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VITAL and HEALTH STATISTICS

DATA FROM THE NATIONAL HEALTH SURVEY

Binocular Visual Acuity of Adults

by Region and Selected Demographic Characteristics

United States - 1960-1962

Binocular central visual acuity level findings at distance and near without and with usual correction, by age, sex, race, region, population density of area of residence, education, income, occupation, and industry.

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COOPERATION OF THE BUREAU OF THE CENSUS

In accordance with specifications established by the National Health Survey, the Bureau of the Census, under a contractual agreement, participated in the design and selection of the sample, and carried out the first stage of the field interviewing and certain parts of the statistical processing.

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THIS REPORT CONTAINS binocular central visual acuity findings for U.S. adults by race, region, area of residence, education, income, occupation, and industry as determined from the Health Examination Survey findings in 1960-62. For the survey a probability sample of 7,710 persons was selected to represent the 111 million adults in the civilian, noninstitutional population of the United States aged 18-79 years. Of these, 6,672 adults, or more than 85 percent, were examined.

Negro adults in general were found to have somewhat better acuity at distance and near, without glasses, than white adults. Relatively more Negro men and women could see at levels of 20/30 (14/21 at near) or better, and fewer did not exceed the 20/100 level (14/70 at near). However, as previously reported in Series 11, No. 3, racial differences in these rates became negligible at levels of 20/20 (14/14 at near) and better. With their usual correction, the proportion of white adults testing 20/20 (14/14 at near) or better was markedly greater than for Negroes.

Essentially no pattern of differences in the distribution of uncorrected acuity levels at distance and near was found among the three regions into which the country was divided for this study. The proportion testing 20/20 or better at distance ranged from 53 percent in the Northeast to 55 in the South and at near from 44 percent in the South and West to 46 percent in the Northeast. Similar improvement in "corrected" over uncorrected "better" acuity rates of about 20 percent was found among the three regions, the gain being somewhat but not significantly less in the South.

In general, slightly more rural than urban residents had a visual acuity the equivalent of 20/20 or better with or without their usual correction, while persons with acuity at the other extreme of the range—the equivalent of 20/100 or less—were found about as frequently in one type of area as the other.

A positive association was found between the visual acuity rates of 20/20 or better and educational level, and between this degree of visual acuity and family income, both reflecting the age gradient for this level of visual acuity. Among employed persons, white-collar workers were found more likely to have this level of acuity than were those in certain of the blue-collar occupations.

BINOCULAR VISUAL ACUITY OF ADULTS

BY REGION AND SELECTED DEMOGRAPHIC CHARACTERISTICS

Jean Roberts, *Division of Health Examination Statistics*

INTRODUCTION

Binocular central visual acuity findings from the first cycle of the Health Examination Survey among adults by race, region, and other selected demographic characteristics are presented in this report.

The Health Examination Survey is one of the three aspects of the National Health Survey, which was authorized in 1956 by Congress as a continuing Public Health Service activity concerned with the collection, analysis, and publication of basic information on the health status of the population. The National Health Survey consists of three different types of survey programs[1]—the Health Interview Survey, the Health Records Survey, and the Health Examination Survey.

The first of these collects information from people by household interview among the noninstitutional population. It is primarily concerned with the impact of illness and disability upon the lives and actions of people. The second consists of a group of record-linked surveys. It includes follow-back studies based on vital records as well as surveys in hospitals and other institutions both to establish sampling frames for future institutional studies and to provide data on health and health services.

The third major program of the National Health Survey—the Health Examination Survey—collects data by direct physical examinations, tests, and measurements performed upon the sample of the noninstitutional population under study. This is the optimum way of obtaining definite diagnostic data on the prevalence of medically defined illness since it makes possible securing data in a controlled, standardized manner. It is the only way to obtain reliable information on conditions which were previously unrecognized and undiagnosed. It is also the only way to obtain distributions of the population by a variety of physical, physiological, and psychological measurements and the interrelation among these measurements within the population under study.

Previous reports have described the plan and initial program of the Health Examination Survey[2] as well as the demographic composition of the sample used for the first cycle, the possible effects of nonresponse on the findings, and the inflation process used to convert examination findings into estimates for the adult population of the United States from which the sample was drawn.[3]

In the first cycle, the Health Examination Survey obtained data on certain chronic diseases and physical and physiological measurements among the adult civilian, noninstitutional population of the United States 18 through 79 years of age. This phase of the survey was started in October 1959 and completed in December 1962. Out of the defined sample of 7,710 persons, 6,672—more than 85 percent—were examined.

Supplemental information obtained on the nonexamined group of the sample indicates that no major demographic features of the adult population were seriously distorted by this nonresponse.

Medical and other staff members administered the standardized examination given during

the single visit of the examinee to the specially designed mobile units used for the survey. Prior to the examination, data comparable to those collected at that time by the Health Interview Survey were obtained from the household of the sample person.

Definitions and limitations of the various demographic variables referred to in this report are given in Appendix I. Descriptions of the sample design and the standard errors of estimate for the data in this report are shown in Appendix II.

THE VISION EXAMINATION

As previously reported,[4] central visual acuity for distance and for near vision was measured without cycloplegics for each examinee as part of the standardized examination in the first cycle of the Health Examination Survey. The right eye, left eye, and binocular acuity were tested without glasses for all examinees. The tests were repeated with glasses for those who brought theirs with them to the examination. A commercial screening instrument was used to permit rapid testing under controlled conditions of lighting and target distance from the examinee, within the limited space available in the examining center. The comparability of test results from the targets, which contained only nine acuity levels, with the commonly used Snellen-type wall charts and cards was assessed in the early stages of the survey.[5]

Optimum recommended scoring criteria were used.[5] To "pass," or be able to read at a particular level, no errors were allowed if the block contained fewer than four letters, and only one error in steps of four letters. The visual acuity level or "score" for an examinee was that which corresponded to the block of the smallest letters he was able to read with no more than the allowable number of errors. Acuity levels in this report are expressed in the Snellen notation.

Testing was done by the examining dentists, who had been specially trained in this type of vision testing. Acuity levels obtained on repeat testing by the various dental examiners in the survey were in at least as good agreement as is usually found among other examiners with this type of testing.

As in the previous report on visual acuity findings[4] this one is limited to binocular acuity at distance and near both without glasses (uncorrected) and with whatever correction is usually worn (referred to here as "corrected" visual acuity). In the examination, about 56 percent of the persons were tested only without glasses. Most of these persons did not own glasses; a few had neglected to bring theirs to the examination. These persons had acuity scores distributed over the entire test range. Findings for "corrected" acuity will understate only slightly, if at all, the true level of usual correction in the adult population. They will not, of course, give a measure of the "best possible" vision or the degree to which vision is "correctable" among adults, since no tests were included in the examination to determine this. The reader needs to keep in mind the special meaning attached to the data for "corrected" acuity in these reports. Findings here are in general further limited to two groups—those testing the equivalent of 20/20 or better and those testing the equivalent of 20/100 or less, groups into which roughly 70 percent of the population fall. The latter group contains persons with severe visual limitations, including the blind.

FINDINGS

Race

The previous report on visual acuity presented some racial findings from the Health Examination Survey.[4] These are further discussed here as they may relate to the geographic distribution of this attribute.

Distance vision.—More than half of the white and Negro adults in the civilian, noninstitutional population of the United States were found to have binocular central visual acuity at a 20-foot distance of 20/20 or better, uncorrected, as estimated from Health Examination Survey findings. The rate was somewhat greater for men—around 60 per 100 among both white persons and Negroes—than for women, among whom the proportion was roughly 50 percent in both groups. Overall, while relatively fewer white than Negro adults tested at this level, the pattern was not consistent throughout the age range, particu-

larly for men, nor was the difference statistically significant with the size of sample and the sample design used in the survey (tables 1 and 2 and Appendix II).

The population able to discriminate target (test) letters, without correction, at a level of at least 20/20 became progressively less with each successive age for both racial groups from 45 years on, as shown in figure 1. Prior to age 45 years, 75 per 100 or more of both races tested at this level. By 65 years, the proportion of Negroes testing 20/20 or better without correction (15 per 100) was significantly greater than it was for white persons (6 per 100) among both men and women. The decline with age started most abruptly for Negro women, with a 50-percent drop in the rate from 35 to 45 years of age. It was slowest among Negro men, where there was a loss of only 20 percent in the rate over this age span. For white men and women, the rates of decrease were similar, but both were somewhat slower than for Negro women.

The racial difference was more pronounced among those with slightly defective or better vision (20/30), with 68 percent of white compared with 77 percent of Negro adults reaching this level. These groups would, in general, probably have been rated as having at least "normal" vision had the scoring criteria used in the survey been more lenient.

Acuities of 20/100 or less without correction, on the other hand, were found relatively more frequently among white than Negro adults up to 75 years of age (fig. 2). Overall just under one-fifth of white adults and one-tenth of Negroes fell within this group. The deviation from this trend among older persons probably reflects sampling error rather than any real divergence from the general pattern.

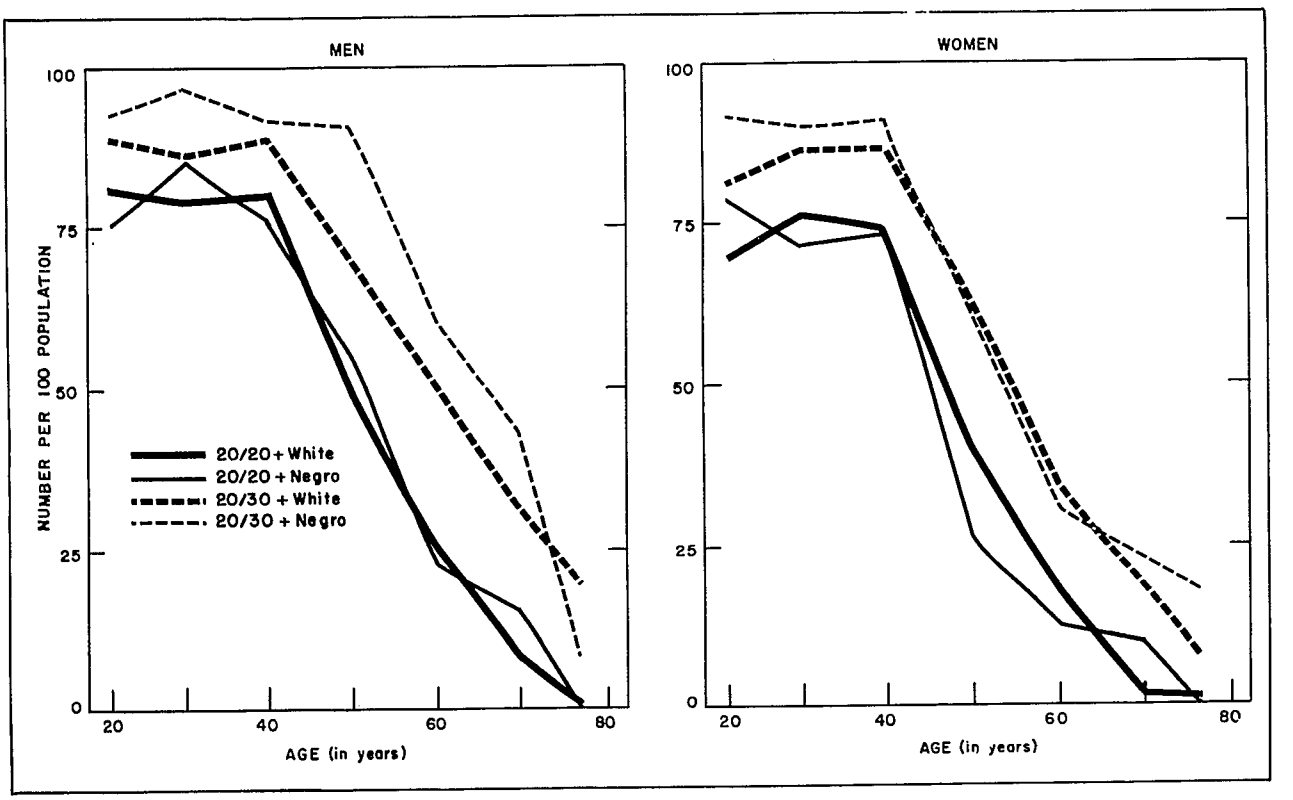

Figure 1. Number of adults per 100 population with uncorrected distance visual acuity of 20/20 or better and 20/30 or better, by age for white and Negro men and women.

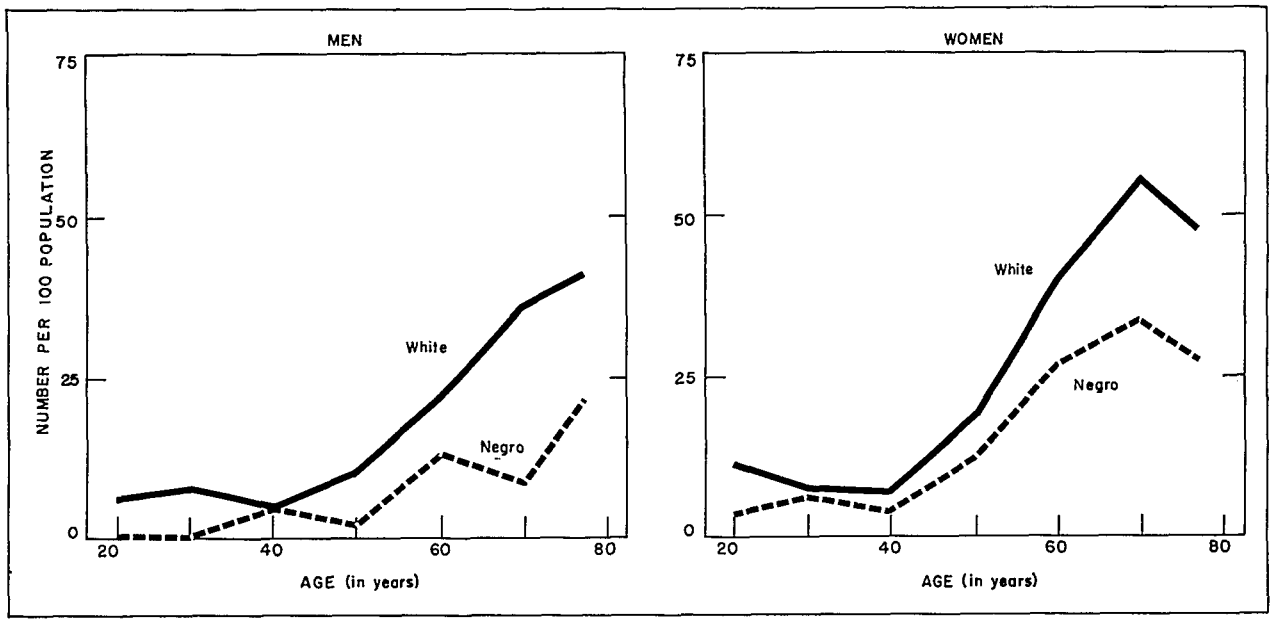

Figure 2. Number of adults per 100 population with uncorrected distance visual acuity of 20/100 or less, by age for white and Negro men and women.

