

Monocular Visual Acuity Of Persons 4-74 Years United States - 1971-1972

Visual acuity levels with usual correction, if any, as determined in the ophthalmology examination before dilation by race, geographic region, family income, and other selected demographic variables.

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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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SYMBOLS

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Quantity more than 0 but less than 0.05---	0.0
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MONOCULAR VISUAL ACUITY OF PERSONS 4-74 YEARS

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INTRODUCTION

This report on monocular distance acuity levels of persons 4-74 years of age in the United States is the first in a series containing national estimates based on findings from the ophthalmological examination of a national probability sample of the U.S. population during the first Health and Nutrition Examination Survey in 1971-1972. The findings for the monocular acuity levels with usual correction, if any, are analyzed with respect to age, sex, race, ancestry, geographic region, population size of place of residence, annual family income, and education.

The Health Examination Survey, in which these data were obtained, is one of the major programs of the National Center for Health Statistics authorized under the National Health Survey Act of 1956 by the 84th Congress as a continuing Public Health Service activity to determine the health status of the population.

The data systems programs used to carry out the intent of the National Health Survey¹ include, in addition to the Health Examination Survey, the Health Interview Survey, which collects health information from samples of people by household interviews and focuses primarily on the impact of illness and disability within various population groups; the Health Manpower and Facilities surveys, which obtain data on hospitals, nursing homes, and other resident institutions; and Health Resources Utilization surveys, which obtain information on persons using and the extent of the use of health facilities and health manpower.

The Health Examination Survey is one of these programs designed to collect the kind of

needed health statistics information obtainable only through direct examinations of probability samples of the population. From direct examinations, tests, and measurements, data are obtained in this program on the prevalence of medically defined illness—known as well as previously unknown or undiagnosed conditions—and on the distributions of a variety of health-related physical, physiological, and psychological measurements from which normative data and appropriate cutoff points for what is abnormal can be determined. Also collected are medical history, demographic, and socioeconomic data on the sample population under study with which the examination findings may be interrelated.

Since 1960 the Health Examination Survey has been conducted as a series of separate, consecutive programs called "cycles," each of which is limited to some specific segment of the U.S. population and to specific aspects of health. During the first cycle in 1960-1962, the prevalence of certain chronic diseases and the distributions of various physical and physiological measures, including visual acuity, were determined among a defined adult population.^{2,3} For that program a national probability sample of 7,710 persons 18-79 years of age, of whom 6,672 (86.5 percent) were examined, was selected to represent the 111 million in that age segment of the civilian noninstitutionalized U.S. population at that time.

The target populations for the second and third cycles in 1963-1965 and 1966-1970 were, respectively, the Nation's noninstitutionalized children 6-11 years of age and youths 12-17 years of age.^{4,5} In both these programs, the

examination was focused primarily on health factors related to growth and development. For the second program a probability sample of 7,417 was selected to represent the nearly 24 million noninstitutionalized children in the U.S. population, of whom 7,119 (96 percent) were examined. For the third program a probability sample of 7,514 was selected to represent the 22.7 million noninstitutionalized youths in the U.S. population at midsurvey. Of these, 6,768 (90 percent) were examined.

The Health and Nutrition Examination Survey (HANES) program, from which the findings in this report were derived, was designed to measure the nutritional status of the U.S. population of ages 1-74 years and to obtain some limited information on the general health status of the entire age group as well as more detailed information on the health status and medical care needs of persons age 25-74 years in the civilian noninstitutionalized population. A description of the specific content and plan of operation, including sample design, has been published.⁶

As in the previous Health Examination Survey programs, the U.S. Bureau of the Census cooperated in the sample design and in the initial visits for interviewing at the eligible households in the primary sampling units (PSU's) selected in the various parts of the country. Members of the field teams of the mobile examination center did further household interviewing and explaining of the examination portion of the program. The selected sample persons for whom appointments could be made were brought into the specially constructed mobile examination centers that were moved into a central location in each of the primary sampling units. The team that traveled to the various survey locations throughout the country included professional and paraprofessional medical and dental examiners along with technicians, interviewers, and management staff.

The probability sample design used in the study provided for oversampling, at predetermined rates, among the poor, preschool children, women of childbearing ages, and the elderly, so that the nutritional status of these high-risk groups could be more accurately estimated. It further provided for a nationally

representative subset of 35 of the initially planned primary sampling units throughout the United States so that some preliminary national findings on the nutritional status of the population could be published before the total survey was completed and so that national estimates could be obtained from those parts of the examination that were included only in this 35-stand subsample.

During the planning for the HANES program, Dr. Carl Kupfer, Director, National Eye Institute (NEI), indicated the interest of that Institute in obtaining more definitive information than was currently available on the prevalence and distribution of specific eye diseases and related conditions throughout the United States as an aid in setting goals and priorities for future emphasis in their programs. Consistent with the overall objectives of the survey, an evaluation of treatment needs was also incorporated into the examination.

Two ophthalmologists from NEI, Drs. James P. Ganley and Arthur F. Garcia, developed the examination form and standardized protocol for the ophthalmic examination and were responsible for recruiting and training the examining ophthalmologists as well as for verifying the resultant diagnoses and for other aspects of quality control in this area.

The National Eye Institute decided to discontinue the ophthalmology examination after 35 stands because of problems encountered in recruiting ophthalmologists to conduct the examinations and the insufficient number of staff within the Institute to carry out the program adequately. While the size of the sample was not as large as originally planned, these unique national eye examination findings do provide the basis for analysis needed to meet most of the original purposes of this part of the examination.

For the 35 locations at which the ophthalmological examination was given during the period between April 1971 and October 1972, a national probability sample of 14,147 persons was selected to represent the 192.7 million in the target population age 1-74 years. Despite intensive efforts, only 10,126 of the sample persons came in for examination. This represents 72.8 percent of the sample persons selected when

adjustments are made for the differential sampling rates for the age-, sex-, and income-defined population subgroups. (The unadjusted overall response rate was 71.6 percent.)

Surveys conducted by the National Center for Health Statistics, including all previous programs of the Health Examination Survey, have achieved higher levels of response than have been reached for the 35-stand subsample in this first HANES. The 72.8-percent response rate fails to meet fully the requirements of the original probability design. However, following a policy of remunerating participants—adopted after the completion of 20 primary sampling units—there was a significant increase in participation.⁷ Because of the lower-than-usual response rate, the national estimates of the more severely visually handicapped in this report will probably understate slightly the actual prevalence of this disability in the noninstitutionalized population 25-74 years of age.

National estimates in this report are based on weighted observations; i.e., the data obtained for each examined person were inflated to the level of the total population. The estimates have been calculated as though the examined persons in each of the age, sex, and income classes are a random subsample of the sample persons in the same class (appendix I). Although there is evidence from the earlier examination surveys and medical history data from HANES that these are not unreasonable approximations, it is clear that some estimates are subject to considerable risk of bias when more than one-quarter of the sample persons in a particular age-sex-income class were not examined.

Even though all examinees 1-74 years of age were examined and tested by the survey ophthalmologists, visual acuity determinations were made only for those age 4-74 years. Hence, findings in this report are based on the examination of the 9,263 persons age 4-74 years at the time of examination. No attempt was made to estimate the acuity levels for the 863 examined children under 4 years of age.

OPHTHALMOLOGY EXAMINATION

At each of the 35 selected locations throughout the country, arrangements were made for 10

different sample persons to come or be brought into the specially designed mobile center for each of the morning, afternoon, and evening examination sessions. These included eight examinees from the nutrition sample (1-74 years) and two from the detailed sample (25-74 years). The ophthalmology examination, which was one of the first procedures scheduled in each session, was similar for persons in the nutrition sample and for those in the detailed sample except for the refraction component in which determination was made of best corrected acuity. The examination for those over 3 years of age included the taking of an ocular history regarding previously known eye disorders or previous eye surgery; a determination of monocular distance visual acuity with usual correction, if any, and with a pinhole test to determine correctability for those with acuity less than 20/20; type of motility defects; prescription of present glasses; dilation, and within 20-70 minutes following dilation, retinoscopy for detailed examinees with acuity less than 20/40 and spherical trial lens test for nutrition examinees with acuity less than 20/40; applanation tonometry on examinees 20 years and older; and examination of the pupils, lids, globes, conjunctiva, sclera, corneas, anterior chambers, irides, and lenses. The pupils were dilated in most instances for the spherical refraction and retinoscopy tests and the examination of the vitreous and retina.

Visual Acuity Testing

In the visual acuity testing of examinees over the age of 3 years, the survey ophthalmologists used a standard A-O Project-O-Chart with the target image (Variable Focus Image and Optotype slides) from the projector focused on a mirror from which the image was reflected to the Project-O-Chart screen (above and behind the examinees) clearly visible on a second mirror at eye level in front of the examinee. The optical distance of the target and the image visible to the examinee was carefully adjusted to the standard 20 feet for distance acuity testing within the limited space available in the examining room.

Target optotypes on slides available for this testing included, in order of examination proto-

col preference for use, Snellen letters, illiterate E, Landolt ring, and Picture.

Visual acuity testing was done with all light in the examining room turned off, except for the overhead lamp on the Reliance Instrument Stand, which was turned on dim and aimed toward a wall above and behind the examinee.

Only monocular distance acuity was tested; the eye not under test was occluded. Corrected acuity only was determined for the 37 percent of the examinees who had brought their glasses or contact lenses. For the 63 percent of examinees without glasses, uncorrected monocular distance acuity was measured. Thus the available visual acuity data from this part of the examination is limited to "corrected" vision, denoting functional acuity or the level at which the examinees were actually seeing with whatever correction they were using.

The visual acuity testing was started with the larger Snellen letters (or other optotype) on the projector chart; then the projected optotypes were decreased in size until a complete line could not be read. If an individual appeared to have good vision, the examiner began at the 20/30 or 20/25 line and then proceeded to the 20/20 line and smaller.

Visual acuity was recorded as the smallest complete line read correctly (no more than one optotype missed), plus any letters read on the next line (e.g., 20/30+3, rather than 20/25-3). In cases where the visual acuity was less than 20/400, the examiner recorded the best acuity—whether the examinee could see finger counting and at what distance, hand movements, light perception with projection, light perception only, or no light perception.

When because of uncorrected astigmatism an examinee missed one or two letters on several lines with successively larger letters, credit was given for the line with the larger letters just above the line with the smallest letters in which no more than two letters were missed. Additional credit was shown for those smaller letters correctly determined on the line immediately below.

For purposes of this report the visual acuity level attained was that corresponding to the line with the smallest letters or other optotypes read correctly with no more than one error in the line

with the one exception noted above for those with uncorrected astigmatism.

Optotypes

For 95 percent of the visual acuity tests the target slides with Snellen letter optotypes were used. The proportion of tests administered using these letters was lowest among young children and increased with age from 4 percent at age 4 years to 60 percent at age 6, 92 percent at age 7, and 99 percent at ages 8-74 (table A).

At ages 4 and 5 years, nearly two-thirds were tested with the illiterate E targets. When the illiterate E was not used, testing was more likely to have been done with the picture targets at age 4 years (29 percent of all 4-year-olds) and Snellen letters at age 5 (24 percent of all 5-year-olds) than with the other optotypes. At age 6, about 60 percent were tested with Snellen letters and about 27 percent with the illiterate E target. Landolt rings were infrequently used, but somewhat more often at ages 4-6 years (less than 3 percent) than at the older ages (less than 0.5 percent).

Hence, comparability of visual acuity measures obtained on the three types of targets was of concern primarily for the younger children under 7 years of age. Various investigators have assessed the comparability and factors affecting the measurement of visual acuity with different targets.⁸⁻¹³ While the targets used were not identical with those used in the present study, their findings give some indication of the possible effect of the use of different targets on the precision of acuity measurement among the young children in the present study. In particular, Jonkers¹² of Rotterdam in his study of 173 children 3 years of age and over found the reliability of visual acuity test results to be best with letter charts and poorest with picture charts. Results with the illiterate E were somewhat more reliable than test results on the same children with Landolt rings. However, both these targets provided more reliable acuity test results than the picture charts.

Lippmann¹³ in his studies of 3-5-year-old children enrolled in day care centers administered by the Office of Economic Opportunity found acuity on all test methods showed a steady increase of visual acuity rating with

Table A. Percent of persons reaching specified visual acuity levels and percent distribution of persons tested by age, according to optotype used: United States, 1971-1972

Visual acuity level and optotype used	Total	Age in years						
		4	5	6	7	8	9-11	12-74
<u>20/20 or better</u>		Percent of persons reaching or exceeding visual acuity level with specific optotype						
All optotypes	72.8	23.2	40.2	50.8	70.4	76.8	79.6	74.5
Snellen letters	---	58.5	43.5	63.2	71.4	76.9	80.1	74.9
Illiterate E	---	25.7	44.6	34.1	61.1	38.9	50.9	29.6
Pictures	---	5.1	3.7	14.6	28.7	100.0	-	-
<u>20/25 or better</u>								
All optotypes	85.5	27.9	51.9	65.0	88.5	91.9	86.5	87.7
Snellen letters	---	74.8	84.7	85.7	91.0	92.2	87.1	88.2
Illiterate E	---	31.8	47.3	36.5	61.1	38.9	50.9	32.2
Pictures	---	5.4	5.4	14.6	28.7	100.0	-	45.8
<u>20/30 or better</u>								
All optotypes	93.5	95.3	93.6	95.8	93.4	95.9	92.1	93.3
Snellen letters	---	98.4	95.8	93.3	94.7	95.8	92.2	93.5
Illiterate E	---	95.0	93.0	99.4	78.2	100.0	94.4	74.1
Pictures	---	94.9	91.6	100.0	74.2	100.0	100.0	45.8
<u>20/50 or poorer</u>								
All optotypes	3.3	2.1	1.8	2.5	2.7	3.7	4.1	3.5
Snellen letters	---	-	-	4.1	3.0	3.8	4.3	3.4
Illiterate E	---	1.7	1.6	-	-	-	-	17.4
Pictures	---	3.8	6.8	-	-	-	-	14.5
<u>Persons tested</u>		Percent distribution						
All optotypes	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Snellen letters	94.8	4.2	23.8	60.3	92.0	99.0	98.9	99.2
Illiterate E	3.9	64.0	63.4	27.3	7.6	0.6	0.4	0.8
Pictures	1.1	29.0	11.7	10.6	0.4	0.3	0.4	0.0
Landolt rings	0.2	2.8	1.1	1.8	-	0.1	0.3	0.0

advancing age of children. Best results were obtained with a symbol-type chart not used in the present study and second best with the illiterate E. Snellen letter charts were not included in these clinical studies.

In the present national survey the proportion of children 4-6 years of age reaching the better

acuity levels was generally substantially higher among those tested with Snellen letter optotypes than among those tested with the illiterate E or picture charts. The proportion with monocular acuity of 20/25 or better on the Snellen targets was more than twice that in the group tested with the illiterate E and 6-16 times that

with the picture optotypes (table A). The proportion reaching the 20/30 level or better was similar on all three types of targets. The Landolt ring optotypes test was used so seldom that its potential influence on the visual acuity estimates would be negligible even among the age group 4-6 years, where it was most frequently used (but for less than 3 percent even in that young age group). Regardless of age, all of the persons tested with the Landolt rings reached the 20/20 acuity level.

Whether the differences in acuity levels obtained for the younger children on the various targets used reflected real differences in acuity levels among the individuals tested, differences in equivalence or difficulty among the targets used, or differences in the degree of cooperation or attention of the examinees, or a combination of these factors cannot be determined from the data in this study.

Quality Control

Drs. Ganley and Garcia, senior ophthalmologists from the National Eye Institute (NEI), were responsible for recruiting the 91 survey ophthalmologists and for training them in the standard examination procedures used at the first 35 examination locations of the Health and Nutrition Examination Survey.

In addition, the senior ophthalmologists from NEI developed a protocol for replicate testing which they carried out at 24 of the 35 locations to ensure the accuracy of the ophthalmology examination data, to provide an estimate of its repeatability or reliability, and to aid in maintaining uniformity in examining procedures.

For this, the examinations of all sample persons in the first two sessions at each of 24 of the 35 stands were observed and replicated by the senior ophthalmologists of NEI who then evaluated the methods and findings of the examiners and made the necessary recommendations where needed. The NEI observer conducted the first part of these examinations simultaneously with the examiner and recorded his findings for each patient on a separate replicate form. The fundoscopic examination was done by the observer when the examiner had completed his examination of the sample person; evaluation of the fundoscopic findings

was made without the observer knowing the examiner's results.

The examiner was observed for technique, facility with the instruments, and adherence to the protocol. Written comments were made on the observer's records, including specific problems or questions that arose during the examination. Recommendations to the examiner, if needed, were made at the end of each session.

At the end of each session, after the examiner's findings had been transferred to the replicate examination form, the examiner's evaluation of each examinee was compared with that of the observer.

In all, 230 ophthalmology examinations (2.5 percent) of the 9,263 given were replicated. Visual acuity test results from the replicate examinations showed a high level of agreement between examiner and observer findings. Of the 230 examinees, there was exact agreement on acuity levels for 94 percent of the monocular tests (right plus left eye), 1 percent differed by one acuity level, and 5 percent differed by two levels. Where there was a disagreement, the examiner was more likely to have obtained a higher acuity level than the observer (70 percent of the tests where there was disagreement).

Testing equipment and illumination were checked periodically throughout the cycle to be sure they were in good working order and met the required standards.

FINDINGS

Age and Sex

Nearly three-fourths (72.8 percent) of the civilian noninstitutionalized population 4-74 years of age in the United States have distance visual acuity of at least 20/20 in their better eye "with usual correction" (figure 1, table 1). These estimates are based on findings from the Health and Nutrition Examination Survey of 1971-1972 among a national probability sample of examinees of whom about one-third (37 percent) were tested with their glasses or contact lenses and the remaining 63 percent without correction. Only 2.4 percent had better monocular distance acuity exceeding the 20/20 level. The prevalence of defective better monocular distance acuity of 20/50 or less "with usual correction" in this total age range is 3.3 percent,

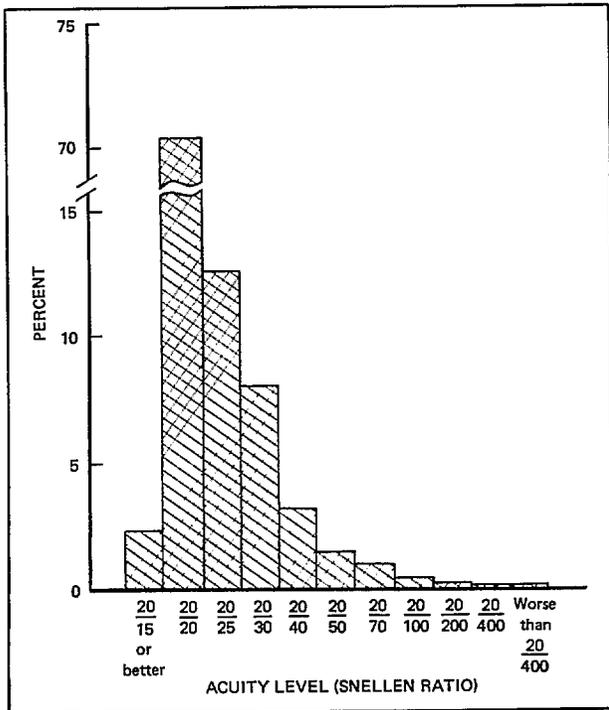


Figure 1. Percent of the population age 4-74 years reaching specified acuity levels for usual distance vision in the better eye: United States, 1971-1972.

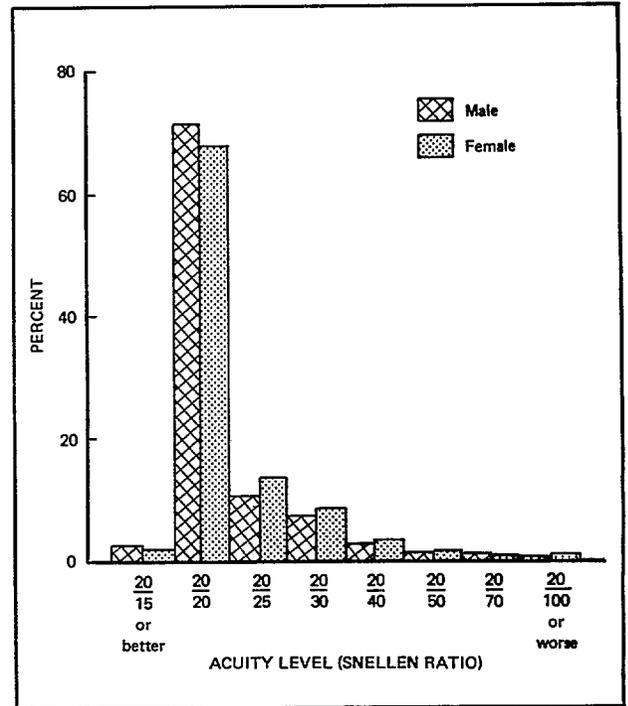


Figure 2. Percent of the population age 4-74 years reaching specified acuity levels for usual distance vision in the better eye, by sex: United States, 1971-1972.

including 0.2 percent with acuity less than 20/200 on this measure. At mid-survey point in 1972, an estimated 6.16 million in the U.S. population age 4-74 years would have had distance acuity of 20/50 or less in their better eye with usual correction and for 0.21 million of these their usual better-eye acuity would have been less than 20/200 (table 2).

Males tend to have somewhat better visual acuity than females. The proportion of males testing at least 20/20 (better monocular acuity "with usual correction") is 75.2 percent compared with 70.5 percent among females age 4-74 years while the proportion with defective usual better monocular distance acuity of 20/50 or less is 2.9 for males and 3.6 for females (figures 2, 3, and 4). Less than 0.1 percent of males compared with 0.2 percent of females have usual acuity of less than 20/200 in the better eye.

Across this age range the proportion with usual acuity in the better eye of at least 20/20 increases steadily from 31.2 percent at 4-5 years to a maximum of 87.6 percent among young adults 18-24 years, levels off and then declines

abruptly after 45 years to 32.0 percent at age 65-74 years. The low proportion with this level of acuity among the preschool-age children of 4 and 5 years probably reflects at least in part the difference in the precise equivalence of the optotype targets used most frequently for testing them as well as in the cooperation and understanding of the examinees tested. By age 6-11 years nearly three-fourths (72.5 percent) have usual better monocular acuity of at least 20/20, a proportion that is also probably influenced to some extent by optotype differences and examinee cooperation, particularly at 6 years and to a lesser extent at 7 years of age. However, even among those tested with Snellen letters, the proportion reaching at least 20/20 increased with age from about 50 percent at 4-5 years to 63 percent at 6 years to 71 percent at 7 years to 77 percent at 8 years and 80 percent at 9-11 years (table A). The proportion with this level of acuity among males generally exceeds that among females across the age range with insignificant exceptions at 25-34 and 65-74 years (figure 3).

