

NOTE: Negative signs indicate higher mean values for rural areas than for urbanized areas, or higher mean values for the South region than for the Northeast region.

Findings for weight

Annual family income

Age.—Mean weight of adults ages 18-74 years by annual family income, sex, and age is presented in table 13. Adults with an annual income of $15,000 and over were observed to be heavier than those with an annual income under $4,000 for every age category except ages 35-44 years. On the average, adults ages 35-44 years with an annual income under $4,000 were observed to weigh 6 pounds more than those with an annual income of $15,000 and over. The observed differences in mean weight between the lowest and highest income levels for the remaining age categories range from 3 pounds at ages 18-24 years to 8 pounds at ages 55-64 years. The overall age-adjusted mean weight for adults ages 18-74 years is higher at each successive income level, with an observed difference of 2 pounds between the lowest and highest income levels.

Sex and age.—The mean weight of males peaks at annual income levels of $7,000-$9,999 for ages 18-24 years, $10,000-$14,999 for ages 25-34 years, and $15,000 and over for ages 35 years and over. The lowest mean weight is found at an annual income level of $4,000-$6,999 for ages 45-54 years and at an annual income level of under $4,000 for all other ages (figure 5). Males ages 25-34, 45-54, 55-64, and 65-74 years with an annual income of $15,000 and over were found to be significantly heavier than those with an annual income under $4,000 by 20, 16, 17, and 10 pounds, respectively. Overall, the age-adjusted mean weight differs by 12 pounds between the lowest and highest income levels for males ages 18-74 years (table A).

The findings for females are the converse of the findings for males. On the average, the heaviest females were observed to be those with an annual income under $4,000, and the less heavy or lightest females were those with an annual income of $10,000 and over (figure 6). The differences in mean weight between the lowest and highest income levels range from 5 pounds at ages 18-24 years to 17 pounds at ages 35-44 years (table A).

A direct relationship between income and mean weight was observed for males ages 18-74 years, whereas an inverse relationship was observed between income and mean weight for females ages 18-74 years. Females with an annual income of $15,000 and over were observed to be 11 pounds lighter than those with an annual income under $4,000.

Race, sex, and age.—Data on mean weight of white males by income, as shown in table 14, parallel the findings for all males. The heaviest white males, on the average, were observed to be those with an annual income of $15,000 and over, and the least heavy were those with an annual income under $4,000. Observed differences in mean weight between the lowest and highest income levels are 10 pounds or more for each age category except ages 18-24 and 35-44 years (table A). Overall, white males ages 18-74 years with an annual income of $15,000 and over were observed to be 13 pounds heavier than those with an annual income under $4,000. The overall age-adjusted mean weight of black males ages 18-74 years is highest for those with an annual income of $15,000 and over; black males at this income level were observed to be 10 pounds heavier than those whose annual income was under $4,000. However, the interracial differences in the age-adjusted means for males ages 18-74 years by annual income level are less than 6 pounds (table B).

The mean weight of females ages 18-74 years by annual family income, race, and age is presented in table 15. Unlike white males, the heaviest white females were generally those with an income under $4,000.

Generally, younger white females ages 44 years and under with an annual income of $15,000 and over showed the lowest mean weight; the lowest mean weight was observed for white females ages 55 years and over at the income level of $4,000-$6,999. The largest observed differences in mean weight

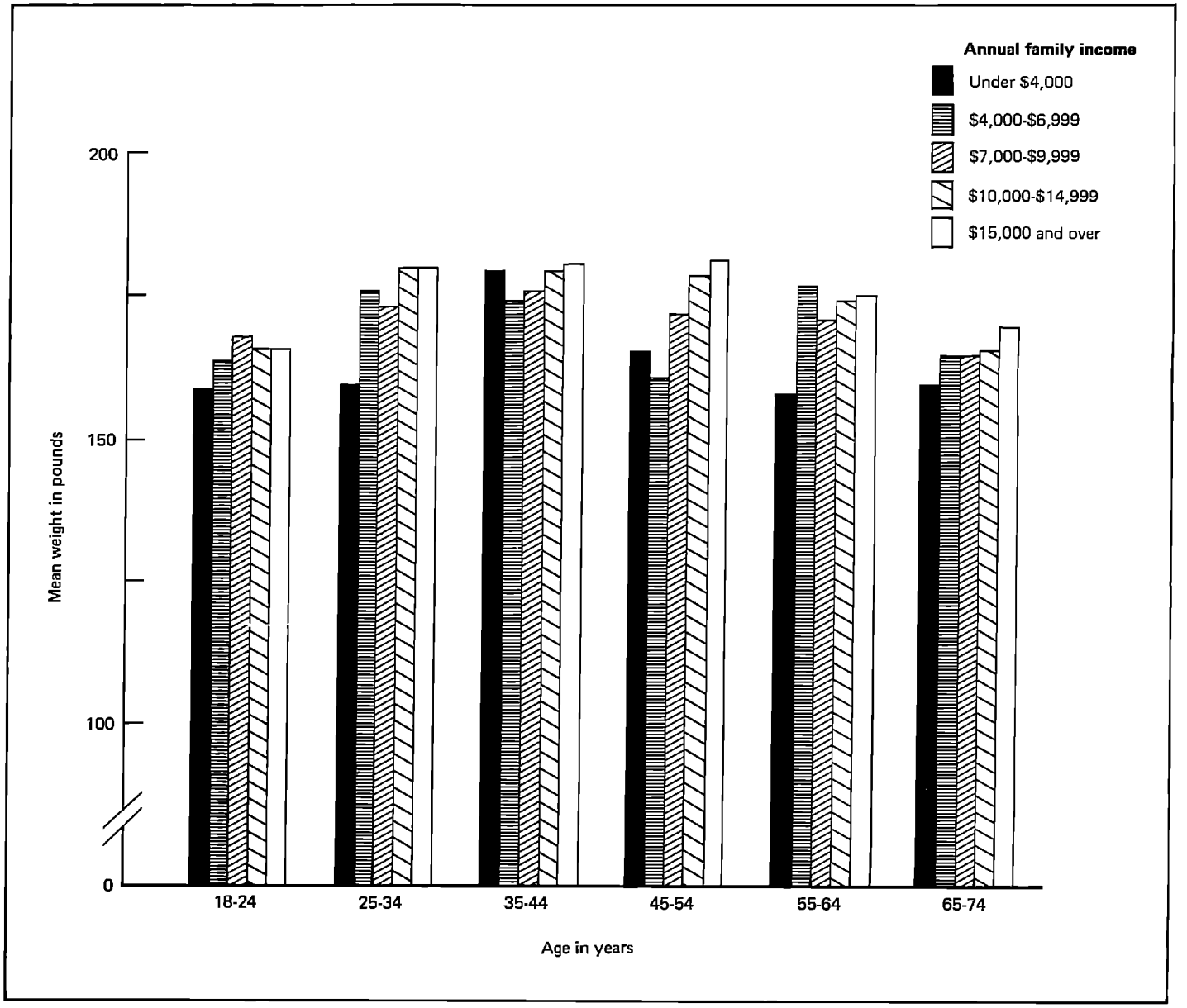

Figure 5. Mean weight of males ages 18-74 years by age and annual family income: United States, 1971-74

between the lowest and highest income levels are 13 pounds and 11 pounds for white females, respectively, ages 25-34 and 35-44 years (table A). The highest age-adjusted mean weight of white females ages 18-74 years is found at the lowest income level; those with an annual income under $4,000 were observed to be 8 pounds heavier than those with an annual income of $15,000 and over. The age-adjusted mean weight of black females ages 18-74 years differs by 5 pounds between those with an annual income under $4,000 and those with an annual income of $15,000 and over (table A).

The age-adjusted mean weight of black females is consistently higher than the age-adjusted mean weight for white females ages 18-74 years at every income level. The observed interracial differences in mean weight range from 11 pounds at $7,000-$9,000 to 16 pounds at $15,000 and over per year. The observed interracial differences in mean weight for each income level are much larger for females than for males ages 18-74 years (table B).

Educational level

Age.—The mean weight of adults as shown in table 16 is not consistently lower or higher at any one educational level as age increases from 18 to 74 years. Adults ages 55-64 years comprise the only group to show a consistently lower mean weight as educational level increases from less than 9 years to 13 years or more.

Adjusting for age, adults ages 18-74 years with less than 9 years of education were observed not to be heavier than those with 13 years or more of

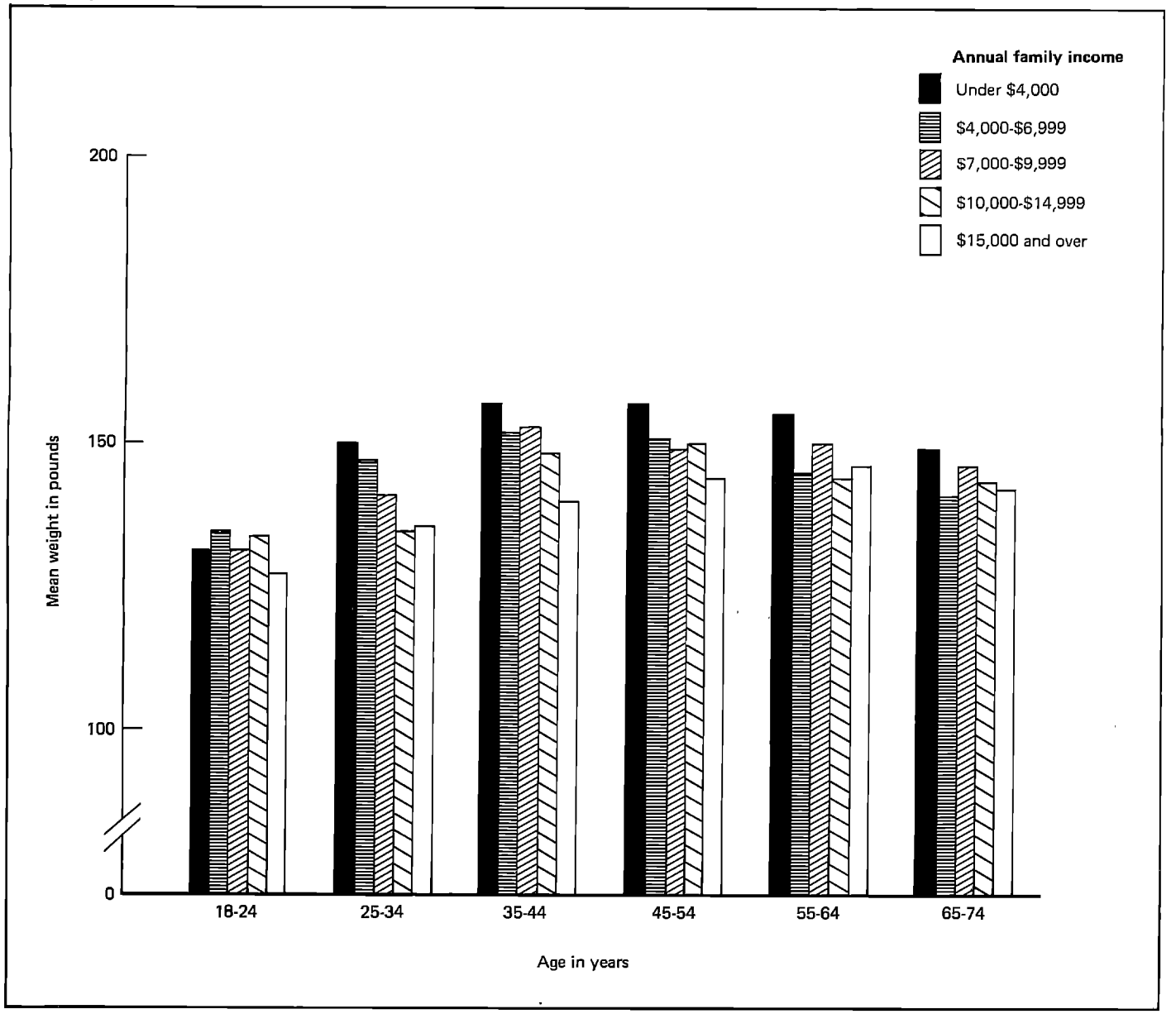

Figure 6. Mean weight of females ages 18-74 years by age and annual family income: United States, 1971-74

education, but 3 pounds heavier than those with exactly 12 years of education.

Sex and age.—The mean weight of males with less than 12 years of education is generally lower than that of males with 12 years or more of education for each age category (figure 7). Differences in mean weight of 10 pounds or more between the lowest and highest educational levels were observed for males ages 18-24, 35-44, and 45-54 years (table A). The overall age-adjusted mean weight for males with 13 years or more of education is 9 pounds higher than for those with less than 9 years of education.

The mean weight for females generally decreases as educational level increases for successive age categories (figure 8). Females also show generally large decreases (differences) in mean weight between the lowest and highest educational levels for each age category (table A).

Overall, the mean weight is inversely related to educational level for females ages 18-74 years. Females ages 18-74 years with less than 9 years of education, on the average, weighed 10 pounds more than females with 13 years or more of education (table A).

Race, sex, and age.—The mean weight of white and black males ages 18-74 years is shown in table 17. Generally, the heavier white males of each age category were observed to be those at the highest educational level. The age-adjusted mean weight of white males ages 18-74 years with 13 years or more of education was observed to be 9 pounds higher than for those males with less than 9 years of education

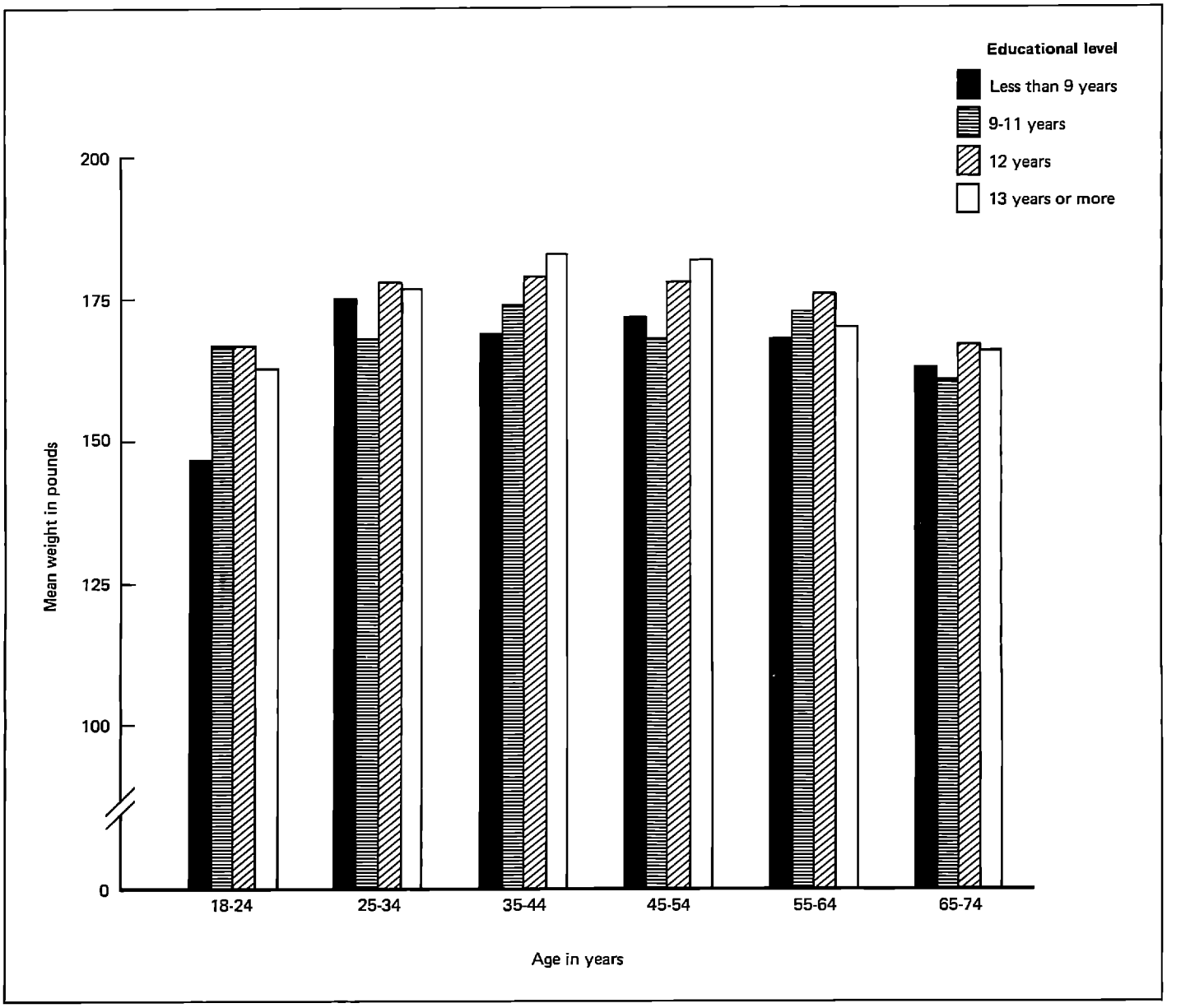

Figure 7. Mean weight of males ages 18-74 years by age and educational level: United States, 1971-74

(table A). On the average, the age-adjusted mean weight of black males ages 18-74 years is 18 pounds higher for those with 13 years or more of education than for those with less than 9 years (table A). The mean interracial differences for males range from less than 1 pound at 9-11 years of education to 7 pounds at 13 years or more (table B).

Unlike white males, the heavier white females of each age category were generally observed to be those at the lowest educational level (table 18). The observed differences in white females' mean weight between the lowest and highest educational levels are less than 8 pounds for all age groups except ages 25-34 and 55-64 years. The observed differences at these ages are each 13 pounds (table A). Overall, age-adjusted white females with less than 9 years of education were 8 pounds heavier than those with 13 years of education or more; the corresponding value for black females is 13 pounds (table A). On the average, black females ages 18-74 years with less than 9 years of education weighed 14 pounds more than their white counterparts; however, the differences decrease to 9 pounds at 13 years or more of education (table B).