With their usual correction, if any, substantially more adults tested 20/20 or better at a distance than were able to reach this level with uncorrected vision. The gain was greater among white than Negro adults—20 per 100 as compared with 6. Consequently, the overall rate for white adults testing at this level with their usual correction was significantly greater than that for Negroes throughout the age range.

Marked improvement of "corrected" over uncorrected acuities was evident in each age group for white adults. Among Negroes, the gain was substantially less and, in fact, nonexistent among men in the younger and older age groups (fig. 3).

A compensating reduction in the frequency of poorer acuities, 20/100 or less, with usual correction among white but not Negro adults (fig. 4) lowered these rates for the white to a level similar to those for the Negro adults.

Near vision.—Essentially the same proportion of white and Negro adults tested 14/14 or better without correction—44 percent for white persons and 47 percent for Negroes (table 3). Nor was any consistent pattern of racial differences by age evident (fig. 5). The decrease in the proportion able to test at this level started between 25 and 35 years of age but became sharper in the next decade for near than for distance acuity among both white persons and Negroes.

In contrast to the findings at distance, there was no consistent pattern of racial difference by age in the proportion with slightly defective or better near vision (14/21 or better).

The frequency of occurrence of poorer near acuities, 14/70 or less without correction, was generally similar among white persons and Negroes, except for the older age groups—men 55 years and over and women 65 years and over—where relatively more white than Negro adults tested no better than this level.

With usual correction the proportion testing 14/14 or better was substantially higher among white than Negro adults in each age group from 35 years and over for men and 25 years and over for women, reflecting the greater improvement

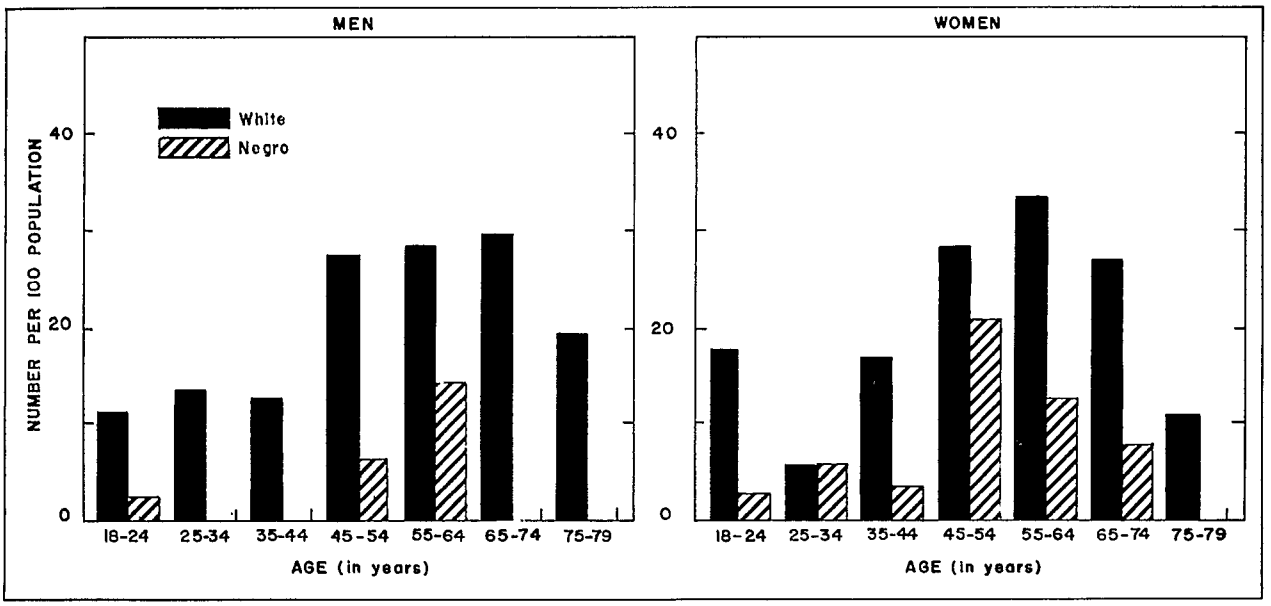

Figure 3. Improvement in rate per 100 population for "corrected" over uncorrected distance visual acuity of 20/20 or better, by age for white and Negro men and women.

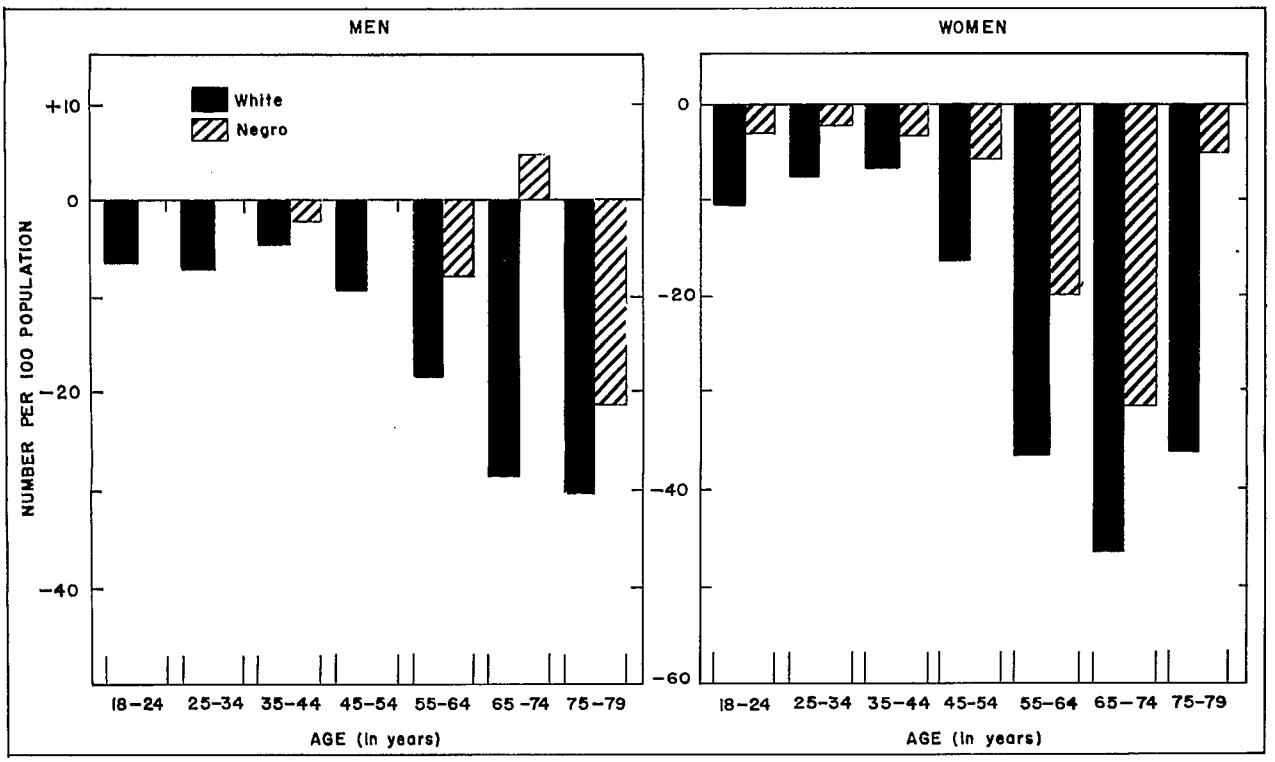

Figure 4. Reduction in rate per 100 population for "corrected" from uncorrected distance visual acuity of 20/100 or less, by age for white and Negro men and women.

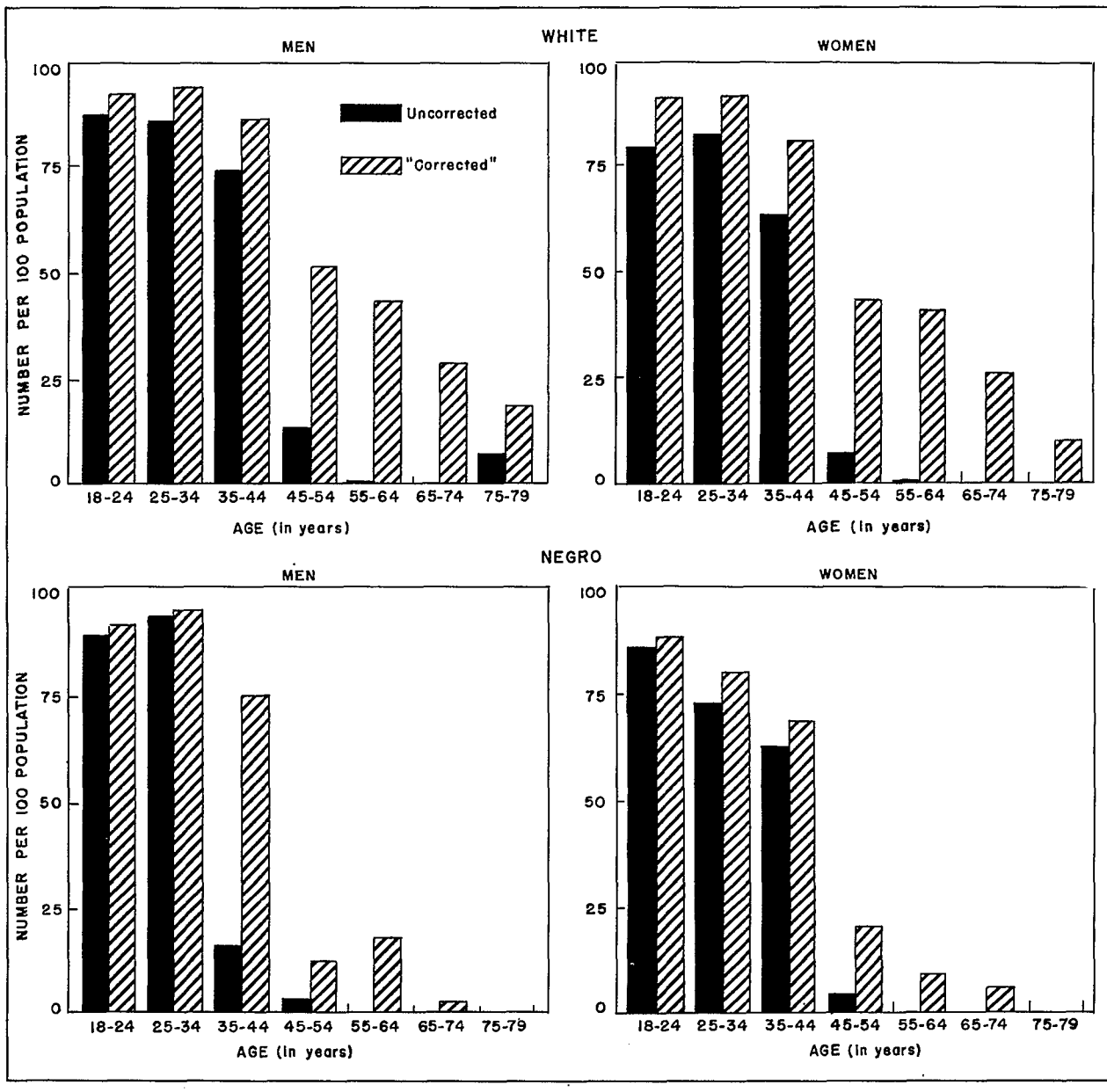

Figure 5. Number of adults per 100 population with uncorrected and "corrected" near visual acuity of 14/14 or better, by age for white and Negro men and women.

from their uncorrected status among the white adults.

At the poorer end of the near acuity range, relatively more Negroes than white persons tested no better than 14/70 with usual correction, in contrast with the comparable findings at distance.

Region

In general no consistent pattern of regional differences was found in the distribution of visual acuity.

Distance vision.—The proportion of adults having uncorrected binocular central visual acuity

of 20/20 or better at distance was similar in all three regions of the United States, ranging from 53 per 100 in the Northeast to 55 in the South. Rates for men were higher than those for women in each region, ranging from 57 to 59 per 100 among men and from 50 to 51 among women (table 4). By age, some significant patterns of regional differences emerged (fig. 6), but no consistent ones.