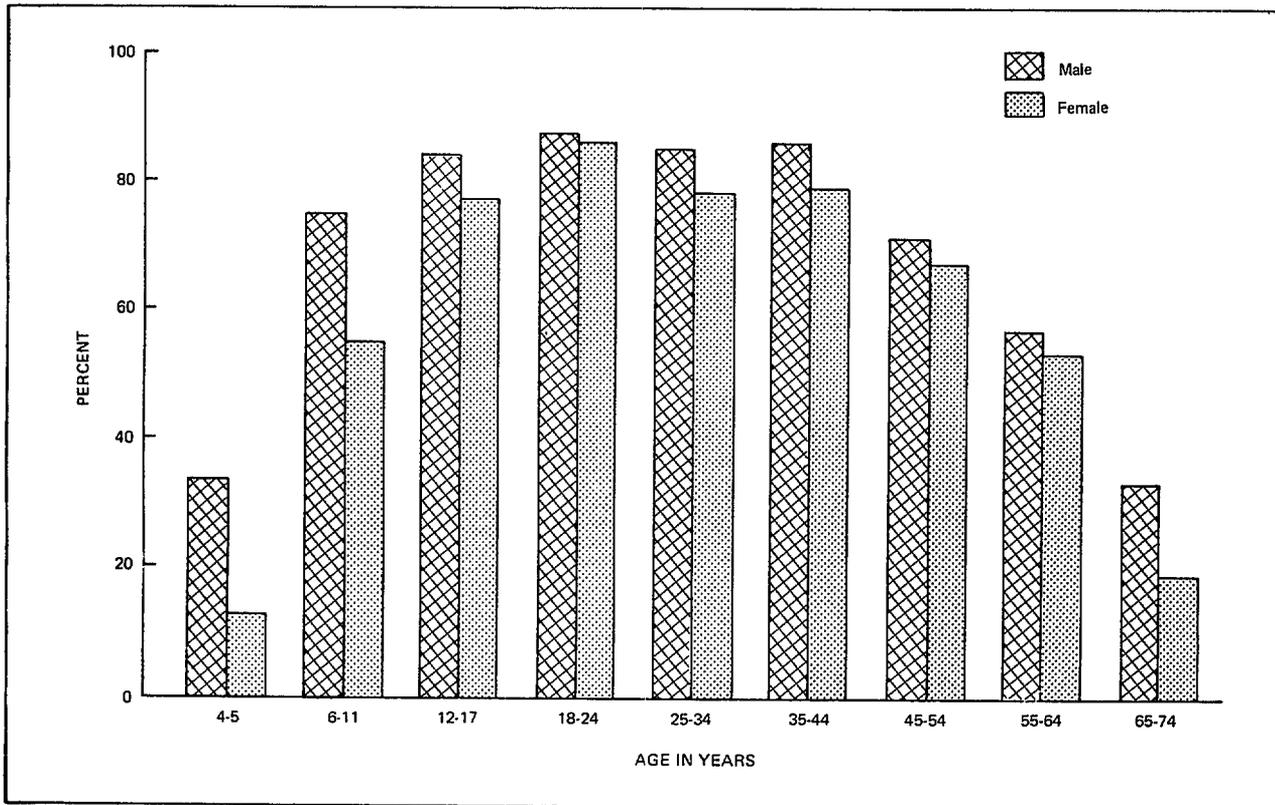


Figure 3. Percent of the population with usual distance vision of at least 20/20 in the better eye, by age and sex: United States, 1971-1972.

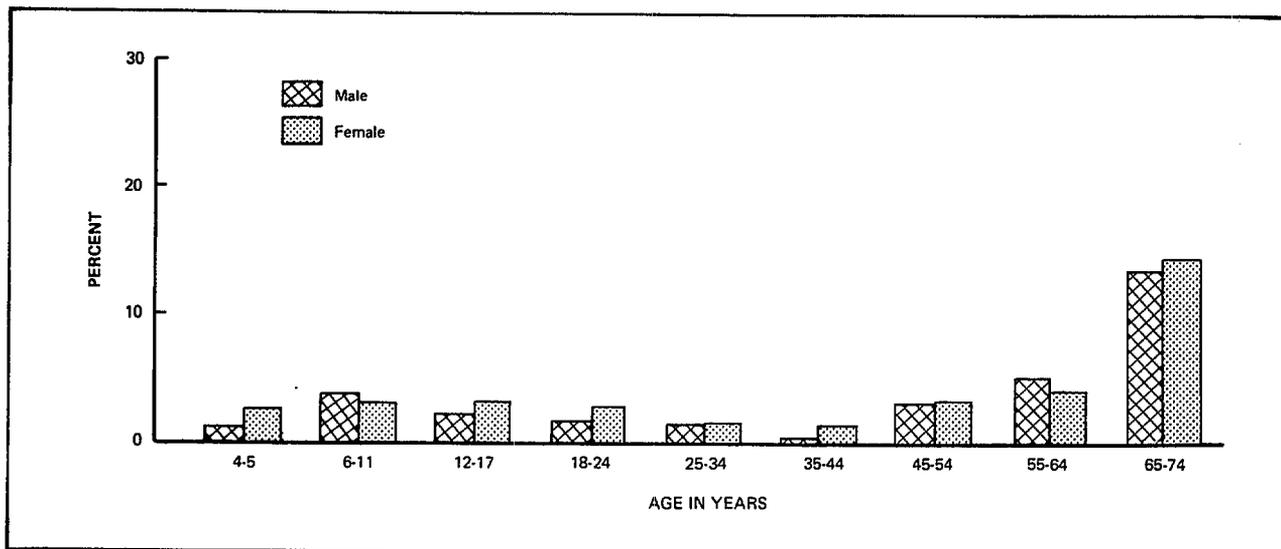


Figure 4. Percent of the population with usual distance vision of 20/50 or worse in the better eye, by age and sex: United States, 1971-1972.

The prevalence of defective acuity of 20/50 or less in the better eye with usual correction decreases steadily with increase in age from 3.5 percent at 6-11 years to 0.7 percent at 35-44 years then increases to 14 percent at age 65-74 years. The trend with age in the prevalence of this degree of defective acuity is generally similar among males and females but tends to be slightly more prevalent among females except at 6-11 years and 55-64 years (figure 4).

With usual correction, the distribution of acuity levels for the right and left eyes are generally similar (table 3), with more than three-fourths (76.7 percent) showing no difference in acuity level between the two eyes on monocular tests. When there is a difference, it is more likely to be of only one level (16 percent) than of more than one (7 percent) and to be slightly better in the left than in the right eye. Among those 4-74 years of age, 66.0 percent tested 20/20 or better and 5.9 percent tested

20/50 or poorer with the left eye "with usual correction" compared with 64.6 percent reaching 20/20 or better and 6.4 percent no better than 20/50 with the right eye.

Race

Negro persons age 4-74 years tend to have poorer acuity with usual correction than white persons in the United States (figures 5, 6, and table 4). Less than two-thirds (65.8 percent) of the Negroes reached at least the 20/20 level on better monocular acuity tests compared with 73.6 percent of white persons, while 5.1 percent of the Negro group compared with 3.1 percent of the white group could not read above the 20/50 level. The number of persons of other races in the population and hence in the sample was too small to provide estimates of their visual acuity sufficiently reliable for publication.

Across the age range in the study, the

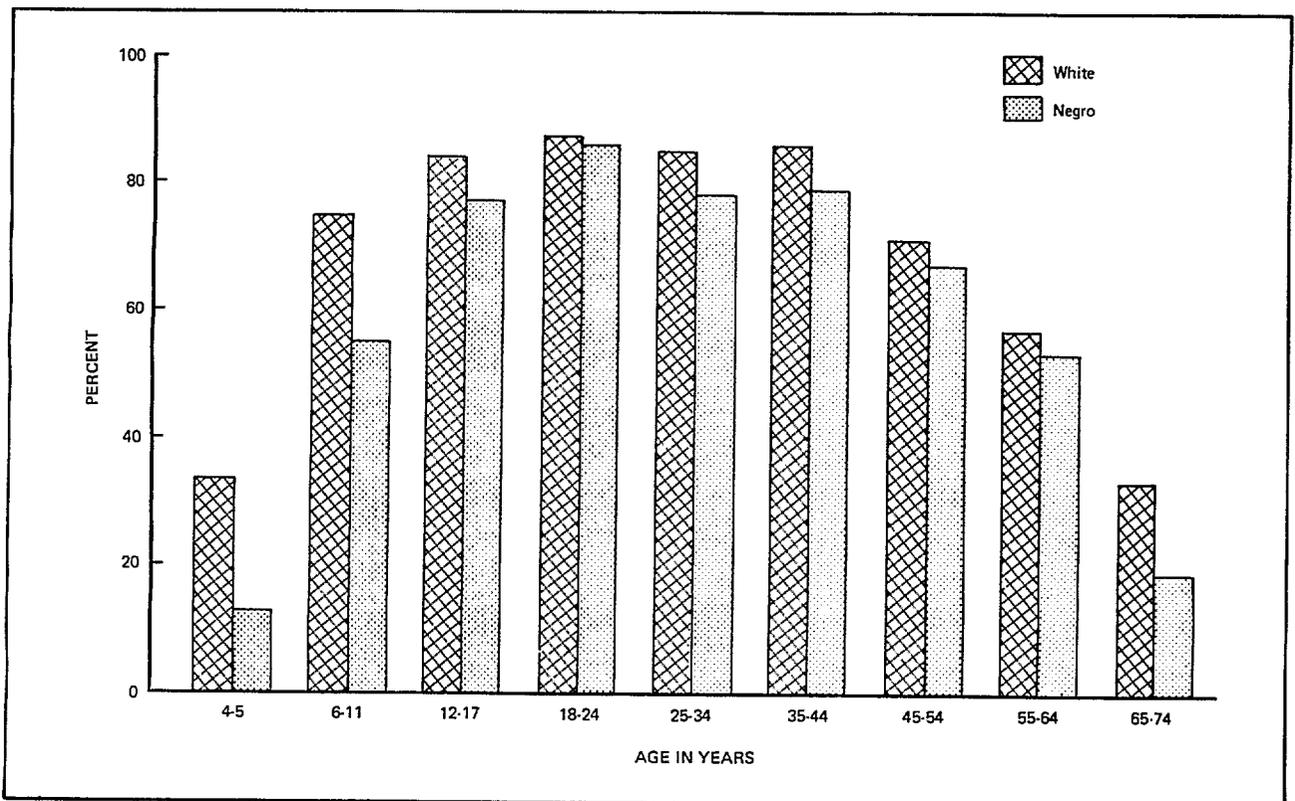


Figure 5. Percent of the white and Negro populations with usual distance vision of at least 20/20 in the better eye, by age: United States, 1971-1972.

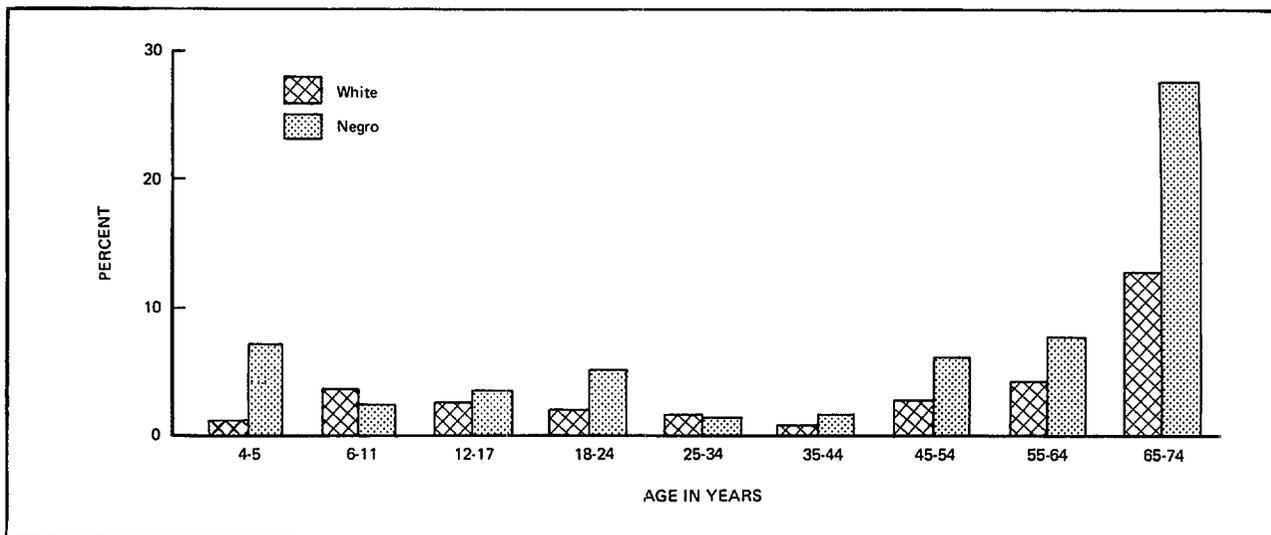


Figure 6. Percent of the white and Negro populations with usual distance vision of 20/50 or worse in the better eye, by age: United States, 1971-1972.

proportion reaching at least 20/20 with usual correction in their better eye was less and the proportion testing no better than 20/50 was greater among Negro than among white persons except at age 6-11 years (figures 5 and 6). The greatest racial difference in acuity is evident among the youngest and oldest age groups—under 6 years and 65-74 years.

Among the preschool group age 4-5 years, only 13.2 percent of Negro compared with 33.9 percent of white children tested 20/20 or better in their better eye with usual correction; while at age 6-11 years, 55.7 percent of Negro children compared with 75.4 percent of white children, and at 65-74 years 19.1 percent of Negro compared with 33.2 percent of white adults reached that level. The racial differences in these rates in the three age groups are large enough to be statistically significant (at the 1-percent level). The racial differences in the proportion with better acuity (20/20 or better) for age 12-64 years are also present but less pronounced.

Defective acuity with usual correction in the better eye is seven times more prevalent among Negro than among white preschool children (7.1 percent compared with 1.0 percent) and the rates about twice as great among Negro as white

adults age 65-74 years (27.6 percent compared with 12.8 percent). In the most severely defective groups unable to read above the 20/400 level which would include most of the "legally" blind, there were 3.5 Negro adults age 65-74 years for every white adult with this degree of impairment. At age 12-64 years there was less difference between the two races in the prevalence of this degree of defective acuity although the rates were consistently higher among the Negro group.

This pattern of poorer visual acuity with usual correction among Negro than among white persons is evident for both males and females and is most pronounced among the youngest (4-5 years) and oldest (65-74 years).

At age 65-74 years both white and Negro women show a slightly higher proportion with 20/20 or better usual vision than white and Negro men. The proportion with defective acuity of 20/50 or worse was greater among Negro men than among Negro women, while a slightly greater proportion of white women than white men had that degree of visual defect. The prevalence of severely defective acuity of less than 20/200 was slightly higher among older women than among men of both races (at age 65-74 years).

Ancestry

In the household questionnaire, information was obtained on the principal ancestry or national origin for each of those examinees whose race was not classified as "Negro" by the census interviewer. From this, estimates of the visual acuity levels for three of the larger minority groups including Spanish and Mexican American, Chinese and Japanese, and American Indians living off reservations have been obtained. Recent immigrants from Puerto Rico are included with those of Spanish ancestry. The sample size is not large enough to provide national estimates in greater ethnic detail and even for these three groups, the survey sample is not large enough to provide estimates sufficiently reliable to assess ethnic differences in visual acuity. The population size, relation between the ancestry and racial classifications, and the acuity levels of these ethnic or ancestry subgroups are shown for adults 18-74 years of age in table 5. The findings are generally similar among children.

Of the three ethnic subgroups, the Orientals—Chinese and Japanese—have the lowest proportion with better as well as with poorer acuity (better eye with usual correction), while the American Indians have the highest proportion in both acuity groups. However, because of the small number of persons reporting themselves to have such ancestry in relation to the size of the sample, the precision of the national estimates of acuity levels for many of them is below the level usually published in this series and relatively large differences in prevalence rates probably reflect sampling variability alone and not actual ancestry or ethnic differences in visual acuity.

Geographic Region

Children and youths under 18 years of age in the South generally have somewhat better usual visual acuity in the better eye than do those in the other three regions of the country. The proportion with acuity of at least 20/20 is greater at age 4-17 years and the proportion with defective acuity of 20/50 or poorer is lower at age 6-17 years in the South than elsewhere (figures 7, 8, and table 6). This regional pattern in the distribution of acuity is present but less

marked among boys than that shown for both sexes combined, but is not consistent among girls.

Among adults 18-74 years of age the regional differences in the distribution of visual acuity are less consistent than those for children and youths. However, the proportion of adults with defective acuity of 20/50 or poorer is consistently lower among those in the Midwest than elsewhere across the 18-74-year age range for all adults and across the 45-74-year range for men and women.

In three of the four regions the proportion of persons with visual acuity 20/20 or better reaches a maximum of 84-88 percent among younger adults 18-44 years, while in the South the maximum is reached earlier among youths 12-17 years where the rate slightly exceeds that in the 18-44-year age range. From the maximum rate the proportion with acuities of 20/20 or better decreases consistently with age until by 65-74 years the proportion with that degree of usual acuity in the better eye is reduced to 28-36 percent in the four regions.

The proportion with defective acuity of 20/50 or poorer is at a minimum of 1-2 percent among younger adults 18-44 years, then generally consistently increases with age and is at a maximum among the oldest age group, to 65-74 years, with rates ranging from 8-20 percent in the four regions. This age-related trend in both better and defective visual acuity is generally consistent among males and females in each of the regions.

The regional distribution of visual acuity among white persons in this country is generally similar to that described above for persons of all races combined, but is somewhat less consistent among the Negro population.

Among white preschool-age children, the proportion with usual acuity of at least 20/20 in the better eye is greatest in the South—51.3 per 100—compared with rates ranging from 15.9 in the West to 38.4 in the Midwest. The wide variability in these rates is probably partly due to differences in targets selected for use in testing. At the other end of the visual acuity scale, no white preschool children in the South had usual defective acuity of 20/50 or poorer while the proportion in the other three regions ranged from 1 percent or less in the West and

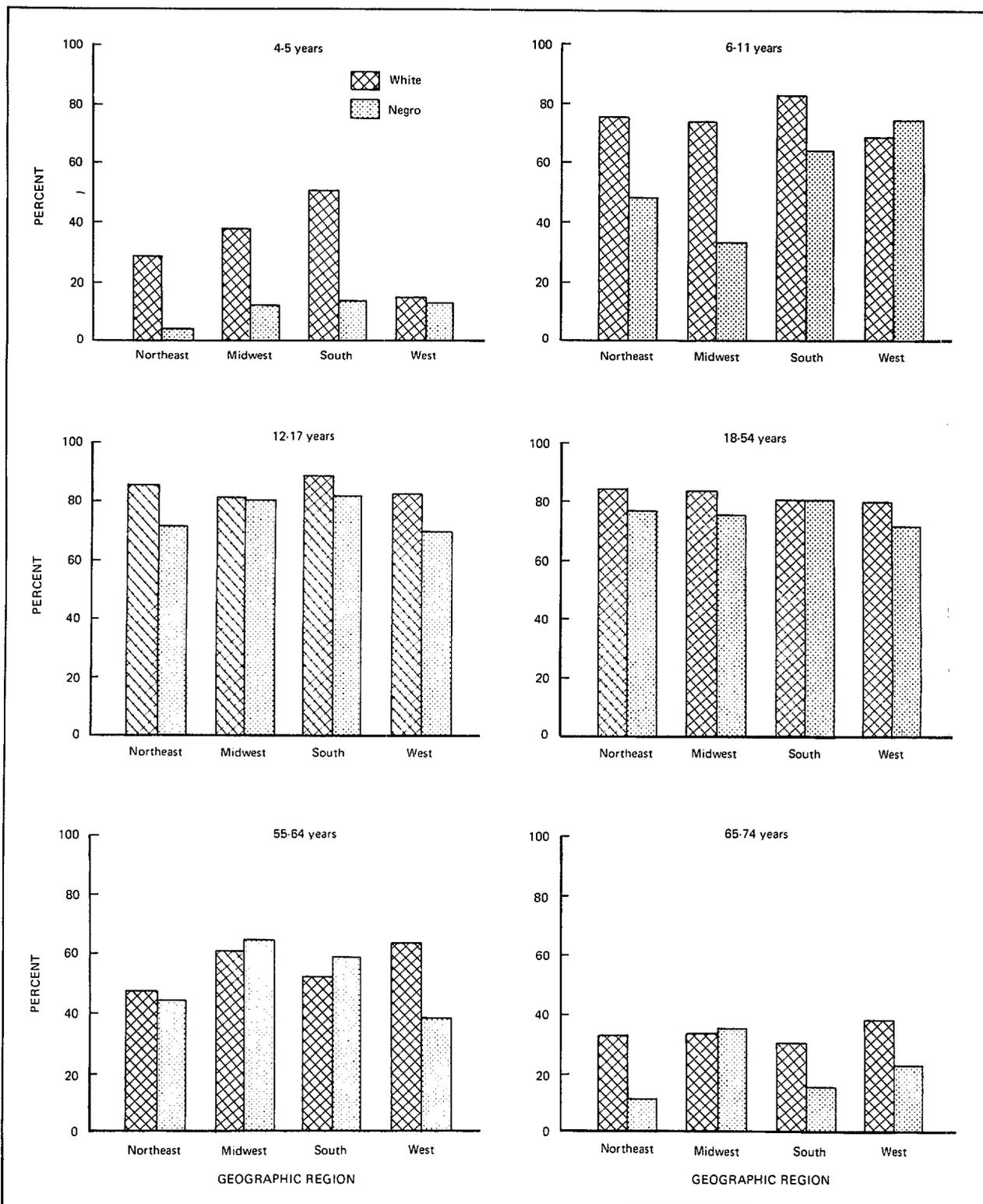


Figure 7. Percent of the white and Negro populations age 4-74 years with at least 20/20 usual distance vision in the better eye, by age and geographic region: United States, 1971-1972.