Urbanization status

Age.—Adults of each age category living in rural areas were generally observed to be heavier than those living in either urban or urbanized areas (table 19). The observed differences in mean weight between those adults living in urbanized areas and those living

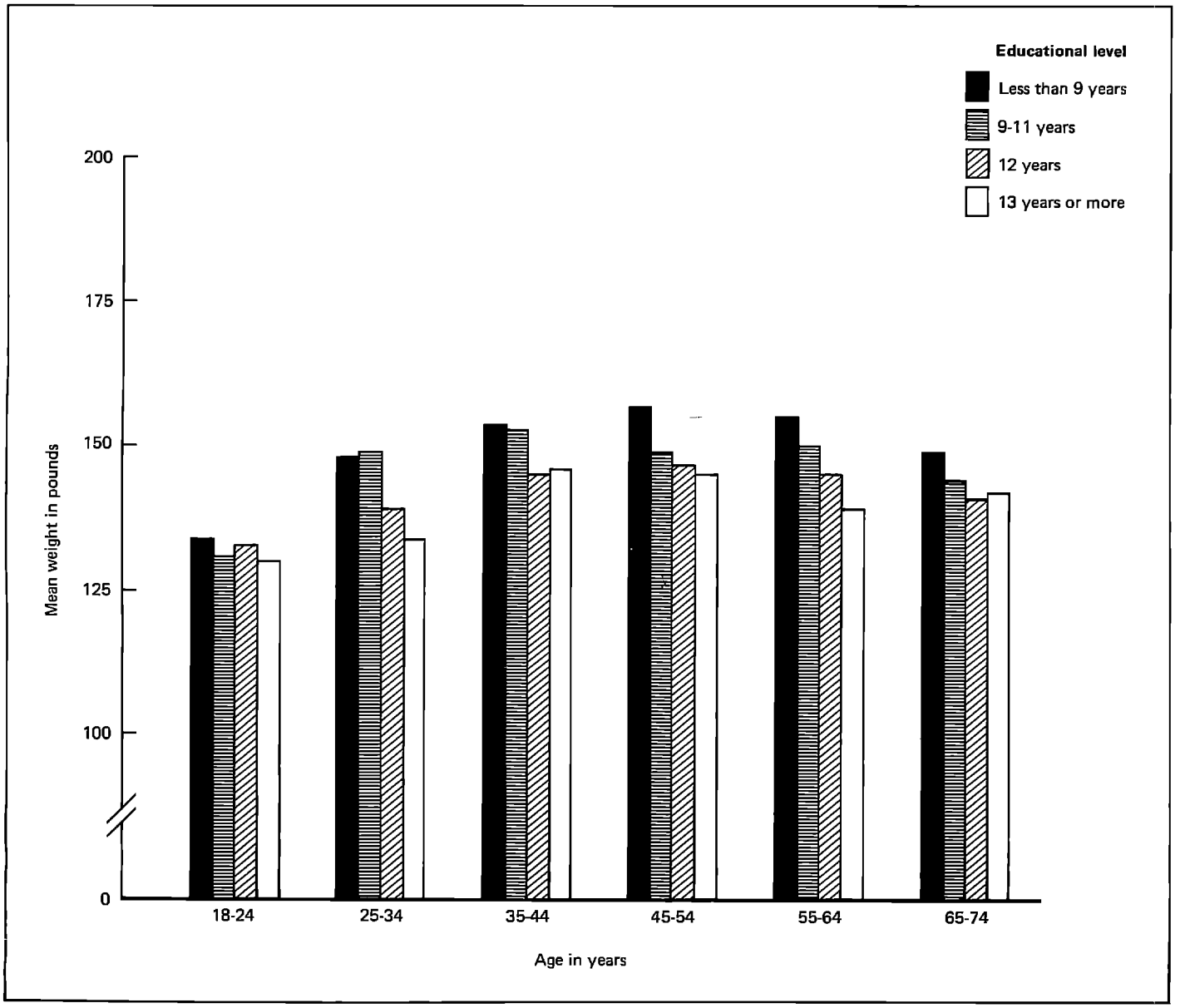

Figure 8. Mean weight of females ages 18-74 years by age and educational level: United States, 1971-74

in rural areas range from less than 1 pound for persons ages 45-54 years to 4 pounds for persons ages 55-74 years. Overall, the heaviest adults ages 18-74 years were those living in rural areas, followed by those living in urbanized areas. Those living in urban areas generally had the lowest average weight.

Sex and age.—Table 19 shows that males ages 25-34 years display the largest observed change in mean weight by urbanization status. Males ages 25-34 years living in rural areas were found to be statistically heavier than those living in urbanized areas. The remaining age categories of males show no significant differences between urbanized and rural areas. Overall, males ages 18-74 living in rural areas averaged 3 pounds heavier than those living in urbanized areas (table C).

On the average, females of each age category living in rural areas were consistently observed to be heavier than those living in urbanized areas (table 19). The observed differences in mean weight between urbanized and rural areas range from 2 pounds for females ages 25-34 years to 5 pounds for females ages 65-74 years. Only the mean weight of females ages 18-24 years shows a statistically significant difference between urbanized and rural areas. Overall, females ages 18-74 years living in rural areas were observed to weigh 3 pounds more than those living in urbanized areas.

Race, sex, and age.—The mean weight of males and females by urbanization status, race, and age is shown in tables 20 and 21. On the average, the highest mean weights for white males in the youngest age groups (under 35 years) were observed in rural areas; for those ages 35-54 years, in urbanized areas;

and for those ages 55 years and over, in urban areas. The largest observed difference in mean weight between urbanized and rural areas, 8 pounds, occurs for white males ages 25-34 years. The observed differences in mean weight between urbanized and rural areas for white males of the older age categories are generally of the same magnitude as those for all males. On the average, white males ages 18-74 years living in rural areas were observed to be 2 pounds heavier than those living in urbanized areas and 4 pounds heavier than those living in urban areas (tables C and 20). The observed differences in average weight between urbanized and rural areas for black males are at least 5 pounds for each age category; however, the observed differences are not consistently in the same direction (table C).

The age-adjusted average weight of black males ages 18-74 years living in rural areas is 5 pounds more than for black males living in urbanized areas and 8 pounds more than for black males living in urban areas (tables C and 20). The interracial difference in age-adjusted mean weight of males ages 18-74 years is 2 pounds for those living in urbanized areas. The difference increases to 5 pounds for urban areas, then decreases to less than 1 pound for rural areas (table B).

Females' mean weight by race, age, and urbanization status is shown in table 21. On the average, white females of each age category except 25-34 years living in rural areas were heavier than their cohorts living in other areas. The observed differences in mean weight between urbanized and rural areas range from 2 pounds at ages 45-54 years to 5 pounds at ages 65-74 years. These differences parallel those found for all females (table C). Black females, like black males, show varying magnitudes of observed differences in mean weight between urbanized and rural areas by age. Each age category of black females except ages 25-34 and 65-74 years shows a higher mean weight for rural areas than for urbanized areas. The observed mean weight of black females ages 35-44 and 45-54 years living in rural areas exceeds that of their counterparts living in urbanized areas by 16 pounds and 25 pounds, respectively (table C). Overall, black and white females ages 18-74 years living in rural areas were observed to be heavier than their respective cohorts living in urbanized areas; black females ages 18-74 years were observed to be heavier than white females at each urbanization status (table 21). The observed interracial differences in age-adjusted mean weight for females ages 18-74 years are 13 pounds for urbanized residents, 23 pounds for urban residents, and 15 pounds for rural residents (table B).

Geographic region

Age.—The mean weight of adults ages 18-74 years by geographic region, sex, and age is presented in table 22. On the average, adults of each age category living in the Midwest were generally observed to be heavier than adults living in any other geographic region. The largest observed regional difference in mean weight is less than 8 pounds. This is seen between adults ages 55-64 years living in the Northeast region and the Midwest region. The age-adjusted mean weight of adults ages 18-74 years living in the Midwest region exceeds that of those living in the West region by 5 pounds and exceeds that of other adults in the other regions by less than 5 pounds.

Sex and age.—As shown in table 22, males and females of successive age categories living in the Midwest region were generally observed to be heavier than those living in other regions. The largest regional difference in mean weight for males is less than 9 pounds and occurs between males ages 25-34 years living in the Midwest and South regions. Correspondingly, the largest observed difference in mean weight for females is less than 7 pounds and occurs between the Midwest and West regions for those ages 55-64 years. A comparison of the Northeast and South regions shows no statistically significant differences in mean weight for males or females of any age category (table C). Overall, the age-adjusted average weight for each sex ages 18-74 years varies less than 6 pounds among the regions (table 22).

Race, sex, and age.—The mean weight of males ages 18-74 years by geographic region, race, and age is shown in table 23. Large regional differences in average weight, which exceed 6 pounds, were observed for white males ages 25-34, 55-64, and 65-74 years. Generally, white males living in the Midwest region were heavier than those living in any other geographic region. Black males' mean weight show no consistent patterns by geographic region. The variations in average weight for black males of each age category are explained in part by the small number of cases in some cells. Overall, black males ages 18-74 years living in the Northeast and West regions were 5 pounds and 4 pounds heavier, respectively, than white males ages 18-74 years living in the same regions. However, white males ages 18-74 years living in the Midwest and South regions were 2 pounds heavier than black males ages 18-74 years living in those regions (table B).

As shown in table 24, the mean weight of white females by geographic region and age generally parallel those for all females. For each age category except 35-44 years, white females living in the Midwest region were observed to be heavier than white females living in any other region. Generally, observed regional differences in average weight for white females of each age category are less than 10 pounds. On the average, white females ages 18-74 years living in the Midwest region were observed to be about 4 pounds heavier than white females ages 18-74 years living in the Northeast and South regions, but

they were about 6 pounds heavier than white females ages 18-74 years living in the West region. Some large differences in mean weight were observed between the Northeast and Midwest regions for black females ages 18-24 years between the Midwest and West regions for black females ages 35-44 years, and between the South and West regions for black females ages 55-64 years. On the average, black females ages 18-74 years were observed to be consistently heavier than white females ages 18-74 years for each of the four geographic regions. Within the Northeast region, black females were, on the average, 12 pounds heavier; within the Midwest region, 8 pounds heavier; within the South region, 19 pounds heavier; and within the West region, 13 pounds heavier (table B).

Discussion

In this report, the mean height and weight of adults ages 18-74 years are analyzed according to age, sex, race, and socioeconomic and geographic variables. The body measurements were collected as part of the anthropometry battery of the first National Health and Nutrition Examination Survey (NHANES I) of 1971-74. The survey provides cross-sectional data and is representative of the U.S. civilian, noninstitutionalized population.

Cross-sectional data on adults' body measurements were obtained for different age cohorts. The age trends show the mean height and weight for successive age cohorts and reflect the effects of different environmental and hereditary influences.[4] The limitation of cross-sectional data is recognized when considering changes over time. Patterns of increased height and weight in a cross-sectional survey may be influenced by a secular trend in body size for successive generations. The NHANES I height and weight measures represent the most recently available cross-sectional data from which estimates can be generalized to the U.S. population.

Body measurements depend in part on nutrient supply[5] and thus provide one method of assessing nutritional status. Height and weight measures are informative though limited in interpretive value unless viewed in terms of total body composition. Body weight is influenced by many factors, such as fat, bone, and muscle. The separation of body weight into its primary components would aid in describing one component of the population's nutritional status.

This report outlines many observations about mean height and weight by age, sex, race, and socioeconomic and geographic variables. Further research is necessary in order to relate many of the differences to other variables, such as dietary intake, exercise, and other components of body composition.[6] This kind of investigation could help clarify some of the different patterns observed for the socioeconomic and geographic variables. Moreover, evaluation of the significance of individual differences in body composition must be applied to such criteria as performance capacity, morbidity, and mortality. An operational definition is needed, in contrast to the statistical descriptions of body measurements presented in this report.

Income and educational differences

Males and females of successive age categories were observed to be taller as income and educational levels increased. Younger individuals (those with higher incomes and more education) were generally the tallest, and older individuals (those with lower incomes and less education) were observed to be the shortest. Findings from the series *Current Population Reports* indicate that the proportion of persons ages 25 years and over with less than 4 years of high school education has been declining and that the proportion of persons ages 25 years and over with 4 years or more of college education is increasing.[7] These patterns of increased educational and income levels are reflected in the NHANES I data. The reader should be cognizant of differences in family income and educational levels among the four race-sex groups of adults ages 18-74 years since, in this report, adjustments are made only for differences in the age distributions.

The differences in the age-adjusted mean height between the lowest and highest levels of income and education were observed to be less than 4 inches for adults ages 18-74 years by sex and race for each age category. The mean height of males ages 55-64 and 65-74 years with an annual income of $15,000 and over was found to be statistically different from that of their birth cohorts with an annual income under $4,000 (table A).

There is no statistically significant difference in the mean height between the highest and lowest income levels for females of any of the six age categories. However, the observed differences in age-adjusted mean height between the highest and the

lowest educational levels are larger than those observed between comparable income levels for each sex and for the four race-sex groups ages 18-74 years. Interracial differences in age-adjusted mean height for both sexes are small (1 inch or less within each income or education stratum) and are of little consequence from a comparative or evaluative standpoint.

The mean weight of males and females shows opposite patterns as both annual family income and education increase from the lowest to highest levels. A direct association between each socioeconomic variable and mean weight was found for males; an indirect association was found for females. This finding is true for white adults of each sex ages 18-74 years.

The association between education and mean weight is more pronounced than the association between income and mean weight for black females; the association is the same for white females ages 18-74 years for both socioeconomic variables. Moreover, interracial differences in mean weight for females are indirectly related to educational level.

The finding that the mean weight of black and white males is not inversely related to income or educational level does not necessarily mean that they are not concerned about weight loss. Males probably are concerned but to a lesser degree than females are. According to findings from the National Health Interview Survey (NHIS), 49 percent of all females ages 17 years and over perceived themselves as overweight compared with 31 percent of males.[8] This statement is reinforced by findings from the NHANES I data on actual physical measurements, which show that 23 percent of females ages 20-74 years, compared with 13 percent of males, were assessed as obese. Thus, the finding that males' mean weight does not vary inversely with socioeconomic status seems to be related to the fact that males do not perceive themselves to be overweight or as overweight as females perceive themselves to be. There are other factors that may affect the relationship of mean weight and socioeconomic status for males; however, males' perceptions of themselves as not overweight is certainly an important factor.

Urbanization and regional differences

A comparison between urbanized and rural areas and between the Northeast and South regions shows small but consistent differences in mean height of 0.8 inch or less and 1.7 inches or less respectively, for adults ages 18-74 years by sex and for each race-sex group. Only males in age categories 35 years and over living in the South region were found to be statistically taller than males living in the Northeast region. Adults ages 18-74 years of each sex living in rural areas and in the South region were observed to be heavier, on the average, than those living in urbanized areas and the Northeast region. Differences in mean weight are larger for black adults for each sex than for white adults. In making comparisons by race, the age-adjusted mean differences should be used since they are more stable and are generally comparable to those of white adults.

Neither males nor females by age show any statistically significant difference in mean weight between the South and Northeast regions. As shown earlier for socioeconomic variables, large differences in mean weight by race for each urbanization status and each geographic region were found for females. The age-adjusted mean weight of black females ages 18-74 years exceeds that of white females ages 18-74 years by at least 13 pounds or more for each urbanization status and by at least 8 pounds for each geographic region.

In general, white males ages 18-74 years were observed to be heavier and taller than black males, and black females ages 18-74 years were observed to be generally taller and consistently heavier than white females for each urbanization status and each geographic region.

Summary

In this report, the mean height and weight of persons ages 18-74 years in the U.S. civilian, noninstitutionalized population, as obtained by the first National Health and Nutrition Examination Survey of 1971-74, are described by age, sex, race, and socioeconomic and geographic variables. Major findings are summarized as follows:

- Males and females were observed to be generally taller as annual income increases from under $4,000 to $15,000 and over for successive birth cohorts. This finding is also true for white adults by sex.
- On the average, males ages 55-64 and 65-74 years with an annual income of $15,000 and over are statistically taller than those with an annual income under $4,000. There are no statistical differences in females' mean height for the two income levels.
- Interracial differences in mean height by sex for adults ages 18-74 years are less than 1 inch. Recognizing the small differences, the mean height of black females ages 18-74 years equals or exceeds that of white females ages 18-74 years, and the mean height of white males ages 18-74 years generally exceeds that of black males ages 18-74 years.
- For each sex and age category, adults with 13 years or more of education were observed to be consistently taller, on the average, than those at any other educational level.
- The mean height of males and females ages 18-74 years is directly related to income and educational levels.
- There is no statistically significant difference in females' mean height between urbanized and rural areas; however, males ages 65-74 years living in rural areas were found to be statistically taller than their counterparts living in urbanized areas.
- Males and females living in the Northeast region were observed to be shorter than those living in any other region. Males ages 35 years and over living in the South region are statistically taller than their counterparts living in the Northeast region. The mean height of females is statistically different for each age category between those living in the Northeast and South regions.
- The heavier males of each age category were generally observed to be those with an annual income of $15,000 and over. In fact, males of each age category except 18-24 and 35-44 years with an annual income of $15,000 and over were found to be statistically heavier than those with an annual income under $4,000. The heavier females of successive age categories, however, were generally observed to be those with an annual income under $4,000. Hence, mean weight was observed to be inversely related to income for females but directly related to income for males.
- Males and females show opposite patterns in mean weight as educational level increases from less than 9 years to 13 years or more. This finding is also true for income.
- The mean weight for white adults of each sex parallels those for all adults of each sex for successive birth cohorts as educational level increases.
- The interracial difference in mean weight increases for males but decreases for females as the level of education increases from less than 9 years to 13 years or more.
- Females living in rural areas were observed to be generally heavier than those living in urbanized areas. Only females ages 18-24 years living in rural areas were found to be statistically heavier than their counterparts living in urbanized areas.
- For each sex of adults ages 18-74 years, those living in rural areas were observed to be heavier than those living in urbanized areas. This finding is also true for each race-sex group.
- Males and females living in the Midwest region were observed to be heavier than males and females living in any other region.
- Comparisons between the Northeast and South regions show no statistically significant difference in the mean weight of males or females.

References

[1]National Center for Health Statistics: Weight and height of adults 18-74 years of age: United States, 1971-74, by S. Abraham, C. L. Johnson, and M. F. Najjar. *Vital and Health Statistics.* Series 11-No. 211. DHEW Pub. No. (PHS) 79-1659. Public Health Service. Washington. U.S. Government Printing Office, May 1979.

[2]National Center for Health Statistics: Weight by height and age for adults 18-74 years: United States, 1971-74, by S. Abraham, C. L. Johnson, and M. F. Najjar. *Vital and Health Statistics.* Series 11-No. 208. DHEW Pub. No. (PHS) 79-1656. Public Health Service. Washington. U.S. Government Printing Office, Sept. 1979.

[3]National Center for Health Statistics: Plan and operation of the Health and Nutrition Examination Survey, United States, 1971-1973, by H. W. Miller. *Vital and Health Statistics.* Series 1-Nos. 10a and 10b. DHEW Pub. No. (PHS) 79-1310. Health Resources Administration. Washington. U.S. Government Printing Office, June 1979.

[4]Tanner, J. M., Hiernaux, J., and Jarman, S.: Growth and Physique Studies in IBP Handbook No. 9. Human Biology: A Guide to Field Methods, Weiner, J. S. and Lourie, J. A. London. Internat. Biol. Programme, 1969.

[5]National Center for Health Statistics: Caloric and selected nutrient values for persons 1-74 years of age: First Health and Nutrition Examination Survey, United States, 1971-1974, by S. Abraham, M. D. Carroll, C. L. Johnson, and C. M. Dresser. *Vital and Health Statistics.* Series 11-No. 209. DHEW Pub. No. (PHS) 79-1657. Public Health Service. Washington. U.S. Government Printing Office, June 1979.

[6]Keys, A., and Grande, F.: Body weight, body composition, and caloric status, in R. S. Goodhart and M. E. Shils, eds., *Modern Nutrition in Health and Disease.* Philadelphia. Lea and Febiger, 1973. p. 20.