Including those with slightly defective acuities (20/30 or better) further reduced the scattered regional differences. Nor was there a consistent regional pattern evident in the frequency of occurrence of poorer acuities (20/100

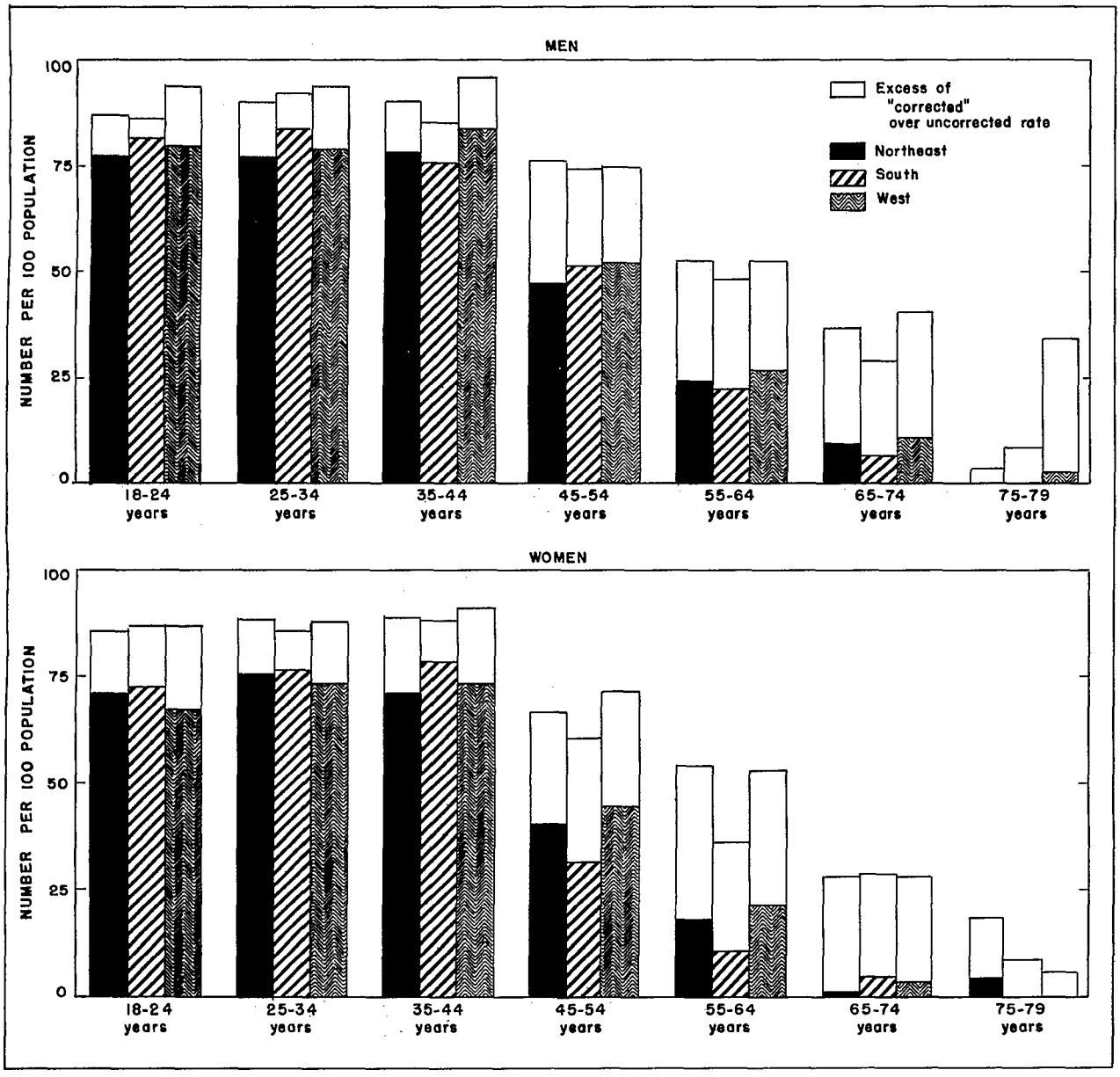

Figure 6. Number of adults per 100 population with uncorrected and "corrected" distance visual acuity of 20/20 or better, by region, age, and sex.

or less without correction) among either men or women.

Similar improvement in "corrected" over uncorrected distance acuities was found among the three regions. The gains ranged from 20 percent for the Northeast and West to 16 percent in the South for the proportion testing 20/20 or better with whatever correction, if any, was normally used. White adults showed a better record in this respect than Negroes in each region and somewhat more so in the South than elsewhere (fig. 7 and table 5).

Near vision.—As for acuity at distance, no consistent pattern of regional differences was evident in the proportion testing 14/14 or better for near visual acuity. The proportions were slightly lower than for uncorrected distance vision, ranging from 46 percent in the Northeast to 44 percent in the other two regions. Rates for men here also were consistently higher than for women in each region.

Improvement in "corrected" over uncorrected near acuities ranged from 18 percent in the South to 22 percent in the West, leaving regional rates of 66 and 67 per 100 for 14/14 or better "corrected" near vision in the Northeast and West and 62 in the South—each slightly below those for "corrected" acuities at distance. Here again the regional differences by age followed no consistent pattern.

White adults in each region were found more likely than their Negro counterparts to have near acuity, with their usual correction, of at least 14/14. This finding is similar to the findings for distance vision, the only exception being among women in the West, where the racial differences in the rates for near vision were negligible. At the poorer end of the acuity range (14/70 or less with "correction") the rates for Negroes consistently exceeded those for white persons (table 6).

Area of Residence

In general, slightly more rural than urban residents were found to have acuity the equivalent of 20/20 or better, with or without their usual correction, though the differences by age were consistently in that direction only for uncorrected vision among men (fig. 8.)

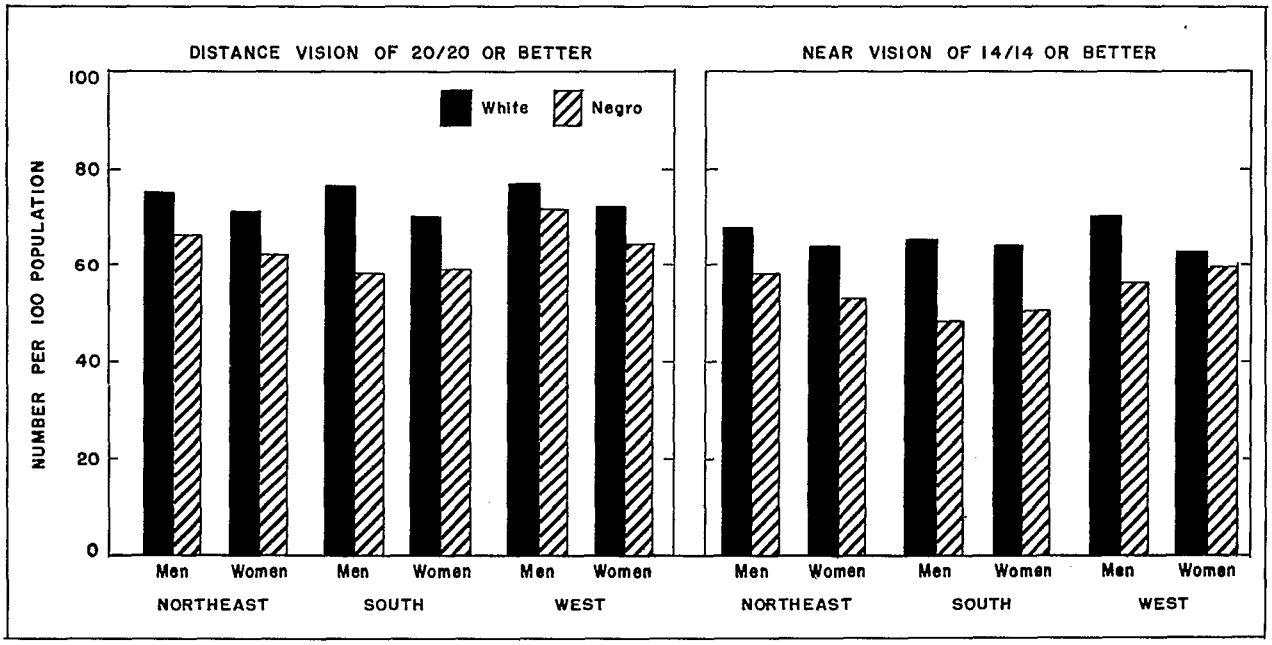

Figure 7. Number of adults per 100 population with "corrected" distance and near visual acuity the equivalent of 20/20 or better, by region for white and Negro men and women.

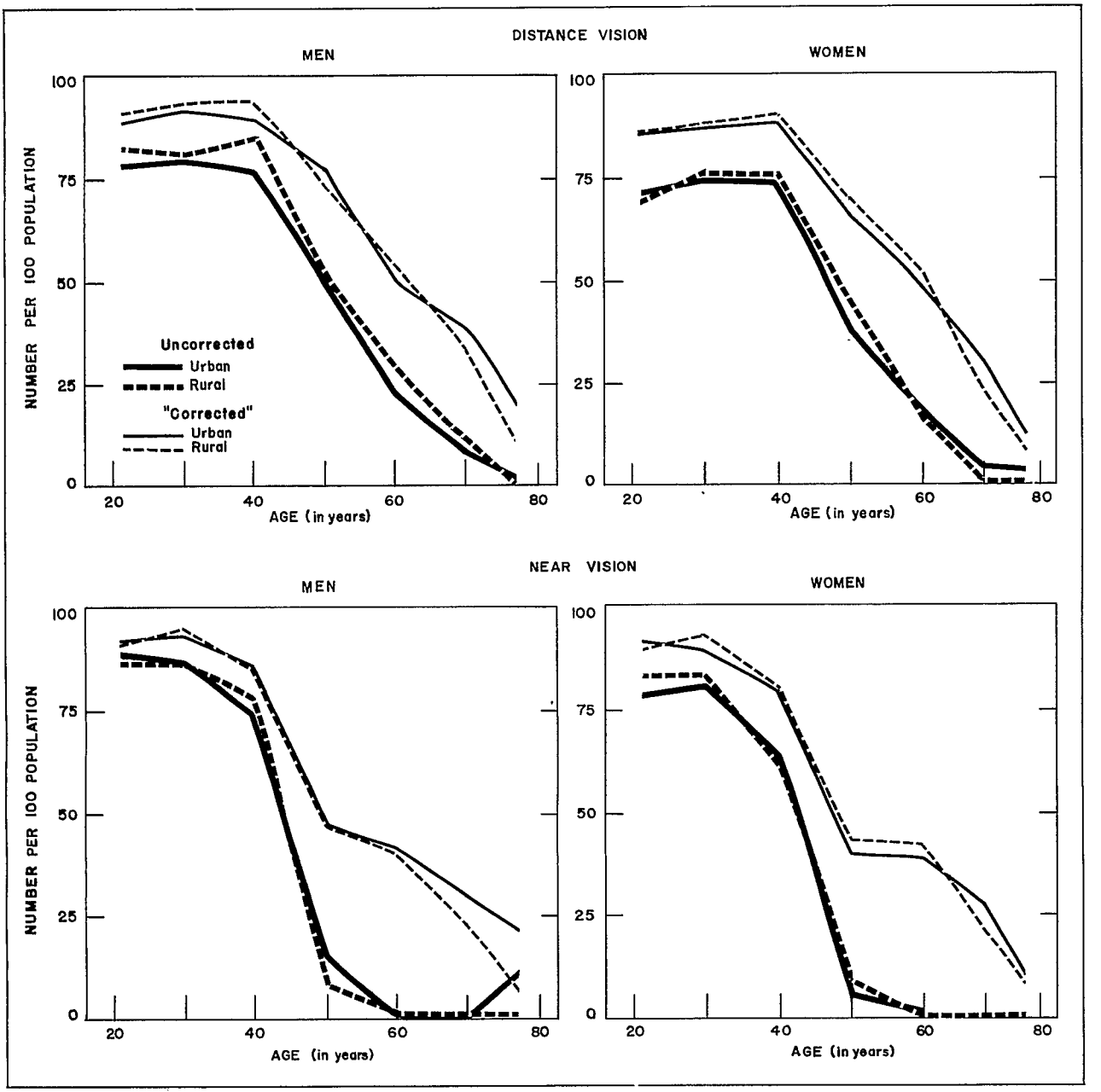

Figure 8. Number of adults per 100 population in urban and rural areas with uncorrected and "corrected" distance and near visual acuity the equivalent of 20/20 or better, by sex and age.

Distance vision.—Men with acuities of 20/20 or better, at distance, without correction, were found more frequently in rural or small urban areas than in larger metropolitan communities. The rates ranged from 50 to 52 per 100 in the giant and other very large metropolitan areas and from 57 to 61 in the other metropolitan, other urban, and rural areas. The rates for women were consistently lower and followed a somewhat similar but less distinct pattern than for men (tables 7 and 8).

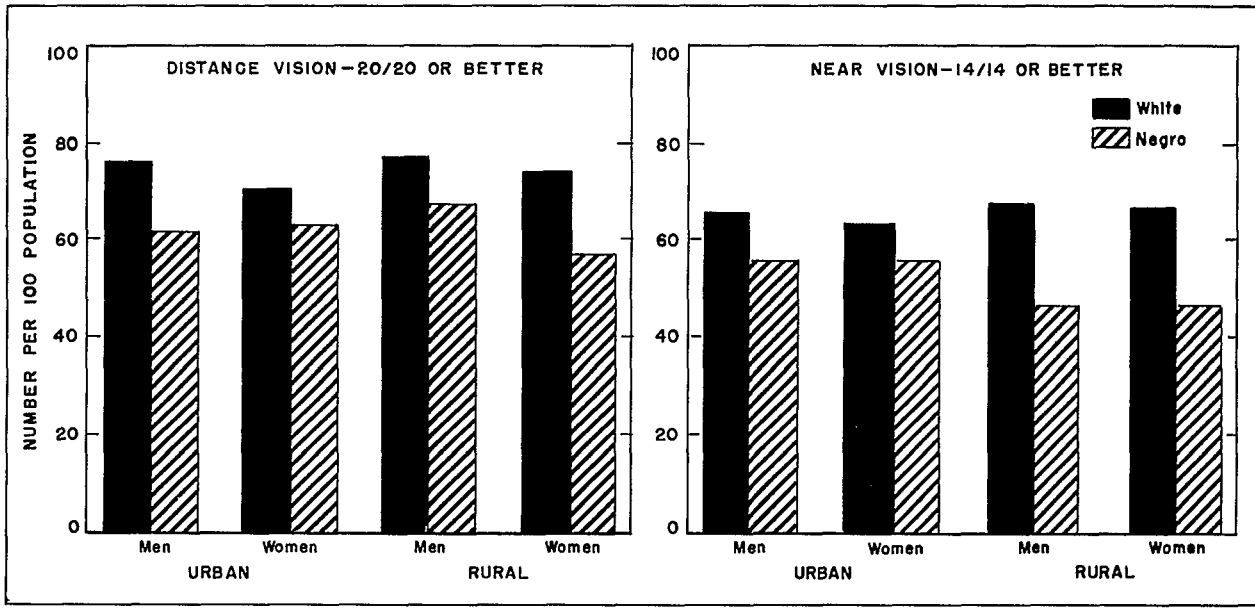

Figure 9. Number of adults per 100 population in urban and rural areas with "corrected" distance and near visual acuity the equivalent of 20/20 or better, for white and Negro men and women.