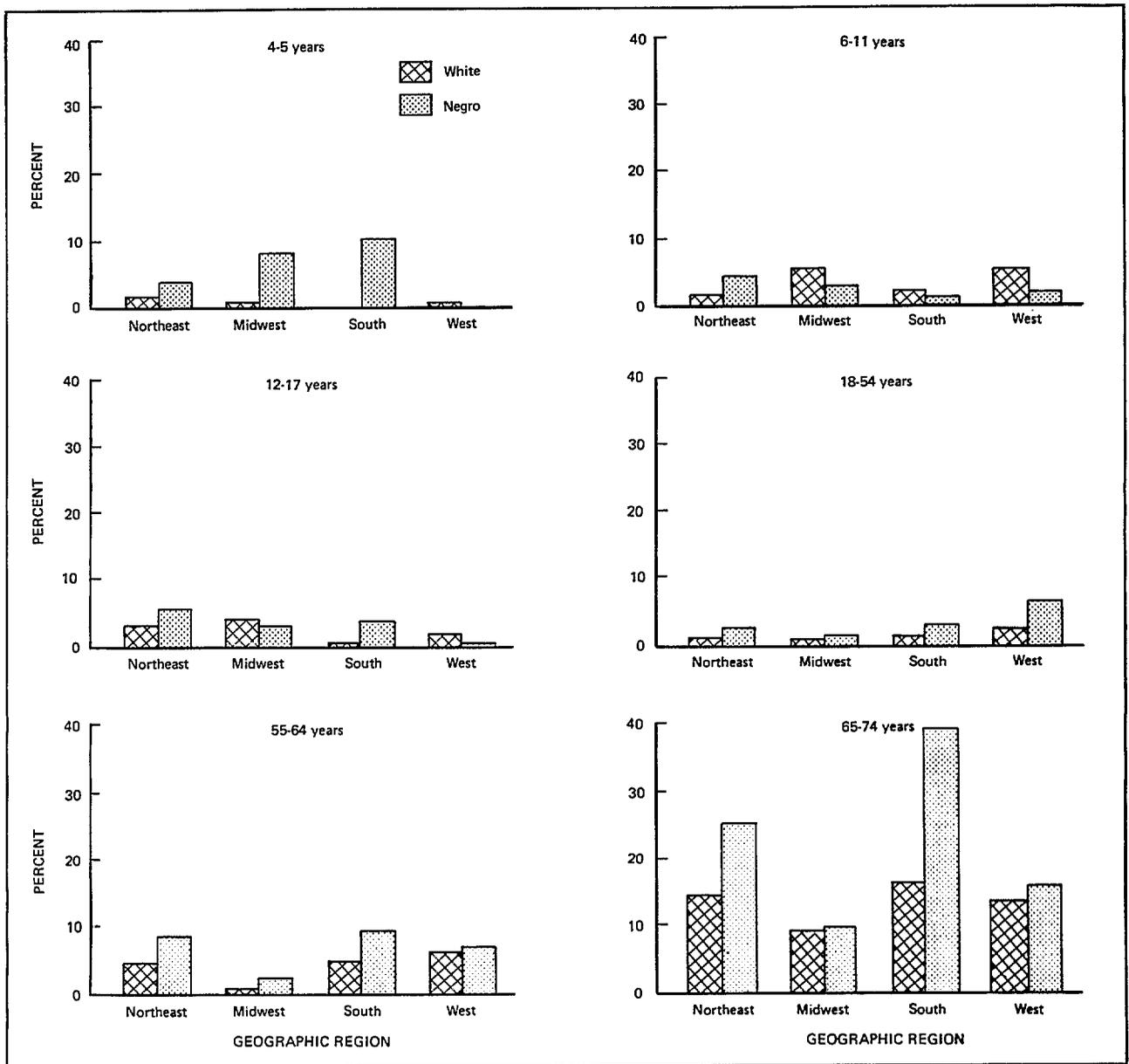


Figure 8. Percent of the white and Negro populations age 4-74 years with 20/50 or worse usual distance vision in the better eye, by age and geographic region: United States, 1971-1972.

Midwest (0.8 and 1.0 per 100, respectively) to 2.3 per 100 in the Northeast.

The regional pattern in the distribution of visual acuity among Negro children and youths differs somewhat from that for their white counterparts and is less consistent. Among the Negro preschool-age children the prevalence of 20/20 or better acuity is about the same—13.5

to 15.5 per 100—in all regions except the Northeast where the rate is lower (3.8 per 100). The highest prevalence of 20/20 or better vision among Negro children 6-11 years of age is in the West (75.0) and South (64.4) with the lower rates in the Northeast (48.7) and in the Midwest (32.8); in contrast, the highest rates for acuity of 20/20 or better among Negro youths 12-17

years of age are in the Midwest (80.3) and South (81.8) and the lowest rates are in the West (68.7).

Between the ages of 18 and 54 years there is little regional difference in the proportion of the white population with usual acuity of 20/20 or better, while among Negro younger adults those in the South show a somewhat higher prevalence rate for better acuity than do those in the other regions. The proportion with defective acuity of 20/50 or less in the better eye with usual correction is highest in the West, particularly for Negro adults.

At 55-64 years of age both white and Negro adults in the Midwest tend to have somewhat better usual acuity—relatively more 20/20 or better, and fewer with defective acuity of 20/50 or poorer—than do those in the other three regions.

Among the oldest age group, 65-74 years, the proportion with defective acuity (usual better monocular vision of 20/50 or less) is substantially greater among Negro adults in the South (38.9 percent) and Northeast (25.0 percent) than in the West (16.1 percent) or Midwest (9.7 percent). Regional differences in the distribution of visual acuity are less marked among older white adults. However, relatively fewer of both white and Negro adults in the Midwest than elsewhere have that degree of defective acuity.

The prevalence of usual monocular visual acuity levels of 20/20 or better (in the better eye) is greater among white than among Negro children and among youths 4-17 years of age in each of the four regions except in the West for children 6-11 years of age (figure 7). Negligible white-Negro differences in these better acuity rates may be seen among preschool children, 4-5 years, in the West and 12-17-year-old youths in the Midwest.

Among adults the regional pattern of the white-Negro differences in the proportion with usual visual acuity of at least 20/20 in the better eye is less consistent than that shown for children and youths. Between the ages of 18 and 54 years, there is little difference in the prevalence of usual acuity of 20/20 or better between white and Negro adults, in each of the regions, except in the West at 45-54 years, where the proportion of Negro adults with this level of better acuity is significantly less than that in the

other regions. By 65-74 years of age, except in the Midwest where the prevalence rates for the two races are similar, the proportion of white adults with 20/20 or better usual acuity consistently exceeds that for Negroes in each of the regions. Prevalence rates for defective acuity (20/50 or poorer) in the South and Northeast are more than twice as great for Negro as for white persons 65-74 years of age, while the proportion with this degree of defect among Negroes in the Midwest and West is only negligibly greater than for their white counterparts.

Size of Place of Residence

There is no consistent pattern of differences in the distribution of usual visual acuity (better eye) by size of place of residence for the U.S. civilian noninstitutionalized population age 4-74 years. Among persons living in urbanized areas, 72.4 percent have usual monocular acuity of 20/20 or better, compared with 73.2 percent in urban communities outside of urbanized areas and 73.1 percent in rural areas. The proportions with defective acuity of 20/50 or poorer are similarly close: 3.5 percent for those in urbanized areas, 3.6 percent in nonurbanized areas, and 3.0 percent in rural areas. The differences in rates are not statistically significant nor is there a consistent pattern in visual acuity rates by age, race, or sex (table 7).

Income

There is a consistent relationship between the level of family income and usual visual acuity of persons 4-74 years of age in the United States. The proportion with usual acuity of at least 20/20 in the better eye increases with the size of the annual family income from 60.1 percent among those in families with income under \$5,000 to 70.5 percent in the middle income brackets to 79.5 percent among those with income of \$10,000 or more per year, while the proportion with defective acuity of 20/50 or poorer decreases from 7.6 percent in the lowest income bracket to 3.3 percent for those with incomes of \$5,000 to \$10,000 to 1.7 percent among those in the highest income brackets (table 8 and figure 9).

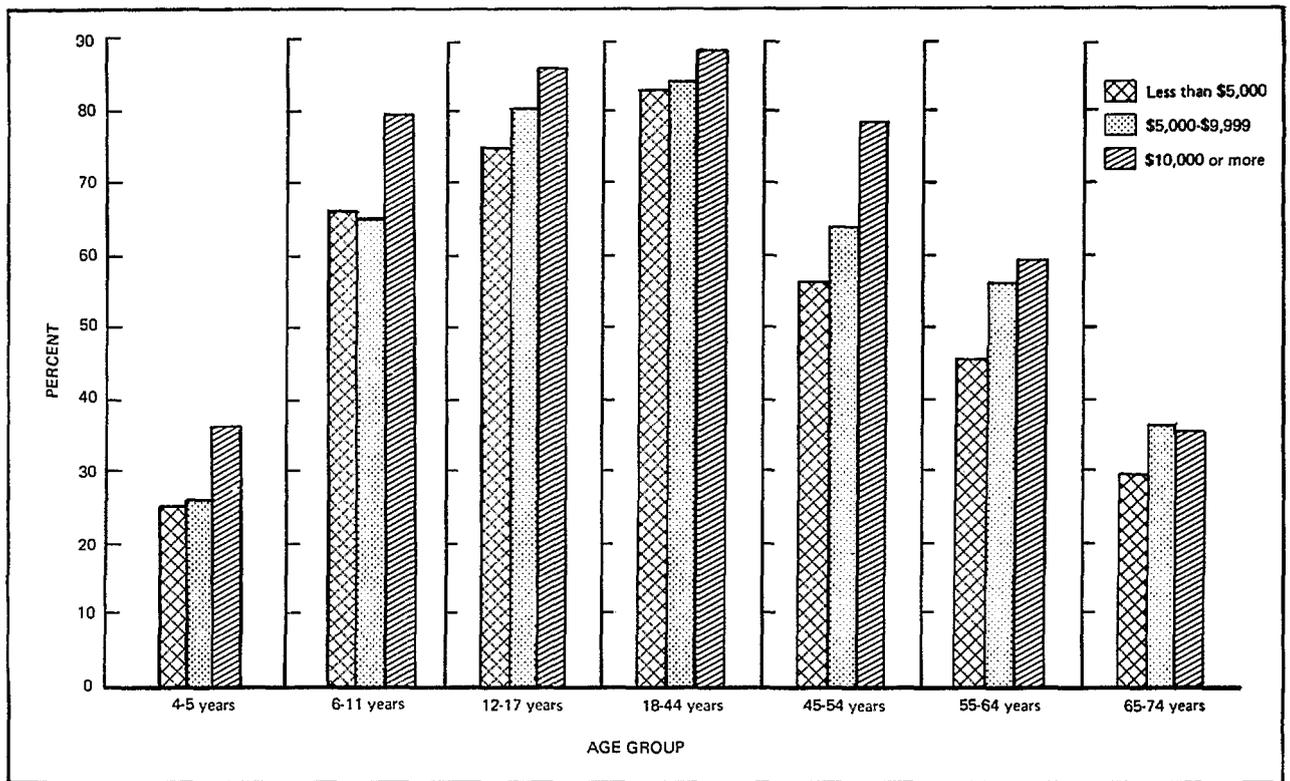


Figure 9. Percent of the population age 4-74 years with at least 20/20 usual distance vision in the better eye, by age and family income: United States, 1971-1972.

The relationship of usual acuity and income is generally similar among both males and females. Among males the increase in the proportion usually testing 20/20 or better from the lowest to the highest income group is from 64.4 percent to 81.1 percent while the proportion with defective acuity of 20/50 or poorer decreases from 8.9 to 1.3 percent. Similarly among females, the proportion with usual acuity of at least 20/20 increases from 57.0 to 77.8 percent, while those with defective vision decreases from 6.7 to 2.0 percent from the lowest to the highest income group.

This pattern of association of usual acuity with income is generally consistent over the age range in the study but tends to be somewhat stronger among preschool-age children 4-5 years and adults in the middle age group 45-64 years. Except for women in the older age group, 55-74 years, and males age 12-44 years, the proportion with usual acuity at least 20/20 in their better eye is highest in the highest income groups. The

proportion with defective acuity testing no better than 20/50 with their usual correction, if any, is significantly higher among persons with a family income of less than \$5,000 per year.

Among the white population the association of usual acuity and income, except among the preschool-age group, is more consistent than for the total population. However, exceptions to this pattern are evident among men age 18-44 years, girls age 4-11 years, and women age 55-74 years (figure 10 and table 8).

Among the Negro population only for those 55-64 years of age is this pattern of increase in better acuity with increased income consistent.

Education

There is a positive association between usual visual acuity and education level attained by the head of the household similar to that shown with family income (tables 9, 10, and figure 11). The proportion of persons 4-74 years of age

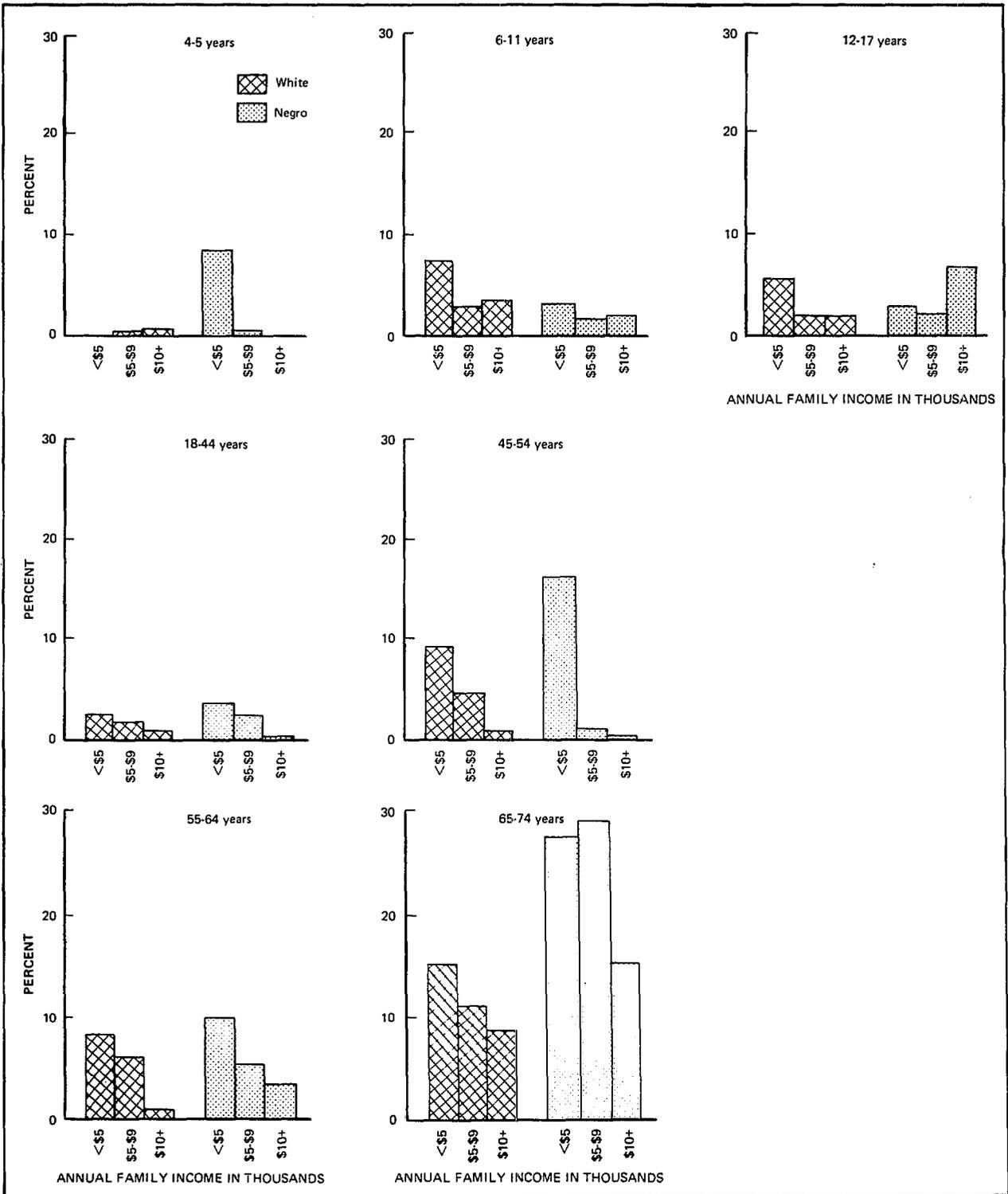


Figure 10. Percent of the white and Negro populations age 4-74 years with 20/50 or worse usual distance vision in the better eye, by age and family income: United States, 1971-1972.

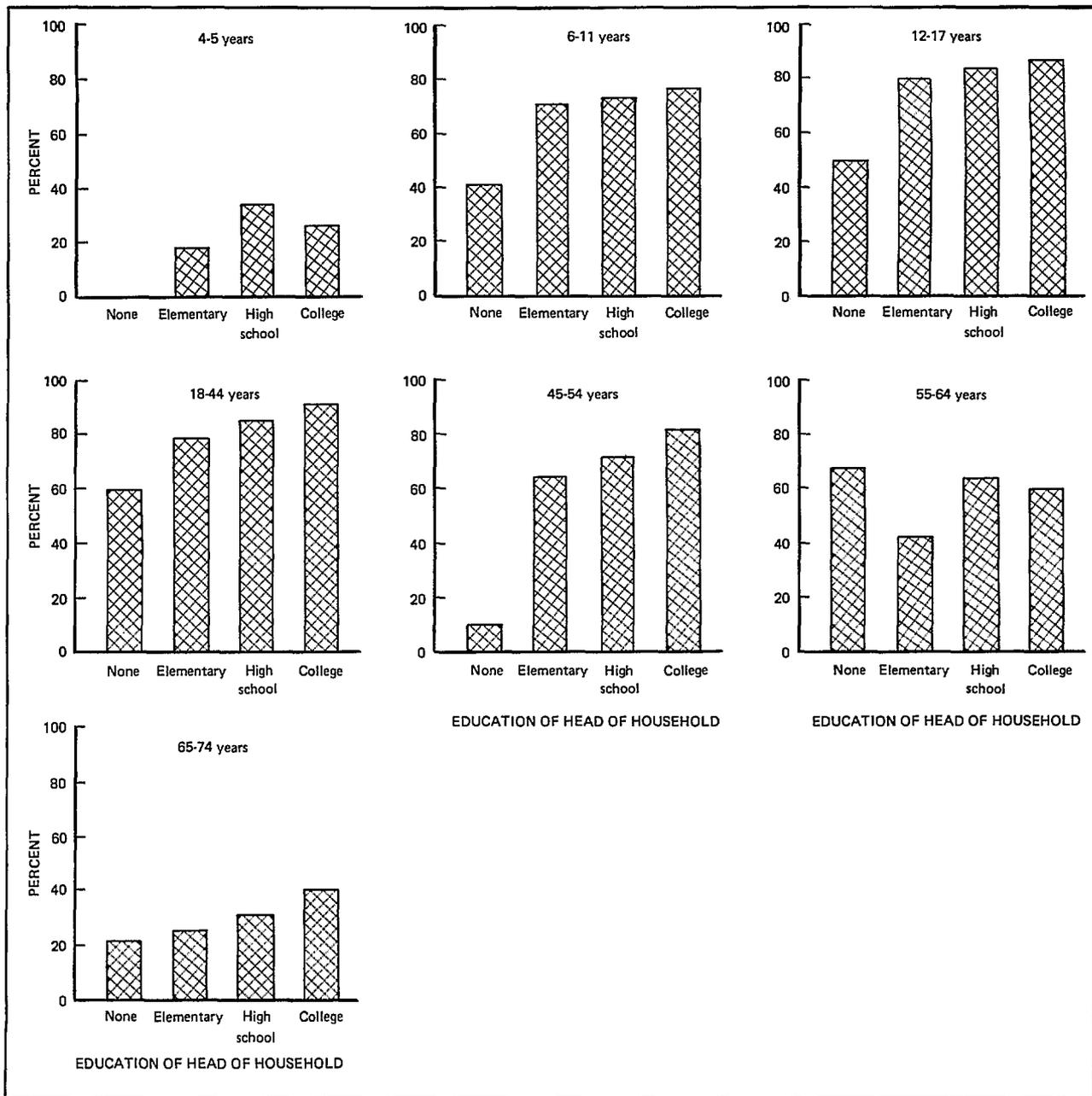


Figure 11. Percent of the population age 4-74 years with at least 20/20 usual distance vision in the better eye, by age and education of head of household: United States, 1971-1972.

with usual acuity of at least 20/20 in the better eye increases from 36.5 percent among those whose household head had no formal schooling to 79.9 percent among those with some college education, while the proportion with defective acuity no better than 20/50 in these two

extremes of the education groups declined from 20.9 to 1.7 percent.

This pattern of association of usual visual acuity with this socioeconomic indicator (education of household head) is generally similar for males and females and across the age groups in

this study. It is also more consistent among the white than the Negro population.

Among the adults 18-74 years of age, the association between visual acuity and the education of the examinee shown in table 10 is similar to that with educational level of the head of the household. These data are included for comparability with acuity data published for adults from the 1960-1962 Health Examination Survey.

Comparison With Previous Studies

Monocular visual acuity was measured with and without correction (the individual's own glasses or contact lenses) in the 1960-1962 Health Examination Survey among the national probability sample representative of the civilian noninstitutionalized population of adults age 18-79 years and in the 1966-1970 Health Examination Survey among the national probability sample representative of the noninstitutionalized population of youths age 12-17 years.

National estimates of the distribution of visual acuity levels in the better eye with usual correction, if any, from these two earlier studies are shown in tables 11 and 12 along with comparable data from the present study.

The apparent improvement shown in usual visual acuity of U.S. youths and adults in the present study over findings for these age groups in the population in the earlier national surveys may be the resultant of a number of factors that need to be considered in interpreting these data. These changes probably reflect improvement in eye care and in socioeconomic conditions among the population as well as differences in testing methods and examiners among the surveys. Moreover, the sampling variability for some in those age groups in the present survey is somewhat larger than in the previous surveys because of the smaller sample size in those groups. There is evidence from the quality control of the present study that the ophthalmologist examiners tended to obtain slightly higher acuity levels than did the more experienced observers. On this basis it might be assumed that the data in all three surveys will somewhat overestimate the proportion reaching the better acuity levels and that the overstatement may be somewhat less in the present than in earlier studies because of the greater skill of the examiners in the present study.

Among youths 12-17 years of age, some improvement in usual visual acuity level may be seen in the present survey from that found in the preceding national study, the midpoint for which was approximately 4 years earlier. The proportion of boys with usual acuity of at least 20/20 in the better eye increased 5 percent (from 82.3 percent to 86.6 percent), while the proportion with usual acuity no better than 20/50 decreased 38 percent (from 3.7 percent to 2.3 percent, figure 12). Girls of that age showed a negligible improvement of less than 1 percent in the proportion with usual acuity at least 20/20 from 78.3 percent to 79.0 percent, while the prevalence of defective acuity no better than 20/50 with usual correction decreased about 40 percent from 5.3 percent to 3.1 percent (figure 13).

From the survey among adults completed 10 years earlier, consistent improvement in usual acuity level that generally increased with age may be seen in the present study findings for men from age 35 years and women 25 years and over.

Among men 35 years and over the proportion testing at least 20/20 with usual acuity in the better eye shows increases ranging from 2.8 percent at 35-44 years to 16.9 percent at 55-64 years, while the proportion with usual acuity no better than 20/50 shows decreases ranging from 16 percent at 45-54 years to 61 percent at 35-44 years.

The proportion of women with usual acuity of at least 20/20 within each age group increased consistently between 1960-1962 and 1971-1972; gains ranged from 3 percent at age 25-34 years to 48 percent at 65-74 years. The proportion with defective acuity no better than 20/50 decreased from 1960-1962 to 1971-1972 at each age from 25 years on; the percentage reductions ranged from a low of 23 percent at 65-74 years to a maximum of 59 percent at 55-64 years.