[7]U.S. Bureau of the Census: Educational attainment, March 1972. *Current Population Reports.* Series P-20, No. 243. Washington. U.S. Government Printing Office, 1972.

[8]U.S. Department of Health, Education, and Welfare: *Health, United States, 1978.* DHEW Pub. No. (PHS) 78-1232. Public Health Service. Washington. U.S. Government Printing Office, Dec. 1978.

[9]National Center for Health Statistics: *The HANES Study, Final Report.* Prepared by the Institute for Survey Research. HSM-110-73-376. Health Services and Mental Health Administration. Philadelphia. Temple University.

[10]U.S. Department of Health, Education, and Welfare: *A Comparison and Analysis of Examined and Unexamined Persons on Medical History Characteristics for the First Round of the Health and Nutrition Examination Study* HSM-110-73-371. Prepared by Westat Inc. Rockville, Md. Jan. 24, 1974.

[11]National Center for Health Statistics: Factors related to response in a Health Examination Survey: United States, 1960-1962. *Vital and Health Statistics.* Series 2-No. 6. DHEW Pub. No. 36 (HSM) 73-1263. Health Services and Mental Health Administration. Washington. U.S. Government Printing Office, Aug. 1969.

[12]Wesley L. Schaible, Ph.D., Acting Chief, Methodological Research Branch, National Center for Health Statistics: Memorandum to Arthur J. McDowell, Director. Division of Health Examination Statistics. June 21, 1974.

[13]National Center for Health Statistics: *HES Variance and Cross Tabulation Program (In House Program), Version 2,* by G. Jones. Mar. 10, 1977. p. 11.

[14]Koch, G. G., Freeman, D. H., and Freeman, J. L.: Strategies in the multivariate analysis of data from complex surveys. *Int. Stat. Rev.* 43(1):59-78, 1975.

[15]Freeman, D. H., Freeman, J. L., Brock, D. B., and Koch, G. G.: Strategies in the multivariate analysis of data from complex surveys II: An application to the United States National Health Interview Survey. *Int. Stat. Rev.* 44:317-330, 1976.

[16]Scheffe, H.: *The Analysis of Variance.* New York. John Wiley & Sons, Inc., 1959.

[17]Johnson, W., and Koch, G.: Analysis of qualitative data: Linear functions. *Health Serv. Res.* 5(4):358-369, Winter 1970.

[18]Wald, A.: Tests of statistical hypothesis concerning several parameters when the number of observations is large. *Trans. Am. Math. Soc.* 54:426, 1943.

[19]National Center for Health Statistics: Replication: An approach to the analysis of data from complex surveys, by P. J. McCarthy. *Vital and Health Statistics.* PHS Pub. No. 1000-Series 2-No. 14. Public Health Service. Washington. U.S. Government Printing Office, Apr. 1966.

[20]Freeman, D. H., and Brock, D. B.: The role of the covariance matrix estimation in the analysis of complex sample survey data, in N. K. Namboodiu, ed., *Survey Sampling and Measurement.* New York. Academic Press, 1978. pp. 121-140.

List of detailed tables

Table 1. Height in inches of adults ages 18-74 years, by sex, age, and annual family income, mean, standard deviation, and age-adjusted values: United States, 1971-74

Sex and age	Annual family income									
	Under $4,000		$4,000-$6,999		$7,000-$9,999		$10,000-$14,999		$15,000 and over	
	Mean	Standard deviation	Mean	Standard deviation	Mean	Standard deviation	Mean	Standard deviation	Mean	Standard deviation
	Height in inches									
Both sexes										
18-74 years	65.2	3.8	65.6	3.7	66.2	3.7	66.7	3.7	66.8	3.7
18-24 years	66.9	3.9	66.5	3.8	66.7	3.7	67.1	3.8	67.2	3.8
25-34 years	65.8	3.8	65.9	3.8	66.6	3.7	67.2	3.8	67.1	3.9
35-44 years	66.0	4.0	65.6	3.8	66.5	3.7	66.7	3.4	66.8	3.5
45-54 years	65.3	3.4	65.4	3.2	65.7	3.4	66.6	3.6	66.6	3.7
55-64 years	64.2	3.5	65.3	3.7	65.5	3.5	65.7	4.0	66.1	3.7
65-74 years	63.8	3.4	64.5	3.4	65.0	3.5	65.0	3.3	65.9	3.7
Males										
18-74 years	68.3	3.1	68.6	2.9	68.9	2.8	69.4	2.7	69.3	2.7
18-24 years	69.7	2.9	69.4	3.2	69.6	2.7	69.9	2.7	69.9	2.6
25-34 years	69.1	3.3	69.1	3.1	69.2	2.7	70.0	2.8	69.9	2.9
35-44 years	68.9	3.2	68.4	3.2	69.0	3.0	69.2	2.5	69.5	2.3
45-54 years	68.3	2.7	68.2	2.0	68.6	2.5	68.9	2.6	69.2	2.8
55-64 years	67.4	2.6	68.4	2.6	68.2	2.6	68.7	2.5	68.3	2.5
65-74 years	66.7	2.6	67.2	2.3	67.5	2.6	67.9	2.3	68.3	2.5
Females										
18-74 years	63.1	2.7	63.4	2.5	63.7	2.5	64.0	2.5	63.9	2.4
18-24 years	64.3	2.6	64.1	2.5	64.2	2.4	64.5	2.6	64.2	2.3
25-34 years	63.8	2.4	63.7	2.5	63.9	2.4	64.4	2.4	64.3	2.5
35-44 years	63.5	2.7	63.4	2.6	64.2	2.7	64.4	2.3	64.1	2.4
45-54 years	63.5	2.4	63.5	2.3	63.6	2.4	63.8	2.3	63.8	2.1
55-64 years	62.5	2.6	62.8	2.4	63.0	2.2	62.5	2.5	62.7	2.6
65-74 years	62.1	2.5	62.2	2.2	62.5	2.3	63.0	2.3	62.6	2.3
Age-adjusted values:										
Both sexes, 18-74 years	65.5	...	65.6	...	66.1	...	66.6	...	66.7	...
Males, 18-74 years	68.6	...	68.6	...	68.3	...	69.3	...	69.3	...
Females, 18-74 years	63.4	...	64.0	...	63.7	...	63.9	...	63.8	...

Table 2. Height in inches of males ages 18-74 years, by race, age, and annual family income, mean, standard deviation, and age-adjusted values: United States, 1971-74

Race and age	Annual family income									
	Under $4,000		$4,000-$6,999		$7,000-$9,999		$10,000-$14,999		$15,000 and over	
	Mean	Standard deviation	Mean	Standard deviation	Mean	Standard deviation	Mean	Standard deviation	Mean	Standard deviation
White males	Height in inches									
18-74 years	68.4	3.1	68.5	3.0	68.9	2.8	69.4	2.7	69.4	2.6
18-24 years	70.0	2.9	69.3	3.3	69.7	2.6	69.9	2.8	70.0	2.6
25-34 years	69.7	3.0	69.2	3.1	69.3	2.6	70.2	2.7	70.0	2.8
35-44 years	68.9	2.7	68.4	3.3	68.8	3.0	69.3	2.5	69.7	2.1
45-54 years	68.6	2.9	68.3	2.1	68.7	2.5	68.9	2.6	69.2	2.8
55-64 years	67.3	2.7	68.4	2.7	68.2	2.7	68.7	2.5	68.4	2.5
65-74 years	66.7	2.7	67.2	2.3	67.5	2.6	67.9	2.3	68.3	2.4
Black males										
18-74 years	68.2	3.0	68.8	2.5	69.0	2.9	68.7	2.7	69.0	2.2
18-24 years	69.2	2.8	70.4	2.4	69.0	3.3	69.8	2.3	68.7	2.0
25-34 years	68.3	3.6	68.1	2.3	68.5	3.0	68.1	2.7	70.1	1.8
35-44 years	68.9	3.8	68.4	2.9	70.9	1.9	68.2	1.2	67.8	1.6
45-54 years	67.8	2.4	68.0	1.7	67.9	2.2	69.6	3.3	70.0	1.7
55-64 years	67.5	2.2	68.6	1.8	68.5	3.0	70.3	2.4	66.8	1.9
65-74 years	67.0	2.5	67.7	2.2	67.8	2.1	68.1	2.0	*66.2	*3.7
Age-adjusted values:										
White males, 18-74 years	68.8	...	68.6	...	68.8	...	69.3	...	69.4	...
Black males, 18-74 years	68.3	...	68.7	...	68.8	...	69.0	...	68.7	...

Table 3. Height in inches of females ages 18-74 years, by race, age, and annual family income, mean, standard deviation, and age-adjusted values: United States, 1971-74

Race and age	Annual family income									
	Under $4,000		$4,000-$6,999		$7,000-$9,999		$10,000-$14,999		$15,000 and over	
	Mean	Standard deviation	Mean	Standard deviation	Mean	Standard deviation	Mean	Standard deviation	Mean	Standard deviation
White females	Height in inches									
18-74 years	63.0	2.7	63.4	2.5	63.8	2.5	64.0	2.5	63.9	2.4
18-24 years	64.4	2.5	64.2	2.5	64.3	2.4	64.6	2.6	64.3	2.4
25-34 years	63.9	2.5	63.7	2.6	64.0	2.4	64.4	2.4	64.3	2.5
35-44 years	63.2	2.6	63.2	2.6	64.3	2.6	64.4	2.3	64.2	2.3
45-54 years	63.6	2.5	63.5	2.2	63.6	2.4	63.8	2.3	63.7	2.1
55-64 years	62.3	2.5	63.0	2.2	63.1	2.2	62.5	2.5	62.7	2.6
65-74 years	62.0	2.5	62.2	2.2	62.5	2.3	63.0	2.2	62.6	2.3
Black females										
18-74 years	63.6	2.5	63.5	2.5	63.8	2.3	64.2	2.4	64.5	2.2
18-24 years	64.0	2.8	63.9	2.1	64.0	2.6	63.8	1.8	64.2	1.9
25-34 years	63.7	2.3	64.0	2.0	63.8	2.4	64.3	2.7	64.4	2.4
35-44 years	64.4	2.5	64.1	2.5	64.3	2.5	64.9	2.0	63.4	2.5
45-54 years	63.4	2.3	63.6	2.4	64.0	1.5	63.9	2.5	65.4	1.4
55-64 years	63.4	2.5	60.9	2.9	62.6	1.3	*64.4	*2.0	*64.5	*2.9
65-74 years	62.6	2.2	63.0	1.6	61.8	1.9	62.7	3.0	*61.7	*0.0
Age-adjusted values:										
White females, 18-74 years	63.4	...	63.4	...	63.7	...	63.9	...	63.8	...
Black females, 18-74 years	63.7	...	63.5	...	63.7	...	64.1	...	64.1	...

Table 4. Height in inches of adults ages 18-74 years, by sex, age, and educational level, mean, standard deviation, and age-adjusted values: United States, 1971-74

Sex and age	Educational level							
	Less than 9 years		9-11 years		12 years		13 years or more	
	Mean	Standard deviation	Mean	Standard deviation	Mean	Standard deviation	Mean	Standard deviation
	Height in inches							
Both sexes								
18-74 years	65.2	3.8	65.7	3.5	66.1	3.7	67.3	3.8
18-24 years	64.9	3.5	66.7	3.6	66.6	3.9	67.5	3.7
25-34 years	65.8	3.8	65.7	3.4	66.6	3.7	67.7	3.9
35-44 years	65.5	4.0	65.9	3.3	66.3	3.5	67.8	3.5
45-54 years	66.0	3.8	65.8	3.3	65.7	3.4	67.3	3.8
55-64 years	65.1	3.7	65.0	3.7	65.3	3.7	66.4	3.6
65-74 years	64.3	3.6	63.9	3.4	64.6	3.4	65.1	3.3
Males								
18-74 years	67.9	2.8	68.5	2.5	69.3	2.7	69.7	2.7
18-24 years	66.9	3.1	69.3	2.4	69.9	2.9	70.1	2.7
25-34 years	68.5	3.1	68.7	2.5	69.6	2.7	70.1	2.9
35-44 years	68.2	3.1	68.6	2.6	69.3	2.4	69.7	2.5
45-54 years	68.5	2.6	68.1	2.5	68.8	2.5	69.7	2.7
55-64 years	67.7	2.5	68.2	2.3	68.6	2.8	68.7	2.5
65-74 years	67.1	2.6	66.9	2.6	67.6	2.4	68.1	2.5
Females								
18-74 years	62.5	2.5	63.5	2.5	63.9	2.4	64.3	2.5
18-24 years	62.7	2.4	64.0	2.5	64.2	2.5	64.7	2.4
25-34 years	63.1	2.2	63.9	2.4	64.1	2.3	64.5	2.6
35-44 years	62.7	2.7	63.9	2.3	64.2	2.5	64.8	2.3
45-54 years	63.0	2.4	63.4	2.1	63.8	2.2	64.2	2.5
55-64 years	62.3	2.5	62.7	2.6	62.9	2.2	63.5	2.3
65-74 years	62.0	2.5	62.2	2.4	62.5	2.4	63.1	2.0
Age-adjusted values:								
Both sexes, 18-74 years	65.4	...	65.7	...	66.0	...	67.1	...
Males, 18-74 years	67.9	...	68.5	...	69.1	...	69.6	...
Females, 18-74 years	62.7	...	63.5	...	63.7	...	64.2	...

Table 5. Height in inches of males ages 18-74 years, by race, age, and educational level, mean, standard deviation, and age-adjusted values: United States, 1971-74

Race and age	Educational level							
	Less than 9 years		9-11 years		12 years		13 years or more	
	Mean	Standard deviation	Mean	Standard deviation	Mean	Standard deviation	Mean	Standard deviation
	Height in inches							
White males								
18-74 years	67.8	2.8	68.4	2.5	69.3	2.7	69.9	2.7
18-24 years	66.9	3.1	69.2	2.4	69.9	2.9	70.2	2.7
25-34 years	68.6	2.9	68.6	2.4	69.7	2.6	70.3	2.8
35-44 years	68.1	3.0	68.2	2.4	69.3	2.4	69.9	2.4
45-54 years	68.6	2.8	68.3	2.5	68.9	2.5	69.7	2.7
55-64 years	67.7	2.6	68.3	2.4	68.7	2.8	68.8	2.5
65-74 years	67.1	2.6	67.0	2.7	67.6	2.4	68.2	2.5
Black males								
18-74 years	68.0	2.8	69.0	2.7	69.0	2.7	69.4	2.4
18-24 years	67.1	3.1	69.6	2.2	70.0	2.8	70.2	2.3
25-34 years	68.3	3.8	68.8	2.8	68.0	2.7	69.4	2.2
35-44 years	68.5	3.3	70.4	2.8	68.9	1.9	68.4	1.6
45-54 years	68.1	2.1	67.1	2.4	68.9	2.4	69.8	2.8
55-64 years	68.0	2.3	68.1	1.8	67.7	1.2	*67.9	*3.2
65-74 years	67.3	2.5	66.8	2.2	67.5	2.2	67.7	1.4
Age-adjusted values:								
White males, 18-74 years	67.9	...	68.4	...	69.2	...	69.7	...
Black males, 18-74 years	67.9	...	68.9	...	68.7	...	69.2	...

Table 6. Height in inches of females ages 18-74 years, by race, age, and educational level, mean, standard deviation, and age-adjusted values: United States, 1971-74

Race and age	Educational level							
	Less than 9 years		9-11 years		12 years		13 years or more	
	Mean	Standard deviation	Mean	Standard deviation	Mean	Standard deviation	Mean	Standard deviation
	Height in inches							
White females								
18-74 years	62.3	2.5	63.4	2.5	63.9	2.4	64.4	2.5
18-24 years	62.6	2.5	63.9	2.6	64.3	2.4	64.8	2.4
25-34 years	63.1	2.3	63.9	2.5	64.1	2.3	64.6	2.6
35-44 years	62.6	2.6	63.8	2.2	64.3	2.4	64.8	2.3
45-54 years	62.7	2.4	63.3	2.1	63.8	2.3	64.2	2.5
55-64 years	62.1	2.4	62.7	2.6	63.0	2.1	63.5	2.3
65-74 years	61.9	2.4	62.2	2.4	62.5	2.4	63.1	2.0
Black females								
18-74 years	63.3	2.4	63.8	2.4	63.8	2.5	64.3	2.3
18-24 years	63.4	1.7	64.2	2.2	63.8	2.6	64.4	2.4
25-34 years	63.2	2.0	63.6	2.2	64.1	2.5	64.5	2.2
35-44 years	63.8	2.8	64.6	2.5	64.0	2.4	65.0	1.8
45-54 years	64.0	2.2	63.8	2.1	63.8	2.0	63.8	2.5
55-64 years	63.0	2.6	62.8	2.4	61.1	2.1	*62.9	*3.0
65-74 years	62.5	2.4	62.3	2.5	62.6	2.6	63.6	2.0
Age-adjusted values:								
White females, 18-74 years	62.6	...	63.4	...	63.8	...	64.3	...
Black females, 18-74 years	63.4	...	63.7	...	63.5	...	64.2	...

Table 7. Height in inches of adults ages 18-74 years, by sex, age, and urbanization status, mean, standard deviation, and age-adjusted values: United States, 1971-74

Sex and age	Urbanization status					
	Urbanized area		Urban area		Rural area	
	Mean	Standard deviation	Mean	Standard deviation	Mean	Standard deviation
	Height in inches					
Both sexes						
18-74 years	66.2	3.8	66.2	3.7	66.2	3.7
18-24 years	66.8	3.8	66.8	3.6	66.9	3.8
25-34 years	66.8	3.9	66.5	3.5	66.8	3.8
35-44 years	66.5	3.7	66.3	3.6	66.5	3.5
45-54 years	66.2	3.6	66.4	3.5	66.0	3.6
55-64 years	65.1	3.7	65.8	3.9	65.7	3.6
65-74 years	64.3	3.5	64.3	3.5	64.8	3.5
Males						
18-74 years	69.0	2.8	68.9	2.8	69.0	2.8
18-24 years	69.8	2.8	69.5	2.7	69.6	2.9
25-34 years	69.6	2.9	69.2	2.7	69.8	2.8
35-44 years	69.2	2.6	68.9	3.0	69.1	2.7
45-54 years	68.8	2.6	68.8	2.6	69.0	2.7
55-64 years	68.0	2.7	68.7	2.5	68.5	2.4
65-74 years	67.1	2.5	67.4	2.6	67.6	2.6
Females						
18-74 years	63.6	2.6	63.8	2.5	63.7	2.3
18-24 years	64.3	2.6	64.3	2.4	64.3	2.4
25-34 years	64.1	2.6	64.2	2.3	64.1	2.3
35-44 years	64.0	2.7	64.1	2.6	64.1	2.3
45-54 years	63.7	2.5	63.9	2.2	63.5	2.1
55-64 years	62.6	2.5	62.9	2.6	63.0	2.2
65-74 years	62.2	2.4	62.5	2.4	62.5	2.3
Age-adjusted values:						
Both sexes, 18-74 years	66.1	...	66.2	...	66.2	...
Males, 18-74 years	68.9	...	68.9	...	69.1	...
Females, 18-74 years	63.6	...	63.8	...	63.7	...