Persons with acuity at the other extreme of the range—20/100 or less, uncorrected—were found about as frequently in one type of area as another.

With whatever correction was normally used, no consistent pattern of urban-rural differences in acuity levels was observed.

Near vision.—With respect to their near acuity levels, urban and rural residents also tended to be similar and no distinct pattern of variation with population density of their place of residence was observable. The rates for better near central acuity (14/14 or better), uncorrected, ranged from 40 per 100 in the giant metropolitan areas to 46 in other urban and rural sectors.

No pattern of urban-rural difference by age for either men or women emerged either with or without usual correction for near acuity.

Race.—The pattern of racial differences previously noted was observed in urban as well as rural areas. White adults more frequently than Negro adults in both types of communities were found to have "corrected" distance and near vision the equivalent of 20/20 or better. Among white women, but not men, the better vision rates (with usual correction) were somewhat higher in rural than urban areas, while for Negro men and women the reverse was found (fig. 9 and table 9).

Poorer "corrected" acuities of 20/100 or less at distance were found as frequently among adults in urban areas as in rural areas for either racial group. The corresponding levels for "corrected" near vision (14/70 or less) were found more frequently among Negroes in rural than urban areas.

Education

A positive association was found for men and women between visual acuity and educational level attained, for both distance and near vision, with or without usual correction. The rate for those testing the equivalent of 20/20 or better increased with the number of years completed throughout the high school period but slowed down or dropped off slightly among those who had some education beyond high school (tables A and 10). (Uncorrected acuities are shown only for better distance vision in this and subsequent sections.) This pattern was to some extent age-associated since those with the least education included a disproportionately smaller number of younger persons and more older persons than the

Table A. Actual and expected rates for adults reaching specified acuity levels for uncorrected and "corrected" distance vision and "corrected" near vision, by sex and education: United States, 1960-62

Acuity level[1] and education	Men		Women	
	Actual	Expected[2]	Actual	Expected[2]
DISTANCE: 20/20 OR BETTER				
Uncorrected	Rate per 100 population			
Under 5 years	28.1	36.9	17.9	32.1
5-8 years	42.4	44.8	37.5	38.2
9-12 years	69.3	65.4	59.8	57.7
13 years and over	62.6	65.3	53.6	54.8
With usual correction				
Under 5 years	35.1	59.4	27.2	54.8
5-8 years	61.3	65.7	54.0	60.8
9-12 years	84.6	81.8	79.8	76.2
13 years and over	88.4	81.4	82.7	74.0
DISTANCE: 20/100 OR LESS				
With usual correction				
Under 5 years	8.9	3.9	15.1	4.7
5-8 years	2.9	3.1	3.4	3.8
9-12 years	0.8	1.2	1.4	1.9
13 years and over	0.6	1.3	1.0	2.1
NEAR: 14/14 OR BETTER				
With usual correction				
Under 5 years	23.7	47.6	17.0	46.5
5-8 years	46.4	54.7	44.4	51.0
9-12 years	78.0	74.0	73.6	69.6
13 years and over	85.8	75.1	74.3	67.1
NEAR: 14/70 OR LESS				
With usual correction				
Under 5 years	22.4	8.3	24.7	6.9
5-8 years	7.4	7.1	6.1	5.9
9-12 years	2.3	3.6	1.7	3.1
13 years and over	0.6	3.4	1.9	3.4

[1]Acuity levels in terms of Snellen ratio.

[2]Rates expected if the age-sex specific rates for all educational groups combined are applied within each of these educational groups.

other groups. Expected rates were obtained by applying the age-sex specific rates for all adults to those within the various education groups. When actual rates were compared with those expected, better acuities (the equivalent of at least 20/20) were found substantially less frequently and poorer acuities (the equivalent of 20/100 or less) more frequently than expected among those with the least education (i.e., less than 5 years of schooling completed); while those with education beyond high school were found more frequently than expected to have better acuity.

Relatively more men than women were found to test the equivalent of 20/20 or better with usual correction at distance and near, regardless of educational level. At distance, the differences were statistically significant for those with less than 9 years' schooling. For near vision, they were greater than would be expected by chance among those with the least (less than 5 years) and the most (13 years or more) education. These differences were also to some extent age-associated.

Income

A positive association was also found between visual acuity, with or without usual correction, and size of family income. The proportion testing the equivalent of 20/20 or better at distance or near increased steadily with income size but at a diminishing rate which slowed or reversed slightly at the highest income bracket (tables B and 11). Rates at the other extreme of the acuity scale decreased as the income level increased. This trend, as for educational level, was strongly age-related since those in the lower income brackets included a disproportionate number of older persons and fewer younger adults under 45 years. Nonetheless, when allowance was made for age, there persisted a strong positive association between income and visual acuity. Better acuity rates were below those expected among adults in the lowest income bracket and higher than expected at the other extreme.

The pattern was less distinct for uncorrected distance vision among men partly because the age gradient among them was somewhat less rapid than for women and less rapid than for other measures of visual acuity for either men or women. There was a distinct deficit of persons with "better" visual acuity, uncorrected, among those with incomes less than $2,000, even when allowance was made for age.

Occupation and Industry

Roughly 55 percent of persons in this age range were employed—slightly in excess of 80 percent of the men and 30 percent of the women.

Among this employed group, the rates for persons testing the equivalent of 20/20 or better with usual correction at distance and near were in general higher than expected for the white-collar workers—those in professional, managerial, and clerical-sales work—and below that for the general population among farmers, laborers, and service employees for both men and women (tables C and 12).

With direct age adjustment to eliminate the differences in age distribution among the various occupational groups, the differences in the ratio were reduced somewhat but the general pattern remained. These differences possibly reflect such factors as differing employment practices and physical demands of the job.

At the other end of the acuity scale, 20/100 or less, the number of employed persons in the sample was too small to adequately reflect any trend that might have been present in the population.

By industry of employment, no consistent pattern of differences was found in the proportion testing 20/20 or better at distance with usual correction, as expected with the wide range of occupations within these industries. The sample of examinees was too small to provide reliable data on acuity levels for employees in specific types of occupations within the various classes of industry.

COMPARISON WITH OTHER STUDIES

Previous studies have suggested possible racial, geographic, and size-of-place differences in visual acuity levels of the adult population. Comparison of findings from these studies with those from the present survey is, at best, difficult because of differences in the populations studied and in the testing methods and scoring criteria used.

Table B. Actual and expected rates for adults reaching specified acuity levels for uncorrected and "corrected" distance vision and "corrected" near vision, by sex and family income: United States, 1960-62

Acuity level[1] and family income	Men		Women	
	Actual	Expected[2]	Actual	Expected[2]
DISTANCE: 20/20 OR BETTER				
Uncorrected	Rate per 100 population			
Under $2,000	37.8	41.4	31.6	37.7
$2,000-$3,999	54.8	53.3	50.3	48.2
$4,000-$6,999	66.0	62.8	56.3	56.6
$7,000-$9,999	64.6	64.8	59.4	56.3
$10,000 and over	54.4	58.9	60.2	53.9
With usual correction				
Under $2,000	47.2	61.8	48.6	59.0
$2,000-$3,999	69.6	71.8	69.8	68.9
$4,000-$6,999	82.1	79.9	76.8	75.5
$7,000-$9,999	85.9	81.6	80.1	75.0
$10,000 and over	83.4	77.2	79.7	73.5
DISTANCE: 20/100 OR LESS				
With usual correction				
Under $2,000	6.2	3.7	6.2	4.2
$2,000-$3,999	3.1	2.5	2.6	2.8
$4,000-$6,999	1.2	1.4	1.7	2.0
$7,000-$9,999	0.5	1.2	1.3	2.1
$10,000 and over	0.3	1.6	0.7	2.3
NEAR: 14/14 OR BETTER				
With usual correction				
Under $2,000	40.1	53.3	40.9	47.8
$2,000-$3,999	58.4	64.2	60.3	61.2
$4,000-$6,999	74.3	71.5	71.1	68.7
$7,000-$9,999	76.2	73.0	74.9	67.4
$10,000 and over	77.7	66.7	70.0	63.9
NEAR: 14/70 OR LESS				
With usual correction				
Under $2,000	13.3	7.2	11.5	6.2
$2,000-$3,999	7.3	5.3	4.1	4.3
$4,000-$6,999	2.7	4.1	2.1	3.2
$7,000-$9,999	1.8	3.8	0.8	3.4
$10,000 and over	1.0	4.9	1.3	3.8

[1]Acuity levels in terms of Snellen ratio.

[2]Rates expected if the age-sex specific rates for all income groups combined are applied within each of these income groups.

Table C. Actual, expected, and age-adjusted rates for adults reaching specified acuity levels for "corrected" distance and near vision, by sex and occupation: United States, 1960-62

Acuity level[1] and occupation[2]	Men			Women		
	Actual	Expected[3]	Age-adjusted[4]	Actual	Expected[3]	Age-adjusted[4]
	Rate per 100 population					
Distance: 20/20 or better						
Professional	88.5	82.8	82.6	82.1	75.8	78.2
Managerial	82.3	76.6	82.3	83.3	69.5	78.5
Farm	61.5	68.0	72.1	59.7	67.9	68.3
Clerical-sales	84.6	80.6	79.8	83.2	77.5	77.7
Craftsmen	82.4	80.0	78.6	79.0	69.6	71.9
Operatives	85.4	83.8	78.0	72.3	74.7	68.5
Service	68.9	76.5	67.1	68.9	71.1	68.6
Laborers	71.4	79.6	67.8	60.7	75.8	60.5
Distance: 20/100 or less						
Professional	1.0	1.2	0.9	1.4	1.9	1.0
Managerial	0.5	1.7	0.7	-	*	*
Farm	0.8	2.6	0.5	-	*	*
Clerical-sales	2.0	1.3	2.2	0.3	1.7	0.4
Craftsmen	1.1	1.4	1.6	-	*	*
Operatives	0.5	0.9	0.6	0.9	2.0	0.8
Service	0.7	1.7	1.1	2.9	2.5	2.7
Laborers	3.4	1.3	3.9	3.0	*	*
Near: 14/14 or better						
Professional	85.3	76.3	77.7	72.6	67.4	67.5
Managerial	76.4	64.7	75.4	62.4	55.9	65.4
Farm	45.8	54.9	60.9	37.9	53.3	54.5
Clerical-sales	77.1	72.7	71.1	77.5	69.9	73.1
Craftsmen	70.9	71.0	66.3	51.1	59.7	61.4
Operatives	75.1	76.2	66.0	61.8	65.7	59.2
Service	62.7	67.5	62.1	56.2	62.0	57.5
Laborers	57.4	71.0	55.8	58.1	70.2	52.1
Near: 14/70 or less						
Professional	1.3	3.2	1.5	-	*	*
Managerial	2.1	5.4	2.3	-	*	*
Farm	11.4	7.1	6.8	5.1	4.7	2.8
Clerical-sales	0.9	3.8	0.9	0.2	2.8	0.1
Craftsmen	2.2	4.2	2.0	4.1	*	*
Operatives	3.4	3.2	3.8	2.6	3.4	2.3
Service	7.8	4.9	7.1	5.6	4.0	5.0
Laborers	10.6	4.1	10.9	8.7	*	*

[1]Acuity levels in terms of Snellen ratio.

[2]Current or usual occupation, following 1960 U.S. census classification.

[3]Rates expected if the age-sex specific rates for the entire United States are applied within each of these occupational classes.

[4]Age-adjusted rates obtained by applying the age-sex specific rates for each occupational class are applied to the total adult population for the United States within each age-sex class.

Poorer visual acuity among white than Negro adults was found by Karpinos among selectees and Army inductees 18-39 years of age in 1943[6] and among Selective Service registrants 18-26 years of age in 1957-58[7] as well as by McDowell and Meroney among National Youth Administration persons in 1942.[8] Findings from the present survey, for 20/20 or better, did not show a significant or consistent racial difference by age. A lower proportion of Negro than white men 18-24 and 35-44 years of age were found to test 20/20 or better, but there was a reversal at 25-34 years of age. If, however, the level is set at 20/30 or better, present findings show a rate for Negro adults consistently exceeding that for white persons. Whether this point of disagreement with the previous studies is due to differences in the population studied (a relatively small random sample of the general population compared with large groups of Armed Forces selectees and registrants or economically needy youths) or to a difference in testing and scoring criteria cannot definitely be determined from the data available.

Some evidence of the slower rate of diminution in visual acuity with age for Negroes suggested by the Karpinos data[6] may be seen in the present report for men up to 45 years of age but not beyond.

The consistently better visual acuity (20/30 or better) rates among Negroes than white persons indicated by Gover and Yankey[9] among low income farm families in 1940 is also shown, with minor exceptions, in the present study.

Regional differences within this country in the prevalence of blindness (there was a higher rate in the South than in the Northeast or West) were found in studies of Hurlin in 1950[10] and 1952.[11] Rambo and Sangal in their study of 1960[12] observed that the onset of presbyopia increases with geographic latitude. This observation was based primarily on the age at which patients are driven to seek prescriptions for reading corrections in various countries. The range of latitude within this country is probably not sufficient to give any further information on the latter aspect. As for the prevalence of blindness, the sample of examinees was too small to insure adequate representation of those with such seriously defective vision in the present study. Nor was reliable information available on the extent to which other degrees of defective visual acuity may follow the pattern of distribution for the blind. Actually the proportion testing less than 20/100 with usual correction in the present study was higher in the South than in the other two regions, while for the group testing less than 20/200—which included most of the blind as well as others whose acuity was correctable above this level—the rates (less than 20/200) for the South and West were similar and higher than that for the Northeast. However, the sampling errors of these rates are so large that the findings cannot be considered reliable indicators of the actual prevalence of blindness in these regions.