Since only uncorrected acuity levels were measured in the 1963-1965 Health Examination Survey among the national probability sample representative of the noninstitutionalized children 6-11 years of age in this country, monocular acuity levels obtained in that earlier survey shown in table 13 are not comparable with those

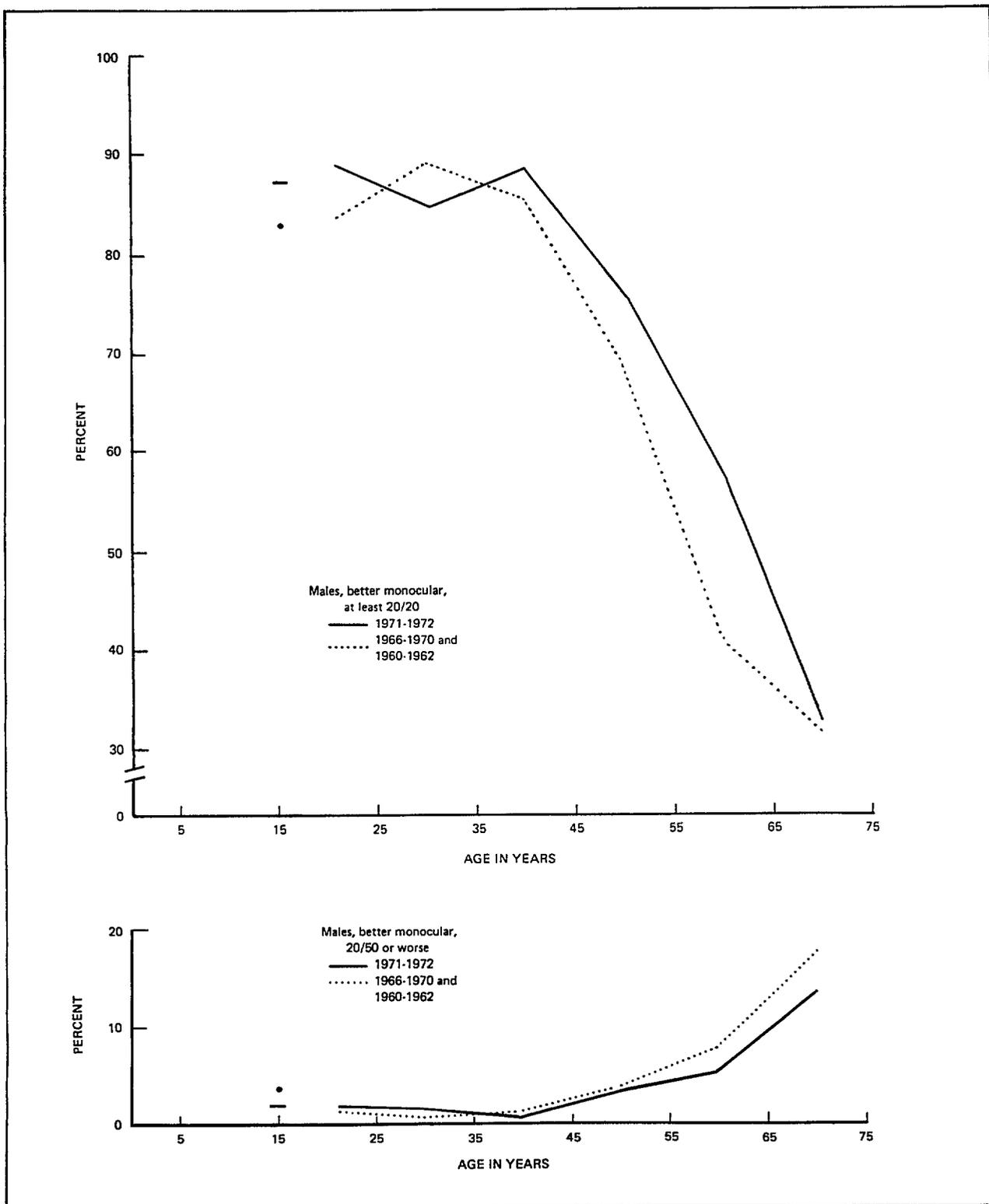


Figure 12. Percent of males age 12-74 years with usual distance acuity of at least 20/20 and percent with 20/50 or worse in the better eye, by age from the present and previous national surveys: United States, 1971-1972 (12-74 years), 1966-1970 (12-17 years), and 1960-1962 (18-74 years).

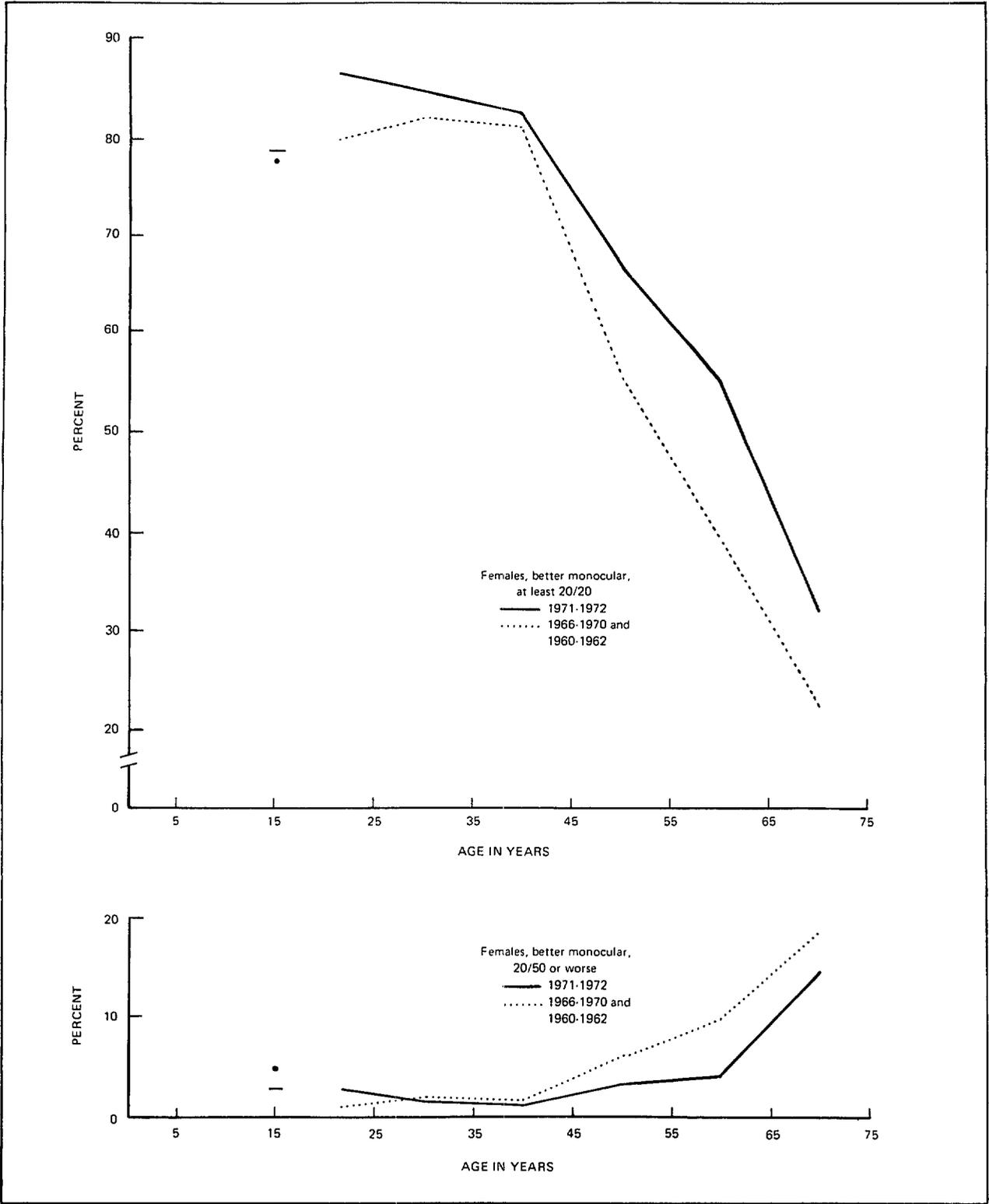


Figure 13. Percent of females age 12-74 years with usual distance acuity of at least 20/20 and percent with 20/50 or worse in the better eye, by age from the present and previous national surveys: United States, 1971-1972 (12-74 years), 1966-1970 (12-17 years), and 1960-1962 (18-74 years).

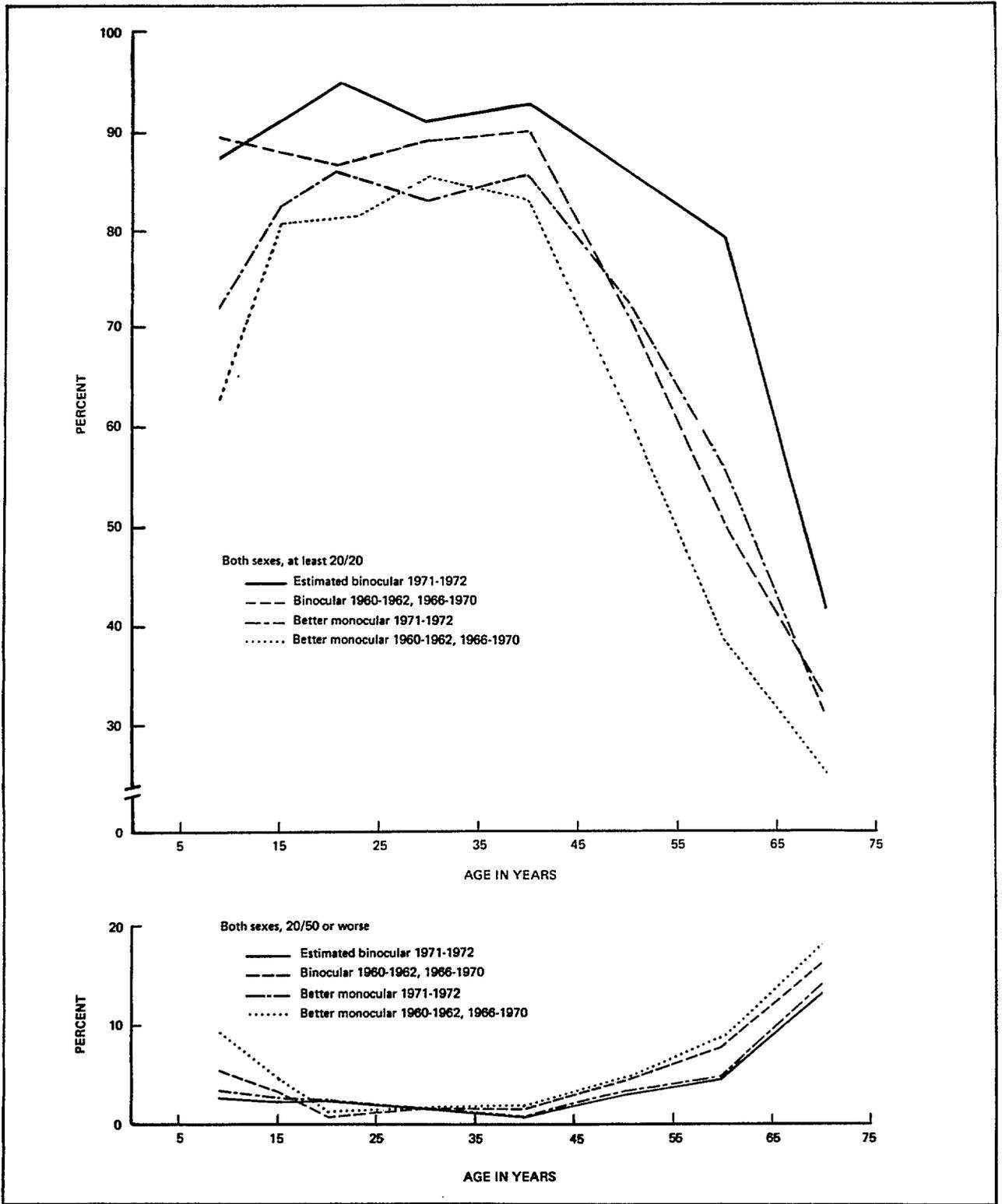


Figure 14. Estimated percent of population age 12-74 years with usual binocular and percent with usual better monocular of at least 20/20 or of 20/50 or worse, by age from present and previous national surveys: United States, 1971-1972 (12-74 years), 1966-1970 (12-17 years), and 1960-1962 (18-74 years).

for children in the present study. At least some if not all of the increase between the two survey periods may reflect the corrected acuity status of these children at the time of the earlier survey, since about 10 percent of the children were known to have glasses or contact lenses.

Other Prevalence Estimates of Defective Acuity

In the three preceding national surveys, measures of binocular acuity were obtained. This measure was not included in the ophthalmology examination given in the present Health and Nutrition Examination Survey because that part of the examination was concerned principally with the detection of ocular pathology not previously attempted in the earlier surveys.

However, if the relationship between monocular, better monocular, and binocular acuity from the preceding survey findings also were to exist in the target population for the present study, the improvement in usual acuity levels of the adult population between the national estimates from the present study in 1971-1972 and those from the 1960-1962 survey is even greater from age 35 years on than that shown by the better monocular acuity (figure 14).

The estimate for those with usual binocular acuity less than 20/200 from the present study would just slightly exceed the estimate of 0.2 per 100 obtained from the better monocular acuity findings.

No measure of near visual acuity was obtained in the present study. Consequently, it is not possible to determine from these data the proportion of the population who have both defective distance and near acuity. From the 1960-1962 Health Examination Survey among adults age 18-79 years there were 5.0 percent with usual binocular distance acuity of less than 20/40 and 9.1 percent with usual near acuity of less than 14/28. This included 2.8 percent who had at least that degree of visual defect at both near and distance or a total of 11.3 percent who had that degree of defect at near or distance.

The trend with age for those with one or both types of visual defect is similar to that for defective distance acuity (table 14). It increases slowly among young adults from 1.8 percent at 18-24 years to 6.5 percent at 35-44 years. The sharp increase at 45-54 years reflects the in-

crease in defective near acuity. The proportion then increases steadily from 29.2 percent at 45-54 years to 63.9 percent at 75-79 years.

SUMMARY

This report contains national estimates of the distribution of monocular distance acuity with usual correction, if any, among the civilian noninstitutionalized population age 4-74 years in the United States, based on findings from the ophthalmologic examination in the Health and Nutrition Examination Survey of 1971-1972. The findings for the usual acuity in the better eye are analyzed by age, sex, race, ancestry, geographic region, population, size of place of residence, annual family income, and education.

For the first 35 examination locations of the Health and Nutrition Examination Survey of 1971-1972, a national probability sample of 14,147 persons between the ages of 1 and 74 years was carefully and scientifically selected to represent the 192.7 million in the civilian noninstitutionalized population of that age in the United States at the midsurvey time. The 10,126 persons who came in for examination represent 72.8 percent of the sample persons selected when adjustments are made for the differential sampling rates used in the age-, sex-, and income-defined population subgroups. The visual acuity measurements were obtained on the 9,263 examinees over the age of 3 years.

Major findings from this study include:

- Nearly three-fourths (72.8 percent) of the U.S. population 4-74 years of age have distance visual acuity of at least 20/20 in their better eye with their usual correction, if any. For these tests about one-third wore their own glasses or contact lenses, and two-thirds were tested without correction.
- About 3 percent (3.3 percent) or 6.16 million persons in the total 4-74-year age range have usual acuity of 20/50 or less in their better eye including 0.2 percent or 0.21 million persons whose usual acuity is less than 20/200 in their better eye.
- Across the age range the proportion with visual acuity in the better eye with usual correction, if any, of at least 20/20 increases steadily from 31.2 percent at age

4-5 years to a maximum of 87.6 percent among young adults 18-24 years of age, levels off, and then declines from 45 years on to 32.0 percent at age 65-74 years.

- Defective acuity of 20/50 or poorer (in the better eye with usual correction) decreases steadily with age from 3.5 percent at 6-11 years to 0.7 percent at 35-44 years then increases to a maximum of 14.1 percent at age 65-74 years.
- The trend with age is similar for males and females in the population but proportionately more males than females have acuity of at least 20/20 and fewer of 20/50 or less.
- Negro persons age 4-74 years have poorer visual acuity (better eye) with their usual correction, if any, than do white persons. Previous national surveys in which both uncorrected and corrected acuities were obtained for each examinee would indicate that this probably reflects differences in the availability or utilization of eye care for the two races. The greatest racial difference in acuity is evident among the youngest and oldest age groups (under 6 years and 65-74 years).
- Children and youths under 18 years of age in the South generally have somewhat better usual acuity (better eye) than do those in the other three geographic regions of the country. The geographic pattern in the distribution of visual acuity among adults is less consistent than that for children and youths. The proportion of adults with acuity 20/50 or poorer in the better eye with usual correction is con-

sistently lower among those in the Midwest than elsewhere across the 18-74-year age range.

- Population size of place of residence is not correlated with visual acuity levels. The distribution of usual visual acuity among persons in rural areas is similar to that among persons in urbanized areas and urban places outside of urbanized areas.
- Both education and family income show an association with usual visual acuity. Persons in families with the lowest income and whose household head has the least education have the highest proportion with defective acuity (better eye with usual correction, if any), while those in families with some college education and those in the highest income level families have the lowest proportion with usual defective acuity.
- Comparison of the visual acuity findings among U.S. adults 18-74 years of age in 1971-1972 with those from 1960-1962 shows consistent improvement from 10 years ago in the usual (better monocular) acuity levels for men from 35-74 years and for women 25-74 years. Some improvement in acuity is also evident among youths 12-17 years of age in the present study from comparable findings among that age group of the population from the 1966-1970 National Health Examination Survey. These trends probably reflect improvement in eye care and in socioeconomic conditions as well as differences in testing methods and examiners in the various surveys.



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Table 1. Percent distribution of the population age 4-74 years reaching specified acuity levels for usual distance vision in the better eye, according to age and sex, with standard errors for totals: United States, 1971-1972

Age and sex	Acuity level—Snellen ratio											
	20/10 or better	20/15	20/20	20/25	20/30	20/40	20/50	20/70	20/100	20/200	20/400	Worse than 20/400
Percent distribution												
Both sexes												
4-74 years	0.0	2.4	70.4	12.7	8.0	3.2	1.5	1.0	0.4	0.2	0.1	0.1
4-5 years	-	0.8	30.4	7.7	55.6	3.6	0.5	0.8	0.6	-	0.0	-
6-11 years	-	1.0	71.5	12.0	9.1	2.9	1.6	1.2	0.5	0.2	-	-
12-17 years	-	3.3	79.5	8.9	2.8	2.8	1.5	0.4	0.5	0.3	-	0.0
18-24 years	-	4.2	83.4	5.8	3.4	0.9	0.5	0.5	0.5	0.7	0.1	-
25-34 years	0.1	3.9	80.3	10.1	3.0	1.1	0.9	0.6	0.0	-	-	-
35-44 years	-	2.7	82.7	9.9	2.7	1.3	0.3	0.3	0.1	-	0.0	0.0
45-54 years	-	1.1	70.1	14.8	7.3	3.5	1.3	1.2	0.5	0.2	-	0.0
55-64 years	-	1.4	54.6	23.1	10.4	5.8	2.0	1.9	0.2	0.3	0.1	0.2
65-74 years	-	0.7	31.3	27.7	14.3	11.9	7.3	3.8	1.7	0.4	0.5	0.4
Males												
4-74 years	-	2.8	72.4	11.4	7.7	2.8	1.2	1.2	0.3	0.2	0.0	0.0
4-5 years	-	1.0	35.2	7.5	52.0	3.2	0.1	-	0.9	-	0.1	-
6-11 years	-	1.2	73.8	10.7	7.9	2.5	1.6	1.8	0.2	0.3	-	-
12-17 years	-	4.5	82.1	7.5	1.9	1.7	1.0	0.5	0.5	0.2	-	0.1
18-24 years	-	5.0	83.5	4.6	4.4	0.8	0.1	0.4	0.1	1.1	-	-
25-34 years	-	4.3	79.5	11.6	2.4	0.8	0.4	1.0	-	-	-	-
35-44 years	-	3.2	84.7	8.5	1.5	1.6	0.1	0.4	-	-	-	-
45-54 years	-	1.3	73.8	10.6	8.5	2.7	1.6	0.9	0.5	0.1	-	-
55-64 years	-	1.1	55.8	23.0	9.7	5.2	2.0	3.1	-	-	-	0.1
65-74 years	-	0.6	30.9	27.1	14.9	13.0	6.3	4.2	2.0	0.3	0.5	0.2
Females												
4-74 years	0.0	2.0	68.5	13.9	8.4	3.6	1.8	0.8	0.6	0.2	0.1	0.1
4-5 years	-	0.5	25.5	7.9	59.3	4.0	0.9	1.6	0.3	-	-	-
6-11 years	-	0.9	69.2	13.1	10.4	3.3	1.7	0.5	0.9	0.0	-	-
12-17 years	-	2.2	76.8	10.5	3.6	3.8	1.9	0.3	0.6	0.3	-	-
18-24 years	-	3.4	83.1	7.1	2.5	1.0	0.7	0.6	1.0	0.4	0.2	-
25-34 years	0.1	3.5	81.1	8.7	3.6	1.5	1.2	0.3	0.0	-	-	-
35-44 years	-	2.2	80.6	11.3	3.8	1.0	0.6	0.2	0.2	-	0.1	0.0
45-54 years	-	1.0	66.5	18.8	6.2	4.1	1.1	1.4	0.5	0.4	-	0.0
55-64 years	-	1.7	53.6	23.1	11.1	6.4	2.0	0.9	0.4	0.5	0.1	0.2
65-74 years	-	0.8	31.5	28.3	13.8	11.1	8.0	3.4	1.5	0.5	0.5	0.6
Standard error												
Both sexes, 4-74 years	0.01	0.52	1.03	0.59	0.44	0.33	0.15	0.11	0.11	0.07	0.01	0.02
Males, 4-74 years	-	0.67	1.17	0.87	0.57	0.33	0.16	0.18	0.11	0.12	0.01	0.02
Females, 4-74 years	0.02	0.40	1.33	0.80	0.65	0.50	0.24	0.11	0.15	0.07	0.02	0.04

Table 2. Number in the population age 4-74 years reaching specified acuity levels for usual distance vision in the better eye, by age and sex:
United States, 1971-1972