Table 8. Height in inches of males ages 18-74 years, by race, age, and urbanization status, mean, standard deviation, and age-adjusted values: United States, 1971-74

Race and age	Urbanization status					
	Urbanized area		Urban area		Rural area	
	Mean	Standard deviation	Mean	Standard deviation	Mean	Standard deviation
	Height in inches					
White males						
18-74 years	69.0	2.8	69.0	2.6	69.1	2.8
18-24 years	69.9	2.8	69.7	2.5	69.6	3.0
25-34 years	69.7	2.9	69.5	2.6	69.9	2.7
35-44 years	69.2	2.6	69.0	2.6	69.2	2.7
45-54 years	68.9	2.6	68.9	2.7	69.0	2.7
55-64 years	68.0	2.7	68.8	2.5	68.5	2.4
65-74 years	67.1	2.5	67.5	2.6	67.6	2.6
Black males						
18-74 years	68.7	2.7	68.3	3.5	68.6	2.6
18-24 years	69.2	2.7	69.5	3.5	69.8	2.4
25-34 years	68.8	2.8	67.3	1.5	68.5	3.4
35-44 years	69.4	2.7	*68.0	*6.1	*68.1	*1.8
45-54 years	68.1	2.5	68.1	2.5	68.5	2.0
55-64 years	68.1	2.6	*67.9	*1.3	68.2	1.9
65-74 years	67.4	2.2	66.8	2.6	67.2	2.6
Age-adjusted values:						
White males, 18-74 years	69.0	...	69.0	...	69.1	...
Black males, 18-74 years	68.7	...	68.1	...	68.6	...

Table 9. Height in inches of females ages 18-74 years, by race, age, and urbanization status, mean, standard deviation, and age-adjusted values: United States, 1971-74

Race and age	Urbanization status					
	Urbanized area		Urban area		Rural area	
	Mean	Standard deviation	Mean	Standard deviation	Mean	Standard deviation
	Height in inches					
White females						
18-74 years	63.6	2.6	63.7	2.5	63.7	2.3
18-24 years	64.4	2.6	64.3	2.3	64.3	2.4
25-34 years	64.1	2.6	64.2	2.3	64.2	2.3
35-44 years	64.1	2.6	64.3	2.5	64.1	2.3
45-54 years	63.7	2.5	63.9	2.3	63.4	2.1
55-64 years	62.6	2.4	62.8	2.7	63.0	2.1
65-74 years	62.1	2.4	62.5	2.4	62.5	2.3
Black females						
18-74 years	63.7	2.5	64.0	2.5	63.7	2.2
18-24 years	63.7	2.4	65.0	2.7	64.2	2.3
25-34 years	64.0	2.4	64.2	2.4	63.2	1.9
35-44 years	64.2	2.6	63.9	1.7	64.7	2.3
45-54 years	63.8	2.4	63.7	1.9	64.0	1.7
55-64 years	62.5	2.7	63.9	1.8	63.2	2.3
65-74 years	62.8	2.3	62.1	3.2	62.4	2.0
Age-adjusted values:						
White females, 18-74 years	63.6	...	63.8	...	63.8	...
Black females, 18-74 years	63.6	...	64.0	...	63.8	...

Table 10. Height in inches of adults ages 18-74 years, by sex, age, and geographic region, mean, standard deviation, and age-adjusted values: United States, 1971-74

Sex and age	Geographic region							
	Northeast		Midwest		South		West	
	Mean	Standard deviation	Mean	Standard deviation	Mean	Standard deviation	Mean	Standard deviation
	Height in inches							
Both sexes								
18-74 years	65.6	3.7	66.5	3.8	66.4	3.6	66.2	3.8
18-24 years	66.6	3.7	67.1	3.9	66.9	3.5	66.8	4.0
25-34 years	66.4	3.7	67.2	4.0	66.8	3.6	66.6	3.8
35-44 years	66.1	3.6	66.5	3.6	66.9	3.7	66.5	3.6
45-54 years	65.4	3.4	66.4	3.5	66.3	3.5	66.5	3.8
55-64 years	64.5	3.6	65.8	3.8	65.9	3.6	65.4	3.6
65-74 years	64.0	3.5	64.6	3.4	64.7	3.5	64.7	3.5
Males								
18-74 years	68.4	2.7	69.3	2.8	69.3	2.7	69.1	2.9
18-24 years	69.4	2.4	69.8	2.8	69.6	2.7	69.8	3.3
25-34 years	68.9	2.9	70.3	2.8	69.6	2.7	69.4	2.8
35-44 years	68.7	2.5	69.1	2.9	69.9	2.5	69.0	2.7
45-54 years	68.1	2.4	68.8	2.6	69.2	2.6	69.4	2.7
55-64 years	67.4	2.7	68.6	2.4	68.8	2.4	68.2	2.6
65-74 years	66.7	2.5	67.4	2.6	67.7	2.6	67.4	2.5
Females								
18-74 years	63.2	2.6	63.7	2.4	63.9	2.4	63.8	2.6
18-24 years	63.9	2.4	64.2	2.5	64.6	2.3	64.3	2.6
25-34 years	63.9	2.5	64.1	2.4	64.3	2.3	64.1	2.5
35-44 years	63.6	2.6	64.2	2.4	64.4	2.3	64.1	2.6
45-54 years	63.2	2.5	63.6	2.1	64.0	2.2	63.8	2.5
55-64 years	62.1	2.4	62.7	2.4	63.1	2.2	63.0	2.5
65-74 years	61.8	2.5	62.6	2.3	62.5	2.3	62.4	2.4
Age-adjusted values:								
Both sexes, 18-74 years	65.7	...	66.4	...	66.4	...	66.2	...
Males, 18-74 years	68.4	...	69.2	...	69.3	...	69.1	...
Females, 18-74 years	63.2	...	63.7	...	64.0	...	63.7	...

Table 11. Height in inches of males ages 18-74 years, by race, age, and geographic region, mean, standard deviation, and age-adjusted values: United States, 1971-74

Race and age	Geographic region							
	Northeast		Midwest		South		West	
	Mean	Standard deviation	Mean	Standard deviation	Mean	Standard deviation	Mean	Standard deviation
	Height in inches							
White males								
18-74 years	68.4	2.7	69.4	2.8	69.4	2.6	69.1	2.9
18-24 years	69.4	2.4	70.0	2.7	69.7	2.6	69.8	3.4
25-34 years	69.0	2.9	70.5	2.8	69.7	2.5	69.6	2.7
35-44 years	68.7	2.5	69.3	2.8	70.0	2.2	69.1	2.7
45-54 years	68.1	2.4	68.9	2.6	69.5	2.6	69.4	2.7
55-64 years	67.3	2.8	68.7	2.5	69.0	2.4	68.1	2.6
65-74 years	66.7	2.5	67.4	2.6	67.8	2.6	67.5	2.5
Black males								
18-74 years	68.5	2.8	68.4	2.7	68.6	2.9	69.2	2.5
18-24 years	69.6	2.4	69.0	3.4	69.3	2.7	70.7	2.1
25-34 years	68.5	2.9	69.1	2.4	68.8	3.3	67.4	2.3
35-44 years	69.7	3.0	67.9	2.9	69.4	3.4	69.3	1.8
45-54 years	67.7	2.2	67.6	2.1	68.1	2.3	69.7	2.6
55-64 years	67.9	2.4	67.8	1.5	67.7	2.2	69.8	2.1
65-74 years	66.5	2.6	68.2	2.3	67.1	2.5	67.4	2.0
Age-adjusted values:								
White males, 18-74 years	68.4	...	69.3	...	69.4	...	69.1	...
Black males, 18-74 years	68.6	...	68.4	...	68.6	...	69.2	...

Table 12. Height in inches of females ages 18-74 years, by race, age, and geographic region, mean, standard deviation, and age-adjusted values: United States, 1971-74

Race and age	Geographic region							
	Northwest		Midwest		South		West	
	Mean	Standard deviation	Mean	Standard deviation	Mean	Standard deviation	Mean	Standard deviation
	Height in inches							
White females								
18-74 years	63.2	2.6	63.8	2.4	63.9	2.4	63.8	2.6
18-24 years	64.0	2.4	64.2	2.5	64.7	2.3	64.3	2.6
25-34 years	63.8	2.5	64.2	2.4	64.5	2.2	64.1	2.6
35-44 years	63.6	2.6	64.4	2.3	64.4	2.3	64.1	2.6
45-54 years	63.2	2.5	63.6	2.1	63.9	2.3	63.7	2.5
55-64 years	62.2	2.3	62.8	2.4	63.1	2.2	63.1	2.5
65-74 years	61.8	2.5	62.6	2.3	62.5	2.3	62.4	2.3
Black females								
18-74 years	63.3	2.6	63.4	2.4	63.9	2.4	64.1	2.4
18-24 years	63.2	2.1	63.6	2.6	64.3	2.3	64.3	2.8
25-34 years	64.2	2.2	63.7	2.0	63.8	2.5	64.2	2.2
35-44 years	63.7	2.5	63.8	2.6	64.4	2.4	65.1	2.2
45-54 years	62.8	1.9	63.8	2.6	64.1	1.9	64.2	2.2
55-64 years	62.0	3.8	62.5	2.1	63.5	2.1	62.4	1.9
65-74 years	62.6	2.3	62.3	2.2	62.4	2.5	63.1	2.1
Age adjusted values:								
White females, 18-74 years	63.2	...	63.7	...	64.0	...	63.7	...
Black females, 18-74 years	63.2	...	63.4	...	63.9	...	64.1	...

Table 13. Weight in pounds of adults ages 18-74 years, by sex, age, and annual family income, mean, standard deviation, and age-adjusted values: United States, 1971-74

Sex and age	Annual family income									
	Under $4,000		$4,000-$6,999		$7,000-$9,999		$10,000-$14,999		$15,000 and over	
	Mean	Standard deviation	Mean	Standard deviation	Mean	Standard deviation	Mean	Standard deviation	Mean	Standard deviation
	Weight in pounds									
Both sexes										
18-74 years	154	37	155	35	157	34	159	34	159	35
18-24 years	145	34	148	33	148	34	149	30	148	31
25-34 years	154	35	159	40	157	36	158	37	158	42
35-44 years	167	47	162	35	164	37	163	34	161	34
45-54 years	160	38	156	32	159	33	166	32	164	33
55-64 years	156	39	159	34	160	31	160	32	164	32
65-74 years	153	30	152	29	156	29	153	30	158	29
Males										
18-74 years	162	35	169	32	171	30	176	30	177	30
18-24 years	159	31	164	29	168	31	166	27	166	26
25-34 years	160	29	176	40	173	30	180	33	180	40
35-44 years	179	50	174	27	176	29	179	28	181	26
45-54 years	166	35	162	30	172	30	178	28	182	27
55-64 years	158	36	177	35	171	28	174	26	175	26
65-74 years	160	29	165	25	165	27	166	27	170	24
Females										
18-74 years	148	37	144	33	144	33	142	29	139	29
18-24 years	132	31	135	31	132	26	134	24	127	22
25-34 years	150	38	147	36	141	34	135	24	136	31
35-44 years	157	42	152	38	153	40	148	33	140	28
45-54 years	157	39	151	32	149	32	150	31	144	27
55-64 years	155	40	145	26	150	30	144	31	146	34
65-74 years	149	30	141	28	146	27	143	29	142	27
Age-adjusted values:										
Both sexes, 18-74 years	156	...	156	...	157	...	158	...	158	...
Males, 18-74 years	164	...	170	...	172	...	175	...	176	...
Females, 18-74 years	150	...	146	...	145	...	142	...	139	...

Table 14. Weight in pounds of males ages 18-74 years, by race, age, and annual family income, mean, standard deviation, and age-adjusted values: United States, 1971-74

Race and age	Annual family income									
	Under $4,000		$4,000-$6,999		$7,000-$9,999		$10,000-$14,999		$15,000 and over	
	Mean	Standard deviation	Mean	Standard deviation	Mean	Standard deviation	Mean	Standard deviation	Mean	Standard deviation
	Weight in pounds									
White males										
18-74 years	161	32	169	32	172	29	177	30	178	28
18-24 years	159	26	165	30	168	29	167	27	166	26
25-34 years	160	19	178	40	174	30	181	34	178	31
35-44 years	181	51	172	24	174	28	179	28	182	26
45-54 years	164	34	161	31	172	29	179	28	182	27
55-64 years	157	35	176	32	170	27	175	26	175	26
65-74 years	160	29	165	24	165	26	165	26	170	24
Black males										
18-74 years	167	41	168	36	174	35	171	30	184	59
18-24 years	170	46	160	19	168	45	158	19	164	28
25-34 years	167	41	158	41	168	25	174	28	214	92
35-44 years	176	48	183	37	191	27	185	34	173	16
45-54 years	170	36	164	28	169	33	162	33	171	16
55-64 years	159	41	183	51	198	33	173	40	172	21
65-74 years	157	29	169	30	160	28	172	38	*158	*30
Age-adjusted values:										
White males, 18-74 years	164	...	170	...	172	...	175	...	176	...
Black males, 18-74 years	168	...	168	...	174	...	170	...	178	...

Table 15. Weight in pounds of females ages 18-74 years, by race, age, and annual family income, mean, standard deviation, and age-adjusted values: United States, 1971-74

Race and age	Annual family income									
	Under $4,000		$4,000-$6,999		$7,000-$9,999		$10,000-$14,999		$15,000 and over	
	Mean	Standard deviation	Mean	Standard deviation	Mean	Standard deviation	Mean	Standard deviation	Mean	Standard deviation
	Weight in pounds									
White females										
18-74 years	146	33	143	30	143	32	142	29	139	29
18-24 years	131	31	135	29	131	25	134	24	126	20
25-34 years	148	34	146	36	140	34	135	25	135	31
35-44 years	150	39	149	38	152	40	148	33	139	26
45-54 years	152	37	148	27	147	29	149	30	144	28
55-64 years	151	33	142	24	149	30	143	30	146	34
65-74 years	147	29	140	27	146	27	143	28	141	27
Black females										
18-74 years	159	45	155	41	156	37	149	31	153	35
18-24 years	137	33	136	39	140	33	135	24	143	38
25-34 years	154	44	154	39	144	29	138	19	151	33
35-44 years	171	47	164	34	164	35	150	24	178	54
45-54 years	172	38	168	46	177	49	167	43	148	13
55-64 years	170	58	168	32	165	30	*198	*13	*149	*7
65-74 years	159	35	153	36	142	34	*156	*34	*156	*5
Age-adjusted values:										
White females, 18-74 years	146	...	144	...	144	...	142	...	138	...
Black females, 18-74 years	159	...	156	...	155	...	153	...	154	...

Table 16. Weight in pounds of adults ages 18-74 years, by sex, age, and educational level, mean, standard deviation, and age-adjusted values: United States, 1971-74

Sex and age	Educational level							
	Less than 9 years		9-11 years		12 years		13 years or more	
	Mean	Standard deviation	Mean	Standard deviation	Mean	Standard deviation	Mean	Standard deviation
	Weight in pounds							
Both sexes								
18-74 years	160	35	156	35	155	35	158	35
18-24 years	141	29	149	36	148	33	147	30
25-34 years	161	40	156	36	156	37	158	39
35-44 years	162	37	162	36	159	34	169	37
45-54 years	165	36	159	35	159	32	166	31
55-64 years	161	35	159	31	158	34	156	32
65-74 years	156	30	150	31	152	30	152	28
Males								
18-74 years	167	32	169	32	175	30	175	31
18-24 years	147	25	167	35	167	30	163	26
25-34 years	175	41	168	29	178	32	177	37
35-44 years	169	31	174	33	179	28	183	29
45-54 years	172	32	168	31	178	27	182	25
55-64 years	168	30	173	28	176	31	170	31
65-74 years	163	28	161	29	167	25	166	24
Females								
18-74 years	152	36	146	34	141	31	138	28
18-24 years	134	32	131	28	133	29	130	24
25-34 years	148	36	149	37	139	32	134	26
35-44 years	154	42	153	35	145	31	146	38
45-54 years	157	38	149	36	147	29	145	26
55-64 years	155	39	150	29	145	30	139	25
65-74 years	149	30	144	31	141	28	142	25
Age-adjusted values:								
Both sexes, 18-74 years	158	...	156	...	155	...	158	...
Males, 18-74 years	166	...	169	...	175	...	174	...
Females, 18-74 years	149	...	146	...	141	...	139	...

Table 17. Weight in pounds of males ages 18-74 years, by race, age, and educational level, mean, standard deviation, and age-adjusted values: United States, 1971-74

Race and age	Educational level							
	Less than 9 years		9-11 years		12 years		13 years or more	
	Mean	Standard deviation	Mean	Standard deviation	Mean	Standard deviation	Mean	Standard deviation
	Weight in pounds							
White males								
18-74 years	167	31	169	30	176	30	175	29
18-24 years	148	24	165	29	168	30	164	25
25-34 years	176	41	169	29	179	32	177	31
35-44 years	168	30	172	30	179	27	185	28
45-54 years	172	32	169	31	179	26	182	25
55-64 years	167	27	174	27	177	31	169	30
65-74 years	163	27	161	28	168	25	167	24
Black males								
18-74 years	166	35	172	42	170	32	185	55
18-24 years	146	26	182	53	161	25	168	21
25-34 years	168	38	166	30	170	32	196	79
35-44 years	169	32	184	44	192	34	181	19
45-54 years	169	32	155	27	178	38	173	17
55-64 years	171	44	149	27	158	15	*213	*21
65-74 years	160	30	166	33	161	23	159	20
Age-adjusted values:								
White males, 18-74 years	166	...	169	...	175	...	175	...
Black males, 18-74 years	163	...	169	...	171	...	182	...

Table 18. Weight in pounds of females ages 18-74 years, by race, age, and educational level, mean, standard deviation, and age-adjusted values: United States, 1971-74

Race and age	Educational level							
	Less than 9 years		9-11 years		12 years		13 years or more	
	Mean	Standard deviation	Mean	Standard deviation	Mean	Standard deviation	Mean	Standard deviation
	Weight in pounds							
White females								
18-74 years	149	33	143	31	141	30	137	28
18-24 years	134	29	128	22	134	29	130	22
25-34 years	146	34	146	34	138	32	134	27
35-44 years	152	40	149	32	144	31	145	38
45-54 years	152	35	146	32	146	29	145	26
55-64 years	151	33	149	28	144	30	139	25
65-74 years	148	28	144	30	141	28	141	25
Black females								
18-74 years	167	46	160	45	147	32	145	29
18-24 years	141	40	145	43	132	25	139	34
25-34 years	159	43	159	44	145	30	137	25
35-44 years	170	47	173	43	156	31	160	30
45-54 years	176	42	174	54	170	37	147	20
55-64 years	172	55	158	34	169	29	*154	*5
65-74 years	158	36	144	36	153	39	164	21
Age-adjusted values:								
White females, 18-74 years	147	...	143	...	141	...	139	...
Black females, 18-74 years	161	...	159	...	152	...	148	...