SUMMARY

Binocular central visual acuity findings by region and selected demographic characteristics for adults 18-79 years of age in the noninstitutional population of the United States as determined from the Health Examination Survey during 1960-62 are analyzed in this report.

Negro adults, both men and women, were found to have better uncorrected visual acuity at both distance and near than white adults—that is, relatively more reached the equivalent of 20/30 or better and fewer did not exceed the equivalent of 20/100. Racial differences at the level of 20/20 or better, as previously reported, however, were negligible. With their usual correction, visual acuity for Negro adults tended to be substantially poorer than that for white persons—that is, the proportion of Negroes testing the equivalent of 20/20 or better was markedly less.

Essentially no pattern of differences in the distribution of acuity levels was found among the three regions into which the country was divided for the purposes of this study, although the rates in the South for those testing the equivalent of 20/20 or better with usual correction were lower than in the other two regions.

A positive association was found between visual acuity of 20/20 or better and educational level attained and between this level of visual acuity and annual family income, both primarily due to the age gradient for this level of visual acuity, but some association remained after age-adjustment.

For the employed group, visual acuity was better (relatively more tested 20/20 or better) among white-collar than blue-collar workers—both men and women—possibly reflecting differing employment practices and physical demands of the work within these various occupations. The pattern of visual acuity levels by industry within the broad groupings considered here (that is, the pattern which can be considered reliably with a sample of the size used here) is not consistent, as expected, because of the wide variety of jobs within each industry grouping.

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DETAILED TABLES

Table 1. Number of white and Negro adults per 100 population reaching specified acuity levels for uncorrected and "corrected" distance vision, by sex and age: United States, 1960-62

Sex and age	White						Negro					
	Uncorrected acuity			"Corrected" acuity			Uncorrected acuity			"Corrected" acuity		
	20/20 or better	20/30	20/100 or less	20/20 or better	20/30	20/100 or less	20/20 or better	20/30	20/100 or less	20/20 or better	20/30	20/100 or less
	Number per 100 population											
Both sexes												
Total, 18-79 years	53.7	14.7	17.2	74.2	16.8	2.2	56.1	21.4	8.1	62.3	24.7	3.4
18-24 years	75.3	9.4	15.3	89.7	8.9	0.3	77.5	14.8	7.7	79.7	15.5	0.4
25-34 years	77.8	8.8	13.4	91.0	6.4	0.4	77.3	15.7	7.0	81.4	14.1	2.2
35-44 years	77.3	10.3	12.4	91.9	5.9	0.3	74.8	16.5	8.7	76.5	17.5	1.7
45-54 years	45.1	22.3	32.6	73.0	19.1	2.0	42.7	34.2	23.1	54.9	30.1	4.5
55-64 years	21.5	21.2	57.3	52.3	32.2	3.5	20.1	28.0	51.9	31.4	43.5	6.6
65-74 years	5.6	19.3	75.1	33.9	37.9	8.1	14.6	19.8	65.6	16.5	46.6	7.9
75-79 years	1.8	12.4	85.8	16.4	38.4	11.2	-	13.7	86.3	-	33.6	11.1
Men												
Total, 18-79 years	57.3	14.8	13.1	76.9	14.9	1.9	60.0	23.1	4.4	63.7	24.0	2.8
18-24 years	80.3	8.5	6.6	91.6	7.5	-	75.3	17.4	-	77.6	17.4	-
25-34 years	79.5	7.1	7.8	93.0	4.6	0.7	85.6	11.1	-	85.6	12.9	-
35-44 years	80.5	8.0	4.8	93.2	4.6	0.2	76.1	15.4	4.8	76.1	16.9	2.7
45-54 years	49.4	21.4	10.5	76.9	16.5	1.3	55.8	35.0	1.8	61.9	29.6	1.8
55-64 years	25.1	25.9	21.7	53.4	31.7	3.4	23.0	37.5	13.6	37.2	35.3	6.0
65-74 years	8.8	23.1	35.4	38.6	33.9	7.1	15.3	27.8	8.8	15.3	48.5	13.3
75-79 years	1.3	18.4	40.7	20.5	38.9	10.6	-	8.7	21.2	-	27.5	-
Women												
Total, 18-79 years	50.4	14.6	20.8	71.8	18.6	2.5	52.9	20.0	11.1	61.1	25.2	4.0
18-24 years	71.2	11.3	11.1	87.8	10.2	0.6	78.8	12.9	3.7	81.7	14.4	0.8
25-34 years	76.2	10.3	7.7	82.0	8.2	0.2	71.4	18.9	6.6	77.3	15.3	4.4
35-44 years	74.2	12.4	7.0	90.7	7.1	0.4	73.4	17.7	4.0	76.8	18.1	0.7
45-54 years	40.6	23.2	18.8	69.2	21.7	2.7	27.2	33.9	12.7	48.0	30.5	7.2
55-64 years	17.8	16.9	39.7	51.2	32.7	3.5	12.9	18.8	26.7	25.6	5.7	7.1
65-74 years	2.4	16.3	55.2	29.2	41.9	9.1	10.2	13.3	33.8	17.6	44.7	2.6
75-79 years	1.8	6.1	47.8	12.4	38.0	11.8	-	17.8	27.2	-	39.8	22.2

Table 2. Number of white and Negro adults reaching specified acuity levels for uncorrected distance vision, by sex and age: United States, 1960-62

Sex and age	Total	20/20 or better	20/30	20/40-20/70	20/100 or less
			Number in thousands		
WHITE					
Both sexes					
Total, 18-79 years	97,745	52,447	14,327	14,194	16,777
Men					
Total, 18-79 years	46,561	26,678	6,867	6,908	6,108
18-24 years	6,264	5,034	530	286	414
25-34 years	8,999	7,158	640	500	701
35-44 years	9,956	8,017	800	657	482
45-54 years	8,766	4,343	1,874	1,632	917
55-64 years	6,660	1,684	1,723	1,815	1,438
65-74 years	4,590	420	1,057	1,495	1,618
75-79 years	1,326	22	243	523	538
Women					
Total, 18-79 years	51,184	25,769	7,460	7,286	10,669
18-24 years	7,230	5,152	748	528	802
25-34 years	9,656	7,363	993	559	741
35-44 years	10,723	7,964	1,329	683	747
45-54 years	9,286	3,788	2,149	1,605	1,744
55-64 years	7,333	1,324	1,237	1,869	2,903
65-74 years	5,685	152	926	1,480	3,127
75-79 years	1,271	26	78	562	605
NEGRO					
Both sexes					
Total, 18-79 years	11,413	6,407	2,438	1,645	923
Men					
Total, 18-79 years	5,194	3,117	1,198	648	231
18-24 years	739	557	129	53	-
25-34 years	902	772	100	30	-
35-44 years	1,184	902	181	44	57
45-54 years	1,148	645	399	83	21
55-64 years	737	179	274	187	97
65-74 years	382	62	106	180	34
75-79 years	102	-	9	71	22
Women					
Total, 18-79 years	6,219	3,290	1,240	997	692
18-24 years	966	763	124	43	36
25-34 years	1,370	983	257	41	89
35-44 years	1,391	1,024	245	67	55
45-54 years	1,162	342	391	286	143
55-64 years	732	116	138	291	187
65-74 years	467	62	62	190	153
75-79 years	131	-	23	79	29

Table 3. Number of white and Negro adults per 100 population reaching specified acuity levels for uncorrected and "corrected" near vision, by sex and age: United States, 1960-62

Sex and age	Uncorrected acuity			"Corrected" acuity		
	14/14 or better	14/21	14/70 or less	14/14 or better	14/21	14/70 or less
WHITE						
Both sexes	Number per 100 population					
Total, 18-79 years	44.4	8.5	32.7	66.2	19.9	3.6
Men						
Total, 18-79 years	47.3	7.4	30.6	68.3	17.4	4.0
18-24 years	87.4	7.2	3.3	92.1	7.2	-
25-34 years	86.0	5.1	4.4	93.6	4.1	0.5
35-44 years	74.8	12.4	4.8	86.2	10.6	0.9
45-54 years	13.2	11.5	47.7	51.4	25.5	6.6
55-64 years	0.9	2.6	70.7	43.2	28.2	8.3
65-74 years	-	1.9	75.9	29.2	37.9	9.4
75-79 years	7.6	1.2	62.7	18.4	27.8	13.5
Women						
Total, 18-79 years	46.7	9.6	34.6	64.2	22.3	3.3
18-24 years	79.3	11.6	3.7	91.3	7.2	0.2
25-34 years	82.8	9.9	4.1	91.8	2.5	0.3
35-44 years	63.3	16.2	10.6	81.0	12.5	1.1
45-54 years	7.3	10.5	50.8	43.2	33.7	4.2
55-64 years	0.8	3.3	75.7	41.1	39.2	4.9
65-74 years	-	1.8	82.0	26.4	42.1	10.2
75-79 years	-	1.4	85.0	10.0	35.1	17.0
NEGRO						
Both sexes						
Total, 18-79 years	46.6	11.2	26.5	53.0	19.6	11.4
Men						
Total, 18-79 years	47.8	9.8	23.8	52.8	17.0	12.9
18-24 years	89.3	6.1	-	91.6	6.1	-
25-34 years	93.7	4.8	-	95.1	3.4	-
35-44 years	16.3	15.8	4.8	75.5	16.6	2.7
45-54 years	3.4	13.4	40.7	12.1	28.7	24.8
55-64 years	-	6.8	59.5	17.8	20.6	29.3
65-74 years	-	8.5	65.8	2.8	33.5	34.4
75-79 years	-	-	40.0	-	10.1	17.4
Women						
Total, 18-79 years	45.6	12.4	28.7	53.2	21.8	9.2
18-24 years	85.7	8.6	1.0	88.6	9.3	1.0
25-34 years	72.8	19.9	6.3	80.1	15.5	4.4
35-44 years	63.0	16.5	10.9	69.1	18.4	2.8
45-54 years	4.7	11.5	53.8	19.6	30.6	20.5
55-64 years	-	1.9	75.3	8.8	30.6	19.6
65-74 years	-	5.6	72.6	5.6	46.2	19.4
75-79 years	-	-	68.9	-	22.0	60.2

Table 4. Number of adults per 100 population reaching specified acuity levels for uncorrected and "corrected" distance and near vision, by sex, age, and geographic region: United States, 1960-62

Region and acuity level	Total, 18-79 years	Men				
		18-79 years	18-24 years	25-34 years	35-44 years	45-54 years
	Number per 100 population					
NORTHEAST						
Distance—uncorrected						
20/20 or better	53.3	56.5	77.3	77.2	78.7	47.4
20/30	15.3	15.1	12.5	8.0	10.2	24.1
20/100 or less	16.4	13.2	5.2	8.1	4.3	12.3
Distance—"corrected"						
20/20 or better	73.1	75.5	87.8	90.8	90.5	76.6
20/30	17.3	16.0	11.6	6.8	5.8	18.5
20/100 or less	2.6	2.3	-	1.2	0.3	1.3
Near—uncorrected						
14/14 or better	45.8	48.9	86.4	87.9	75.4	14.7
14/70 or less	30.9	28.7	3.1	4.8	2.7	43.8
Near—"corrected"						
14/14 or better	65.5	67.5	90.4	95.2	85.5	47.6
14/70 or less	4.1	4.7	-	0.8	0.9	7.0
SOUTH						
Distance—uncorrected						
20/20 or better	54.6	58.9	81.9	84.2	76.0	51.2
20/30	14.5	15.3	9.6	6.2	11.8	21.2
20/100 or less	15.4	10.5	2.7	3.6	4.7	6.7
Distance—"corrected"						
20/20 or better	70.6	73.3	86.4	92.2	85.7	74.3
20/30	18.9	15.8	9.4	5.1	9.6	15.9
20/100 or less	2.8	2.6	-	0.3	1.4	2.4
Near—uncorrected						
14/14 or better	44.4	46.1	88.1	87.3	66.3	4.0
14/70 or less	32.7	29.5	0.5	3.8	7.6	51.3
Near—"corrected"						
14/14 or better	62.1	62.4	90.8	91.5	77.4	34.9
14/70 or less	5.4	5.7	-	0.3	2.2	9.3
WEST						
Distance—uncorrected						
20/20 or better	54.1	58.0	80.1	79.2	84.2	52.6
20/30	16.1	16.0	6.0	7.7	4.4	22.7
20/100 or less	16.3	12.4	9.0	9.2	6.0	8.2
Distance—"corrected"						
20/20 or better	74.4	77.2	94.0	94.0	96.3	74.5
20/30	17.3	15.5	4.7	4.3	2.9	18.8
20/100 or less	1.6	1.2	-	0.3	-	0.7
Near—uncorrected						
14/14 or better	44.1	47.5	87.2	84.5	81.7	14.7
14/70 or less	31.8	30.7	4.7	4.3	5.4	46.3
Near—"corrected"						
14/14 or better	66.5	69.6	93.1	94.1	92.1	53.6
14/70 or less	4.0	4.4	-	0.3	0.3	9.5

Table 4. Number of adults per 100 population reaching specified acuity levels for uncorrected and "corrected" distance and near vision, by sex, age, and geographic region: United States, 1960-62—Con.