Age and sex	Acuity levels — Snellen ratio											
	20/10 or better	20/15	20/20	20/25	20/30	20/40	20/50	20/70	20/100	20/200	20/400	Worse than 20/400
Number in thousands												
Both sexes												
4-74 years . . .	20	4,308	128,877	23,279	14,655	5,866	2,811	1,904	811	425	105	101
4-5 years	-	56	2,226	564	4,066	263	34	58	43	-	3	-
6-11 years	-	258	17,759	2,966	2,269	719	404	286	135	40	-	-
12-17 years	-	825	19,673	2,210	682	681	362	104	129	71	-	10
18-24 years	-	899	18,001	1,254	735	193	105	111	117	160	17	-
25-34 years	20	997	20,715	2,599	775	291	222	155	5	-	-	-
35-44 years	-	655	19,913	2,387	648	310	79	78	23	-	8	2
45-54 years	-	266	16,431	3,482	1,721	811	312	279	108	56	-	6
55-64 years	-	259	10,190	4,294	1,943	1,084	367	356	37	47	9	30
65-74 years	-	93	3,969	3,523	1,816	1,514	926	477	214	51	67	54
Males												
4-74 years	-	2,442	64,095	10,129	6,722	2,485	1,098	1,105	288	214	32	30
4-5 years	-	39	1,310	280	1,941	120	2	-	32	-	3	-
6-11 years	-	145	9,287	1,364	992	317	200	220	29	37	-	-
12-17 years	-	561	10,270	932	244	216	125	63	58	31	-	10
18-24 years	-	523	8,797	470	463	83	16	47	9	121	-	-
25-34 years	-	521	9,562	1,407	284	90	51	115	-	-	-	-
35-44 years	-	382	9,976	996	178	188	10	52	-	-	-	-
45-54 years	-	147	8,330	1,191	962	308	177	107	53	9	-	-
55-64 years	-	92	4,876	2,006	844	453	173	270	-	-	-	7
65-74 years	-	32	1,687	1,483	814	710	344	231	106	16	29	13
Females												
4-74 years	20	1,866	64,782	13,150	7,933	3,381	1,713	799	523	211	73	71
4-5 years	-	17	916	284	2,125	143	32	58	12	-	-	-
6-11 years	-	113	8,472	1,601	1,277	402	204	65	106	3	-	-
12-17 years	-	264	9,404	1,278	439	465	237	41	71	40	-	-
18-24 years	-	376	9,204	784	271	110	90	63	108	39	17	-
25-34 years	20	476	11,152	1,192	491	201	171	40	5	-	-	-
35-44 years	-	273	9,937	1,391	470	122	68	26	23	-	8	2
45-54 years	-	118	8,101	2,291	759	503	134	172	55	46	-	6
55-64 years	-	168	5,314	2,289	1,099	631	194	87	37	47	9	22
65-74 years	-	61	2,282	2,040	1,002	804	583	247	106	36	39	41

Table 3. Percent of the population age 4-74 years reaching specified visual acuity levels in the right, left, and better eye, by age and sex: United States, 1971-1972

Age and sex	Right eye				Left eye				Better eye	
	20/20 or better	20/25 or better	20/30 or better	20/50 or worse	20/20 or better	20/25 or better	20/30 or better	20/50 or worse	20/20 or better	20/50 or worse
Both sexes	Percent									
4-74 years	64.6	78.8	88.7	6.4	66.0	80.2	89.4	5.9	72.8	3.3
4-5 years	27.7	35.8	92.9	2.6	28.7	36.7	91.0	3.4	31.2	1.9
6-11 years	66.5	80.8	90.4	5.7	68.7	80.5	90.8	5.1	72.5	3.5
12-17 years	78.2	88.1	92.2	3.7	78.4	87.8	92.2	4.5	82.8	2.7
18-44 years	76.7	88.4	94.6	3.4	78.8	90.1	94.3	3.2	85.7	1.5
45-54 years	60.4	77.1	85.7	6.7	60.6	79.2	88.9	6.4	71.2	3.2
55-64 years	46.0	68.1	79.3	13.2	47.3	71.8	83.0	8.5	56.0	4.7
65-74 years	23.0	47.1	63.2	22.8	23.8	48.7	63.2	22.1	32.0	14.1
Males										
4-74 years	66.5	79.7	89.3	6.5	68.1	81.7	90.5	5.1	75.2	2.9
4-5 years	32.4	40.4	95.6	2.3	34.4	41.8	92.6	2.0	36.2	1.1
6-11 years	70.0	83.0	91.5	6.1	70.6	82.7	92.0	5.2	75.0	3.9
12-17 years	81.4	89.8	93.1	3.4	82.9	91.1	94.7	2.9	86.6	2.3
18-44 years	75.3	87.1	94.3	3.2	79.5	90.9	94.5	2.6	86.7	1.2
45-54 years	64.0	76.5	84.7	7.0	64.8	80.5	90.9	5.3	75.1	3.1
55-64 years	46.1	71.1	79.2	15.1	45.4	69.9	82.5	9.9	56.9	5.2
65-74 years	23.9	44.0	60.9	24.1	23.7	49.7	63.5	21.8	31.5	13.5
Females										
4-74 years	62.9	78.1	88.2	6.5	64.1	78.9	88.5	6.4	70.5	3.6
4-5 years	22.7	30.9	90.0	2.8	22.8	31.5	89.5	5.0	26.0	2.8
6-11 years	63.0	78.7	89.5	5.0	66.8	78.4	89.8	5.0	70.1	3.1
12-17 years	74.9	86.3	91.1	4.0	73.8	84.4	89.5	6.3	79.0	3.1
18-44 years	77.1	88.7	93.9	3.7	78.1	89.3	94.2	3.8	84.6	1.8
45-54 years	57.1	77.7	86.7	6.4	56.9	78.1	87.1	7.4	67.5	3.4
55-64 years	46.0	65.5	79.5	11.8	49.0	73.5	83.5	7.2	55.3	4.1
65-74 years	22.3	49.5	65.0	21.9	23.9	48.1	63.1	22.3	32.3	14.5

Table 4. Percent distribution of the population age 4-74 years reaching specified acuity levels for usual distance vision in the better eye, according to race, age, and sex, with standard errors: United States, 1971-1972

Age and sex	White											
	20/10 or better	20/15	20/20	20/25	20/30	20/40	20/50	20/70	20/100	20/200	20/400	Worse than 20/400
	Percent distribution											
Both sexes	0.0	2.3	71.3	12.5	7.7	3.1	1.4	1.0	0.4	0.2	0.1	0.0
4-5 years	-	0.9	33.0	8.0	53.9	3.2	-	0.6	0.4	-	0.0	-
6-11 years	-	0.9	74.5	10.2	8.6	2.1	1.8	1.1	0.6	0.2	-	-
12-17 years	-	3.4	80.6	8.1	2.6	2.9	1.3	0.3	0.6	0.2	-	0.0
18-24 years	-	4.0	83.9	5.9	3.5	0.7	0.2	0.5	0.3	0.9	0.1	-
25-34 years	0.1	3.8	81.2	9.3	2.9	1.2	0.9	0.6	0.0	-	-	-
35-44 years	-	2.5	83.4	9.5	2.5	1.4	0.2	0.4	0.1	-	0.0	-
45-54 years	-	1.3	70.3	15.0	7.4	3.1	1.4	1.1	0.2	0.2	-	-
55-64 years	-	1.4	55.2	23.5	10.1	5.8	2.1	1.6	0.0	0.2	-	0.1
65-74 years	-	0.8	32.4	28.6	13.6	11.8	6.7	3.4	1.6	0.3	0.6	0.2
Males	-	2.7	73.1	11.3	7.3	2.7	1.2	1.2	0.2	0.3	0.0	0.0
4-5 years	-	1.2	36.7	7.8	51.4	2.4	-	-	0.4	-	0.1	-
6-11 years	-	0.8	75.1	10.0	7.4	2.5	1.8	1.8	0.3	0.3	-	-
12-17 years	-	4.8	83.2	6.9	1.8	1.6	0.6	0.3	0.5	0.2	-	0.1
18-24 years	-	4.6	83.7	4.5	4.6	0.7	0.2	0.4	-	1.3	-	-
25-34 years	-	4.7	81.0	10.3	1.9	0.7	0.4	1.0	-	-	-	-
35-44 years	-	2.9	85.2	8.3	1.4	1.6	0.1	0.5	-	-	-	-
45-54 years	-	1.5	75.4	10.4	8.6	1.7	1.7	0.6	-	0.1	-	-
55-64 years	-	1.1	55.8	23.6	9.0	5.4	2.0	3.1	-	-	-	-
65-74 years	-	0.6	32.2	28.4	14.0	13.0	5.3	3.8	1.9	0.2	0.5	0.1
Females	0.0	1.9	69.6	13.7	8.1	3.4	1.7	0.8	0.5	0.2	0.1	0.0
4-5 years	-	0.6	28.8	8.3	56.5	4.1	-	1.4	0.3	-	-	-
6-11 years	-	1.0	73.8	10.4	9.9	1.6	1.9	0.5	0.9	-	-	-
12-17 years	-	1.9	78.0	9.3	3.4	4.2	1.9	0.4	0.6	0.3	-	-
18-24 years	-	3.4	84.2	7.3	2.4	0.7	0.2	0.6	0.6	0.4	0.2	-
25-34 years	0.1	3.0	81.5	8.7	3.6	1.5	1.3	0.3	0.0	-	-	-
35-44 years	-	2.1	81.7	10.8	3.6	1.0	0.4	0.2	0.2	-	0.0	-
45-54 years	-	1.1	65.7	19.2	6.2	4.4	1.2	1.5	0.4	0.3	-	-
55-64 years	-	1.6	54.5	23.4	11.2	6.2	2.2	0.3	0.0	0.4	-	0.2
65-74 years	-	0.9	32.6	28.9	13.2	10.9	7.5	3.2	1.4	0.5	0.6	0.3

Table 4. Percent distribution of the population age 4-74 years reaching specified acuity levels for usual distance vision in the better eye, according to race, age, and sex, with standard errors: United States, 1971-1972—Con.

Age and sex	White											
	20/10 or better	20/15	20/20	20/25	20/30	20/40	20/50	20/70	20/100	20/200	20/400	Worse than 20/400
	Standard error											
Both sexes	0.01	0.51	1.09	0.67	0.48	0.32	0.17	0.13	0.12	0.07	0.02	0.02
4-5 years	-	0.53	3.37	1.94	3.10	1.14	-	0.48	0.27	-	0.05	-
6-11 years	-	0.29	1.96	1.46	0.74	0.53	0.79	0.32	0.35	0.19	-	-
12-17 years	-	1.03	1.93	1.10	0.61	1.12	0.56	0.15	0.31	0.18	-	0.05
18-24 years	-	1.25	1.51	1.23	0.99	0.32	0.13	0.28	0.25	0.51	0.06	-
25-34 years	0.08	1.13	1.53	1.08	0.80	0.41	0.44	0.34	0.02	-	-	-
35-44 years	-	0.74	1.96	1.34	0.83	0.51	0.13	0.28	0.11	-	0.02	-
45-54 years	-	0.62	3.34	2.03	1.62	0.99	0.47	0.46	0.14	0.14	-	-
55-64 years	-	0.74	3.21	2.50	1.74	1.45	0.74	0.66	0.01	0.24	-	0.13
65-74 years	-	0.41	1.81	1.72	1.29	1.41	1.27	0.51	0.66	0.16	0.19	0.16
Males	-	0.71	1.21	0.89	0.63	0.32	0.20	0.22	0.11	0.13	0.02	0.02
4-5 years	-	0.81	5.26	2.06	5.25	1.23	-	-	0.40	-	0.09	-
6-11 years	-	0.19	2.91	1.97	1.70	0.98	1.23	0.67	0.24	0.37	-	-
12-17 years	-	1.61	2.38	1.02	0.70	0.55	0.44	0.25	0.42	0.24	-	0.10
18-24 years	-	1.57	2.41	1.30	1.69	0.59	0.17	0.48	-	0.97	-	-
25-34 years	-	2.04	2.14	2.11	0.99	0.52	0.31	0.72	-	-	-	-
35-44 years	-	0.90	2.00	1.90	0.85	0.93	0.10	0.49	-	-	-	-
45-54 years	-	0.91	3.58	2.31	2.21	0.90	0.73	0.49	-	0.10	-	-
55-64 years	-	1.10	4.30	3.94	2.67	1.54	1.29	1.49	-	-	-	-
65-74 years	-	0.48	2.33	2.45	1.38	1.62	1.24	0.73	1.12	0.15	0.24	0.14
Females	0.02	0.35	1.39	0.82	0.70	0.48	0.27	0.12	0.18	0.07	0.03	0.03
4-5 years	-	0.59	5.39	2.56	5.03	1.64	-	1.03	0.36	-	-	-
6-11 years	-	0.51	2.34	2.01	1.70	0.66	0.85	0.34	0.70	-	-	-
12-17 years	-	0.74	3.50	1.93	0.92	2.07	0.84	0.12	0.45	0.27	-	-
18-24 years	-	1.25	1.73	1.76	0.92	0.34	0.21	0.33	0.47	0.31	0.11	-
25-34 years	0.15	0.94	1.57	0.86	1.12	0.61	0.70	0.13	0.05	-	-	-
35-44 years	-	0.83	2.91	1.73	1.42	0.41	0.25	0.21	0.22	-	0.04	-
45-54 years	-	0.58	4.03	2.84	1.88	1.51	0.63	0.76	0.26	0.25	-	-
55-64 years	-	0.89	3.38	3.33	2.27	1.90	1.08	0.24	0.03	0.45	-	0.24
65-74 years	-	0.39	2.07	2.63	1.89	1.61	1.80	0.66	0.57	0.23	0.29	0.25

Table 4. Percent distribution of the population age 4-74 years reaching specified acuity levels for usual distance vision in the better eye, according to race, age, and sex, with standard errors: United States, 1971-1972—Con.

Age and sex	Negro											
	20/10 or better	20/15	20/20	20/25	20/30	20/40	20/50	20/70	20/100	20/200	20/400	Worse than 20/400
	Percent distribution											
Both sexes	0.0	2.6	63.2	14.7	10.0	4.4	2.0	1.4	1.1	0.3	0.1	0.2
4-5 years	-	-	13.2	6.2	67.6	5.9	3.4	1.7	2.0	-	-	-
6-11 years	-	1.9	53.8	22.0	12.5	7.6	0.7	1.2	0.2	0.1	-	-
12-17 years	-	2.2	74.6	14.6	3.0	2.2	1.7	0.9	0.2	0.6	-	-
18-24 years	-	5.1	81.3	5.1	1.8	1.8	2.4	0.4	2.1	-	-	-
25-34 years	0.1	4.6	73.5	15.2	4.3	1.0	0.7	0.6	-	-	-	-
35-44 years	-	4.7	73.8	13.9	4.6	1.5	1.2	-	-	-	0.2	0.1
45-54 years	-	-	66.9	13.7	6.7	6.5	0.5	2.3	2.7	0.5	-	0.2
55-64 years	-	1.7	51.6	20.5	12.1	6.5	0.8	2.5	2.5	0.6	0.7	0.5
65-74 years	-	0.2	18.9	18.2	21.6	13.5	13.9	7.2	2.7	1.0	0.3	2.5
Males	-	3.0	66.2	13.1	9.0	4.1	1.4	1.9	1.1	0.1	0.0	0.1
4-5 years	-	-	19.8	5.8	59.5	9.7	0.5	-	4.7	-	-	-
6-11 years	-	3.2	64.6	16.0	11.3	2.5	0.6	1.8	-	-	-	-
12-17 years	-	2.8	78.3	11.4	1.4	2.6	1.3	1.6	0.3	0.3	-	-
18-24 years	-	7.8	84.8	4.4	0.9	1.2	-	0.3	0.6	-	-	-
25-34 years	-	1.4	69.2	20.9	5.8	1.1	0.8	0.8	-	-	-	-
35-44 years	-	8.3	74.8	11.4	3.2	2.3	-	-	-	-	-	-
45-54 years	-	-	60.5	11.9	7.4	11.6	0.6	3.6	4.4	-	-	-
55-64 years	-	0.3	62.8	17.1	11.5	2.3	1.7	3.2	-	-	-	1.1
65-74 years	-	-	17.0	14.6	24.5	13.5	14.9	8.9	3.0	1.5	0.8	1.3
Females	0.0	2.3	60.9	16.0	10.8	4.7	2.4	1.0	1.1	0.4	0.1	0.3
4-5 years	-	-	8.8	6.4	73.1	3.3	5.4	2.8	0.2	-	-	-
6-11 years	-	0.6	43.3	27.9	13.7	12.4	0.8	0.8	0.4	0.1	-	-
12-17 years	-	1.6	71.0	17.8	4.6	1.8	2.0	0.2	0.2	0.8	-	-
18-24 years	-	2.8	78.5	5.6	2.7	2.3	4.4	0.4	3.3	-	-	-
25-34 years	0.2	7.7	77.6	9.9	2.8	0.9	0.5	0.4	-	-	-	-
35-44 years	-	3.0	73.4	15.0	5.3	1.1	1.8	-	-	-	0.3	0.1
45-54 years	-	-	73.0	15.4	6.0	1.6	0.4	1.0	1.0	1.1	-	0.5
55-64 years	-	2.8	43.0	23.3	12.7	9.7	-	1.9	4.4	1.0	1.2	-
65-74 years	-	0.4	20.4	20.9	19.4	13.4	13.0	5.9	2.5	0.6	-	3.5

Table 4. Percent distribution of the population age 4-74 years reaching specified acuity levels for usual distance vision in the better eye, according to race, age, and sex, with standard errors: United States, 1971-1972—Con.

Age and sex	Negro											
	20/10 or better	20/15	20/20	20/25	20/30	20/40	20/50	20/70	20/100	20/200	20/400	Worse than 20/400
	Standard error											
Both sexes	0.01	0.82	1.63	1.05	0.48	0.64	0.26	0.25	0.40	0.10	0.06	0.12
4-5 years	-	-	3.90	2.63	5.84	2.26	2.47	1.39	1.98	-	-	-
6-11 years	-	0.92	5.13	3.95	1.79	2.28	0.36	0.63	0.15	0.08	-	-
12-17 years	-	0.93	4.02	3.31	1.36	1.11	0.88	0.82	0.17	0.36	-	-
18-24 years	-	2.65	4.12	2.07	0.78	0.92	1.56	0.18	1.44	-	-	-
25-34 years	0.08	2.72	4.20	2.89	1.65	0.77	0.52	0.42	-	-	-	-
35-44 years	-	2.38	5.40	3.34	1.65	0.77	0.72	-	-	-	0.20	0.10
45-54 years	-	-	5.34	2.34	2.86	3.18	0.37	1.77	2.22	0.40	-	0.17
55-64 years	-	1.49	8.29	7.04	3.64	2.81	0.50	1.11	1.55	0.59	0.69	0.48
65-74 years	-	0.24	3.80	2.90	2.29	2.33	1.50	2.12	1.11	0.36	0.19	2.05
Males	-	1.29	2.97	2.42	0.90	1.02	0.23	0.47	0.67	0.07	0.02	0.09
4-5 years	-	-	7.84	3.78	8.14	4.70	0.52	-	4.80	-	-	-
6-11 years	-	2.20	5.97	4.55	2.77	1.90	0.48	0.88	-	-	-	-
12-17 years	-	1.26	4.94	4.67	0.70	1.88	0.83	1.66	0.28	0.35	-	-
18-24 years	-	5.28	8.26	2.94	0.87	0.97	-	0.33	0.82	-	-	-
25-34 years	-	1.01	6.45	5.42	3.33	1.25	0.94	0.86	-	-	-	-
35-44 years	-	7.27	9.93	5.26	2.12	1.59	-	-	-	-	-	-
45-54 years	-	-	7.30	4.23	5.04	5.90	0.62	3.38	4.39	-	-	-
55-64 years	-	0.36	9.16	7.38	7.02	1.61	1.20	3.44	-	-	-	1.14
65-74 years	-	-	3.88	2.49	5.10	2.54	3.83	3.78	1.75	0.74	0.45	0.73
Females	0.02	0.81	1.97	1.57	0.68	1.13	0.40	0.22	0.57	0.17	0.09	0.21
4-5 years	-	-	4.43	3.64	7.31	1.61	4.10	2.28	0.22	-	-	-
6-11 years	-	0.48	6.37	4.44	3.31	5.15	0.55	0.62	0.31	0.15	-	-
12-17 years	-	0.78	5.45	5.21	2.51	0.89	1.21	0.24	0.20	0.60	-	-
18-24 years	-	1.35	3.30	2.33	1.15	1.24	2.57	0.26	2.25	-	-	-
25-34 years	0.17	4.29	5.15	3.03	0.66	0.53	0.25	0.27	-	-	-	-
35-44 years	-	1.86	5.41	5.09	1.98	0.43	1.05	-	-	-	0.30	0.15
45-54 years	-	-	5.85	4.25	1.98	1.13	0.42	1.06	0.95	0.81	-	0.33
55-64 years	-	2.80	10.85	8.82	4.78	4.80	-	1.71	2.89	0.99	1.25	-
65-74 years	-	0.42	4.92	4.47	3.29	3.48	3.50	1.15	1.07	0.47	-	3.58

Table 5. Percent of the population age 18-74 years reaching at least 20/20 or no better than 20/50 with usual distance visual acuity in the better eye, by ancestry and race, with standard errors: United States, 1971-1972

Better usual monocular acuity and ancestry	Race, 18-74 years							
	All races	White	Negro	Other	All races	White	Negro	Other
<u>20/20 or better</u>	Percent				Standard error			
Spanish, Mexican ¹	68.3	68.3	-	*69.2	5.05	5.03	-	*27.24
Chinese, Japanese	50.3	-	-	63.5	16.44	-	-	11.60
American Indian ²	72.2	73.6	-	*52.3	6.07	6.92	-	*32.33
All other	73.7	74.1	70.0	96.2	1.40	1.38	3.0	3.46
<u>20/50 or poorer</u>								
Spanish, Mexican ¹	7.5	7.6	-	-	1.76	1.80	-	-
Chinese, Japanese	1.1	-	-	*1.3	1.66	-	-	*1.74
American Indian ²	8.9	6.2	-	*47.7	4.57	4.50	-	*32.33
All other	3.3	3.0	6.0	*0.6	0.35	0.35	3.5	*0.64
	Number in thousands							
Total in population	122,404	108,453	13,000	951	...	...	...	...
Spanish, Mexican ¹	5,685	5,615	-	70	...	...	...	...
Chinese, Japanese	587	123	-	464	...	...	...	...
American Indian ²	1,588	1,483	-	105	...	...	...	...
All other	114,544	101,232	13,000	312	...	...	...	...

¹Includes Puerto Rican immigrants.

²Living off reservations.

*Figure does not meet standards of reliability or precision usually set for these reports.