Table 19. Weight in pounds of adults ages 18-74 years, by sex, age, and urbanization status, mean, standard deviation, and age-adjusted values: United States, 1971-74

Sex and age	Urbanization status					
	Urbanized area		Urban area		Rural area	
	Mean	Standard deviation	Mean	Standard deviation	Mean	Standard deviation
	Weight in pounds					
Both sexes						
18-74 years	156	34	155	33	159	36
18-24 years	147	33	146	29	150	34
25-34 years	156	36	155	36	161	42
35-44 years	163	36	157	34	164	36
45-54 years	162	33	161	33	162	35
55-64 years	157	33	161	36	161	33
65-74 years	152	29	153	28	156	30
Males						
18-74 years	172	30	169	28	174	34
18-24 years	165	29	160	23	166	33
25-34 years	174	31	170	30	183	41
35-44 years	179	31	175	31	179	28
45-54 years	176	29	172	27	176	31
55-64 years	169	31	175	27	172	30
65-74 years	162	25	166	26	166	30
Females						
18-74 years	142	32	142	33	146	33
18-24 years	131	27	132	28	134	27
25-34 years	139	32	142	35	141	31
35-44 years	147	35	142	28	151	38
45-54 years	148	30	149	34	151	35
55-64 years	147	32	147	39	151	32
65-74 years	144	30	145	27	149	29
Age-adjusted values:						
Both sexes, 18-74 years	156	...	155	...	159	...
Males, 18-74 years	172	...	170	...	174	...
Females, 18-74 years	142	...	143	...	145	...

Table 20. Weight in pounds of males ages 18-74 years, by race, age, and urbanization status, mean, standard deviation, and age-adjusted values: United States, 1971-74

Race and age	Urbanization status					
	Urbanized area		Urban area		Rural area	
	Mean	Standard deviation	Mean	Standard deviation	Mean	Standard deviation
	Weight in pounds					
White males						
18-74 years	172	29	171	26	175	32
18-24 years	165	26	163	22	166	34
25-34 years	175	30	174	28	182	36
35-44 years	179	31	173	25	179	28
45-54 years	177	28	173	26	176	30
55-64 years	169	30	176	27	173	29
65-74 years	162	24	167	25	166	30
Black males						
18-74 years	171	36	167	38	174	49
18-24 years	167	46	163	25	162	23
25-34 years	172	31	146	26	192	80
35-44 years	177	33	*216	*56	182	29
45-54 years	164	28	166	30	178	38
55-64 years	177	40	*151	*26	168	43
65-74 years	165	31	156	29	157	28
Age-adjusted values:						
White males, 18-74 years	172	...	171	...	175	...
Black males, 18-74 years	170	...	167	...	175	...

Table 21. Weight in pounds of females ages 18-74 years, by race, age, and urbanization status, mean, standard deviation, and age-adjusted values: United States, 1971-74

Race and age	Urbanization status					
	Urbanized area		Urban area		Rural area	
	Mean	Standard deviation	Mean	Standard deviation	Mean	Standard deviation
	Weight in pounds					
White females						
18-74 years	140	30	140	29	145	32
18-24 years	130	26	132	26	134	26
25-34 years	136	30	142	36	141	31
35-44 years	145	34	142	27	149	37
45-54 years	146	28	144	29	149	32
55-64 years	145	31	142	27	150	31
65-74 years	143	28	144	26	148	28
Black females						
18-74 years	154	38	162	51	159	44
18-24 years	136	32	139	39	141	39
25-34 years	152	38	143	32	143	33
35-44 years	162	38	158	33	178	44
45-54 years	160	37	189	43	185	49
55-64 years	162	36	225	84	163	46
65-74 years	155	38	153	32	155	33
Age-adjusted values:						
White females, 18-74 years	140	...	141	...	144	...
Black females, 18-74 years	153	...	163	...	159	...

Table 22. Weight in pounds of adults ages 18-74 years, by sex, age, and geographic region, mean, standard deviation, and age-adjusted values: United States, 1971-74

Sex and age	Geographic region							
	Northeast		Midwest		South		West	
	Mean	Standard deviation	Mean	Standard deviation	Mean	Standard deviation	Mean	Standard deviation
	Weight in pounds							
Both sexes								
18-74 years	156	35	160	35	157	36	155	33
18-24 years	146	32	150	31	148	33	146	34
25-34 years	156	39	162	41	156	38	155	34
35-44 years	162	37	163	35	165	38	160	35
45-54 years	161	36	165	30	159	34	160	33
55-64 years	156	31	164	35	161	36	156	31
65-74 years	153	29	157	31	152	30	152	28
Males								
18-74 years	171	32	175	31	171	31	172	29
18-24 years	163	27	163	27	165	31	166	32
25-34 years	174	39	182	36	173	35	174	26
35-44 years	178	28	179	30	180	31	176	31
45-54 years	176	33	177	26	172	30	176	27
55-64 years	168	32	175	31	172	28	169	29
65-74 years	162	27	169	28	162	28	164	25
Females								
18-74 years	142	31	146	33	145	34	140	30
18-24 years	129	26	135	28	133	27	131	27
25-34 years	138	28	142	36	141	33	138	30
35-44 years	147	37	148	34	152	38	144	31
45-54 years	149	33	153	29	149	33	146	32
55-64 years	146	27	151	35	151	40	144	28
65-74 years	145	29	149	30	145	29	143	27
Age-adjusted values:								
Both sexes, 18-74 years	156	...	160	...	157	...	155	...
Males, 18-74 years	171	...	175	...	172	...	172	...
Females, 18-74 years	142	...	146	...	145	...	140	...

Table 23. Weight in pounds of males ages 18-74 years, by race, age, and geographic region, mean, standard deviation, and age-adjusted values: United States, 1971-74

Race and age	Geographic region							
	Northeast		Midwest		South		West	
	Mean	Standard deviation	Mean	Standard deviation	Mean	Standard deviation	Mean	Standard deviation
	Weight in pounds							
White males								
18-74 years	171	30	176	31	172	30	172	28
18-24 years	164	27	165	26	166	29	166	30
25-34 years	172	31	184	36	174	35	175	25
35-44 years	179	28	180	29	177	27	177	31
45-54 years	176	34	178	26	174	29	176	27
55-64 years	168	30	175	31	172	26	168	28
65-74 years	162	26	168	28	163	28	165	24
Black males								
18-74 years	176	55	167	32	170	37	176	37
18-24 years	167	22	158	31	164	35	177	55
25-34 years	201	94	169	32	170	36	171	24
35-44 years	168	25	173	36	193	41	174	22
45-54 years	173	22	164	27	163	33	182	35
55-64 years	168	48	173	18	168	38	188	38
65-74 years	165	31	177	35	155	27	157	23
Age-adjusted values:								
White males, 18-74 years	171	...	170	...	172	...	172	...
Black males, 18-74 years	176	...	168	...	170	...	176	...

Table 24. Weight in pounds of females ages 18-74 years, by race, age, and geographic region, mean, standard deviation, and age-adjusted values: United States, 1971-74

Race and age	Geographic region							
	Northeast		Midwest		South		West	
	Mean	Standard deviation	Mean	Standard deviation	Mean	Standard deviation	Mean	Standard deviation
	Weight in pounds							
White females								
18-74 years	141	30	145	33	141	30	139	29
18-24 years	129	26	134	27	131	23	131	27
25-34 years	137	27	142	36	138	30	137	30
35-44 years	146	36	148	34	149	36	142	29
45-54 years	147	31	152	30	143	28	145	29
55-64 years	145	26	149	35	147	32	144	28
65-74 years	144	27	149	30	143	28	142	27
Black females								
18-74 years	153	40	154	33	159	45	153	40
18-24 years	129	28	149	37	140	36	132	27
25-34 years	146	28	145	34	154	41	146	36
35-44 years	159	41	154	32	168	42	177	33
45-54 years	178	48	157	24	176	41	161	55
55-64 years	159	28	167	31	177	67	154	35
65-74 years	158	47	155	39	152	33	159	27
Age-adjusted values:								
White females, 18-74 years	141	...	145	...	141	...	140	...
Black females, 18-74 years	153	...	153	...	160	...	153	...

Appendixes

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Appendix I. Statistical notes

Survey design

The sampling plan of the first National Health and Nutrition Examination Survey (NHANES I) followed a highly stratified multistage probability design in which a sample of the civilian noninstitutionalized population of the coterminous United States, 1-74 years of age, was selected. Excluded from the selection process were those persons residing in institutions or residing on any of the reservation lands set aside for use by American Indians. Successive elements dealt with, in the process of sampling, are the primary sampling unit (PSU), census enumeration district (ED), segment (a cluster of households) household, eligible person, and finally, sample person.

The starting points in the first stage of this design were the 1960 decennial census lists of addresses and the nearly 1,900 PSU's into which the coterminous United States was divided. Each PSU was either a standard metropolitan statistical area, a single county, or two or three contiguous counties. The PSU's were grouped into 357 strata for use in the National Health Interview Survey and subsequently collapsed into 40 superstrata for NHANES I.

Of the 40 superstrata, 15 contained a single large metropolitan area of more than 2 million population. These 15 large metropolitan areas were chosen for the sample with certainty. The remaining 25 superstrata were formed by classifying the noncertainty strata into 4 population density groups within each of 4 geographic regions. Then a modified Goodman-Kish controlled selection technique was used to select 2 PSU's from each of the 25 noncertainty superstrata with the probability of selection of a PSU proportionate to its 1960 population. In this manner, a total first-stage sample of 65 PSU's or "stands" included the areas within which a sample of persons would be selected for examination. The PSU's were scheduled to be sampled over a 3-year period with 300-600 persons to be examined per stand.

The calendar of operations required that the 1960 census data be used for the first 44 locations in the NHANES I sample. The 1970 census data were used for the last 21 stands of the sample.

Beginning with the use of the 1970 census data, the segment size was changed from an expected 6 households selected from compact clusters of 18 households to an expected compact cluster of 8 households. The change was made because of operational advantages, and research by the Census Bureau indicated that precision of estimates would not be appreciably affected by the change from noncompact clusters to compact clusters.

For ED's not having usable addresses (generally located in rural areas), area sampling was employed and consequently some variation in the segment size occurred. To make the sample representative of the current population of the United States, the address or ED segments were supplemented by a sample of housing units that had been constructed since the 1960 and 1970 decennial censuses.

Within each PSU, a systematic sample of segments was selected. The ED's that fell into the sample were coded into one of two economic classes. The first class, identified as the "poverty stratum," was composed of "Current Poverty Areas" that had been identified by the Bureau of the Census in 1970 (pre-1970 census), plus other ED's in the PSU with a mean family income of less than $3,000 in 1959 (based on the 1960 census). The second economic class, the "nonpoverty stratum," included all ED's not designated as belonging to the poverty stratum.

All sample segments classified as being in the poverty stratum were retained in the sample. For the first 42 stands, sample segments in nonpoverty stratum ED's were divided into 8 random subgroups and one of the subgroups was chosen to remain in the NHANES I sample. Research indicated that efficiency of estimates could be increased by changing the ratio of poverty to nonpoverty segments from 8:1 to 2:1. Therefore in the later stands, the selected segments in the nonpoverty-stratum ED's were divided into two

random subgroups and one of the subgroups was chosen to remain in the NHANES I sample. The differential sampling does permit a separate analysis with adequate reliability of those classified as being below the poverty level and those classified as being above the poverty level.

After identification of the sample segments, a list of all current addresses within the segment boundaries was made, and the households were interviewed to determine the age and sex of each household member as well as other demographic and socioeconomic information required for the survey. If no one was at home after repeated calls or if the household members refused to be interviewed, the interviewer tried to determine the household composition from neighbors.

To select the persons in sample segments to be examined in NHANES I and at the same time to oversample certain groups at high risk of malnutrition, all household members ages 1-74 years in each segment were first listed on a sample selection worksheet with each household in the segment listed serially. The number of household members in each of the six age-sex groups shown in table I were then listed on the worksheet under the appropriate age-sex group column. The sample selection worksheets were next put in segment-number order and a systematic random sample of persons in each age-sex group was selected to be examined using the sampling rates shown in table I.

The persons selected in the 65-stand sample of NHANES I comprised a representative sample of the target population and included 28,043 sample persons ages 1-74 years, of whom 20,749, or 74 percent, were examined. When adjustments were made for the differential sampling of high-risk groups, the response rate was 75 percent.

All data presented in this report are based on "weighted" observations. That is, data recorded for each person are inflated to characterize the subuniverse from which that sample person was drawn. The weight for each examined person is a product of the reciprocal of the probability of selecting the person, an adjustment for nonresponse cases (i.e., persons not examined), and a poststratified ratio adjustment that increases precision by bringing survey results into closer alignment with official U.S. population figures for 20 age, race, and sex groups as of November 1, 1972, the approximate midpoint of NHANES I.

A more detailed description of the survey design and selection technique can be found elsewhere.[3]

Table I. Sampling rates by age-sex groups: First National Health and Nutrition Examination Survey, 1971-74

Age and sex	*Rate*
1-5 years (males and females)	½
6-19 years (males and females)	¼
20-44 years (males)	¼
20-44 years (females)	½
45-64 years (males and females)	¼
65-74 years (males and females)	1

Nonresponse

In any health examination survey, after the sample is identified and the sample persons are requested to participate in the examination, the survey meets one of its more severe problems, namely that of nonresponse. Usually a sizable number of sample persons will not participate in the examination. A potential for bias exists if the sample persons who do not participate differ from the sample persons who do participate, with respect to the characteristics under examination. Intensive efforts were made in NHANES I to develop and implement procedures and inducements that would reduce the number of nonrespondents and thereby reduce the potential of bias due to nonresponse. These procedures and inducements are discussed elsewhere.[3]

Despite intensive efforts, 26 percent of the sample persons from the 65-stand nutrition sample and 30 percent of the sample persons from the 100-stand detailed sample were not examined. Consequently, the potential for a sizable bias does exist in the estimates in this publication. From what is known about the nonrespondents and the nature of nonresponse, it is believed that the likelihood of sizable bias is small.

Efforts have been made using data from NHANES I and from an earlier survey to examine possible health-related differences between examined and nonexamined persons. An investigation of reasons for nonparticipation in NHANES I was done[9] for a sample of 325 persons (209 examined persons, 35 who had made appointments for the examination but who never came to the mobile examination center, and 81 persons who refused to participate in the survey). The sample persons for this study came from four stand locations: St. Louis, Monterey, New York, and Philadelphia. People in the study were asked to indicate why they did not choose to be examined in NHANES I. The primary reasons given were that they had no need for a physical examination (48 percent), and that the examination times were inconvenient because of work schedules or other demands (15 percent). Only 6 percent of those persons not examined in NHANES I indicated that they refused the examination because of sickness, and 3 percent based their refusal on a fear of possible findings.

An analysis of data on examined and nonexamined (but interviewed) persons was conducted, using data from the first 35 stands of NHANES I.[10] It was found that the two groups were quite similar

NOTE: A list of references follows the text.

with respect to the health characteristics that were being compared. For example, 20 percent of the examined persons reported that a doctor had told them they had arthritis, compared with 17 percent of the unexamined persons. Similarly, 18 percent of both the examined and the nonexamined persons were told by a doctor that they had high blood pressure; 12 percent of both groups reported that they were on a special diet; and 6 percent of both groups said they regularly used medication for nerves.

In another study,[11] factors relating to response in Cycle I of the Health Examination Survey were investigated. It was found that 36 percent of the unexamined persons in that survey viewed themselves as being in excellent health, compared with 31 percent of the examined persons. A self-appraisal of being in poor health was made by 5 percent of the nonexamined persons and by 6 percent of those who were examined. In a different study of the Cycle I data[12] comparisons between two extreme groups, those who participated in the survey with no persuasion effort and those who participated only after a great deal of persuasion effort, indicated that differences between the two groups generally had little effect on estimates based on numerous selected examination and questionnaire items. This was interpreted as evidence that no large bias exists between the two groups for the items investigated and was offered as further support for the belief that there is little bias introduced to the findings because of differences in health characteristics between examined and nonexamined persons.

As mentioned earlier, the data in this report were based on weighted observations, and one of the components of the weight assigned to an examined person was an adjustment for nonresponse. A procedure was adopted that multiplied the reciprocal of the probability of selection of sample persons who were examined by a factor that brought estimates based on examined persons up to a level that would have been achieved if all sample persons had been examined. The nonresponse-adjustment factor was calculated by dividing the sum of the reciprocals of the probability of selection for all selected sample persons in each of five income groups within each stand by the sum of the reciprocals of the probability of selection for examined sample persons in the same stand and income group. The five income groups were: under $3,000; $3,000-$6,999; $7,000-$9,999; $10,000-$14,999; and $15,000 and over. For sample weighting purposes, the income group was imputed for 5.6 percent of the sample persons using educational level of the head of the household. To the extent that the income-within-stand classes were homogeneous with respect to the health characteristics under study, the adjustment procedure was effective in reducing the possible bias due to nonresponse. The percent distribution of the nonresponse adjustment factors computed for the 65-stand sample of NHANES I is shown in table II.

NOTE: A list of references follows the text.

Missing data

Examination surveys are subject to the loss of information not only through the failure to examine all sample persons but also from the failure to obtain and record all items of information for examined persons. Age, sex, and race were known for every examined person, but for a number of examinees one or more of the anthropometric measurements was not available. The extent of these missing measurements is indicated in table III.

Estimates for missing anthropometric data were generally made subjectively on the basis of a multiple-regression type decision, substituting for the missing measurements those of an individual who was of the same age, sex, and race and who had other dimensions similar to those available for the examinee with incomplete data.

For those with no anthropometric measurements available, a respondent of the same age-sex-race group was selected at random and his or her measurements were assigned to the nonexamined person.

Table II. Percent distribution of nonresponse adjustment factors: First National Health and Nutrition Examination Survey, 1971-74

Size of factor	*Percent distribution*
Total	100.0
1.00-1.24	32.6
1.25-1.49	38.5
1.50-1.74	18.2
1.75-1.99	7.4
2.00-2.49	2.8
2.50-2.99	0.3
3.00[1]	0.3

[1]A size of 3.00 was assigned for all factors greater than 3.00. The final poststratified ratio adjustment corrects for this truncation.

Table III. Number of examinees with one or more missing anthropometric measurements: National Health and Nutrition Examination Survey, 1971-74

Measurement missing	*Number of examinees*
All measurements	23
Height only	15
Weight only	45
Height and weight	4

Age adjustment

The age-adjusted mean values were calculated by the direct method. The values were adjusted to the age distribution of the U.S. civilian noninstitutionalized population at the midpoint of the NHANES I.[13]

Standard errors

The probability design of this survey determines the estimation of standard errors that correspond to the weighted estimates. The NHANES I sampling design was a highly clustered, multistage probability sample of the U.S. civilian noninstitutionalized population. The reader should be aware that estimates from this type of design are different from and generally larger than standard errors calculated under the assumption of simple random sampling.