Men			Women							
55-64 years	65-74 years	75-79 years	18-79 years	18-24 years	25-34 years	35-44 years	45-54 years	55-64 years	65-74 years	75-79 years
Number per 100 population										
24.7	9.2	-	50.4	71.1	75.8	71.4	40.8	18.3	1.2	4.3
19.9	21.5	7.8	15.5	9.6	10.6	14.2	24.2	20.2	18.8	-
23.9	33.2	50.9	19.3	10.7	7.5	8.2	14.0	33.4	56.5	47.9
53.0	37.1	3.2	71.1	85.4	87.7	88.1	67.1	54.5	28.4	18.6
29.9	34.9	42.9	18.4	10.8	8.9	9.2	20.7	27.8	43.0	37.5
4.8	7.7	17.3	2.8	1.6	0.9	0.3	3.0	1.6	11.2	13.8
1.2	-	-	43.0	76.7	80.3	65.8	10.0	0.7	-	-
68.4	80.9	66.7	33.0	3.6	5.7	11.5	48.0	71.6	79.9	81.7
36.7	33.3	7.4	63.6	88.6	90.1	80.1	42.0	38.3	28.3	10.9
9.9	12.1	21.1	3.6	0.5	0.9	1.4	6.0	2.8	11.2	15.7
22.3	6.4	-	51.3	73.0	76.5	78.5	31.8	10.9	4.9	-
28.6	16.9	21.0	13.9	11.5	10.2	12.4	23.6	15.4	9.2	6.9
24.4	33.5	37.5	19.2	9.4	6.6	3.3	22.4	44.0	53.2	41.2
48.2	29.4	8.2	68.5	86.5	85.8	87.8	60.8	36.2	28.6	8.8
30.4	40.1	30.7	21.3	11.6	11.2	10.3	26.7	44.1	39.6	30.6
6.4	5.6	16.1	3.0	0.3	1.3	-	5.3	6.6	5.0	21.3
0.8	-	-	43.0	83.7	81.5	60.0	1.3	-	-	-
71.6	72.5	58.3	35.3	3.5	3.3	9.9	62.7	83.4	84.3	88.9
34.3	22.7	8.2	61.9	92.2	89.0	72.3	36.4	33.3	24.6	12.3
16.0	8.3	15.1	5.2	0.3	0.6	0.5	9.9	10.5	11.6	35.9
26.7	10.9	2.5	50.2	67.9	73.3	73.8	44.5	21.5	3.5	-
32.0	28.8	23.1	16.1	12.7	14.4	11.6	24.9	15.2	18.3	17.3
15.2	33.8	32.0	20.3	10.8	8.5	7.1	18.1	39.0	50.7	44.2
52.9	40.7	34.0	71.6	86.2	87.7	90.5	71.8	53.1	28.3	5.6
36.1	32.2	37.5	19.0	12.4	7.9	5.5	21.7	33.3	42.9	44.9
0.4	8.4	2.2	2.1	-	0.4	0.7	1.5	3.8	8.0	6.7
1.0	-	14.6	40.6	78.3	81.9	61.8	9.2	1.2	-	-
68.6	70.7	58.1	33.0	3.0	3.7	10.9	43.1	73.2	80.8	79.6
48.3	23.4	27.1	63.3	90.7	91.0	83.0	43.2	41.4	21.1	5.6
6.6	11.6	8.3	3.6	-	0.8	2.3	3.0	6.2	9.9	16.4

Table 5. Number of white and Negro adults per 100 population reaching specified acuity levels for "corrected" distance vision, by geographic region, sex, and age: United States, 1960-62

Sex and age	Northeast				South				West			
	White		Negro		White		Negro		White		Negro	
	20/20 or better	20/100 or less	20/20 or better	20/100 or less	20/20 or better	20/100 or less	20/20 or better	20/100 or less	20/20 or better	20/100 or less	20/20 or better	20/100 or less
	Number per 100 population											
Both sexes												
Total, 18-79 years	73.9	2.6	64.0	2.9	73.4	2.5	59.1	3.9	75.1	1.6	68.5	2.8
Men												
Total, 18-79 years	75.9	2.4	66.3	2.2	77.0	2.4	58.8	3.4	77.7	1.1	72.0	1.9
18-24 years	89.0	-	67.3	-	90.4	-	76.1	-	95.3	-	91.3	-
25-34 years	91.1	1.4	85.0	-	93.7	0.4	84.3	-	94.4	0.3	91.3	-
35-44 years	91.7	0.3	77.1	-	90.7	0.5	63.9	5.3	97.1	-	96.2	-
45-54 years	75.9	1.4	85.3	-	80.3	2.6	53.9	1.6	76.1	0.4	58.7	3.4
55-64 years	54.3	5.2	33.7	-	49.4	6.2	42.9	7.4	55.4	-	23.1	8.4
65-74 years	39.0	6.8	-	26.7	32.1	4.5	18.6	9.8	40.9	8.6	32.5	-
75-79 years	3.3	18.1	-	-	11.3	22.3	-	-	34.7	2.2	-	-
Women												
Total, 18-79 years	71.9	2.8	62.2	3.4	70.6	2.6	59.3	4.3	72.5	2.0	64.8	3.7
18-24 years	86.0	1.7	83.3	-	88.1	-	80.2	1.3	89.6	-	84.5	-
25-34 years	89.4	-	76.6	8.5	86.0	0.8	85.0	3.2	91.2	-	58.6	-
35-44 years	89.2	0.4	77.7	-	90.6	-	76.5	-	92.3	0.5	75.9	4.0
45-54 years	69.4	2.8	42.4	6.2	63.9	4.3	48.2	9.4	73.0	1.6	55.3	-
55-64 years	56.4	1.7	28.6	-	40.6	7.0	15.1	4.6	53.2	2.9	51.9	24.4
65-74 years	29.1	11.4	-	-	30.5	5.2	19.2	3.8	28.4	8.3	26.4	-
75-79 years	19.6	14.5	-	-	12.5	18.2	-	28.4	5.8	6.9	-	-

Table 6. Number of white and Negro adults per 100 population reaching specified acuity levels for "corrected" near vision, by geographic region, sex, and age: United States, 1960-62

Sex and age	Northeast				South				West			
	White		Negro		White		Negro		White		Negro	
	14/14 or better	14/70 or less	14/14 or better	14/70 or less	14/14 or better	14/70 or less	14/14 or better	14/70 or less	14/14 or better	14/70 or less	14/14 or better	14/70 or less
	Number per 100 population											
Both sexes												
Total, 18-79 years	66.2	3.7	55.4	9.5	65.2	3.8	49.9	12.2	66.8	3.5	58.3	11.7
Men												
Total, 18-79 years	68.0	4.2	58.7	11.5	65.7	4.0	48.5	12.6	70.2	3.8	56.6	14.9
18-24 years	90.4	-	88.8	-	92.2	-	89.4	-	93.7	-	100.0	-
25-34 years	95.1	0.9	95.8	-	91.0	0.4	93.1	-	93.8	0.3	100.0	-
35-44 years	85.3	1.0	86.2	-	81.5	1.5	58.5	5.3	91.1	0.3	97.0	-
45-54 years	49.6	6.7	24.4	10.8	41.8	5.0	11.3	23.8	58.3	7.1	4.8	36.3
55-64 years	38.4	6.7	11.3	54.2	37.0	14.1	23.1	23.8	51.1	5.8	8.7	16.7
65-74 years	35.0	11.4	-	26.7	27.3	2.6	4.7	30.7	24.0	10.2	-	67.5
75-79 years	7.8	22.0	-	-	11.3	11.1	-	25.4	27.6	8.4	-	-
Women												
Total, 18-79 years	64.5	3.2	53.0	8.0	64.7	3.6	50.9	11.8	63.5	3.1	60.0	8.5
18-24 years	88.7	0.5	83.3	-	93.5	-	86.8	1.6	92.0	-	95.6	-
25-34 years	93.1	-	68.1	8.5	89.0	-	88.8	3.2	92.8	0.9	78.9	-
35-44 years	80.0	1.1	80.4	4.6	77.2	0.4	58.5	1.1	84.5	1.5	75.2	4.0
45-54 years	44.4	4.5	15.7	18.3	40.2	6.0	20.5	25.0	44.4	2.5	21.6	5.9
55-64 years	41.1	2.1	-	11.1	37.8	8.7	12.5	19.0	43.2	5.0	10.4	33.0
65-74 years	29.0	11.4	-	-	27.9	10.5	8.3	16.8	21.9	8.5	-	45.0
75-79 years	11.5	16.4	-	-	17.6	18.2	-	77.2	5.8	17.0	-	-

Table 7. Number of adults per 100 population in urban and rural areas reaching specified acuity levels for uncorrected and "corrected" distance and near vision, by sex and age: United States, 1960-62

Area and acuity level	Total, 18-79 years	Men				
		18-79 years	18-24 years	25-34 years	35-44 years	45-54 years
URBAN						
Distance—uncorrected		Number per 100 population				
20/20 or better	52.5	55.8	78.3	79.2	76.6	49.1
20/100 or less	16.6	12.8	6.9	6.8	5.8	8.2
Distance—"corrected"						
20/20 or better	72.2	75.2	88.8	91.9	89.5	76.7
20/100 or less	2.4	2.1	-	0.9	0.6	1.1
Near—uncorrected						
14/14 or better	44.1	47.4	87.5	86.5	73.3	14.5
14/70 or less	32.0	29.5	2.5	4.1	5.1	44.5
Near—"corrected"						
14/14 or better	64.5	67.2	91.7	93.1	85.8	47.2
14/70 or less	4.1	4.2	-	0.7	1.2	5.4
RURAL						
Distance—uncorrected						
20/20 or better	57.1	61.2	82.4	80.6	85.3	52.7
20/100 or less	15.0	11.1	3.3	8.3	3.5	11.7
Distance—"corrected"						
20/20 or better	74.3	76.6	91.4	93.3	94.2	72.6
20/100 or less	2.1	1.6	-	0.2	0.2	1.7
Near—uncorrected						
14/14 or better	46.1	48.0	86.5	86.3	78.0	7.8
14/70 or less	31.3	30.0	3.9	4.7	4.6	50.5
Near—"corrected"						
14/14 or better	65.7	66.8	91.0	95.0	84.7	46.7
14/70 or less	5.1	5.9	-	0.2	0.8	14.3

Table 7. Number of adults per 100 population in urban and rural areas reaching specified acuity levels for uncorrected and "corrected" distance and near vision, by sex and age: United States, 1960-62—Con.

Men			Women							
55-64 years	65-74 years	75-79 years	18-79 years	18-24 years	25-34 years	35-44 years	45-54 years	55-64 years	65-74 years	75-79 years
Number per 100 population										
22.9	8.0	1.8	49.6	71.1	74.5	73.4	37.1	17.9	3.8	2.4
22.8	35.5	38.8	19.9	10.1	7.3	6.7	18.3	39.3	51.0	49.7
50.3	38.8	22.5	69.8	86.0	86.7	88.2	65.5	48.1	30.5	12.9
4.4	7.5	9.1	2.6	0.3	0.5	0.4	3.6	4.8	6.7	13.9
0.9	-	10.4	41.2	78.4	80.4	63.1	6.1	1.0	-	-
68.7	78.2	53.4	34.1	3.5	3.8	11.7	50.2	75.0	81.7	79.5
41.1	29.6	21.5	62.3	91.1	88.5	78.8	39.4	37.3	26.7	9.8
10.4	10.4	12.1	4.0	0.2	0.5	1.4	6.2	6.4	10.1	20.2
28.7	11.7	-	52.9	69.9	76.7	75.8	44.3	16.3	0.7	-
16.2	29.7	40.2	19.0	10.8	7.9	6.2	17.5	36.6	60.9	34.3
53.8	33.3	11.5	72.2	86.1	87.8	90.5	69.6	51.3	23.0	7.4
1.9	7.6	11.2	2.6	1.4	1.5	0.3	2.2	1.1	13.2	9.4
1.2	-	-	44.3	83.1	82.7	62.3	8.9	-	-	-
70.9	69.4	77.0	32.7	3.0	5.3	9.1	52.2	76.3	80.5	88.6
39.3	22.7	7.6	64.6	88.9	92.8	79.2	43.6	40.2	20.6	7.4
10.4	12.6	17.4	4.3	0.4	1.3	1.7	6.0	5.6	12.9	20.5

Table 8. Number of adults per 100 population in urban areas reaching specified acuity levels for uncorrected distance and near vision, by size of place, sex, and age: United States, 1960-62

Sex and age	20/20 or better				20/100 or less			
	Giant metropolitan area	Other large metropolitan area	Other metropolitan area	Other urban area	Giant metropolitan area	Other large metropolitan area	Other metropolitan area	Other urban area
DISTANCE								
Both sexes	Number per 100 population							
Total, 18-79 years	49.0	49.3	53.5	55.4	17.7	17.9	16.7	14.7
Men								
Total, 18-79 years	50.1	52.4	57.4	59.8	15.1	14.1	12.8	9.9
18-24 years	79.0	82.7	76.3	79.1	8.2	2.1	6.6	9.7
25-34 years	68.4	77.4	87.4	76.0	15.0	7.2	2.1	7.7
35-44 years	75.7	62.3	77.4	83.8	7.1	8.3	6.3	2.8
45-54 years	50.4	43.2	46.3	57.9	8.2	12.1	9.4	2.6
55-64 years	15.1	27.1	25.2	24.1	21.3	34.0	24.6	14.3
65-74 years	-	8.3	9.6	12.1	42.9	20.8	39.8	34.6
75-79 years	-	9.7	-	-	31.2	52.9	43.7	21.0
Women								
Total, 18-79 years	48.1	46.6	50.0	51.7	19.9	21.2	20.1	18.6
18-24 years	71.5	59.2	72.1	75.4	9.6	20.9	10.4	3.6
25-34 years	66.1	73.9	72.8	82.8	12.6	10.2	6.3	4.0
35-44 years	72.1	67.5	73.2	79.4	7.8	13.0	5.4	3.2
45-54 years	41.2	38.6	31.3	40.1	16.2	17.7	17.9	21.0
55-64 years	21.9	14.9	20.3	12.2	34.3	33.6	42.9	39.7
65-74 years	1.9	3.7	7.2	-	46.1	49.5	49.8	58.0
75-79 years	-	-	6.5	-	54.5	27.5	68.5	27.2
Sex and age	14/14 or better				14/70 or less			
NEAR								
Both sexes	Number per 100 population							
Total, 18-79 years	40.4	43.8	44.8	46.1	31.3	32.1	32.9	30.9
Men								
Total, 18-79 years	44.1	46.6	47.5	50.8	30.8	29.8	30.1	27.0
18-24 years	84.2	97.8	85.4	87.4	1.7	-	2.6	4.5
25-34 years	80.4	82.5	91.8	85.5	6.8	5.9	2.2	3.9
35-44 years	83.4	67.3	70.6	73.8	3.6	2.8	4.9	8.0
45-54 years	15.2	14.5	13.2	16.7	35.8	44.0	50.8	40.9
55-64 years	2.5	-	0.9	-	62.7	65.7	73.6	67.5
65-74 years	-	-	-	-	88.5	83.4	77.1	66.9
75-79 years	-	-	-	46.5	81.1	56.8	48.3	45.7
Women								
Total, 18-79 years	37.4	41.4	42.4	42.2	31.6	34.0	35.3	34.2
18-24 years	74.0	70.2	81.6	79.3	-	9.3	4.5	0.8
25-34 years	73.9	80.0	78.3	88.0	4.2	3.1	4.8	2.3
35-44 years	58.5	67.9	62.2	66.1	13.4	12.1	13.1	6.9
45-54 years	8.1	12.0	3.1	4.3	37.6	50.4	55.7	52.5
55-64 years	-	2.3	0.6	1.8	64.8	79.1	82.0	68.8
65-74 years	-	-	-	-	84.9	66.4	79.9	91.0
75-79 years	-	-	-	-	77.1	77.5	73.2	92.4