Table 6. Percent of the population age 4-74 years reaching specified acuity levels for usual distance vision in the better eye, by geographic region, age, race, and sex, with standard errors: United States, 1971-1972

Age, race, ¹ and sex	20/20 or better				20/25-20/40				20/50 or worse			
	North-east	Mid-west	South	West	North-east	Mid-west	South	West	North-east	Mid-west	South	West
<u>Both sexes</u>	Percent											
4-74 years	72.8	73.9	72.5	71.7	24.2	23.4	23.8	24.2	3.0	2.7	3.7	4.1
All races, 4-5 years	27.5	36.5	42.7	15.7	70.0	61.8	54.7	83.5	2.5	1.7	2.6	0.8
White	29.5	38.4	51.3	15.9	68.2	60.6	48.7	83.3	2.3	1.0	-	0.8
Negro	3.8	13.5	15.5	14.3	92.5	78.5	73.9	85.7	3.7	8.0	10.6	-
All races, 6-11 years	73.1	69.6	78.0	69.6	24.9	25.4	20.1	25.4	2.0	5.0	1.9	5.0
White	75.9	75.1	83.3	68.6	22.4	19.5	14.5	26.1	1.7	5.4	2.2	5.3
Negro	48.7	32.8	64.4	75.0	46.7	64.2	34.5	23.0	4.6	3.0	1.1	2.0
All races, 12-17 years	84.1	81.3	86.5	80.4	12.6	15.1	12.0	17.1	3.3	3.6	1.5	2.5
White	85.8	81.4	88.1	82.3	11.2	14.9	11.1	15.6	3.0	3.7	0.8	2.1
Negro	71.1	80.3	81.8	68.7	23.1	16.6	14.5	30.5	5.8	3.1	3.7	0.8
All races, 18-44 years	87.5	86.7	85.9	84.1	11.4	12.3	12.7	13.6	1.1	1.0	1.4	2.3
White	88.0	87.2	85.9	83.7	11.0	11.7	13.0	14.0	1.0	1.1	1.1	2.3
Negro	74.5	78.0	85.3	79.8	22.9	20.2	12.4	15.5	2.6	1.8	2.3	4.7
All races, 45-54 years	76.4	74.5	65.1	67.7	20.7	23.5	31.0	27.4	2.9	2.0	3.9	4.9
White	75.0	75.0	64.7	70.3	22.1	23.2	32.4	25.8	2.9	1.8	2.9	3.9
Negro	85.4	70.3	64.4	47.3	11.5	27.6	28.8	35.6	3.1	2.1	6.8	17.1
All races, 55-64 years	46.6	61.0	51.7	61.0	48.7	37.6	41.6	32.2	4.7	1.4	6.7	6.8
White	47.7	60.9	53.6	64.2	48.0	37.8	41.7	29.6	4.3	1.3	4.7	6.2
Negro	45.8	65.2	58.5	38.5	45.8	32.3	32.6	54.5	8.4	2.5	8.9	7.0
All races, 65-74 years	32.5	34.1	28.0	36.5	54.5	57.7	52.5	49.9	13.0	8.2	19.5	13.6
White	32.1	32.6	30.4	37.9	55.5	58.6	53.1	48.9	12.4	8.8	16.5	13.2
Negro	11.7	35.8	15.1	22.7	63.3	54.5	46.0	61.2	25.0	9.7	38.9	16.1

¹Rates for all races include other than white and Negro.

Table 6. Percent of the population age 4-74 years reaching specified acuity levels for usual distance vision in the better eye, by geographic region, age, race, and sex, with standard errors: United States, 1971-1972—Con.

Age, race, ¹ and sex	20/20 or better				20/25-20/40				20/50 or worse			
	North-east	Mid-west	South	West	North-east	Mid-west	South	West	North-east	Mid-west	South	West
Both sexes	Standard error											
4-74 years	3.40	1.83	1.90	1.93	3.70	2.80	2.40	2.50	0.66	0.65	0.21	0.58
All races, 4-5 years	5.90	8.89	2.78	1.85	6.18	9.16	1.47	2.35	1.97	0.97	2.14	0.82
White	5.52	9.02	3.94	1.83	5.85	8.64	3.94	2.38	2.11	0.91	-	0.92
Negro	7.38	6.02	7.07	3.23	5.84	15.88	10.16	3.23	2.29	16.58	9.48	-
All races, 6-11 years	4.12	4.32	1.64	3.34	4.14	3.31	2.33	2.99	0.35	2.21	1.10	2.09
White	4.38	4.59	3.22	3.75	3.94	3.04	3.76	3.20	0.58	2.57	1.61	2.29
Negro	6.87	15.04	7.06	7.25	9.29	13.91	6.73	8.06	3.92	1.82	0.63	2.45
All races, 12-17 years	5.95	2.49	2.77	4.00	4.28	3.20	2.10	3.90	1.92	1.30	1.04	0.89
White	6.33	3.12	2.18	4.71	4.55	3.77	1.84	4.30	2.27	1.38	0.66	0.90
Negro	13.63	6.55	4.52	12.92	13.73	6.69	3.24	13.44	4.15	1.38	2.55	0.75
All races, 18-44 years	4.25	1.31	1.38	1.04	3.90	1.18	1.24	0.99	0.54	0.58	0.39	0.44
White	3.86	1.66	1.76	1.22	3.64	1.55	1.94	0.84	0.47	0.62	0.44	0.58
Negro	10.82	4.49	3.40	8.58	10.45	4.80	2.99	7.75	1.82	0.84	1.01	2.01
All races, 45-54 years	3.48	6.23	5.75	5.95	3.65	6.50	4.62	5.43	1.26	1.15	1.33	1.78
White	3.56	6.02	9.08	6.40	3.72	6.34	8.45	5.64	1.14	1.20	0.95	1.98
Negro	10.02	4.17	9.38	21.10	6.97	5.82	10.59	16.06	3.32	1.91	3.63	14.60
All races, 55-64 years	7.84	2.84	5.70	1.94	7.26	2.57	4.15	3.39	1.79	1.26	2.86	2.16
White	5.42	3.15	8.33	3.86	5.15	2.98	6.10	4.66	1.73	1.26	3.75	2.08
Negro	18.72	11.04	11.44	22.40	10.45	13.20	11.76	22.64	4.87	2.24	3.04	5.73
All races, 65-74 years	4.40	4.11	1.02	3.59	2.86	6.12	1.51	5.72	3.88	2.77	1.89	4.37
White	4.85	3.94	0.75	3.19	3.15	6.55	3.41	5.64	5.08	3.53	2.87	5.06
Negro	4.11	10.60	6.90	8.28	14.00	9.15	5.98	11.24	11.96	2.09	5.37	4.07

¹Rates for all races include other than white and Negro.

Table 6. Percent of the population age 4-74 years reaching specified acuity levels for usual distance vision in the better eye, by geographic region, age, race, and sex, with standard errors: United States, 1971-1972—Con.

Age, race, ¹ and sex	20/20 or better				20/25-20/40				20/50 or worse			
	North-east	Mid-west	South	West	North-east	Mid-west	South	West	North-east	Mid-west	South	West
Males	Percent											
All races, 4-5 years	31.1	35.7	50.2	20.5	68.9	63.8	48.2	77.9	-	0.5	1.6	1.6
White	32.3	34.8	57.4	20.6	67.7	64.9	42.6	77.6	-	0.3	-	1.8
Negro	6.5	30.8	19.0	19.5	93.5	65.9	72.6	80.5	-	3.3	8.4	-
All races, 6-11 years	69.9	70.8	83.6	74.8	27.2	23.9	15.2	18.7	2.9	5.3	1.2	6.5
White	72.3	76.0	83.8	73.0	25.0	18.8	14.7	19.8	2.7	5.2	1.5	7.2
Negro	47.3	30.1	83.2	85.9	48.1	63.7	16.4	12.3	4.6	6.2	0.4	1.8
All races, 12-17 years	81.6	85.9	87.9	90.4	14.9	12.9	10.9	6.5	3.5	1.2	1.2	3.1
White	83.9	86.7	88.3	92.6	13.6	11.9	10.7	5.5	2.5	1.4	1.0	1.9
Negro	67.7	78.9	86.4	92.0	23.2	21.1	11.3	6.1	9.1	-	2.3	1.9
All races, 18-44 years	87.7	90.4	84.7	85.8	11.6	8.3	14.8	11.5	0.7	1.3	0.5	2.7
White	87.8	91.6	83.8	85.2	11.5	7.2	15.6	12.3	0.7	1.2	0.6	2.5
Negro	74.2	72.6	87.7	79.5	25.1	25.7	12.3	15.8	0.7	1.7	-	4.7
All races, 45-54 years	84.2	77.2	70.6	70.8	13.0	21.1	24.6	25.1	2.8	1.7	4.8	4.1
White	81.3	79.5	70.5	74.2	16.0	18.8	26.0	23.8	2.7	1.7	3.5	2.0
Negro	79.3	64.9	59.3	43.8	20.7	34.5	32.3	25.9	-	0.6	8.4	30.3
All races, 55-64 years	49.1	55.2	54.4	69.2	41.4	42.5	40.3	24.9	9.5	2.3	5.3	5.9
White	47.4	56.0	53.7	71.7	43.3	41.7	41.9	23.0	9.3	2.3	4.4	5.3
Negro	73.5	80.9	57.0	43.8	23.3	19.1	34.6	46.7	3.2	-	8.4	9.5
All races, 65-74 years	24.1	39.9	27.0	39.6	62.7	52.5	53.0	45.6	13.2	7.6	20.0	14.8
White	24.2	39.0	29.2	40.3	63.8	54.0	56.1	46.5	12.0	7.0	14.7	13.2
Negro	6.9	28.7	14.7	23.0	79.3	64.5	41.9	52.4	13.8	6.8	43.4	24.6

¹ Rates for all races include other than white and Negro.

Table 6. Percent of the population age 4-74 years reaching specified acuity levels for usual distance vision in the better eye, by geographic region, age, race, and sex, with standard errors: United States, 1971-1972—Con.

Age, race, ¹ and sex	20/20 or better				20/25-20/40				20/50 or worse			
	North-east	Mid-west	South	West	North-east	Mid-west	South	West	North-east	Mid-west	South	West
Males	Standard error											
All races, 4-5 years	8.71	9.87	10.60	4.61	8.71	9.94	9.17	5.26	-	0.33	1.60	1.73
White	8.82	10.10	12.73	5.09	8.82	10.04	12.73	5.87	-	0.31	-	1.96
Negro	9.47	23.31	12.07	7.27	9.47	21.32	14.04	7.27	-	8.24	9.08	-
All races, 6-11 years . . .	5.49	4.37	2.57	6.09	5.17	3.73	2.98	5.29	0.69	2.03	1.20	3.84
White	6.74	4.90	4.00	6.67	5.96	3.95	4.82	5.64	1.21	2.45	1.54	4.34
Negro	16.16	10.66	4.55	2.19	16.86	9.37	4.67	3.04	4.41	5.55	0.54	2.22
All races, 12-17 years . . .	6.31	1.99	2.31	1.93	4.99	1.05	2.43	1.87	1.97	1.57	0.86	1.09
White	6.20	2.94	2.50	1.06	4.59	2.25	3.05	1.41	2.20	1.74	1.02	0.49
Negro	17.19	12.36	1.83	5.24	16.54	12.36	1.30	5.48	6.51	-	1.47	1.61
All races, 18-44 years . . .	5.73	1.73	1.30	1.54	5.75	1.16	1.49	1.60	0.79	0.83	0.49	0.72
White	5.71	2.12	1.45	1.59	5.82	1.48	2.03	0.65	0.73	0.79	0.62	1.01
Negro	24.73	9.11	6.31	21.47	24.29	10.19	6.31	13.05	0.99	1.35	-	8.43
All races, 45-54 years . . .	4.32	7.20	5.92	5.67	5.62	8.24	2.90	4.69	2.07	1.55	3.13	1.59
White	5.24	6.28	10.93	5.42	6.42	7.42	9.22	4.40	2.13	1.67	2.14	1.53
Negro	41.05	13.22	9.90	30.05	41.05	14.49	13.43	30.38	-	5.13	5.96	25.36
All races, 55-64 years . . .	7.47	6.81	6.45	7.60	6.91	6.02	4.83	5.06	5.59	2.44	3.81	3.86
White	6.50	7.01	7.72	6.69	4.30	6.28	6.37	4.43	5.38	2.41	3.76	3.64
Negro	17.92	34.69	13.88	30.85	17.57	16.59	8.34	24.15	2.16	-	8.80	7.10
All races, 65-74 years . . .	4.45	3.10	3.34	4.81	5.75	5.53	4.48	4.82	6.67	3.73	2.35	3.31
White	4.80	3.72	2.98	5.09	5.65	6.06	4.92	5.29	6.29	3.53	3.15	3.93
Negro	8.83	11.49	6.00	8.20	9.26	11.92	6.09	15.95	7.61	4.65	7.96	8.40

¹Rates for all races include other than white and Negro.

Table 6. Percent of the population age 4-74 years reaching specified acuity levels for usual distance vision in the better eye, by geographic region, age, race, and sex, with standard errors: United States, 1971-1972—Con.

Age, race, ¹ and sex	20/20 or better				20/25-20/40				20/50 or worse			
	North-east	Mid-west	South	West	North-east	Mid-west	South	West	North-east	Mid-west	South	West
Females												
Percent												
All races, 4-5 years	24.6	37.3	31.3	11.6	71.0	59.7	64.7	88.4	4.4	3.0	4.0	-
White	27.1	42.5	40.3	11.8	68.6	55.6	59.7	88.2	4.3	1.9	-	-
Negro	2.8	4.9	12.3	10.7	92.2	84.8	75.0	89.3	5.0	10.3	12.7	-
All races, 6-11 years	77.0	68.8	71.2	64.0	22.1	26.3	26.1	32.7	0.9	4.9	2.7	3.3
White	80.3	74.5	82.6	64.1	19.3	20.0	14.3	32.5	0.4	5.5	3.1	3.4
Negro	50.2	34.3	44.2	59.9	45.2	64.5	54.1	37.9	4.6	1.2	1.7	2.2
All races, 12-17 years	87.1	76.7	85.1	71.8	9.8	17.3	13.1	26.3	3.1	6.0	1.8	1.9
White	88.1	76.1	87.9	73.6	8.3	17.9	11.5	24.2	3.6	6.0	0.6	2.2
Negro	77.0	81.7	78.1	52.3	23.0	12.2	17.0	47.7	-	6.1	4.9	-
All races, 18-44 years	87.3	82.9	86.9	82.6	11.2	16.3	10.9	15.4	1.5	0.8	2.2	2.0
White	88.1	82.7	87.6	82.3	10.6	16.3	10.8	15.5	1.3	1.0	1.6	2.2
Negro	74.6	83.7	83.4	79.9	21.9	14.4	12.4	15.3	3.5	1.9	4.2	4.8
All races, 45-54 years	70.3	71.1	60.1	64.8	26.7	26.6	36.8	29.7	3.0	2.3	3.1	5.5
White	70.0	69.3	60.0	66.8	26.9	28.8	37.6	27.7	3.1	1.9	2.4	5.5
Negro	88.6	75.1	70.1	51.8	6.7	21.4	25.0	48.2	4.7	3.5	4.9	-
All races, 55-64 years	44.8	68.0	49.0	54.6	53.8	31.7	42.9	37.9	1.4	0.3	8.1	7.5
White	47.9	66.7	53.4	58.5	51.4	33.3	41.7	34.7	0.7	-	4.9	6.8
Negro	7.0	58.2	59.9	36.1	77.4	38.2	30.7	58.0	15.6	3.6	9.4	5.9
All races, 65-74 years	39.3	30.1	28.8	33.9	47.9	61.3	52.0	53.4	12.8	8.6	19.2	12.7
White	38.5	28.1	31.2	36.0	48.8	61.9	51.2	50.9	12.7	10.0	17.6	13.1
Negro	15.3	39.9	15.4	22.4	51.6	48.7	49.5	67.8	33.1	11.4	35.1	9.8

¹Rates for all races include other than white and Negro.

Table 6. Percent of the population age 4-74 years reaching specified acuity levels for usual distance vision in the better eye, by geographic region, age, race, and sex, with standard errors: United States, 1971-1972—Con.

Age, race, ¹ and sex	20/20 or better				20/25-20/40				20/50 or worse			
	North-east	Mid-west	South	West	North-east	Mid-west	South	West	North-east	Mid-west	South	West
Females	Standard error											
All races, 4-5 years	10.16	12.42	10.49	3.73	9.75	13.39	13.38	3.73	3.23	2.49	3.76	-
White	11.10	12.64	16.44	4.45	10.47	12.63	16.44	4.45	3.56	2.16	-	-
Negro	6.32	9.17	9.02	2.68	4.53	24.80	13.86	2.68	3.05	21.61	10.45	-
All races, 6-11 years . . .	5.33	5.08	1.22	2.27	5.80	4.04	1.92	2.42	0.79	2.60	2.22	0.68
White	5.15	4.95	6.70	1.96	5.37	3.33	5.51	1.86	0.45	3.00	3.16	0.59
Negro	7.49	19.55	10.04	19.16	9.83	18.69	9.73	19.91	3.71	2.00	1.11	2.91
All races, 12-17 years . . .	6.45	5.40	5.33	6.93	4.76	5.95	4.84	6.61	2.22	1.14	1.46	1.27
White	7.08	6.19	4.89	7.62	5.39	6.62	4.82	7.15	2.58	1.24	0.56	1.40
Negro	11.62	5.39	8.03	14.54	11.62	4.09	6.60	14.54	-	2.11	3.70	-
All races, 18-44 years . . .	3.81	2.86	2.15	1.29	3.27	2.88	1.93	1.33	0.70	0.44	0.90	0.28
White	3.22	3.09	2.25	1.45	2.64	3.08	2.46	1.47	0.65	0.71	0.92	0.25
Negro	6.86	2.38	3.16	7.26	6.70	2.60	3.07	8.66	2.73	1.03	1.85	2.46
All races, 45-54 years . . .	5.25	7.43	6.74	8.53	5.56	7.96	7.14	8.14	2.05	1.87	0.87	2.80
White	4.64	8.44	8.35	9.08	5.33	9.26	8.69	8.68	2.03	1.98	1.49	2.87
Negro	7.25	9.97	12.14	16.29	4.81	11.56	10.09	16.29	4.73	2.62	3.31	-
All races, 55-64 years . . .	9.72	6.25	5.37	7.55	8.91	6.35	4.63	8.00	1.26	0.34	3.40	2.34
White	7.83	7.11	10.55	6.22	7.12	7.11	7.53	7.46	0.83	-	5.77	2.46
Negro	5.57	24.13	13.87	24.48	10.33	26.91	17.92	32.17	13.77	3.07	5.44	5.22
All races, 65-74 years . . .	4.73	5.92	1.41	2.99	3.36	7.71	3.97	7.22	2.19	3.52	3.48	5.90
White	5.56	5.18	2.83	2.05	3.33	7.71	6.88	6.65	4.52	4.41	4.67	6.41
Negro	6.90	19.38	9.51	11.78	18.59	19.41	6.04	14.27	16.35	5.63	5.97	4.70

¹Rates for all races include other than white and Negro.

Table 7. Percent of the population age 4-74 years reaching specified acuity levels for usual distance vision in the better eye, by size of place of residence, age, race, and sex, with standard errors: United States, 1971-1972

Age, race, ¹ and sex	20/20 or better			20/50 or worse			20/20 or better			20/50 or worse		
	Urban	Non-urbanized	Rural	Urban	Non-urbanized	Rural	Urban	Non-urbanized	Rural	Urban	Non-urbanized	Rural
Both sexes	Percent						Standard error					
4-74 years	72.4	73.2	73.1	3.5	3.6	3.0	1.73	1.65	1.16	0.37	0.76	0.35
All races, 4-5 years	35.4	28.5	26.8	2.1	5.5	0.5	4.11	13.17	4.49	0.98	4.27	0.52
White	39.4	30.1	28.7	1.9	1.7	-	4.29	16.46	4.90	1.13	1.70	-
Negro	14.0	21.3	6.1	3.4	22.2	5.9	4.05	15.14	3.66	2.42	24.29	7.53
All races, 6-11 years	71.5	73.1	73.9	3.8	2.3	3.4	2.44	4.86	2.64	1.14	0.80	1.79
White	76.0	75.0	74.7	4.1	2.4	3.6	2.46	5.67	3.16	1.48	0.98	2.03
Negro	51.4	59.9	65.4	2.7	1.8	1.2	6.43	14.59	7.28	1.26	1.24	1.10
All races, 12-17 years	82.2	84.9	83.0	2.8	2.1	2.8	2.69	3.26	2.39	0.89	1.28	1.13
White	83.4	88.1	83.4	2.6	0.5	2.9	2.64	3.30	2.79	0.99	0.59	1.16
Negro	77.4	65.7	78.5	1.9	16.9	2.8	5.72	16.93	11.15	0.60	11.87	2.05
All races, 18-44 years	84.7	86.4	86.8	1.8	2.2	0.8	1.55	1.51	1.38	0.34	0.98	0.34
White	85.6	87.2	86.8	1.7	1.9	0.8	1.81	1.70	1.27	0.39	0.81	0.36
Negro	79.8	77.6	86.3	2.7	6.6	1.1	3.05	11.37	4.85	0.84	6.11	0.58
All races, 45-54 years	71.2	72.7	70.3	2.8	3.3	3.9	4.01	4.94	5.37	0.74	2.54	1.25
White	71.1	72.4	72.2	2.8	3.7	2.6	4.44	6.89	5.63	0.86	2.87	0.98
Negro	72.1	75.6	48.5	2.6	-	18.9	4.33	22.18	11.38	1.14	-	10.52
All races, 55-64 years	54.6	54.7	54.9	3.6	4.9	5.8	2.95	4.34	5.90	0.90	2.86	2.06
White	55.5	54.5	55.3	3.8	4.5	4.8	3.02	4.63	6.26	0.97	2.80	2.41
Negro	49.0	59.5	43.6	8.3	6.2	15.2	10.65	20.28	13.61	2.27	4.93	6.86
All races, 65-74 years	29.4	34.0	29.7	15.9	13.1	11.5	3.31	4.68	3.35	2.39	3.61	2.72
White	29.8	35.7	30.9	16.0	12.9	11.2	3.42	5.04	3.04	2.93	4.30	2.69
Negro	25.0	14.9	11.9	25.3	34.0	30.6	5.73	12.97	7.06	6.30	20.41	5.19

¹Totals include races other than white and Negro.

Table 7. Percent of the population age 4-74 years reaching specified acuity levels for usual distance vision in the better eye, by size of place of residence, age, race, and sex, with standard errors: United States, 1971-1972—Con.