The standard error is primarily a measure of sampling variability, that is, the variations that might occur by chance because only a sample of the population is surveyed. As calculated for this report, the standard error also reflects part of the variation that arises in the measurement process. Estimates of any biases that might lie in the data are not included. The chances are about 68 out of 100 that an estimate from the sample would differ from a complete census by less than the standard error. The chances are about 95 out of 100 that the difference would be less than twice the standard error and about 99 out of 100 that it would be less than 2½ times as large.

Estimates of the standard errors of the means used in this report are presented in tables IV-VII. The standard errors of the difference between two means are not presented. These standard errors of the differences (assuming an underlying normal distribution) can be calculated in the following way.

Let $S_{\bar{X}_1}$ and $S_{\bar{X}_2}$ be the standard errors of the means $\bar{X}_1$ and $\bar{X}_2$, respectively, from two independent populations.

Let $d = \bar{X}_1 - \bar{X}_2$.

Then the standard error of the difference S_d can be calculated as follows:

$$S_d = \sqrt{S^2_{\bar{X}_1} + S^2_{\bar{X}_2}}$$

These estimates have been prepared by a replication technique that yields overall variability through observation of variability among random subsamples of the total sample. The estimated standard errors do not reflect any residual bias that might still be present after the attempted correction for nonresponse. The need for the balanced repeated replication technique for estimating standard errors arises because of the complexity of NHANES I sample survey design, which makes it inappropriate to calculate them by a technique that does not take into consideration a complex sample design. It must be noted that the estimates of standard errors are themselves subject to errors that may be large if the number of cases upon which they are based is small.

Data limitation and reliability

The criteria for reliability of means consisted of the following: (1) that a sample size be at least five persons, and (2) that the estimated coefficient of variation (i.e., the standard error of the mean divided by the mean ($S_{\bar{X}}/\bar{X}$) be less than 25 percent. Thus if the sample size was too small or if the variation regarding the mean was too large, an asterisk is placed next to the value on the table. This estimate is considered neither precise nor stable enough to meet reliability standards. However, the values are shown to give an impression of the observed distribution and to permit users to combine data into useful categories.

Analytic methodology

The mean height and weight by selected socioeconomic and geographic variables were tested for statistically significant differences for males and females ages 18-74 years. For the socioeconomic variables, annual family income and educational level were used, and comparisons were made for each sex between the variables' lowest and highest levels. For annual family income, the lowest level was "under $4,000" and the highest level was "$15,000 and over"; for education, the lowest level was "less than 9 years" and the highest was "13 years or more." The geographic variables included a comparison of the mean height and weight values for males and females living in urbanized and rural areas and in the Northeast and South regions. All mean values were individually compared for males and females ages 18-74 years for the following six age categories: 18-24, 25-34, 35-44, 45-54, 55-64, and 65-74 years.

The following approach developed by Koch, Freeman, and Freeman[14] and Freeman, Freeman, Brock, and Koch,[15] was taken:

Let

$$y' = (\bar{Y}_{11}, \bar{Y}_{12}, \bar{Y}_{21}, \bar{Y}_{22}, \cdots, \bar{Y}_{61}, \bar{Y}_{62}) \quad (1)$$

be a vector of 12 elements, $\bar{Y}ij$, $i = 1, \cdots, 6$, and $j = 1, 2$, where $\bar{Y}$ is the observed mean height or weight, i is the index for the age categories, and j is the index for the levels of the socioeconomic (or geographic) variables). As an illustration using annual family income, $\bar{Y}_{11}$ is the observed mean of the first age category and the lowest income level. Thus in general, $\bar{Y}ij$ is the observed mean height or weight of the jth

NOTE: A list of references follows the text.

Table IV. Standard error of the mean height of adults ages 18-74 years, by race, sex, age, annual family income, and educational level: United States, 1971-74

Race, sex, and age	Annual family income					Educational level			
	Under $4,000	$4,000-$6,999	$7,000-$9,999	$10,000-$14,999	$15,000 and over	Less than 9 years	9-11 years	12 years	13 years or more
	Standard error in inches								
ALL RACES, BOTH SEXES									
18-74 years	0.14	0.13	0.09	0.08	0.09	0.13	0.09	0.08	0.09
18-24 years	0.25	0.36	0.20	0.17	0.26	0.38	0.24	0.16	0.17
25-34 years	0.37	0.23	0.18	0.20	0.21	0.42	0.20	0.13	0.19
35-44 years	0.41	0.35	0.22	0.18	0.20	0.32	0.21	0.13	0.13
45-54 years	0.40	0.30	0.23	0.20	0.23	0.22	0.20	0.19	0.25
55-64 years	0.22	0.37	0.20	0.36	0.38	0.18	0.33	0.22	0.37
65-74 years	0.13	0.10	0.14	0.26	0.26	0.09	0.20	0.17	0.18
Males									
18-74 years	0.14	0.20	0.10	0.12	0.10	0.12	0.11	0.11	0.09
18-24 years	0.28	0.54	0.27	0.28	0.23	0.67	0.28	0.27	0.21
25-34 years	0.59	0.41	0.24	0.20	0.22	0.52	0.32	0.18	0.20
35-44 years	0.62	0.49	0.32	0.21	0.25	0.38	0.38	0.21	0.19
45-54 years	0.41	0.25	0.23	0.22	0.23	0.18	0.23	0.22	0.26
55-64 years	0.30	0.42	0.22	0.26	0.33	0.17	0.24	0.36	0.30
65-74 years	0.14	0.15	0.19	0.26	0.23	0.10	0.28	0.20	0.24
Females									
18-74 years	0.11	0.10	0.08	0.09	0.10	0.11	0.10	0.06	0.10
18-24 years	0.25	0.20	0.12	0.18	0.23	0.28	0.21	0.12	0.13
25-34 years	0.24	0.16	0.13	0.16	0.19	0.22	0.16	0.08	0.16
35-44 years	0.23	0.27	0.16	0.14	0.14	0.26	0.16	0.11	0.17
45-54 years	0.40	0.33	0.23	0.22	0.21	0.24	0.20	0.18	0.34
55-64 years	0.19	0.27	0.29	0.38	0.30	0.17	0.30	0.15	0.35
65-74 years	0.12	0.14	0.16	0.32	0.21	0.11	0.18	0.19	0.18
WHITE									
Males									
18-74 years	0.17	0.22	0.09	0.12	0.10	0.14	0.12	0.11	0.10
18-24 years	0.31	0.59	0.29	0.30	0.25	1.02	0.32	0.27	0.22
25-34 years	0.52	0.47	0.25	0.22	0.24	0.50	0.37	0.19	0.23
35-44 years	0.60	0.54	0.33	0.22	0.24	0.36	0.36	0.22	0.19
45-54 years	0.65	0.32	0.27	0.22	0.23	0.21	0.24	0.21	0.26
55-64 years	0.32	0.48	0.24	0.26	0.35	0.21	0.26	0.37	0.31
65-74 years	0.19	0.16	0.19	0.26	0.23	0.11	0.29	0.21	0.24
Females									
18-74 years	0.12	0.12	0.08	0.10	0.10	0.13	0.11	0.06	0.10
18-24 years	0.27	0.24	0.12	0.18	0.24	0.36	0.27	0.12	0.16
25-34 years	0.34	0.17	0.14	0.16	0.20	0.21	0.20	0.80	0.17
35-44 years	0.32	0.35	0.18	0.15	0.13	0.29	0.17	0.11	0.18
45-54 years	0.49	0.37	0.24	0.23	0.22	0.31	0.23	0.18	0.34
55-64 years	0.22	0.28	0.29	0.38	0.30	0.19	0.31	0.15	0.36
65-74 years	0.14	0.15	0.17	0.32	0.21	0.13	0.18	0.20	0.17
BLACK									
Males									
18-74 years	0.33	0.38	0.30	0.47	0.38	0.26	0.31	0.43	0.28
18-24 years	0.49	0.88	1.11	1.07	1.30	0.73	0.48	0.76	0.70
25-34 years	1.64	0.55	0.67	0.90	0.74	1.69	0.69	0.57	0.57
35-44 years	1.26	1.08	0.59	0.75	0.86	0.94	0.83	0.65	0.94
45-54 years	0.47	0.46	0.44	1.00	0.62	0.26	0.66	0.75	1.20
55-64 years	0.64	0.82	1.40	11.23	1.28	0.45	0.70	1.40	*18.74
65-74 years	0.29	0.40	0.61	0.87	*18.32	0.22	0.82	1.10	0.46
Females									
18-74 years	0.15	0.20	0.18	0.23	0.58	0.21	0.16	0.21	0.38
18-24 years	0.38	0.35	0.55	0.50	10.19	0.45	0.20	0.39	0.47
25-34 years	0.33	0.38	0.32	0.59	0.99	0.54	0.26	0.29	0.61
35-44 years	0.29	0.38	0.46	0.44	0.90	0.55	0.36	0.36	0.36
45-54 years	0.44	0.78	0.48	0.91	14.66	0.38	0.59	0.76	1.25
55-64 years	0.40	0.62	0.28	*32.22	*28.92	0.46	0.69	1.29	14.20
65-74 years	0.19	0.40	0.51	14.10	*30.84	0.17	0.60	0.70	0.74

Table V. Standard error of the mean height of adults ages 18-74 years, by race, sex, age, urbanization status, and geographic region: United States, 1971-74

Race, sex, and age	Urbanization status			Geographic region			
	Urbanized area	Urban area	Rural area	Northeast	Midwest	South	West
	Standard error in inches						
ALL RACES, BOTH SEXES							
18-74 years	0.08	0.12	0.08	0.10	0.07	0.08	0.16
18-24 years	0.13	0.25	0.17	0.12	0.15	0.13	0.28
25-34 years	0.12	0.21	0.16	0.18	0.11	0.27	0.21
35-44 years	0.15	0.25	0.14	0.32	0.17	0.19	0.31
45-54 years	0.13	0.29	0.18	0.25	0.13	0.21	0.20
55-64 years	0.20	0.45	0.19	0.29	0.34	0.27	0.22
65-74 years	0.09	0.18	0.11	0.12	0.14	0.10	0.16
Males							
18-74 years	0.11	0.14	0.09	0.09	0.06	0.10	0.25
18-24 years	0.21	0.25	0.34	0.18	0.25	0.36	0.54
25-34 years	0.16	0.31	0.19	0.25	0.08	0.30	0.31
35-44 years	0.18	0.47	0.16	0.27	0.33	0.22	0.23
45-54 years	0.21	0.38	0.21	0.25	0.16	0.26	0.38
55-64 years	0.25	0.45	0.18	0.34	0.36	0.22	0.34
65-74 years	0.12	0.22	0.12	0.18	0.15	0.14	0.17
Females							
18-74 years	0.07	0.12	0.06	0.06	0.07	0.06	0.12
18-24 years	0.10	0.29	0.16	0.15	0.16	0.17	0.13
25-34 years	0.12	0.16	0.12	0.13	0.08	0.18	0.20
35-44 years	0.12	0.21	0.15	0.15	0.13	0.18	0.23
45-54 years	0.14	0.27	0.13	0.23	0.16	0.13	0.25
55-64 years	0.16	0.38	0.17	0.18	0.32	0.12	0.19
65-74 years	0.12	0.16	0.15	0.16	0.20	0.10	0.18
WHITE							
Males							
18-74 years	0.11	0.14	0.10	0.10	0.07	0.13	0.25
18-24 years	0.22	0.30	0.36	0.23	0.23	0.44	0.56
25-34 years	0.18	0.36	0.21	0.26	0.15	0.36	0.32
35-44 years	0.19	0.36	0.18	0.26	0.33	0.14	0.25
45-54 years	0.21	0.44	0.22	0.26	0.17	0.30	0.39
55-64 years	0.29	0.46	0.18	0.44	0.36	0.22	0.36
65-74 years	0.13	0.25	0.14	0.19	0.16	0.16	0.15
Females							
18-74 years	0.07	0.12	0.05	0.06	0.08	0.06	0.12
18-24 years	0.11	0.29	0.18	0.18	0.18	0.20	0.14
25-34 years	0.13	0.15	0.13	0.12	0.09	0.16	0.21
35-44 years	0.12	0.18	0.16	0.14	0.14	0.21	0.21
45-54 years	0.17	0.33	0.15	0.27	0.19	0.14	0.27
55-64 years	0.18	0.40	0.17	0.20	0.34	0.13	0.18
65-74 years	0.13	0.16	0.17	0.16	0.21	0.11	0.18
BLACK							
Males							
18-74 years	0.19	1.02	0.33	0.31	0.30	0.22	0.41
18-24 years	0.53	1.96	0.78	0.70	1.13	0.69	0.68
25-34 years	0.42	1.09	0.98	0.53	0.75	0.79	0.61
35-44 years	0.38	*24.40	0.85	1.25	0.94	0.71	0.77
45-54 years	0.39	0.68	0.38	0.50	0.37	0.31	0.95
55-64 years	0.48	*23.99	0.43	0.76	0.76	0.34	0.58
65-74 years	0.22	0.56	0.42	0.27	0.41	0.27	0.46
Females							
18-74 years	0.13	0.42	0.16	0.20	0.17	0.17	0.18
18-24 years	0.20	0.84	0.26	0.32	0.57	0.30	0.73
25-34 years	0.22	0.65	0.31	0.31	0.30	0.39	0.50
35-44 years	0.26	0.40	0.36	0.51	0.62	0.11	0.42
45-54 years	0.45	0.93	0.60	0.59	0.94	0.39	0.75
55-64 years	0.31	1.05	0.43	0.76	0.25	0.40	0.32
65-74 years	0.24	0.50	0.28	0.47	0.50	0.23	0.60

Table VI. Standard error of the mean weight of adults ages 18-74 years, by race, sex, age, annual family income, and educational level: United States, 1971-74

Race, sex, and age	Annual family income					Educational level			
	Under $4,000	$4,000-$6,999	$7,000-$9,999	$10,000-$14,999	$15,000 and over	Less than 9 years	9-11 years	12 years	13 years or more
	Standard error in pounds								
ALL RACES, BOTH SEXES									
18-74 years	0.88	0.98	0.84	0.83	0.79	0.74	0.90	0.75	0.90
18-24 years	1.65	2.70	1.58	1.47	2.42	2.78	2.72	0.99	1.43
25-34 years	2.76	2.80	2.02	1.94	2.25	4.15	1.98	1.60	1.83
35-44 years	4.19	3.11	1.94	1.77	1.71	2.30	1.90	1.33	1.92
45-54 years	3.17	1.97	2.23	1.88	2.24	1.82	2.54	1.58	2.34
55-64 years	2.69	2.52	1.83	3.05	2.82	1.75	2.28	1.97	2.57
65-74 years	1.46	1.22	1.60	2.23	2.21	1.08	1.45	1.58	1.82
Males									
18-74 years	1.32	1.72	1.17	1.12	1.06	1.23	1.41	1.06	1.05
18-24 years	2.75	4.29	3.03	2.61	2.91	4.60	3.70	2.24	1.75
25-34 years	4.26	5.76	2.60	2.91	3.91	7.55	3.49	2.09	2.53
35-44 years	8.08	4.33	2.95	2.57	2.41	2.98	3.69	2.54	1.90
45-54 years	4.45	3.73	2.67	1.87	1.98	2.23	2.67	2.42	2.34
55-64 years	4.64	3.68	2.92	2.77	3.30	2.04	3.43	3.20	3.32
65-74 years	1.95	1.21	1.78	2.75	2.24	1.18	2.45	1.82	2.18
Females									
18-74 years	1.17	1.05	1.09	1.09	1.18	1.10	1.09	0.73	0.90
18-24 years	1.93	2.15	1.52	1.22	2.22	3.97	1.77	1.21	1.25
25-34 years	3.53	2.91	2.21	1.09	1.63	3.54	2.39	1.40	1.43
35-44 years	3.86	3.45	2.42	1.63	1.39	3.48	2.30	1.50	2.99
45-54 years	5.13	2.73	2.83	2.98	2.78	3.46	3.68	2.01	2.93
55-64 years	3.97	2.66	2.83	4.02	4.58	2.95	3.22	1.65	3.52
65-74 years	1.52	1.96	2.40	2.91	3.30	1.41	1.84	1.91	1.77
WHITE									
Males									
18-74 years	1.72	2.02	1.22	1.17	0.94	1.19	1.34	1.12	1.06
18-24 years	2.49	5.21	3.08	2.78	3.18	7.30	3.71	2.65	1.71
25-34 years	2.73	6.29	2.93	3.12	2.65	8.15	4.73	2.19	1.86
35-44 years	10.06	4.33	3.25	2.45	2.46	3.88	3.40	2.47	1.97
45-54 years	5.78	4.06	2.85	1.86	2.10	2.51	2.91	2.57	2.48
55-64 years	4.87	3.62	2.95	2.79	3.42	2.26	3.56	3.19	3.50
65-74 years	2.42	1.42	1.83	2.65	2.28	1.52	2.50	1.82	2.13
Females									
18-74 years	1.28	1.19	1.14	1.12	1.24	1.17	1.16	0.82	0.97
18-24 years	2.51	2.29	1.68	1.27	2.16	4.47	1.67	1.31	1.28
25-34 years	3.73	2.85	2.49	1.13	1.84	3.75	2.71	1.61	1.43
35-44 years	5.41	3.36	3.08	1.76	1.42	3.86	2.25	1.52	3.27
45-54 years	6.27	2.52	2.41	2.99	2.87	4.51	3.67	1.96	3.10
55-64 years	3.64	2.80	2.91	4.08	4.69	3.21	3.45	1.65	3.68
65-74 years	1.57	2.06	2.32	3.10	3.32	1.42	1.92	1.85	1.75
BLACK									
Males									
18-74 years	4.96	4.24	2.87	4.48	14.67	3.83	5.45	3.47	12.00
18-24 years	9.94	3.83	11.27	6.73	13.06	6.10	13.55	4.12	4.99
25-34 years	13.05	14.63	3.58	9.62	43.72	16.11	3.67	7.28	27.71
35-44 years	16.60	13.88	6.69	20.64	9.91	4.55	16.78	9.57	10.99
45-54 years	9.40	7.06	6.36	6.98	7.46	6.05	5.63	12.34	9.54
55-64 years	10.39	22.08	17.23	36.02	13.45	8.85	12.37	18.87	*61.27
65-74 years	2.63	6.21	8.04	19.03	*44.23	2.42	13.32	15.53	8.14
Females									
18-74 years	2.60	2.73	3.98	3.33	5.19	2.18	3.24	3.01	2.35
18-24 years	2.94	7.25	5.42	6.40	25.98	10.29	7.95	4.37	4.60
25-34 years	6.99	7.43	5.99	4.50	9.77	10.53	6.23	2.71	5.69
35-44 years	5.15	6.34	6.15	7.08	17.99	5.47	5.49	6.04	5.63
45-54 years	8.60	9.90	18.63	16.73	34.09	5.02	11.47	18.13	7.03
55-64 years	11.75	9.19	10.21	*99.66	*66.61	8.58	10.57	17.74	34.54
65-74 years	3.71	8.06	12.16	*38.76	*78.02	3.69	7.97	15.34	5.86

Table VII. Standard error of the mean weight of adults ages 18-74 years, by race, sex, age, urbanization status, and geographic region: United States, 1971-74