Table 9. Number of white and Negro adults per 100 population in urban and rural areas reaching specified acuity levels for "corrected" distance and near vision, by sex and age: United States, 1960-62

Sex and age	Urban				Rural			
	White		Negro		White		Negro	
	20/20 or better	20/100 or less	20/20 or better	20/100 or less	20/20 or better	20/100 or less	20/20 or better	20/100 or less
DISTANCE								
Both sexes	Number per 100 population							
Total, 18-79 years	73.4	2.3	62.2	2.9	75.9	1.9	62.3	4.5
Men								
Total, 18-79 years	76.6	2.1	61.7	2.4	77.4	1.5	67.8	3.4
18-24 years	90.7	-	75.6	-	93.6	-	82.5	-
25-34 years	92.6	1.0	84.8	-	93.8	0.2	88.2	-
35-44 years	91.7	0.4	71.3	3.1	96.1	-	83.1	2.0
45-54 years	78.1	1.2	61.8	-	74.4	1.3	62.1	4.1
55-64 years	51.8	4.4	41.5	4.3	56.6	1.3	19.5	12.7
65-74 years	41.2	6.9	6.5	16.0	33.4	7.6	31.7	8.1
75-79 years	25.0	10.2	-	-	11.8	11.5	-	-
Women								
Total, 18-79 years	70.6	2.5	62.7	3.4	74.4	2.3	57.1	5.6
18-24 years	86.8	0.2	81.4	1.1	90.6	1.8	82.4	-
25-34 years	88.4	0.2	78.1	2.1	89.8	0.2	75.1	10.8
35-44 years	89.5	0.5	77.8	-	93.2	-	72.9	3.4
45-54 years	67.5	2.9	49.5	9.9	72.9	2.3	45.0	1.9
55-64 years	50.6	4.7	21.5	6.2	52.7	0.4	36.4	9.3
65-74 years	31.1	7.2	22.1	-	24.3	13.6	8.2	7.9
75-79 years	13.6	13.1	-	29.2	9.3	8.6	-	16.8
Sex and age	14/14 or better	14/70 or less	14/14 or better	14/70 or less	14/14 or better	14/70 or less	14/14 or better	14/70 or less
NEAR								
Both sexes	Number per 100 population							
Total, 18-79 years	65.5	3.5	55.7	9.3	67.6	3.9	46.8	16.4
Men								
Total, 18-79 years	68.3	3.5	55.7	11.3	68.3	5.0	46.7	16.1
18-24 years	91.8	-	93.9	-	92.6	-	85.4	-
25-34 years	92.6	0.7	95.9	-	95.2	0.2	92.4	-
35-44 years	86.7	1.0	75.8	3.1	85.3	0.7	75.0	2.0
45-54 years	50.5	4.2	15.0	17.9	53.2	11.4	8.6	33.2
55-64 years	43.8	8.3	22.2	27.4	42.0	8.4	-	37.3
65-74 years	31.8	8.5	-	35.3	23.9	11.0	7.9	32.7
75-79 years	23.9	11.3	-	19.4	7.8	17.8	-	-
Women								
Total, 18-79 years	63.1	3.5	55.7	7.7	66.8	2.8	46.8	16.5
18-24 years	91.1	0.2	90.4	-	91.6	-	84.1	3.4
25-34 years	90.0	0.2	81.3	2.1	95.0	0.3	76.8	10.8
35-44 years	80.6	1.3	70.6	2.0	81.7	0.6	63.6	5.8
45-54 years	41.7	4.2	19.6	21.2	46.6	4.0	19.4	19.0
55-64 years	40.1	5.4	8.6	16.4	43.6	3.6	9.3	28.1
65-74 years	27.9	10.0	8.3	11.2	22.4	10.9	-	36.3
75-79 years	10.3	18.6	-	49.3	9.3	12.7	-	68.6

Table 10. Number of adults per 100 population reaching specified acuity levels for "corrected" distance and near vision, by sex, age, and education: United States, 1960-62

Acuity level and education	Total, 18-79 years	Men				
		18-79 years	18-24 years	25-34 years	35-44 years	45-54 years
	Number per 100 population					
Distance: 20/20 or better						
Under 5 years	31.2	35.1	81.9	68.9	66.1	41.2
5-8 years	57.6	61.3	84.5	87.3	85.0	71.8
9-12 years	81.9	84.6	88.6	93.2	92.0	81.8
13 years and over	85.7	88.4	95.2	95.2	97.1	81.0
Unknown	42.8	51.8	100.0	90.0	87.0	63.0
Distance: 20/100 or less						
Under 5 years	12.0	8.9	-	-	4.9	9.3
5-8 years	3.1	2.9	-	1.5	1.0	1.0
9-12 years	1.1	0.8	-	0.3	0.4	0.7
13 years and over	0.8	0.6	-	0.5	-	-
Unknown	8.1	8.6	-	10.0	-	-
Near: 14/14 or better						
Under 5 years	20.4	23.7	82.0	72.5	45.3	13.1
5-8 years	45.4	46.4	86.6	84.5	75.7	35.4
9-12 years	75.5	78.0	90.3	95.6	89.7	53.1
13 years and over	80.4	85.8	97.6	96.7	90.1	72.1
Unknown	30.5	31.0	100.0	90.0	55.4	23.3
Near: 14/70 or less						
Under 5 years	23.5	22.4	-	-	12.9	23.1
5-8 years	6.8	7.4	-	1.5	2.5	8.2
9-12 years	1.9	2.3	-	0.3	0.6	8.1
13 years and over	1.2	0.6	-	-	-	-
Unknown	12.9	17.1	-	10.0	-	26.4

Table 10. Number of adults per 100 population reaching specified acuity levels for "corrected" distance and near vision, by sex, age, and education: United States, 1960-62—Con.

Men			Women							
55-64 years	65-74 years	75-79 years	18-79 years	18-24 years	25-34 years	35-44 years	45-54 years	55-64 years	65-74 years	75-79 years
Number per 100 population										
34.8	17.5	-	27.2	48.2	45.7	50.0	27.3	34.7	4.7	-
49.3	27.9	21.0	54.0	73.6	76.6	88.4	60.3	37.2	26.7	-
59.0	52.8	31.4	79.8	87.2	89.8	89.6	72.9	56.7	40.2	28.4
56.6	77.9	74.4	82.7	92.0	91.4	94.4	74.0	67.5	51.9	29.9
41.6	22.9	-	31.5	100.0	100.0	100.0	43.8	30.1	8.9	-
9.8	11.7	12.5	15.1	8.9	15.7	2.4	12.1	5.9	29.2	26.6
1.4	9.4	7.7	3.4	0.9	1.3	-	3.1	2.9	7.9	10.8
4.1	2.1	-	1.4	0.5	0.5	0.5	3.1	3.9	-	10.9
3.8	-	-	1.0	-	-	-	0.7	3.8	5.4	-
4.9	15.9	35.8	7.4	-	-	-	7.4	8.2	6.2	17.9
19.7	17.1	-	17.0	43.5	42.0	29.9	10.3	16.3	4.2	-
29.8	22.9	18.8	44.4	76.9	78.1	71.3	32.5	33.7	24.8	2.0
51.6	38.9	23.7	73.6	92.0	92.5	82.3	47.9	42.3	32.7	28.4
69.3	43.5	75.3	74.3	97.0	96.6	85.7	43.5	49.3	44.8	-
9.0	16.5	-	29.8	100.0	100.0	56.6	31.7	38.9	10.6	-
39.8	22.5	10.5	24.7	-	15.7	11.3	28.6	14.2	44.6	32.1
9.7	11.9	16.1	6.1	1.2	-	4.5	9.0	6.8	7.4	12.9
5.3	-	-	1.7	0.2	0.6	0.4	3.5	5.2	0.7	18.0
3.6	2.8	-	1.9	-	-	-	1.8	3.0	7.3	51.3
11.3	29.4	32.3	7.6	-	-	-	15.4	5.9	6.2	9.3

Table 11. Number of adults per 100 population reaching specified acuity levels for "corrected" distance and near vision, by sex, age, and family income: United States, 1960-62

Acuity level and family income	Total, 18-79 years	Men				
		18-79 years	18-24 years	25-34 years	35-44 years	45-54 years
	Number per 100 population					
Distance: 20/20 or better						
Under $2,000	48.0	47.2	82.1	84.2	72.1	52.5
$2,000-$3,999	69.7	69.6	90.7	89.3	85.4	74.5
$4,000-$6,999	79.4	82.1	91.2	92.7	91.7	79.6
$7,000-$9,999	83.1	85.9	89.0	95.8	95.0	77.4
$10,000 and over	81.6	83.4	96.1	95.7	94.9	80.7
Unknown	67.4	72.7	85.0	92.6	91.9	68.8
Distance: 20/100 or less						
Under $2,000	6.2	6.2	-	-	1.9	3.2
$2,000-$3,999	2.8	3.1	-	0.4	1.6	3.6
$4,000-$6,999	1.5	1.2	-	1.1	0.6	1.7
$7,000-$9,999	0.9	0.5	-	-	-	-
$10,000 and over	0.5	0.3	-	-	-	-
Unknown	3.0	1.7	-	2.3	-	-
Near: 14/14 or better						
Under $2,000	40.6	40.1	84.3	89.9	61.7	37.6
$2,000-$3,999	59.4	58.4	92.9	90.0	77.9	35.3
$4,000-$6,999	72.7	74.3	92.2	94.7	86.5	50.2
$7,000-$9,999	75.5	76.2	94.2	97.3	88.5	46.8
$10,000 and over	73.9	77.7	90.9	95.7	90.4	57.2
Unknown	57.3	61.7	91.6	90.6	89.4	42.0
Near: 14/70 or less						
Under $2,000	12.3	13.3	-	-	3.4	11.3
$2,000-$3,999	5.5	7.3	-	0.4	2.6	22.9
$4,000-$6,999	2.4	2.7	-	0.7	1.2	7.2
$7,000-$9,999	1.3	1.8	-	-	-	4.0
$10,000 and over	1.2	1.0	-	-	-	3.2
Unknown	6.7	7.5	-	2.3	2.1	9.6

Table 11. Number of adults per 100 population reaching specified acuity levels for "corrected" distance and near vision, by sex, age, and family income: United States, 1960-62—Con.

Men			Women							
55-64 years	65-74 years	75-79 years	18-79 years	18-24 years	25-34 years	35-44 years	45-54 years	55-64 years	65-74 years	75-79 years
Number per 100 population										
35.9	19.7	15.5	48.6	78.0	79.1	72.5	44.7	36.0	26.4	2.9
48.7	32.2	23.7	69.8	90.5	79.6	87.3	67.5	52.9	34.8	15.2
53.4	51.3	11.9	76.8	87.7	90.4	90.2	69.6	44.8	22.4	-
60.7	76.7	-	80.1	90.8	92.5	91.5	71.2	50.7	44.5	44.3
57.0	64.1	32.1	79.7	83.7	92.4	95.4	75.1	68.6	18.0	-
56.0	34.0	47.9	63.3	81.8	76.5	81.3	69.9	50.0	23.4	20.8
4.6	12.1	18.4	6.2	-	4.0	1.1	8.7	4.2	12.0	12.0
4.5	10.0	-	2.6	0.4	1.7	0.9	1.4	4.2	6.9	17.7
3.3	1.7	-	1.7	0.5	0.4	0.6	3.4	5.1	4.0	-
4.5	-	-	1.3	-	-	-	2.2	-	12.5	-
1.6	-	-	0.7	-	-	-	-	-	4.9	24.1
2.8	7.0	-	4.0	4.0	1.0	-	5.0	5.6	4.4	14.5
22.3	10.4	13.1	40.9	90.4	79.9	60.8	14.6	28.3	16.1	-
23.9	24.8	15.1	60.3	91.8	84.6	69.6	35.2	40.6	40.5	15.2
44.5	49.5	11.9	71.1	90.5	91.9	82.7	50.5	32.3	21.7	-
46.8	36.9	47.3	74.9	90.8	97.3	88.2	48.0	44.9	38.3	23.2
72.8	46.9	70.5	70.0	91.5	94.9	83.3	48.6	55.1	25.4	-
28.0	27.2	21.1	54.0	86.8	80.0	68.8	38.1	38.9	16.0	24.6
21.1	21.6	23.1	11.5	0.6	2.8	4.3	22.0	9.1	18.2	22.0
16.0	8.5	-	4.1	-	2.3	5.1	5.5	3.4	7.3	17.7
5.4	2.1	-	2.1	0.5	-	0.4	4.6	7.0	2.9	35.2
8.8	-	-	0.8	-	-	0.7	2.0	-	3.7	-
-	3.6	-	1.3	-	-	-	-	2.3	9.6	30.3
15.6	14.3	29.2	6.1	-	1.8	1.0	5.0	11.8	12.1	18.7

Table 12. Number of adults per 100 population reaching specified acuity levels for "corrected" distance and near vision, by sex, age, and occupation: United States, 1960-62