Age, race, ¹ and sex	20/20 or better			20/50 or worse			20/20 or better			20/50 or worse		
	Urban	Non-urbanized	Rural	Urban	Non-urbanized	Rural	Urban	Non-urbanized	Rural	Urban	Non-urbanized	Rural
Males	Percent						Standard error					
4-74 years	76.0	73.4	74.4	3.1	3.1	3.2	1.72	3.59	1.40	0.48	0.96	0.45
All races, 4-5 years	44.9	28.6	28.5	0.3	6.7	-	5.01	12.39	8.55	0.21	4.23	-
White	47.2	27.4	30.2	0.2	3.4	-	5.51	15.22	9.56	0.19	3.33	-
Negro	20.5	33.2	8.6	1.1	19.9	-	9.19	25.79	5.86	1.12	19.42	-
All races, 6-11 years	74.5	75.6	75.2	4.4	3.8	3.1	3.95	6.01	3.96	1.07	2.08	2.90
White	76.6	76.6	74.7	4.6	4.1	3.6	4.10	7.23	4.58	1.40	2.28	3.32
Negro	64.7	65.5	76.7	3.4	1.9	-	8.68	19.32	5.92	1.61	2.30	-
All races, 12-17 years	86.4	85.6	87.2	2.1	2.0	2.7	2.24	6.20	2.31	1.11	2.31	1.05
White	88.3	91.0	86.8	1.3	-	2.8	2.00	5.16	2.71	0.87	-	1.12
Negro	80.6	50.9	89.3	1.9	29.0	2.3	6.97	36.93	3.75	1.11	31.22	2.20
All races, 18-44 years	86.6	86.4	86.9	1.6	0.4	0.9	2.10	4.01	2.05	0.59	0.29	0.59
White	88.0	86.8	86.6	1.7	0.1	0.9	2.54	4.78	2.12	0.70	0.14	0.61
Negro	77.4	81.4	89.3	0.8	3.6	0.8	5.46	28.95	4.66	0.61	5.25	0.88
All races, 45-54 years	75.5	73.0	75.6	2.6	1.8	4.4	4.25	10.05	5.91	1.15	2.15	2.44
White	76.4	73.5	79.2	2.9	2.1	1.8	3.92	14.66	5.50	1.30	2.80	1.44
Negro	68.3	69.7	38.4	0.3	-	31.1	10.79	27.01	11.80	0.45	-	20.16
All races, 55-64 years	58.4	51.2	53.5	3.9	5.3	6.7	4.13	7.58	8.00	2.00	4.80	3.66
White	58.3	50.9	54.2	4.6	4.7	6.8	4.84	8.17	8.28	1.88	4.91	3.85
Negro	67.5	57.4	42.2	3.9	12.2	10.9	10.74	32.03	17.27	2.08	13.73	11.42
All races, 65-74 years	28.2	32.6	31.2	12.9	17.7	13.1	4.07	3.29	5.42	2.97	6.47	2.58
White	28.9	34.7	32.6	11.6	17.3	11.5	4.16	5.12	5.24	3.49	8.07	2.79
Negro	19.6	17.9	7.3	29.1	32.6	42.3	6.08	18.01	4.63	10.17	20.43	7.34

¹Totals include races other than white and Negro.

Table 7. Percent of the population age 4-74 years reaching specified acuity levels for usual distance vision in the better eye, by size of place of residence, age, race, and sex, with standard errors: United States, 1971-1972—Con.

Age, race, ¹ and sex	20/20 or better			20/50 or worse			20/20 or better			20/50 or worse		
	Urban	Non-urban-ized	Rural	Urban	Non-urban-ized	Rural	Urban	Non-urban-ized	Rural	Urban	Non-urban-ized	Rural
Females	Percent						Standard error					
4-74 years	69.1	73.1	71.8	3.9	4.1	2.8	1.95	1.54	1.71	0.42	0.77	0.51
All races, 4-5 years	26.2	28.4	25.0	3.9	4.1	1.0	5.13	17.72	8.51	1.97	5.43	1.11
White	30.7	32.9	27.0	3.7	-	-	6.82	20.75	9.25	2.36	-	-
Negro	11.0	5.2	3.3	4.4	25.3	12.5	6.29	5.20	3.37	3.36	35.09	14.38
All races, 6-11 years	68.7	69.7	72.5	3.3	0.3	3.6	2.19	8.99	3.13	1.44	0.26	2.15
White	75.3	72.7	74.7	3.6	-	3.7	2.67	10.95	4.13	1.85	-	2.44
Negro	39.0	54.6	53.0	2.0	1.6	2.4	7.04	20.80	9.61	1.47	1.60	1.95
All races, 12-17 years	77.3	84.3	79.1	3.7	2.1	3.0	4.63	4.94	4.05	1.10	1.42	1.45
White	77.7	85.7	80.3	4.1	1.0	3.0	4.97	5.66	4.45	1.38	1.10	1.51
Negro	73.6	73.1	70.4	2.0	10.9	3.2	6.84	15.44	18.18	0.78	9.59	2.45
All races, 18-44 years	83.0	86.4	86.8	1.9	3.8	0.7	1.86	2.77	1.36	0.41	1.79	0.38
White	83.2	87.6	87.1	1.6	3.4	0.6	2.04	3.10	1.43	0.45	1.51	0.46
Negro	81.3	74.2	82.7	3.9	9.3	1.4	2.42	6.97	8.11	1.40	10.05	0.89
All races, 45-54 years	67.6	72.4	65.2	3.0	5.1	3.4	4.85	6.38	6.59	1.14	3.79	1.53
White	66.5	71.2	65.6	2.8	5.4	3.4	6.13	6.84	7.24	1.30	3.99	1.85
Negro	74.9	94.0	60.5	4.1	-	4.4	5.50	25.62	17.21	1.76	-	4.57
All races, 55-64 years	51.5	58.0	56.3	3.4	4.6	4.8	3.70	8.87	5.92	1.16	2.52	1.84
White	53.3	57.9	56.4	3.2	4.4	2.9	4.04	9.21	6.37	1.49	2.44	2.93
Negro	38.3	61.5	45.7	10.9	-	21.7	13.39	32.31	19.88	4.06	-	13.74
All races, 65-74 years	30.2	34.9	28.2	18.1	10.4	10.1	3.70	6.60	4.03	2.26	4.59	4.26
White	30.4	36.3	29.3	19.3	10.3	10.9	4.10	6.62	4.43	3.16	5.61	4.17
Negro	28.7	10.8	15.9	22.7	36.0	20.5	7.32	15.54	17.59	6.02	26.61	9.31

¹Totals include races other than white and Negro.

Table 8. Percent of the population age 4-74 years reaching specified acuity levels for usual distance vision in the better eye, by family income, age, race, and sex, with standard errors: United States, 1971-1972

Age, race, ¹ and sex	20/20 or better			20/25-20/40			20/50 or worse		
	Under \$5,000	\$5,000-\$9,999	\$10,000 and over	Under \$5,000	\$5,000-\$9,999	\$10,000 and over	Under \$5,000	\$5,000-\$9,999	\$10,000 and over
Both sexes	Percent								
4-74 years	60.1	70.5	79.5	32.3	26.2	18.8	7.6	3.3	1.7
All races, 4-5 years	25.0	26.5	37.1	71.8	73.0	62.1	3.1	0.5	0.9
White	28.3	29.3	38.2	71.7	70.1	60.9	-	0.5	0.9
Negro	19.7	7.2	5.3	71.9	92.2	94.7	8.4	0.6	-
All races, 6-11 years	67.0	65.4	79.5	27.4	31.9	17.0	5.6	2.7	3.5
White	71.8	68.9	79.9	21.0	28.2	16.5	7.2	2.9	3.5
Negro	57.4	45.6	69.2	39.5	52.7	28.7	3.1	1.7	2.0
All races, 12-17 years	75.3	80.5	86.3	20.2	17.6	11.3	4.5	1.9	2.4
White	72.2	81.8	87.1	22.1	16.2	11.0	5.7	1.9	1.9
Negro	78.8	73.9	81.6	18.3	24.2	11.8	2.9	2.0	6.7
All races, 18-44 years	83.3	84.2	88.2	13.9	14.0	11.0	2.8	1.9	0.8
White	84.1	84.3	88.8	13.5	14.0	10.3	2.4	1.7	0.9
Negro	82.0	83.6	75.9	14.0	13.7	23.9	3.9	2.7	0.2
All races, 45-54 years	56.6	64.1	78.1	32.2	31.5	20.9	11.2	4.4	1.0
White	53.6	64.9	78.0	37.0	30.2	21.0	9.3	4.9	1.0
Negro	63.6	58.7	80.2	20.3	40.1	19.5	16.1	1.2	0.3
All races, 55-64 years	45.7	56.4	59.5	45.9	37.0	39.5	8.4	6.6	1.1
White	46.2	57.3	58.5	45.7	36.7	40.5	8.1	6.0	1.0
Negro	43.3	57.5	83.1	46.6	37.4	13.5	10.0	5.1	3.4
All races, 65-74 years	29.1	37.2	35.5	54.2	50.8	55.8	16.6	12.0	8.8
White	30.7	37.6	36.3	54.3	51.3	55.1	15.0	11.1	8.6
Negro	17.9	29.4	3.3	54.7	41.6	81.8	27.4	29.0	14.9

¹Totals include races other than white and Negro.

Table 8. Percent of the population age 4-74 years reaching specified acuity levels for usual distance vision in the better eye, by family income, age, race, and sex, with standard errors: United States, 1971-1972—Con.

Age, race, ¹ and sex	20/20 or better			20/25-20/40			20/50 or worse		
	Under \$5,000	\$5,000-\$9,999	\$10,000 and over	Under \$5,000	\$5,000-\$9,999	\$10,000 and over	Under \$5,000	\$5,000-\$9,999	\$10,000 and over
Both sexes	Standard error								
4-74 years	2.05	1.29	1.71	1.57	1.18	1.71	0.88	0.43	0.26
All races, 4-5 years	7.42	4.62	3.90	8.85	4.64	3.69	3.49	0.47	0.66
White	11.96	4.98	3.78	11.96	4.97	3.58	-	0.53	0.69
Negro	7.60	3.14	3.97	11.62	3.31	3.97	8.56	0.62	-
All races, 6-11 years	4.33	3.54	2.59	2.90	3.55	2.39	2.89	0.97	1.24
White	5.66	3.97	2.85	3.57	3.85	2.65	4.49	1.13	1.33
Negro	5.34	7.94	14.17	4.97	7.96	13.81	1.04	0.87	2.58
All races, 12-17 years	5.91	3.15	1.39	5.23	2.84	1.52	2.06	0.76	0.67
White	8.74	3.71	1.50	7.82	3.31	1.60	3.04	0.86	0.59
Negro	4.22	8.64	8.78	4.43	8.82	6.84	2.14	1.03	5.54
All races, 18-44 years	2.10	1.45	1.76	1.99	1.18	1.65	0.63	0.41	0.35
White	2.41	1.73	1.73	2.61	1.54	1.61	0.82	0.42	0.37
Negro	3.69	3.11	7.47	3.33	2.88	7.55	1.11	1.50	0.15
All races, 45-54 years	5.44	4.23	3.90	4.54	3.94	3.99	3.37	1.76	0.56
White	9.23	4.39	4.08	7.08	3.93	4.18	4.70	1.98	0.60
Negro	8.35	10.76	7.55	4.37	11.02	7.58	6.60	0.99	0.39
All races, 55-64 years	7.20	4.18	4.64	6.08	3.21	4.88	2.77	1.59	1.02
White	7.07	4.59	4.32	6.37	3.44	4.65	3.39	2.13	1.06
Negro	11.08	14.94	20.79	10.94	13.97	15.42	3.29	3.32	6.77
All races, 65-74 years	1.94	2.85	4.95	1.85	3.64	5.86	2.21	2.43	2.22
White	2.01	3.07	5.30	1.77	4.00	6.23	2.42	2.77	2.23
Negro	5.10	10.68	5.51	4.81	12.70	11.00	4.04	13.24	10.97

¹Totals include races other than white and Negro.

Table 8. Percent of the population age 4-74 years reaching specified acuity levels for usual distance vision in the better eye, by family income, age, race, and sex, with standard errors: United States, 1971-1972—Con.

Age, race, ¹ and sex	20/20 or better			20/25-20/40			20/50 or worse		
	Under \$5,000	\$5,000-\$9,999	\$10,000 and over	Under \$5,000	\$5,000-\$9,999	\$10,000 and over	Under \$5,000	\$5,000-\$9,999	\$10,000 and over
Males	Percent								
4-74 years	64.4	72.1	81.1	26.8	24.7	17.5	8.9	3.1	1.3
All races, 4-5 years	26.9	31.6	42.2	69.8	67.4	57.7	3.3	1.0	0.2
White	28.8	33.2	42.3	71.2	65.8	57.5	-	1.0	0.2
Negro	24.0	14.0	16.3	67.8	84.4	83.7	8.2	1.7	-
All races, 6-11 years	68.3	67.7	81.9	24.0	29.1	15.3	7.7	3.1	2.8
White	69.1	69.4	81.5	20.6	27.4	15.5	10.3	3.2	2.9
Negro	65.3	56.9	88.4	31.4	40.6	11.6	3.3	2.5	-
All races, 12-17 years	82.6	88.2	88.0	12.6	10.8	10.5	4.9	1.1	1.4
White	83.6	88.8	89.3	9.4	10.1	10.3	7.0	1.1	0.4
Negro	80.3	83.8	86.0	17.5	15.2	5.6	2.2	1.0	8.4
All races, 18-44 years	89.1	85.1	88.3	9.3	13.4	10.7	1.6	1.6	1.0
White	90.9	84.7	89.5	7.7	13.6	9.4	1.3	1.7	1.1
Negro	85.4	87.5	65.3	12.3	11.7	34.7	2.3	0.7	-
All races, 45-54 years	60.1	67.2	81.7	17.3	28.6	18.1	22.5	4.1	0.2
White	62.1	69.1	82.3	15.9	26.0	17.6	22.0	4.9	0.1
Negro	57.6	59.1	63.4	19.2	40.0	35.5	23.3	0.9	1.1
All races, 55-64 years	47.0	53.9	62.3	38.4	40.4	35.8	14.6	5.8	1.9
White	47.4	54.4	61.4	37.0	39.7	36.7	15.6	5.9	1.9
Negro	44.5	61.0	92.0	46.2	34.1	3.8	9.3	4.9	4.2
All races, 65-74 years	27.8	34.1	39.4	54.9	51.4	54.5	17.3	14.5	6.2
White	28.8	35.2	40.7	57.0	51.0	53.3	14.3	13.8	6.0
Negro	18.8	6.8	4.9	45.6	63.6	86.3	35.6	29.6	8.8

¹Totals include races other than white and Negro.

Table 8. Percent of the population age 4-74 years reaching specified acuity levels for usual distance vision in the better eye, by family income, age, race, and sex, with standard errors: United States, 1971-1972—Con.

Age, race, ¹ and sex	20/20 or better			20/25-20/40			20/50 or worse		
	Under \$5,000	\$5,000-\$9,999	\$10,000 and over	Under \$5,000	\$5,000-\$9,999	\$10,000 and over	Under \$5,000	\$5,000-\$9,999	\$10,000 and over
Males	Standard error								
4-74 years	2.43	1.88	1.96	2.10	1.63	1.97	1.04	0.64	0.33
All races, 4-5 years	7.71	7.98	5.67	9.55	8.00	5.68	3.59	0.89	0.19
White	13.02	8.88	5.83	13.02	8.90	5.85	-	0.96	0.20
Negro	11.68	6.48	15.81	13.49	6.75	15.81	8.56	1.68	-
All races, 6-11 years	6.40	5.09	4.03	4.49	4.67	3.79	4.55	1.43	1.40
White	8.19	5.20	4.16	5.26	4.75	3.89	6.61	1.62	1.48
Negro	6.86	15.56	12.68	6.55	15.18	12.68	1.51	1.71	-
All races, 12-17 years	4.94	3.03	1.55	4.48	3.05	1.20	2.77	0.81	0.94
White	6.63	3.33	1.51	5.98	3.28	1.34	4.72	0.94	0.43
Negro	5.95	6.70	9.64	6.81	6.81	2.58	1.62	0.91	9.60
All races, 18-44 years	3.32	2.66	2.49	3.13	2.35	2.29	0.98	0.73	0.61
White	3.44	2.88	2.50	3.40	2.58	2.25	1.10	0.81	0.65
Negro	8.04	6.34	12.41	7.43	5.92	12.41	1.65	0.87	-
All races, 45-54 years	9.92	3.92	4.77	6.27	4.21	4.72	7.60	2.43	0.15
White	16.42	4.55	4.53	7.10	4.43	4.47	15.93	2.95	0.16
Negro	11.83	14.76	26.16	9.81	14.76	26.40	11.85	1.01	1.18
All races, 55-64 years	9.79	5.25	4.91	6.91	4.46	4.77	6.83	3.23	1.85
White	8.48	5.40	5.00	6.99	4.67	4.87	7.84	3.52	1.90
Negro	24.30	19.58	20.24	17.18	19.73	8.81	8.93	5.39	14.33
All races, 65-74 years	3.14	3.74	5.24	3.82	5.40	6.05	2.34	4.97	2.58
White	3.17	3.90	5.55	3.73	5.82	6.33	2.45	4.84	2.40
Negro	4.89	5.22	7.09	6.02	18.17	17.97	6.32	20.40	14.20

¹Totals include races other than white and Negro.

Table 8. Percent of the population age 4-74 years reaching specified acuity levels for usual distance vision in the better eye, by family income, age, race, and sex, with standard errors: United States, 1971-1972—Con.

Age, race, ¹ and sex	20/20 or better			20/25-20/40			20/50 or worse		
	Under \$5,000	\$5,000-\$9,999	\$10,000 and over	Under \$5,000	\$5,000-\$9,999	\$10,000 and over	Under \$5,000	\$5,000-\$9,999	\$10,000 and over
<u>Females</u>	Percent								
4-74 years	57.0	69.0	77.8	36.3	27.6	20.2	6.7	3.4	2.0
All races, 4-5 years	23.5	20.9	31.5	73.6	79.1	66.8	2.9	-	1.7
White	27.9	24.6	33.5	72.1	75.4	64.7	-	-	1.8
Negro	15.2	3.5	-	76.2	96.5	100.0	8.6	-	-
All races, 6-11 years	65.1	63.2	77.2	32.1	34.5	18.7	2.8	2.2	4.1
White	75.6	68.5	78.4	21.5	29.0	17.5	2.9	2.5	4.1
Negro	47.9	37.3	54.1	49.3	61.6	42.3	2.8	1.2	3.6
All races, 12-17 years	68.9	73.5	84.3	26.9	23.8	12.2	4.2	2.7	3.5
White	62.8	74.9	84.7	32.5	22.3	11.8	4.7	2.8	3.5
Negro	77.2	68.0	74.7	19.2	29.5	21.4	3.6	2.5	3.9
All races, 18-44 years	79.3	83.3	88.1	17.1	14.5	11.3	3.6	2.2	0.6
White	79.0	83.9	88.1	17.8	14.4	11.2	3.2	1.8	0.7
Negro	80.0	80.3	85.6	15.1	15.3	14.1	4.9	4.3	0.3
All races, 45-54 years	54.9	61.4	73.8	39.1	33.9	24.2	6.0	4.7	2.0
White	50.8	61.7	72.7	44.1	33.4	25.2	5.1	4.9	2.1
Negro	69.7	57.9	87.1	21.4	40.2	12.9	8.9	1.9	-
All races, 55-64 years	45.2	58.9	56.1	49.2	33.5	43.9	5.7	7.5	-
White	45.7	60.3	54.9	49.7	33.6	45.1	4.6	6.1	-
Negro	42.9	53.8	46.0	46.8	40.9	54.0	10.3	5.2	-
All races, 65-74 years	30.0	40.0	32.0	53.8	50.2	56.9	16.2	9.8	11.1
White	31.9	39.8	32.5	52.5	51.5	56.7	15.5	8.7	10.8
Negro	17.2	44.4	-	61.4	27.0	72.7	21.4	28.6	27.3

¹Totals include races other than white and Negro.

Table 8. Percent of the population age 4-74 years reaching specified acuity levels for usual distance vision in the better eye, by family income, age, race, and sex, with standard errors: United States, 1971-1972—Con.

Age, race, ¹ and sex	20/20 or better			20/25-20/40			20/50 or worse		
	Under \$5,000	\$5,000-\$9,999	\$10,000 and over	Under \$5,000	\$5,000-\$9,999	\$10,000 and over	Under \$5,000	\$5,000-\$9,999	\$10,000 and over
Females	Standard error								
4-74 years	2.88	1.42	1.92	2.45	1.40	1.90	1.07	0.47	0.41
All races, 4-5 years	9.71	6.12	7.37	10.57	6.12	7.09	3.55	-	1.34
White	13.42	7.62	7.57	13.42	7.62	7.27	-	-	1.46
Negro	9.90	2.32	-	14.95	2.32	-	9.17	-	-
All races, 6-11 years	5.82	4.21	3.23	6.01	4.08	2.82	1.48	1.42	1.98
White	6.12	4.84	3.58	7.35	4.43	3.27	2.79	1.68	2.07
Negro	7.08	8.24	19.08	6.76	8.19	19.11	1.30	0.90	6.81
All races, 12-17 years	7.58	4.62	3.03	7.05	4.37	3.22	2.71	1.27	1.01
White	11.01	6.49	3.24	10.77	6.19	3.45	3.88	1.53	1.06
Negro	4.92	12.44	16.00	3.85	12.55	15.98	2.99	1.58	3.11
All races, 18-44 years	2.75	1.63	1.89	2.36	1.65	1.91	0.82	0.65	0.34
White	3.35	1.65	1.92	3.40	1.85	1.94	0.92	0.66	0.36
Negro	3.39	3.54	7.73	3.44	3.98	7.81	2.04	2.42	0.27
All races, 45-54 years	8.02	6.35	5.34	7.22	6.37	5.52	2.47	2.41	1.22
White	11.13	7.03	6.19	9.28	7.14	6.39	3.59	2.54	1.33
Negro	11.15	17.84	10.35	8.25	18.53	10.35	4.86	1.92	-
All races, 55-64 years	8.26	4.66	9.32	7.50	5.35	9.32	1.80	2.74	-
White	8.28	5.04	9.08	7.25	6.16	9.08	2.30	4.14	-
Negro	14.90	16.26	34.13	15.86	14.43	34.71	3.73	5.12	-
All races, 65-74 years	2.06	4.17	6.11	3.07	4.70	7.87	2.97	2.03	3.51
White	2.48	4.36	6.32	3.48	4.88	8.05	3.12	2.20	3.66
Negro	6.17	16.91	-	5.35	10.24	35.49	4.49	18.13	24.06

¹Totals include races other than white and Negro.