Race, sex, and age	Urbanization status			Geographic region			
	Urbanized area	Urban area	Rural area	Northeast	Midwest	South	West
	Standard error in pounds						
ALL RACES, BOTH SEXES							
18-74 years	0.61	0.83	0.69	0.74	0.75	0.82	0.62
18-24 years	1.08	1.43	1.57	1.59	1.21	1.47	1.96
25-34 years	0.89	1.97	2.17	2.03	1.50	2.19	1.64
35-44 years	1.51	2.31	0.94	2.72	1.91	1.46	1.82
45-54 years	1.23	2.72	1.69	2.32	1.53	2.12	2.07
55-64 years	1.41	3.73	1.70	2.25	1.74	2.25	1.29
65-74 years	1.13	1.39	1.54	1.43	1.63	1.87	1.41
Males							
18-74 years	0.90	1.45	1.27	1.17	1.19	1.36	1.28
18-24 years	1.84	2.27	3.50	2.68	2.20	3.59	4.49
25-34 years	1.53	3.84	3.45	3.88	2.31	2.74	2.32
35-44 years	2.19	4.24	2.01	3.40	2.63	2.40	2.89
45-54 years	1.54	2.70	2.54	2.54	1.70	3.01	1.92
55-64 years	2.03	3.72	2.42	2.78	2.22	2.42	3.29
65-74 years	1.41	1.89	1.44	2.13	1.90	1.39	1.78
Females							
18-74 years	0.75	1.04	0.98	0.82	1.10	1.07	1.05
18-24 years	1.01	1.99	1.14	1.44	0.94	1.36	1.53
25-34 years	1.43	1.95	1.42	1.25	2.12	1.64	1.07
35-44 years	1.71	2.40	1.43	3.25	1.77	2.31	1.16
45-54 years	1.99	4.80	2.19	3.46	2.00	2.31	3.26
55-64 years	1.90	5.67	2.46	1.95	2.44	2.88	2.41
65-74 years	1.57	1.62	1.85	2.07	2.00	2.50	1.54
WHITE							
Males							
18-74 years	1.04	1.38	1.19	1.42	1.24	1.81	1.45
18-24 years	2.01	1.97	3.96	2.80	2.44	4.62	5.02
25-34 years	1.74	3.51	2.72	3.23	2.51	2.85	2.87
35-44 years	2.49	3.33	2.09	3.66	2.44	3.03	3.06
45-54 years	1.60	2.79	2.78	2.61	1.78	3.78	2.15
55-64 years	2.56	3.43	2.69	3.19	2.23	3.20	3.80
65-74 years	1.47	2.17	1.81	2.14	2.29	1.82	1.66
Females							
18-74 years	0.85	1.22	1.00	0.95	1.25	1.39	1.12
18-24 years	1.18	2.04	1.35	1.48	1.24	2.04	1.68
25-34 years	1.73	2.27	1.59	1.26	2.33	2.72	1.57
35-44 years	1.96	2.48	1.61	3.69	2.18	2.79	1.21
45-54 years	1.78	2.39	2.14	2.91	1.63	2.30	3.24
55-64 years	2.11	3.48	2.35	2.13	3.07	2.86	2.48
65-74 years	1.66	1.77	1.82	2.03	2.01	2.68	1.62
BLACK							
Males							
18-74 years	1.98	6.17	8.67	12.46	3.55	2.36	4.32
18-24 years	7.23	7.38	4.91	5.95	7.80	5.37	16.87
25-34 years	3.61	15.72	35.13	37.29	6.88	5.99	5.59
35-44 years	3.65	*84.19	9.15	5.31	8.93	6.97	9.90
45-54 years	3.54	9.26	8.56	3.37	6.34	5.67	11.33
55-64 years	8.08	*56.06	12.55	19.85	11.12	7.73	15.87
65-74 years	3.41	5.74	5.11	5.40	6.63	3.07	3.65
Females							
18-74 years	1.88	6.90	2.62	4.14	3.15	2.42	4.02
18-24 years	2.81	14.63	2.69	6.44	6.73	3.98	5.02
25-34 years	4.10	4.48	3.48	2.57	5.52	5.92	6.78
35-44 years	3.82	6.73	9.05	4.96	5.60	6.27	4.48
45-54 years	6.39	18.01	12.80	16.55	9.27	4.77	14.96
55-64 years	3.93	*56.20	8.86	4.26	7.61	15.16	7.29
65-74 years	4.89	11.52	8.11	12.41	7.40	3.58	5.82

subgroup of each socioeconomic (or geographic) variable within the ith age category.

Assume that the effect of age and socioeconomic (or geographic) variables on mean height or weight, $\overline{Y}ij$, can be expressed as linear combinations of unknown parameters $\beta_1, \beta_2, \cdots, \beta_{12}$ plus error terms $e_1, e_2, \cdots, e_{12}$, that is,

$$\overline{Y}ij = X_{k1}\beta_1 + X_{k2}\beta_2 + \cdots + X_{k12}\beta_{12} + e_k \quad (2)$$
$$k = 1, \cdots, 12.$$

Equivalently, in matrix notation,

$$y = X\beta + e, \quad (3)$$

where

$$X_{12 \times 12} = \begin{bmatrix} X_{1\,1} & X_{1\,2} & \cdots & X_{1\,11} & X_{1\,12} \\ X_{2\,1} & X_{2\,2} & \cdots & X_{2\,11} & X_{2\,12} \\ X_{3\,1} & X_{3\,2} & \cdots & X_{3\,11} & X_{3\,12} \\ X_{4\,1} & X_{4\,2} & \cdots & X_{4\,11} & X_{4\,12} \\ \cdot & \cdot & & \cdot & \cdot \\ \cdot & \cdot & & \cdot & \cdot \\ \cdot & \cdot & & \cdot & \cdot \\ X_{9\,1} & X_{9\,2} & \cdots & X_{9\,11} & X_{9\,12} \\ X_{10\,1} & X_{10\,2} & \cdots & X_{10\,11} & X_{10\,12} \\ X_{11\,1} & X_{11\,2} & \cdots & X_{11\,11} & X_{11\,12} \\ X_{12\,1} & X_{12\,2} & \cdots & X_{12\,11} & X_{12\,12} \end{bmatrix}$$

is called the design matrix,

$$\beta' = (\beta_1, \cdots, \beta_{12}), e' = (e_1, \cdots, e_{12}).$$

The parameter β' is a vector of unknown constants, and e' is a random variable with an asymptotic multivariate normal distribution.

In some of the cases under consideration, a preliminary examination showed that the $\overline{Y}_{i1} - \overline{Y}_{i2}$ differences between subgroups within age categories generally increased with age, reached a maximum, and then generally decreased, thus indicating a possible interaction of age with socioeconomic (or geographic) variables.

To account for the presence of interaction of variables, the following design matrix was proposed:

$$X_{12 \times 12} = \begin{bmatrix} 1 & 1 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\ 1 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 1 & 0 & 1 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 \\ 1 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 \\ 1 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 1 & 0 & 0 \\ 1 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 1 & 0 \\ 1 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 \\ 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$$

The first column, containing twelve 1's, represents a baseline figure for the second subgroup under consideration in the last age category. The next five columns represent age effects, and the last six columns represent socioeconomic (or geographic) effects within age.

Further assume that

$$E(e') = [E(e_1), \cdots, E(e_{12})] = (0, \cdots, 0)$$

or, equivalently,

$$E(y) = X\beta, |X'X| \neq 0 \text{ and } |V| \neq 0 \quad (4)$$

where V is a valid and consistent estimate for the population variance-covariance matrix[14-20] V_p, where V_p is defined as

$$V_{p\ n \times n} = \begin{bmatrix} \sigma_{11}^2 & \sigma_{12}^2 & \cdots & \sigma_{1n}^2 \\ \sigma_{21}^2 & \sigma_{22}^2 & \cdots & \sigma_{2n}^2 \\ \cdot & \cdot & & \cdot \\ \cdot & \cdot & & \cdot \\ \cdot & \cdot & & \cdot \\ \sigma_{n1}^2 & \sigma_{n2}^2 & \cdots & \sigma_{nn}^2 \end{bmatrix}$$

and it is the population variance-covariance matrix of y, when σ_{ii}^2 is the variance of y_i, and σ_{ij}^2 is the covariance of (y_i, y_j), $i \neq j$.

The variance of the random variable y_i is a measure of the extent to which y_i is dispersed about its mean and is estimated by the balanced half-sample replication method, which reflects the sampling design.[18]

The covariance σ_{ij}^2 of y_i and y_j $(i \neq j)$ is a measure of the extent to which y_i and y_j vary together and is a function of the units of the measurement. It too is estimated by the balanced half-sample replication method. A discussion of the importance of the estimation of the full covariance matrix is given by Freeman and Brock.[20] Following Koch et al.,[14] estimates b_i of parameters β_i are calculated by weighted least square as follows:

$$b = (X'\,V^{-1}\,X)^{-1}\,X'\,V^{-1}\,y \quad (5)$$

$$b' = (b_1, b_2, \cdots, b_{12})$$

$$\text{Var}(b) = (X'\,V^{-1}\,X)^{-1} \quad (6)$$

When the model parameters have been estimated, one has

$$\hat{y} = Xb \quad (7)$$

NOTE: A list of references follows the text.

or

$$\begin{bmatrix} \hat{\bar{Y}}_{11} \\ \hat{\bar{Y}}_{12} \\ \hat{\bar{Y}}_{21} \\ \hat{\bar{Y}}_{22} \\ \hat{\bar{Y}}_{31} \\ \hat{\bar{Y}}_{32} \\ \hat{\bar{Y}}_{41} \\ \hat{\bar{Y}}_{42} \\ \hat{\bar{Y}}_{51} \\ \hat{\bar{Y}}_{52} \\ \hat{\bar{Y}}_{61} \\ \hat{\bar{Y}}_{62} \end{bmatrix} = \begin{bmatrix} 1&1&0&0&0&0&1&0&0&0&0&0 \\ 1&1&0&0&0&0&0&0&0&0&0&0 \\ 1&0&1&0&0&0&0&1&0&0&0&0 \\ 1&0&1&0&0&0&0&0&0&0&0&0 \\ 1&0&0&1&0&0&0&0&1&0&0&0 \\ 1&0&0&1&0&0&0&0&0&0&0&0 \\ 1&0&0&0&1&0&0&0&0&1&0&0 \\ 1&0&0&0&1&0&0&0&0&0&0&0 \\ 1&0&0&0&0&1&0&0&0&0&1&0 \\ 1&0&0&0&0&1&0&0&0&0&0&0 \\ 1&0&0&0&0&0&0&0&0&0&0&1 \\ 1&0&0&0&0&0&0&0&0&0&0&0 \end{bmatrix} \begin{bmatrix} b_1 \\ b_2 \\ b_3 \\ b_4 \\ b_5 \\ b_6 \\ b_7 \\ b_8 \\ b_9 \\ b_{10} \\ b_{11} \\ b_{12} \end{bmatrix}$$

where the estimates $\hat{\bar{Y}}_{ij}$ in (7) can be expressed as:

$$\hat{\bar{Y}}_{11} = b_1 + b_2 + b_7$$
$$\hat{\bar{Y}}_{12} = b_1 + b_2$$
$$\hat{\bar{Y}}_{21} = b_1 + b_3 + b_8$$
$$\vdots$$
$$\hat{\bar{Y}}_{61} = b_1 + b_{12}$$
$$\hat{\bar{Y}}_{62} = b_1$$

Hence $b_1, \cdots, b_6$ represent the weighted least squares estimates of the age effects, and $b_7, \cdots, b_{12}$ represent the weighted least squares estimates of the differences of socioeconomic (or geographic) effects within each age category.

In general, after the model parameters have been estimated, the goodness of fit of the model is tested using the Wald statistic[18]

$$Q_E = (y - Xb)' V^{-1} (y - Xb). \qquad (8)$$

If subgroups under consideration are sufficiently large, the $\hat{\bar{Y}}_{ij}$ is assumed to be approximately normally distributed by the central limit theorem since V is a valid and consistent estimate of the population variance-covariance matrix V_p.

NOTE: A list of references follows the text.

The statistic Q_E has approximately a χ^2 distribution with degrees of freedom equal to the number of rows minus the number of columns of the design matrix X. If Q_E is nonsignificant, the model is assumed to fit.

However, in this case X is a square matrix; the number of rows equals the number of columns. Therefore, Q_E is zero (degenerate). One then examines the total variation statistic

$$Q_T = y' V^{-1} y, \qquad (9)$$

which, as a consequence of the central limit theorem, has a χ^2 distribution with degrees of freedom equal to the number of rows, since the y' in the total variation statistic was not corrected for the mean. Otherwise, the degrees of freedom would be equal to the number of rows minus 1, or 11 in this case. If the y' values in Q_T are not corrected for the mean, then what Q_T tests is that all the means are simultaneously equal to zero, which is usually of little interest. Hence, Q_T is usually huge, and the hypothesis will generally be rejected.

If the Q_T statistic is significant with respect to a χ^2 distribution, this indicates that differences in the mean values are not due to chance, and it is of interest to determine for which subgroup the differences exist. This is done through the construction of contrast matrices, C, and testing hypothesis of the form $C\beta = 0$.[16]

The statistics used to test such a hypothesis have the form

$$Q_c = b'C'[C(X'V^{-1}X)^{-1}C']^{-1}Cb \qquad (10)$$

The statistics have an approximate χ^2 distribution with degrees of freedom equal to the number of rows of C when H_o is true.

Unless there exists an a priori, substantive reason for leaving the interaction term out of the model, (i.e., the difference of socioeconomic (or geographic) effects across age categories), one must test for an interaction effect. The hypothesis is

$$H_o : \beta_7 - \beta_8 = 0, \cdots, \beta_7 - \beta_9, \cdots, \beta_7 - \beta_{12} = 0, \qquad (11)$$

with the appropriate contrast matrix as

$$C_{5\times 12} = \begin{bmatrix} 0&0&0&0&0&0&1&-1&0&0&0&0 \\ 0&0&0&0&0&0&1&0&-1&0&0&0 \\ 0&0&0&0&0&0&1&0&0&-1&0&0 \\ 0&0&0&0&0&0&1&0&0&0&-1&0 \\ 0&0&0&0&0&0&1&0&0&0&0&-1 \end{bmatrix}$$

If (11) is not rejected, the conclusion would be that the differences between the subgroups of socioeconomic (or geographic) variables are generally the same

for each age group. It is then appropriate to test for equality of means between the subgroups of socio-economic (or geographic) variables; that is,

$$H_o : \mu_{11} = \mu_{12}, \cdots, \mu_{61} = \mu_{62}$$

where μ_{ij} is the mean height (or weight) for the jth subgroup o of the ith age category. Noting that it can be shown that

$$E(\overline{Y}_{ij}) = \mu_{ij},$$

it can be shown that H_o is equivalent to the following hypothesis:

$$H_o : \beta_7 = \beta_8 = \beta_9 = \cdots = \beta_{12} = 0$$

and the contrast matrix used to test this hypothesis is

$$C_{6 \times 12} = \begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 \end{bmatrix}$$

If Q_c is found to be statistically significant, that is not all $\mu_{i1} = \mu_{i2}$, then it is of interest to test for specific age categories where significance occurred, that is, hypotheses of the form $\beta_i = 0$ where $i = 7, \cdots, 12$.

The contrast matrix for the hypothesis $\beta_7 = 0$ is

$$C_{1 \times 12} = (0\ 0\ 0\ 0\ 0\ 0\ 1\ 0\ 0\ 0\ 0\ 0).$$

In this analysis, a model has been produced that completely saturates the variation in the y space. However, the ultimate objective of such an analysis is the development of a parsimonious model that fits the data and adequately represents the variation displayed by the data.

If other models were reduced from the one herein, the conclusions drawn on the basis of the other models would be similar to those obtained from the original model. The reduced model is simply a more concise and easily recognized representation of the variation that is actually shown by the data.

Appendix II. Demographic, socioeconomic, and geographic terms

Age.—The age recorded for each examinee was the age at last birthday prior to the examination date. The age criterion used in the survey was defined as the examinee's age at time of the census interview. Twenty persons who were 74 years old at the time of the interview became 75 years old during the time of the examination. In the adjustment and weighting procedures used to produce national estimates, these persons were included in the 74-year-old group.

Race.—For each individual, the observed race was recorded as "white," "black," or "other races." The last category included American Indians, Chinese, Japanese, and all races other than white or black. Mexican persons were included with white. Black persons and persons of mixed black and other parentage were recorded as "black."

Geographic region.—The 48 contiguous States and the District of Columbia (excluding Alaska and Hawaii) were stratified into four broad geographic regions, each of about the same population size. In a few instances the actual boundaries of the region did not follow State lines. Some strata in the Midwest and South include primary sampling units (PSU's) located in the West. Similarly, some strata in the West contain PSU's located in the Midwest and South. These were included in those specific regions. The compositions were as follows:

Region	*States included*
Northeast	Maine, New Hampshire, Vermont, Massachusetts, Connecticut, Rhode Island, New York, New Jersey, Pennsylvania
Midwest	Ohio, Michigan, Indiana, Illinois, Wisconsin, Minnesota, Iowa, Missouri
South	Delaware, Maryland, Virginia, West Virginia, Kentucky, Arkansas, Tennessee, North Carolina, South Carolina, Georgia, Florida, Alabama, Mississippi, Louisiana, District of Columbia
West	Washington, Oregon, Idaho, Montana, Wyoming, Colorado, Utah, Nevada, California, Arizona, New Mexico, Texas, Oklahoma, Kansas, Nebraska, South Dakota, North Dakota

Annual family income.—The income recorded was the total income received during the 12 months prior to the interview by the head of the household and all other related household members. This income was considered the gross cash family income (excluding pay in kind) except for those families owning farms or businesses; for them, the net income was recorded. Furthermore, the income of a member of the Armed Forces living at home with his family (even though he was not considered a household member) was included. If he was not living at home, allotments or other money received by the family from him were included in the family income figure.

Educational level.—Only grades attended in a regular graded public or private school where persons were given formal education, during the day or night, either on a full-time or part-time attendance basis were included. A "regular" school advances a person toward an elementary or high school diploma, or a college, university, or professional school degree. Education received in vocational, trade, or business schools outside the regular school system was not counted in determining the highest grade completed. If a person attended school in a foreign country, at an ungraded school, under a tutor, or under other special circumstances, the nearest equivalent of his or her highest grade attended was given.

Urbanization status.—The classification of urban-rural areas was defined in the 1960 census. According to that definition, the urban areas are (1) places of 2,500 inhabitants or more incorporated as cities, boroughs, villages, and towns (except towns in New England, New York, and Wisconsin); (2) the densely

settled urban fringe, whether incorporated or unincorporated, of urbanized areas; (3) towns in New England and townships in New Jersey and Pennsylvania that have no incorporated municipalities as subdivisions and either have 2,500 inhabitants or more, or a population of 2,500 to 25,000 with a density of 1,500 persons per square mile; (4) counties in States except the New England States, New Jersey, and Pennsylvania that have no incorporated municipalities within their boundaries and have a density of 1,500 persons or more per square mile; and (5) unincorporated places of 2,500 inhabitants or more that are not included in any urban fringe. The remaining population is classified as rural.