Acuity level and occupation	Total, 18-79 years	Men				
		18-79 years	18-24 years	25-34 years	35-44 years	45-54 years
	Number per 100 population					
Distance: 20/20 or better						
Professional	86.0	88.5	100.0	94.5	97.5	79.4
Managerial	82.5	82.3	100.0	95.2	92.4	80.6
Farm	61.4	61.5	100.0	96.4	83.6	63.7
Clerical-sales	83.8	84.6	92.2	93.1	93.3	84.4
Craftsmen	82.3	82.4	83.4	97.1	91.4	79.8
Operatives	81.5	85.4	90.9	90.1	92.2	82.5
Service	68.9	68.9	91.3	90.5	87.0	63.0
Laborers	70.0	71.4	88.6	76.5	89.7	59.6
Distance: 20/100 or less						
Professional	1.1	1.0	-	1.6	-	-
Managerial	0.4	0.5	-	-	0.9	-
Farm	0.7	0.8	-	-	-	1.6
Clerical-sales	1.0	2.0	-	1.5	0.9	-
Craftsmen	1.1	1.1	-	0.6	-	2.8
Operatives	0.6	0.5	-	-	-	1.6
Service	2.1	0.7	-	-	-	-
Laborers	3.4	3.4	-	2.5	3.0	4.5
Near: 14/14 or better						
Professional	80.3	85.3	100.0	96.8	92.5	69.0
Managerial	73.5	76.4	81.1	97.5	90.0	60.4
Farm	45.3	45.8	100.0	100.0	66.8	38.7
Clerical-sales	77.3	77.1	98.1	95.7	86.3	50.7
Craftsmen	70.4	70.9	86.2	94.6	86.6	41.8
Operatives	71.0	75.1	91.1	93.8	84.5	47.7
Service	58.7	62.7	95.0	92.6	79.1	46.9
Laborers	57.5	57.4	88.0	77.2	75.9	16.7
Near: 14/70 or less						
Professional	0.8	1.3	-	0.5	-	-
Managerial	1.7	2.1	-	-	0.9	2.8
Farm	10.9	11.4	-	-	-	12.7
Clerical-sales	0.5	0.9	-	1.5	0.9	-
Craftsmen	2.2	2.2	-	-	0.6	6.5
Operatives	3.2	3.4	-	-	1.2	10.0
Service	6.5	7.8	-	1.7	-	12.3
Laborers	10.4	10.6	-	2.5	6.5	27.2

Table 12. Number of adults per 100 population reaching specified acuity levels for "corrected" distance and near vision, by sex, age, and occupation: United States, 1960-62—Con.

Men			Women							
55-64 years	65-74 years	75-79 years	18-79 years	18-24 years	25-34 years	35-44 years	45-54 years	55-64 years	65-74 years	75-79 years
Number per 100 population										
56.3	69.1	-	82.1	92.3	84.9	99.0	67.6	75.7	45.0	-
60.4	67.1	-	83.3	*	*	*	*	*	-	-
48.1	28.9	-	59.7	*	*	*	*	*	-	-
50.8	60.8	-	83.2	91.4	87.5	92.2	73.3	66.3	29.8	100.0
55.5	47.0	44.5	79.0	*	*	*	*	*	-	-
53.7	52.0	-	72.3	92.4	81.8	83.0	61.3	51.4	33.7	-
41.5	5.0	-	68.9	80.4	90.7	82.2	62.5	42.7	45.7	-
33.5	57.5	-	60.7	*	*	*	*	*	*	-
4.0	-	-	1.4	-	-	-	5.8	-	-	-
-	5.6	-	-	-	-	-	-	-	-	-
1.1	-	-	-	-	-	-	-	-	-	-
12.2	-	-	0.3	-	-	-	-	2.8	-	-
-	9.8	-	-	-	-	-	-	-	-	-
2.2	-	-	0.9	-	-	-	1.7	3.6	-	-
-	11.8	-	2.9	1.0	2.5	-	4.7	8.5	-	-
9.0	6.9	-	3.0	-	-	-	-	*	-	-
53.4	48.5	-	72.6	94.3	91.5	89.9	41.9	54.0	19.3	-
71.4	45.6	-	62.4	*	*	*	*	*	-	-
33.0	15.4	-	37.9	*	*	*	*	*	-	-
54.1	34.3	-	77.5	93.4	91.5	80.6	55.4	61.4	59.3	-
48.6	27.5	-	51.1	*	*	*	*	-	-	-
27.7	44.0	-	61.8	92.4	93.3	63.6	42.6	29.2	24.2	-
25.7	16.3	-	56.2	89.0	92.5	74.5	27.3	20.8	30.2	-
18.1	71.6	-	58.1	*	*	*	*	*	-	-
9.8	-	-	-	-	-	-	-	-	-	-
2.9	11.9	-	-	-	-	-	-	-	-	-
14.1	25.2	-	5.1	-	-	-	-	*	-	-
3.1	-	-	0.2	-	-	-	0.8	-	-	-
4.7	-	-	4.1	-	-	-	*	-	-	-
11.6	-	-	2.6	-	-	1.7	5.0	7.6	-	-
19.3	18.1	-	5.6	-	2.5	2.5	11.6	13.9	-	-
17.4	14.1	-	8.7	*	-	-	*	*	-	-

APPENDIX I

DEMOGRAPHIC VARIABLES

Regional and demographic characteristics by which the population has been classified for this report are defined and limited as follows:

Race.—Visual acuity findings by race are limited here to those for white and Negro adults. The sample of examinees was too small to insure adequate representation of other nonwhite races. The racial classification follows that in the 1950 census, where Mexicans are included as white unless definitely known to be American Indian or of another nonwhite race.

Region.—Regional data are shown for the three major sections into which the conterminous United States was divided for these reports as follows:

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

Area of residence.—Population density of the place of residence for the purposes of this report was classified into rural or urban and the latter into four subgroups by size of urban place following the 1950 census definitions.

Giant metropolitan areas, those with a population of 3 million persons or more.

Other very large metropolitan areas, having a population of 500,000 to 3 million.

Other metropolitan areas, standard metropolitan statistical areas with less than 500,000 population.

Other urban areas, those that were highly urban in organization but not defined in 1950 as standard metropolitan areas.

Rural areas, primarily rural in composition—farm and nonfarm—according to the 1950 and 1960 census definitions.

Education.—Each person was classified by education in terms of the highest grade of regular school completed. A "regular" school is one which advances a person toward an elementary or high school diploma or a college, university, or professional school degree. Education in vocational, trade, or business schools outside of the regular school system was not counted in determining the highest grade of school completed.

Family income.—This was the total income of the family of which the person was a member. Within the household all persons related to each other by blood, marriage, or adoption constitute a family. Unrelated individuals were classified according to their own income. Income from all sources—wages, salaries, rents from properties, pensions, help from relatives, and so forth—received by members of the family in the 12-month period preceding the week of interview was included.

Occupation.—In general the occupation was that in which the person was employed at the time of the interview. If he was not working but was looking for work or laid off from work, his occupation was classified as his last full-time civilian job. The occupational classification follows that of the 1960 census.

Industry.—The industry in which the person was reportedly working was classified by the major activity of the establishment in which he worked, generally following the 1960 census definitions.

APPENDIX II

STATISTICAL NOTES

The Survey Design

The first cycle of the Health Examination Survey employed a highly stratified multistage probability design in which a sample of the civilian, noninstitutional population of the conterminous United States 18-79 years of age was selected. At the first stage, a sample of 42 primary sampling units (PSU's) was drawn from among the 1,900 geographic units into which the United States was divided. Random selection was controlled within regional and size-of-urban-place strata into which the units were classified. As used here a PSU is a standard metropolitan statistical area or one to three contiguous counties. Later stages result in the random selection of clusters of typically about four persons from a neighborhood within the PSU. The total sample included some 7,700 persons in 29 different States. The detailed structure of the design and the conduct of the survey have been described in previous reports.[2,3]

Reliability

The methodological strength of the survey derives especially from its use of scientific probability sampling techniques and highly standardized and closely controlled measurement processes. This does not imply that statistics from the survey are exact or without error. Data from the survey are imperfect for three major reasons: (1) results are subject to sampling error, (2) the actual conduct of a survey never agrees perfectly with the design, and (3) the measurement processes themselves are inexact even though standardized and controlled.

The first-stage evaluation of the survey was reported in reference 3, which dealt principally with an analysis of the faithfulness with which the sampling design was carried out. This study notes that out of the 7,700 sample persons the 6,670 who were examined—a response rate of over 86 percent—gave evidence that they were a highly representative sample of the civilian, noninstitutional population of the United States. Imputation of nonrespondents was accomplished by attributing to nonexamined persons the characteristics of comparable examined persons as described in reference 3. The specific procedure used amounted to inflating the sampling weight for each examined person in order to compensate for sample persons at that stand of the same age-sex group who were not examined.

In addition to persons not examined at all, there were some whose examination was incomplete in one procedure or another. Age, sex, and race were known for every examined person, but for a number of the examinees, one or more of the vision tests were not available. The extent of these missing data is shown in reference 4. As indicated there, a regression-type decision was made subjectively on the basis of existing scores and test results for other persons of the same age, sex, and race, for persons for whom at least one vision test part was completed. Where none of the vision tests were given, for some a probability selection was made of a respondent from the same age-sex-race group and his scores assigned the nonrespondent and for the remainder the distribution of acuity levels was assumed to be the same as for the examined group.

Sampling and Measurement Error

In the present report, reference has been made to efforts to minimize bias and variability of the measurement techniques.

The probability design of the survey makes possible the calculation of sampling errors. Traditionally the role of the sampling error has been the determination of how imprecise the survey results may be because they come from a sample rather than from the measurement of all elements in the universe.

The estimation of sampling errors for a study of the type of the Health Examination Survey is difficult for at least three reasons: (1) measurement error and "pure" sampling error are confounded in the data—it is not easy to find a procedure which will either completely include both or treat one or the other separately, (2) the survey design and estimation procedure are complex and, accordingly, require computationally involved techniques for the calculation of variances, and (3) from the survey are coming thousands of statistics, many for subclasses of the population for which

Table I. Relative sampling errors of rates for adults with uncorrected and "corrected" acuity of 20/20 or better and uncorrected acuity of 20/100 or less, by age, race, geographic region, and urban-rural area: United States, 1960-62

Acuity level, race, region, and area	Total, 18-79 years	18-24 years	25-34 years	35-44 years	45-54 years	55-64 years	65-74 years	75-79 years
UNCORRECTED ACUITY: 20/20 OR BETTER								
Race	Relative sampling error							
White	0.03	0.04	0.03	0.03	0.05	0.10	0.30	1.00
Negro	0.08	0.10	0.08	0.08	0.14	0.30	0.60	-
Region								
Northeast	0.04	0.04	0.03	0.03	0.06	0.10	0.40	0.90
South	0.05	0.05	0.04	0.04	0.05	0.10	0.50	1.20
West	0.04	0.04	0.03	0.03	0.05	0.10	0.30	1.00
Area								
Urban	0.03	0.04	0.03	0.03	0.06	0.12	0.40	1.20
Rural	0.05	0.08	0.07	0.07	0.12	0.30	0.50	-
"CORRECTED" ACUITY: 20/20 OR BETTER								
Race								
White	0.02	0.02	0.02	0.01	0.03	0.07	0.10	0.35
Negro	0.02	0.07	0.06	0.07	0.11	0.30	0.50	-
Region								
Northeast	0.03	0.03	0.02	0.02	0.06	0.10	0.14	0.80
South	0.03	0.03	0.03	0.03	0.06	0.10	0.24	1.20
West	0.03	0.03	0.02	0.02	0.05	0.10	0.12	0.60
Area								
Urban	0.02	0.03	0.02	0.02	0.03	0.08	0.15	0.50
Rural	0.03	0.04	0.03	0.03	0.08	0.20	0.35	1.00
UNCORRECTED ACUITY: 20/100 OR LESS								
Race								
White	0.06	0.25	0.20	0.20	0.15	0.12	0.15	0.20
Negro	0.30	0.70	0.70	0.70	0.80	0.40	0.60	0.90
Region								
Northeast	0.10	0.28	0.30	0.25	0.20	0.20	0.12	0.30
South	0.12	0.40	0.30	0.40	0.20	0.15	0.12	0.40
West	0.10	0.30	0.25	0.30	0.22	0.15	0.15	0.30
Area								
Urban	0.06	0.25	0.20	0.20	0.15	0.15	0.15	0.25
Rural	0.14	0.50	0.50	0.50	0.60	0.30	0.50	0.70

Table II. Relative sampling errors of rates for adults with "corrected" acuity of 20/20 or better, by sex, education, family income, and occupation: United States, 1960-62

Characteristic	Relative sampling error	
Education	Men or women	
Under 5 years	0.14	
5-8 years	0.05	
9-12 years	0.02	
13 years and over	0.03	
Family income		
Under $2,000	0.06	
$2,000-$3,999	0.04	
$4,000-$6,999	0.03	
$7,000-$9,999	0.03	
$10,000 and over	0.04	
Occupation	Men	Women
Professional	0.03	0.04
Farm	0.09	0.30
Clerical-sales	0.04	0.03
Craftsmen	0.03	0.15
Operatives	0.03	0.06
Service	0.07	0.20
Laborers	0.06	0.15

there are a small number of sample cases. Estimates of sampling error are obtained from the sample data and are themselves subject to sampling error when the number of cases in a cell is small or, even occasionally, when the number of cases is substantial.

Estimates of approximate sampling variability for selected statistics used in this report are presented in tables I and II. These estimates have been prepared by a replication technique which yields overall variability through observation of variability among random subsamples of the total sample. The method reflects both "pure" sampling variance and a part of the measurement variance.

In accordance with usual practice, the interval estimate for any statistic may be considered the range within one standard error of the tabulated statistic, with 68 percent confidence; or the range within two standard errors of the tabulated statistic, with 95 percent confidence.

Small Categories

In some tables magnitudes are shown for cells for which sample size is so small that the sampling error may be several times as great as the statistic itself. Obviously in such instances the statistic has no meaning in itself except to indicate that the true quantity is small. Such numbers, if shown, have been included in the belief that they help to convey an impression of the overall story of the table.

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