The categories of urbanization status (according to population density) are as follows: (1) urbanized area, 3,000,000 persons or more; (2) urbanized area, 1,000,000-2,000,000 persons; (3) urbanized area, 250,000-999,999 persons; (4) urbanized area, under 250,000 persons; (5) urban, not in an urbanized area, 25,000 persons or more; (6) urban, not in an urbanized area, 10,000-24,999 persons; (7) urban, not in an urbanized area, 2,500-9,999 persons; and (8) rural.

Appendix III. Sample size and estimated population tables

Table VIII. Sample size and estimated population for adults ages 18-74 years, by sex, age, and annual family income: United States, 1971-74

Sex and age	Annual family income									
	Under $4,000		$4,000-$6,999		$7,000-$9,999		$10,000-$14,999		$15,000 and over	
	Sample size	Population in thousands	Sample size	Population in thousands	Sample size	Population in thousands	Sample size	Population in thousands	Sample size	Population in thousands
Both sexes										
18-74 years	3,268	19,882	2,256	17,883	2,962	29,170	2,587	29,824	2,072	27,111
18-24 years	549	4,756	412	4,293	563	6,107	423	4,960	270	3,741
25-34 years	317	2,146	427	3,338	685	7,055	702	7,814	494	5,794
35-44 years	291	1,870	283	2,043	519	4,697	592	6,345	558	6,505
45-54 years	231	2,299	209	2,514	346	4,706	401	6,335	353	6,447
55-64 years	322	3,836	215	2,943	268	4,256	202	3,213	194	3,725
65-74 years	1,558	4,975	710	2,752	581	2,349	267	1,156	203	899
Males										
18-74 years	1,196	7,917	851	7,758	1,131	13,741	1,012	15,027	857	14,386
18-24 years	197	2,289	126	1,928	170	2,810	150	2,416	106	1,972
25-34 years	75	814	104	1,358	219	3,563	231	3,939	151	2,909
35-44 years	63	860	73	891	149	2,178	180	3,076	173	3,272
45-54 years	99	852	86	1,021	152	1,994	213	3,454	186	3,422
55-64 years	118	1,334	97	1,288	130	2,018	106	1,664	116	2,283
65-74 years	644	1,768	365	1,273	311	1,177	132	479	125	528
Females										
18-74 years	2,072	11,965	1,405	10,125	1,831	15,429	1,575	14,797	1,215	12,725
18-24 years	352	2,466	286	2,365	393	3,297	273	2,545	164	1,769
25-34 years	242	1,333	323	1,981	466	3,491	471	3,876	343	2,885
35-44 years	228	1,010	210	1,152	370	2,519	412	3,268	385	3,232
45-54 years	132	1,447	123	1,493	194	2,712	188	2,882	167	3,025
55-64 years	204	2,502	118	1,655	138	2,238	96	1,548	78	1,442
65-74 years	914	3,207	345	1,479	270	1,172	135	678	78	371

Table IX. Sample size and estimated population for adults ages 18-74 years, by race, sex, age, and annual family income: United States, 1971-74

Race, sex, and age	Annual family income									
	Under $4,000		$4,000-$6,999		$7,000-$9,999		$10,000-$14,999		$15,000 and over	
	Sample size	Population in thousands	Sample size	Population in thousands	Sample size	Population in thousands	Sample size	Population in thousands	Sample size	Population in thousands
WHITE										
Males										
18-74 years	824	5,920	685	6,659	957	12,160	921	14,303	792	13,593
18-24 years	141	1,781	97	1,606	140	2,454	134	2,282	93	1,830
25-34 years	53	550	80	1,203	180	3,171	203	3,614	137	2,659
35-44 years	40	548	55	745	123	1,846	172	2,965	162	3,087
45-54 years	55	495	65	834	119	1,704	192	3,346	173	3,299
55-64 years	81	1,069	80	1,111	114	1,875	100	1,637	109	2,201
65-74 years	454	1,477	308	1,160	281	1,111	120	459	118	517
Females										
18-74 years	1,355	9,177	1,077	8,482	1,527	13,763	1,435	14,026	1,126	12,025
18-24 years	210	1,851	205	1,909	331	2,973	233	2,371	149	1,654
25-34 years	123	780	239	1,612	381	3,058	444	3,679	312	2,698
35-44 years	106	653	140	918	285	2,048	371	3,051	356	3,089
45-54 years	84	1,089	97	1,219	171	2,511	168	2,731	159	2,816
55-64 years	141	2,017	94	1,456	119	2,061	94	1,542	74	1,400
65-74 years	691	2,788	302	1,367	240	1,113	125	650	76	367
BLACK										
Males										
18-74 years	357	1,824	155	1,055	157	1,403	81	589	52	617
18-24 years	50	386	28	308	27	328	14	110	10	118
25-34 years	21	232	21	140	37	368	26	269	10	203
35-44 years	22	308	18	146	25	306	6	81	8	95
45-54 years	44	357	21	186	31	276	18	90	12	116
55-64 years	36	259	16	174	13	76	5	19	6	74
65-74 years	184	281	51	100	24	51	12	20	6	11
Females										
18-74 years	701	2,699	310	1,521	282	1,555	121	662	73	557
18-24 years	135	572	75	415	54	281	33	134	14	104
25-34 years	117	545	79	345	81	416	22	162	26	147
35-44 years	119	329	68	226	78	441	35	185	21	96
45-54 years	47	355	25	265	23	201	19	147	7	189
55-64 years	63	485	23	174	18	158	2	6	3	17
65-74 years	220	414	40	96	28	57	10	28	2	4

Table X. Sample size and estimated population for adults ages 18-74 years, by race, sex, age, and educational level: United States, 1971-74

Race and age	Educational level											
	Less than 9 years						9-11 years					
	Both sexes		Males		Females		Both sexes		Males		Females	
	Sample size	Population in thousands	Sample size	Population in thousands	Sample size	Population in thousands	Sample size	Population in thousands	Sample size	Population in thousands	Sample size	Population in thousands
All races[1]												
18-74 years	3,740	24,655	1,750	12,446	1,990	12,209	2,416	21,500	816	9,499	1,600	12,000
18-24 years	144	1,299	51	679	93	621	456	4,459	162	2,257	294	2,202
25-34 years	264	2,325	76	1,155	188	1,170	476	3,633	110	1,381	366	2,252
35-44 years	404	3,013	119	1,540	285	1,473	471	3,896	114	1,643	357	2,253
45-54 years	458	5,207	248	2,839	210	2,368	300	4,182	142	2,114	158	2,069
55-64 years	527	6,674	263	3,404	264	3,270	222	3,333	94	1,377	128	1,956
65-74 years	1,943	6,136	993	2,829	950	3,307	491	1,997	194	728	297	1,269
White												
18-74 years	2,742	20,114	1,301	10,151	1,441	9,963	1,804	18,252	648	8,203	1,156	10,048
18-24 years	86	916	28	479	58	437	308	3,643	121	1,893	187	1,749
25-34 years	206	1,949	62	961	144	988	321	2,774	73	1,040	248	1,734
35-44 years	272	2,319	85	1,148	187	1,171	332	3,201	90	1,374	242	1,828
45-54 years	330	4,042	178	2,210	152	1,832	239	3,717	114	1,905	125	1,813
55-64 years	389	5,616	200	2,921	189	2,694	184	3,064	82	1,315	102	1,750
65-74 years	1,459	5,272	748	2,431	711	2,841	420	1,853	168	678	252	1,175
Black												
18-74 years	957	4,335	432	2,219	525	2,116	595	3,144	160	1,269	435	1,876
18-24 years	50	322	21	178	29	144	142	773	40	361	102	411
25-34 years	56	370	14	195	42	175	152	846	35	331	117	515
35-44 years	124	650	34	392	90	258	136	666	23	266	113	401
45-54 years	125	1,135	68	602	57	533	61	465	28	209	33	256
55-64 years	134	1,023	60	472	74	551	37	266	11	60	26	206
65-74 years	468	836	235	380	233	455	67	128	23	42	44	86

[1]Includes races other than white and black.

Table X. Sample size and estimated population for adults ages 18-74 years, by race, sex, age, and educational level: United States, 1971-74—Con.

Race and age	Educational level											
	12 years						13 years or more					
	Both sexes		Males		Females		Both sexes		Males		Females	
	Sample size	Population in thousands	Sample size	Population in thousands	Sample size	Population in thousands	Sample size	Population in thousands	Sample size	Population in thousands	Sample size	Population in thousands
All races[1]												
18-74 years	4,469	47,606	1,416	19,876	3,053	27,730	2,938	34,364	1,224	18,800	1,714	15,564
18-24 years	941	10,403	284	4,417	657	5,986	750	8,493	274	4,416	476	4,077
25-34 years	1,173	11,632	325	5,239	848	6,392	772	9,229	289	5,159	483	4,070
35-44 years	942	9,190	223	3,741	719	5,449	485	5,897	196	3,564	289	2,334
45-54 years	545	8,529	209	3,188	336	5,341	287	5,230	159	2,926	128	2,304
55-64 years	328	5,561	137	2,329	191	3,232	178	3,334	97	1,865	81	1,468
65-74 years	540	2,291	238	962	302	1,330	466	2,181	209	871	257	1,311
White												
18-74 years	3,859	43,823	1,245	18,439	2,614	25,385	2,627	31,775	1,113	17,497	1,514	14,277
18-24 years	741	9,129	228	3,861	513	5,268	652	7,734	248	4,064	404	3,670
25-34 years	989	10,547	279	4,853	710	5,693	685	8,381	255	4,675	430	3,706
35-44 years	817	8,420	203	3,509	614	4,911	434	5,496	183	3,360	251	2,136
45-54 years	502	8,127	185	3,028	317	5,099	255	4,905	146	2,820	109	2,085
55-64 years	310	5,388	130	2,266	180	3,122	167	3,162	91	1,737	76	1,425
65-74 years	500	2,212	220	921	280	1,291	434	2,096	190	841	244	1,255
Black												
18-74 years	567	3,480	158	1,345	409	2,135	248	1,870	79	765	169	1,105
18-24 years	191	1,213	53	530	138	683	76	527	17	189	59	338
25-34 years	173	1,021	45	383	128	638	68	628	24	319	44	309
35-44 years	112	675	18	201	94	473	40	254	8	83	32	170
45-54 years	40	365	22	144	18	221	27	302	10	94	17	208
55-64 years	15	138	5	53	10	86	8	82	4	57	4	25
65-74 years	36	68	15	33	21	35	29	77	16	22	13	55

[1] Includes races other than white and black.

Table XI. Sample size and estimated population for adults ages 18-74 years, by race, sex, age, and urbanization status: United States, 1971-74

Sex and age	Urbanization status																	
	Urbanized area						Urban area						Rural area					
	All races		White		Black		All races		White		Black		All races		White		Black	
	Sample size	Population in thousands	Sample size	Population in thousands	Sample size	Population in thousands	Sample size	Population in thousands	Sample size	Population in thousands	Sample size	Population in thousands	Sample size	Population in thousands	Sample size	Population in thousands	Sample size	Population in thousands
Both sexes																		
18-74 years	7,110	70,544	5,362	61,157	1,620	8,548	1,749	16,962	1,505	15,129	227	1,576	4,812	41,512	4,234	38,331	557	2,931
18-24 years	1,259	13,662	914	11,679	313	1,772	342	3,808	288	3,236	46	429	695	7,208	588	6,517	102	647
25-34 years	1,501	15,166	1,139	12,978	335	1,965	302	3,011	266	2,694	35	285	897	8,759	806	8,083	84	628
35-44 years	1,224	12,197	890	10,257	305	1,738	280	2,801	243	2,541	32	200	824	7,270	738	6,829	84	386
45-54 years	826	12,820	642	11,332	175	1,428	181	2,890	164	2,508	25	362	594	7,604	537	7,079	56	504
55-64 years	654	10,239	507	9,126	140	1,024	163	2,537	147	2,408	16	129	450	6,273	402	5,778	44	421
65-74 years	1,646	6,460	1,270	5,786	352	622	481	1,915	407	1,742	73	170	1,352	4,398	1,163	4,045	187	345
Males																		
18-74 years	2,683	33,546	2,087	29,554	543	3,547	660	7,945	569	7,017	82	734	1,918	19,689	1,688	18,123	222	1,472
18-24 years	401	6,413	308	5,638	84	691	119	1,830	100	1,493	15	226	253	3,540	218	3,169	33	353
25-34 years	449	7,468	353	6,520	85	810	90	1,400	81	1,276	8	92	265	4,135	238	3,798	26	330
35-44 years	352	5,941	280	5,119	67	752	73	1,259	68	1,137	4	92	239	3,475	221	3,260	16	160
45-54 years	401	6,206	312	5,569	84	603	85	1,465	70	1,254	13	192	279	3,479	246	3,217	33	262
55-64 years	302	4,751	239	4,228	56	434	80	1,269	74	1,219	6	50	216	3,052	192	2,828	23	219
65-74 years	778	2,767	595	2,480	167	257	213	721	176	638	36	81	666	2,008	573	1,852	91	148
Females																		
18-74 years	4,427	36,998	3,275	31,603	1,077	5,002	1,089	9,017	936	8,112	145	842	2,894	21,822	2,546	20,208	335	1,459
18-24 years	858	7,249	606	6,041	229	1,081	223	1,978	188	1,742	31	203	442	3,667	370	3,348	69	293
25-34 years	1,052	7,698	786	6,458	250	1,155	212	1,611	185	1,418	27	193	632	4,624	568	4,285	58	299
35-44 years	872	6,256	610	5,138	238	985	207	1,542	175	1,404	28	107	585	3,795	517	3,570	68	225
45-54 years	425	6,614	330	5,763	91	825	96	1,424	84	1,254	12	170	315	4,125	291	3,862	23	242
55-64 years	352	5,488	268	4,898	84	590	83	1,268	73	1,189	10	79	234	3,220	210	2,951	21	202
65-74 years	868	3,694	675	3,306	185	365	268	1,193	231	1,104	37	89	686	2,390	590	2,193	96	197

Table XII. Sample size and estimated population for adults ages 18-74 years, by race, sex, age, and geographic region: United States, 1971-74

Race and age	Geographic region											
	Northeast						Midwest					
	Both sexes		Males		Females		Both sexes		Males		Females	
	Sample size	Population in thousands	Sample size	Population in thousands	Sample size	Population in thousands	Sample size	Population in thousands	Sample size	Population in thousands	Sample size	Population in thousands
All races[1]												
18-74 years	2,926	31,469	1,123	14,936	1,803	16,523	3,251	33,370	1,258	16,542	1,993	16,828
18-24 years	467	5,506	159	2,723	298	2,783	541	5,983	193	3,093	348	2,890
25-34 years	613	6,231	186	3,130	427	3,101	709	7,565	215	3,734	494	3,831
35-44 years	522	5,695	156	2,784	366	2,911	579	5,900	166	2,785	413	3,115
45-54 years	361	5,903	163	2,684	198	3,218	402	6,240	201	3,272	201	2,968
55-64 years	279	4,958	124	2,226	155	2,732	283	4,744	135	2,433	148	2,311
65-74 years	694	3,167	335	1,390	359	1,778	737	2,937	348	1,224	389	1,714
White												
18-74 years	2,483	28,776	978	13,833	1,505	14,943	2,732	30,345	1,075	15,121	1,657	15,224
18-24 years	378	4,977	139	2,525	239	2,452	437	5,386	159	2,752	278	2,634
25-34 years	508	5,672	156	2,886	352	2,786	600	6,824	185	3,343	415	3,481
35-44 years	432	5,150	141	2,617	291	2,533	480	5,332	142	2,517	338	2,815
45-54 years	317	5,526	142	2,543	175	2,983	333	5,621	167	2,990	166	2,631
55-64 years	234	4,474	104	1,950	130	2,525	247	4,437	126	2,383	121	2,053
65-74 years	614	2,977	296	1,314	318	1,664	635	2,745	296	1,135	339	1,610
Black												
18-74 years	422	2,438	137	955	285	1,483	489	2,706	172	1,228	317	1,478
18-24 years	75	468	18	149	57	318	93	456	29	244	64	212
25-34 years	98	518	27	214	71	304	102	671	28	347	74	325
35-44 years	85	511	14	163	71	348	91	485	23	236	68	249
45-54 years	42	357	21	141	21	216	68	604	33	268	35	337
55-64 years	43	396	19	213	24	183	36	307	9	50	27	257
65-74 years	79	188	38	74	41	114	99	182	50	83	49	99

[1] Includes races other than white and black.

Table XII. Sample size and estimated population for adults ages 18-74 years, by race, age, and geographic region: United States, 1971-74—Con.

Race and age	Geographic region											
	South						West					
	Both sexes		Males		Females		Both sexes		Males		Females	
	Sample size	Population in thousands	Sample size	Population in thousands	Sample size	Population in thousands	Sample size	Population in thousands	Sample size	Population in thousands	Sample size	Population in thousands
All races[1]												
18-74 years	3,778	30,905	1,427	14,127	2,351	16,778	3,716	33,284	1,453	15,576	2,263	17,708
18-24 years	663	6,374	217	2,943	446	3,431	635	6,815	204	3,024	431	3,791
25-34 years	657	6,183	197	2,899	460	3,285	721	6,956	206	3,240	515	3,717
35-44 years	577	4,821	147	2,203	430	2,617	650	5,853	195	2,904	455	2,949
45-54 years	410	5,362	189	2,374	221	2,988	428	5,808	212	2,820	216	2,989
55-64 years	351	4,757	163	2,281	188	2,476	354	4,590	176	2,133	178	2,457
65-74 years	1,120	3,407	514	1,427	606	1,981	928	3,262	460	1,456	468	1,805
White												
18-74 years	2,710	25,029	1,042	11,445	1,668	13,583	3,176	30,467	1,249	14,294	1,927	16,173
18-24 years	449	4,868	155	2,239	294	2,629	526	6,200	173	2,784	353	3,416
25-34 years	480	4,960	150	2,406	330	2,554	623	6,299	181	2,959	442	3,340
35-44 years	407	3,888	113	1,747	294	2,141	552	5,257	173	2,634	379	2,623
45-54 years	311	4,388	136	1,909	175	2,479	372	5,383	183	2,598	189	2,786
55-64 years	269	4,089	127	1,967	142	2,122	306	4,313	148	1,975	158	2,337
65-74 years	794	2,835	361	1,177	433	1,658	797	3,015	391	1,344	406	1,671
Black												
18-74 years	1,056	5,805	380	2,663	676	3,142	437	2,106	158	907	279	1,199
18-24 years	208	1,475	61	696	147	779	85	449	24	180	61	269
25-34 years	175	1,214	46	488	129	726	79	475	18	183	61	292
35-44 years	170	932	34	456	136	476	75	395	16	150	59	245
45-54 years	99	974	53	465	46	509	47	359	23	183	24	176
55-64 years	81	643	36	314	45	329	40	227	21	125	19	101
65-74 years	323	565	150	243	173	322	111	202	56	86	55	116

[1] Includes races other than white and black.

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