Table 9. Percent of the population age 4-74 years reaching specified acuity levels for usual distance vision in the better eye, by education of head of household, age, race, and sex, with standard errors: United States, 1971-1972

Age, race, ¹ and sex	20/20 or better acuity				20/50 or worse acuity			
	None	Elementary	High school	College or more	None	Elementary	High school	College or more
<u>Both sexes</u>		Percent						
4-74 years	36.5	61.4	74.3	79.9	20.9	5.8	2.9	1.7
All races, 4-5 years	-	18.2	35.4	31.1	-	3.2	0.7	2.9
White	-	18.7	38.0	33.2	-	0.3	-	3.2
Negro	-	16.8	16.2	4.7	-	13.3	5.1	-
All races, 6-11 years	40.7	70.8	72.2	76.0	39.5	1.7	3.2	3.8
White	38.0	74.9	75.0	78.2	42.3	1.6	3.3	4.1
Negro	-	60.0	54.7	43.6	53.2	2.0	2.3	-
All races, 12-17 years	49.1	79.8	83.1	86.9	-	3.2	3.4	0.9
White	46.2	81.7	83.9	87.9	-	3.1	3.0	1.0
Negro	100.0	73.5	79.0	79.4	-	3.3	4.1	-
All races, 18-44 years	59.5	78.3	84.8	90.8	12.4	2.4	1.9	0.5
White	65.0	77.3	85.2	91.8	16.1	2.3	1.7	0.4
Negro	64.2	81.7	81.6	77.3	-	2.6	3.1	2.0
All races, 45-54 years	9.7	63.4	72.2	80.7	24.7	6.7	2.5	0.6
White	11.7	61.2	73.0	80.9	11.4	6.8	2.5	0.5
Negro	-	71.8	63.5	75.5	88.0	6.1	2.6	3.3
All races, 55-64 years	67.6	42.3	63.3	59.9	10.6	9.0	2.3	2.5
White	68.9	39.2	62.5	59.4	4.3	8.1	2.3	2.9
Negro	67.9	49.8	37.7	75.5	25.5	9.0	10.2	-
All races, 65-74 years	22.2	26.5	31.6	40.1	31.0	16.0	12.7	9.8
White	14.9	26.6	29.9	37.7	31.3	15.0	13.6	11.0
Negro	18.8	15.5	36.1	9.9	35.2	31.7	22.0	9.4

¹Totals include races other than white and Negro.

Table 9. Percent of the population age 4-74 years reaching specified acuity levels for usual distance vision in the better eye, by education of head of household, age, race, and sex, with standard errors: United States, 1971-1972—Con.

Age, race, ¹ and sex	20/20 or better acuity				20/50 or worse acuity			
	None	Elementary	High school	College or more	None	Elementary	High school	College or more
<u>Both sexes</u>	Standard error							
4-74 years	8.03	1.78	1.12	1.70	3.19	0.32	0.37	0.41
All races, 4-5 years	-	4.70	3.85	3.58	-	2.04	0.54	1.55
White	-	6.38	4.00	3.90	-	0.38	-	1.67
Negro	-	11.74	6.47	4.03	-	9.21	4.18	-
All races, 6-11 years	25.94	3.51	1.73	4.42	29.37	0.84	0.60	1.91
White	26.96	3.58	2.02	4.50	34.33	0.90	0.79	2.04
Negro	-	6.79	6.36	12.28	37.60	1.19	1.06	-
All races, 12-17 years	34.38	4.45	1.78	2.48	-	1.50	0.85	0.79
White	35.36	4.81	1.87	2.81	-	1.69	0.85	0.82
Negro	50.00	8.69	5.13	14.86	-	2.30	1.92	-
All races, 18-44 years	11.75	2.39	1.16	1.10	7.45	0.66	0.39	0.20
White	19.36	2.54	1.19	1.10	9.38	0.78	0.45	0.30
Negro	34.41	4.59	3.32	6.78	-	1.40	1.07	1.87
All races, 45-54 years	4.57	5.05	3.46	4.15	21.74	2.72	0.95	0.51
White	8.87	6.19	3.79	4.10	12.74	2.80	1.02	0.50
Negro	-	5.67	9.99	18.59	62.44	4.36	1.53	3.58
All races, 55-64 years	12.69	6.10	3.93	6.75	10.17	2.05	1.18	0.40
White	17.99	6.00	3.92	5.81	5.73	2.62	1.17	0.84
Negro	25.27	11.43	9.37	33.85	25.30	2.32	6.51	-
All races, 65-74 years	9.96	2.77	2.60	3.87	8.81	2.56	1.71	4.46
White	14.13	2.77	3.38	5.49	8.66	3.39	2.46	4.28
Negro	14.63	3.46	10.46	7.09	18.19	4.67	5.42	7.56

¹Totals include races other than white and Negro.

Table 9. Percent of the population age 4-74 years reaching specified acuity levels for usual distance vision in the better eye, by education of head of household, age, race, and sex, with standard errors: United States, 1971-1972—Con.

Age, race, ¹ and sex	20/20 or better acuity				20/50 or worse acuity			
	None	Elementary	High school	College or more	None	Elementary	High school	College or more
Males								
Percent								
4-74 years	36.2	62.1	77.4	81.9	31.1	6.1	2.6	1.3
All races, 4-5 years	-	17.3	38.5	40.1	-	0.6	1.1	1.0
White	-	19.1	40.0	40.8	-	0.8	-	1.1
Negro	-	11.5	24.8	-	-	-	8.0	-
All races, 6-11 years	29.8	77.7	73.5	79.5	47.9	1.8	3.4	3.3
White	21.3	79.5	75.0	80.2	53.7	1.9	3.4	3.5
Negro	-	72.7	63.8	66.1	-	1.6	3.1	-
All races, 12-17 years	100.0	83.5	87.1	88.7	-	3.4	3.0	-
White	100.0	83.9	88.0	90.8	-	3.9	1.9	-
Negro	-	82.0	85.1	64.1	-	1.6	5.2	-
All races, 18-44 years	74.8	77.2	86.5	92.1	-	1.8	1.7	0.5
White	79.8	75.1	86.7	94.0	-	1.8	1.7	0.5
Negro	56.7	83.9	84.4	64.5	-	1.9	0.8	0.6
All races, 45-54 years	17.8	65.3	77.9	81.1	41.7	8.6	1.5	-
White	26.0	63.0	80.0	82.1	20.1	8.8	1.6	-
Negro	-	72.1	57.9	53.0	88.0	8.1	1.3	-
All races, 55-64 years	63.0	35.9	69.8	59.5	17.2	11.5	2.2	2.7
White	78.1	33.3	67.2	60.0	5.8	11.8	2.6	2.7
Negro	-	58.0	55.5	90.2	74.3	7.1	2.2	-
All races, 65-74 years	20.5	28.2	33.1	40.4	31.0	14.6	11.6	10.4
White	20.3	27.6	32.7	38.9	23.3	12.4	12.1	11.4
Negro	-	15.5	28.3	16.0	60.0	33.8	30.5	22.4

¹Totals include races other than white and Negro.

Table 9. Percent of the population age 4-74 years reaching specified acuity levels for usual distance vision in the better eye, by education of head of household, age, race, and sex, with standard errors: United States, 1971-1972—Con.

Age, race, ¹ and sex	20/20 or better acuity				20/50 or worse acuity			
	None	Elementary	High school	College or more	None	Elementary	High school	College or more
<u>Males</u>								
Standard error								
4-74 years	4.30	2.08	1.12	2.15	9.83	0.89	0.52	0.60
All races, 4-5 years	-	6.46	6.02	5.30	-	0.65	1.04	1.10
White	-	9.30	6.92	5.62	-	0.90	-	1.12
Negro	-	6.98	10.39	-	-	-	8.14	-
All races, 6-11 years	29.39	4.66	3.66	5.77	37.47	0.80	0.83	1.83
White	28.03	6.14	3.98	5.90	40.68	1.03	1.18	1.95
Negro	-	10.54	7.19	20.94	-	1.69	1.80	-
All races, 12-17 years	50.00	4.79	1.71	2.09	-	2.00	1.11	-
White	50.00	5.56	1.83	1.52	-	2.54	0.81	-
Negro	-	4.12	5.23	34.23	-	1.50	3.14	-
All races, 18-44 years	22.17	4.60	1.43	1.93	-	1.25	0.77	0.46
White	41.45	5.70	1.49	1.64	-	1.36	0.87	0.50
Negro	39.73	7.37	4.75	16.01	-	2.02	0.80	0.62
All races, 45-54 years	16.97	6.69	3.32	4.02	26.27	4.97	0.96	-
White	17.09	8.14	3.94	3.70	21.78	4.96	1.06	-
Negro	-	9.56	15.82	36.81	62.44	6.92	1.30	-
All races, 55-64 years	12.40	7.16	4.72	8.79	10.45	4.26	1.70	3.01
White	8.17	6.77	5.00	8.09	7.43	4.29	1.64	2.94
Negro	-	14.76	18.14	46.02	39.33	4.00	3.13	-
All races, 65-74 years	12.86	4.44	2.99	4.24	13.16	1.94	2.15	5.75
White	17.70	4.69	3.19	5.62	10.79	2.75	2.99	6.52
Negro	-	5.31	13.46	28.23	23.58	7.21	9.44	22.40

¹Totals include races other than white and Negro.

Table 9. Percent of the population age 4-74 years reaching specified acuity levels for usual distance vision in the better eye, by education of head of household, age, race, and sex, with standard errors: United States, 1971-1972—Con.

Age, race, ¹ and sex	20/20 or better acuity				20/50 or worse acuity			
	None	Elementary	High school	College or more	None	Elementary	High school	College or more
<u>Females</u>								
Percent								
4-74 years	36.9	60.7	71.6	77.7	10.1	5.6	3.2	2.1
All races, 4-5 years	-	19.0	32.2	19.8	-	5.4	0.3	5.3
White	-	18.4	35.9	22.3	-	-	-	6.2
Negro	-	21.5	7.1	5.3	-	25.2	2.0	-
All races, 6-11 years	74.5	63.3	70.9	72.7	13.6	1.6	3.0	4.3
White	100.0	69.8	75.1	76.2	-	1.2	3.2	4.6
Negro	-	47.3	45.6	28.0	53.2	2.4	1.6	-
All races, 12-17 years	45.4	76.3	79.1	84.6	-	2.9	3.9	2.1
White	42.1	79.4	79.9	84.2	-	2.3	4.0	2.2
Negro	100.0	66.2	71.9	92.4	-	4.7	2.7	-
All races, 18-44 years	40.7	79.3	83.3	89.4	27.7	2.9	2.1	0.6
White	46.2	79.1	83.8	89.5	36.5	2.8	1.7	0.4
Negro	100.0	79.6	79.9	87.3	-	3.2	4.4	3.2
All races, 45-54 years	-	62.0	67.4	78.9	4.4	5.3	3.3	1.5
White	-	59.9	67.3	79.1	4.4	5.5	3.2	1.2
Negro	-	71.5	69.1	91.0	-	3.9	3.9	5.7
All races, 55-64 years	75.1	48.0	57.9	60.3	-	6.8	2.4	2.4
White	41.4	45.1	58.5	59.0	-	4.5	2.1	3.1
Negro	91.3	44.9	22.5	39.4	8.7	10.2	16.9	-
All races, 65-74 years	25.1	25.0	30.5	39.9	31.1	17.3	13.6	9.4
White	-	25.6	27.7	36.6	53.2	17.3	14.7	10.6
Negro	37.1	15.6	41.2	5.6	11.0	29.5	16.4	-

¹Totals include races other than white and Negro.

Table 9. Percent of the population age 4-74 years reaching specified acuity levels for usual distance vision in the better eye, by education of head of household, age, race, and sex, with standard errors: United States, 1971-1972—Con.

Age, race, ¹ and sex	20/20 or better acuity				20/50 or worse acuity			
	None	Elementary	High school	College or more	None	Elementary	High school	College or more
Females								
Standard error								
4-74 years	16.98	2.56	1.60	2.45	4.94	0.81	0.34	0.56
All races, 4-5 years	-	5.20	6.38	5.88	-	4.02	0.20	3.08
White	-	6.93	7.18	7.07	-	-	-	3.55
Negro	-	19.98	2.82	4.74	-	15.52	1.55	-
All races, 6-11 years	34.58	7.04	2.72	5.24	16.40	0.97	0.82	2.90
White	31.62	6.62	2.96	5.44	-	0.80	0.99	3.12
Negro	-	9.18	8.44	13.27	37.60	2.01	1.08	-
All races, 12-17 years	36.00	6.22	2.55	5.47	-	1.61	0.96	1.80
White	37.05	7.13	2.79	5.85	-	1.66	1.02	1.91
Negro	50.00	15.30	7.54	5.45	-	3.31	1.88	-
All races, 18-44 years	19.40	3.10	1.76	1.33	22.12	0.98	0.47	0.28
White	27.13	3.08	1.72	1.44	28.69	1.09	0.50	0.25
Negro	50.00	4.62	4.04	4.24	-	1.88	1.65	3.22
All races, 45-54 years	-	5.99	4.72	8.52	30.93	2.70	1.50	1.25
White	-	7.47	5.31	9.05	30.93	3.28	1.60	1.28
Negro	-	4.88	9.56	18.09	-	2.82	2.99	8.09
All races, 55-64 years	29.64	8.65	5.51	9.71	-	1.43	1.59	2.48
White	47.57	9.23	5.44	8.04	-	3.18	1.52	2.39
Negro	30.42	13.49	10.68	36.05	30.42	2.18	11.73	-
All races, 65-74 years	13.46	3.64	3.33	5.81	9.58	3.68	3.15	4.38
White	-	4.15	4.78	7.13	9.76	4.62	3.82	4.07
Negro	28.71	5.25	13.42	10.19	16.43	6.68	10.15	-

¹Totals include races other than white and Negro.

Table 10. Percent of population age 18-74 years reaching specified acuity levels for usual distance vision in the better eye, by education of person, age, and sex, with standard errors: United States, 1971-1972

Age and sex	Education of persons								
	With 20/20 or better vision				With 20/50 or worse vision				
	None	Elementary	High school	College or more	None	Elementary	High school	College or more	
<u>Both sexes</u>		Percent of persons							
18-74 years	25.4	51.0	77.2	81.7	21.7	9.2	2.6	1.1	
18-44 years	53.5	72.4	85.9	90.4	1.9	2.8	1.9	0.4	
45-54 years	10.1	61.0	73.1	78.7	26.0	8.8	2.0	0.2	
55-64 years	27.0	39.7	64.4	61.5	31.6	9.7	1.9	1.5	
65-74 years	17.7	28.8	33.1	40.0	29.4	16.5	12.3	8.8	
<u>Males</u>									
18-74 years	36.6	51.4	80.1	83.4	27.4	7.9	2.4	1.1	
18-44 years	73.5	73.3	86.5	91.5	-	2.0	1.7	0.4	
45-54 years	18.0	62.1	80.0	80.7	42.9	7.3	1.5	-	
55-64 years	41.7	34.9	72.0	56.4	30.4	10.6	2.2	2.7	
65-74 years	18.7	27.4	34.6	41.7	35.9	14.0	11.8	9.8	
<u>Females</u>									
18-74 years	9.3	50.7	72.2	79.5	13.4	10.4	2.8	1.1	
18-44 years	15.9	71.4	85.4	88.9	5.6	3.7	2.1	0.3	
45-54 years	-	59.7	68.4	75.8	4.4	10.7	2.4	0.4	
55-64 years	8.2	44.0	58.8	67.9	33.1	9.0	1.7	-	
65-74 years	16.2	29.9	32.0	39.0	20.4	18.6	12.6	8.2	

Table 10. Percent of population age 18-74 years reaching specified acuity levels for usual distance vision in the better eye, by education of person, age, and sex, with standard errors: United States, 1971-1972—Con.

Age and sex	Education of persons							
	With 20/20 or better vision				With 20/50 or worse vision			
	None	Elementary	High school	College or more	None	Elementary	High school	College or more
<u>Both sexes</u>	Standard error							
18-74 years	4.97	2.24	1.06	2.03	6.16	0.65	0.39	0.48
18-44 years	17.85	4.74	1.04	1.17	1.97	1.15	0.33	0.18
45-54 years	4.08	6.23	2.62	4.62	20.52	3.28	0.82	0.14
55-64 years	10.54	5.72	3.88	6.41	16.30	2.63	0.89	1.62
65-74 years	7.72	2.91	2.78	4.36	6.31	2.18	2.03	4.36
<u>Males</u>								
18-74 years	10.95	3.91	1.26	2.59	9.47	1.30	0.51	0.72
18-44 years	24.05	7.29	1.44	2.07	-	1.55	0.58	0.45
45-54 years	13.99	7.29	3.14	3.90	20.68	4.18	0.98	-
55-64 years	21.06	6.25	4.92	8.96	18.46	4.06	1.71	2.93
65-74 years	11.42	3.87	3.48	4.00	9.74	1.83	2.43	5.88
<u>Females</u>								
18-74 years	3.83	2.32	1.58	2.85	3.92	0.95	0.42	0.45
18-44 years	10.11	3.88	1.51	1.15	7.02	1.58	0.49	0.19
45-54 years	-	6.92	3.75	8.36	30.93	4.54	1.16	0.35
55-64 years	13.31	7.98	4.66	5.96	25.12	2.22	1.14	-
65-74 years	7.53	3.82	3.85	6.36	6.73	2.97	3.38	4.14

Table 11. Percent distribution of adults age 18-74 years reaching specified acuity levels for usual distance vision in the better eye, according to age and sex: United States, 1960-1962 and 1971-1972

Age and sex	United States, 1960-1962				United States, 1971-1972			
	20/20 or better	20/25- 20/40	20/50- 20/100	20/200 or worse	20/20 or better	20/25- 20/40	20/50- 20/100	20/200 or worse
Both sexes		Percent distribution						
18-24 years	81.2	17.7	0.9	0.2	87.6	10.1	1.5	0.8
25-34 years	85.5	13.0	1.2	0.3	84.2	14.3	1.5	-
35-44 years	83.4	15.0	1.3	0.3	85.4	13.9	0.7	0.0
45-54 years	61.8	33.4	4.0	0.8	71.2	25.6	3.0	0.2
55-64 years	39.8	51.4	7.4	1.4	56.0	39.3	4.1	0.6
65-74 years	26.1	55.7	15.2	3.0	32.0	53.9	12.8	1.3
Males								
18-24 years	82.6	16.2	1.2	-	88.5	9.8	0.6	1.1
25-34 years	88.9	10.2	0.8	0.1	83.8	14.8	1.4	-
35-44 years	85.1	13.6	0.9	0.4	87.9	11.6	0.5	-
45-54 years	68.2	28.1	3.2	0.5	75.1	21.8	3.0	0.1
55-64 years	40.0	52.3	6.4	1.3	56.9	37.9	5.1	0.1
65-74 years	31.2	51.3	15.4	2.1	31.5	55.0	12.5	1.0
Females								
18-24 years	80.0	19.0	0.6	0.4	86.5	10.6	2.3	0.6
25-34 years	82.4	15.6	1.5	0.5	84.7	13.8	1.5	-
35-44 years	81.6	16.6	1.6	0.2	82.8	16.1	1.0	0.1
45-54 years	55.6	38.3	4.9	1.2	67.5	29.1	3.0	0.4
55-64 years	39.5	50.5	8.5	1.5	55.3	40.6	3.3	0.8
65-74 years	21.8	59.3	15.2	3.7	32.3	53.2	12.9	1.6

Table 12. Percent distribution of youths age 12-17 years reaching specified acuity levels for usual distance vision in the better eye, according to age and sex, with standard errors for totals: United States, 1966-1970 and 1971-1972

Age and sex	Acuity level "with usual correction"—Snellen ratio											
	United States, 1966-1970						United States, 1971-1972					
	20/20 or better	20/25-20/30	20/40	20/50-20/70	20/80-20/100	20/200 or worse	20/20 or better	20/25-20/30	20/40	20/50-20/70	20/80-20/100	20/200 or worse
Percent distribution of youths												
Both sexes												
12-17 years	80.3	12.5	2.7	3.0	0.9	0.6	82.8	11.7	2.8	1.9	0.5	0.3
12 years	74.0	16.7	3.9	3.6	1.0	0.8	75.5	15.5	5.5	3.0	0.3	0.2
13 years	76.8	13.7	3.5	4.3	0.9	0.8	80.6	11.2	4.4	1.8	0.6	1.4
14 years	80.9	11.7	2.3	3.3	0.8	1.0	83.0	10.8	2.6	2.4	1.1	0.1
15 years	80.4	13.0	2.8	2.6	0.7	0.5	84.2	11.7	1.1	2.9	-	0.1
16 years	84.3	10.5	2.4	2.0	0.6	0.2	87.3	10.1	0.9	0.7	1.0	-
17 years	86.6	8.7	1.3	2.2	1.0	0.2	86.6	10.9	1.9	0.5	0.1	-
Boys												
12-17 years	82.3	11.4	2.6	2.6	0.6	0.5	86.6	9.4	1.7	1.5	0.5	0.3
12 years	77.7	15.1	3.0	2.7	1.2	0.3	80.1	15.3	3.2	0.4	0.6	0.4
13 years	80.3	11.6	3.3	3.1	1.2	0.5	85.3	8.4	5.0	-	-	1.3
14 years	81.4	11.9	2.3	3.2	-	1.2	86.5	9.4	0.4	1.4	2.0	0.3
15 years	81.7	12.1	3.0	2.6	0.3	0.3	85.3	9.2	0.4	5.1	-	-
16 years	84.9	10.1	2.2	2.3	0.2	0.3	92.4	4.8	1.7	1.1	-	-
17 years	88.8	6.9	1.5	1.8	0.8	0.2	91.0	8.1	-	0.7	0.2	-
Girls												
12-17 years	78.3	13.5	2.9	3.4	1.1	0.8	79.0	14.0	3.8	2.3	0.6	0.3
12 years	70.2	18.3	4.9	4.6	0.8	1.2	69.6	15.5	8.5	6.4	-	-
13 years	73.2	15.6	3.8	5.5	0.7	1.2	76.8	13.5	3.9	3.1	1.2	1.5
14 years	80.5	11.4	2.2	3.4	1.7	0.8	79.8	12.0	4.6	3.4	0.2	-
15 years	79.1	13.8	2.6	2.6	1.1	0.8	83.0	14.6	2.0	0.2	-	0.2
16 years	83.7	10.9	2.6	1.7	1.0	0.1	82.7	14.8	0.2	0.4	1.9	-
17 years	84.3	10.7	1.0	2.6	1.2	0.2	81.1	14.4	4.3	0.2	-	-
Standard error												
Both sexes, 12-17 years	0.76	0.51	0.23	0.22	0.15	0.09	1.79	1.31	0.99	0.58	0.26	0.16
Boys, 12-17 years	0.89	0.69	0.32	0.35	0.17	0.12	1.51	1.38	0.52	0.66	0.36	0.23
Girls, 12-17 years	0.87	0.72	0.24	0.25	0.20	0.13	3.11	2.06	1.82	0.77	0.39	0.24

Table 13. Percent distribution of children age 6-11 years reaching specified acuity levels for distance vision in the better eye, "without correction" and "with usual correction," according to age and sex, with standard errors for totals: United States, 1963-1965 and 1971-1972

Age and sex	"Without correction" United States, 1963-1965						"With usual correction" United States, 1971-1972					
	20/20 or better	20/25- 20/30	20/40	20/50- 20/70	20/100	20/200 or worse	20/20 or better	20/25- 20/30	20/40	20/50- 20/70	20/80- 20/100	20/200 or worse
Percent distribution of children												
Both sexes												
6-11 years	62.0	24.2	4.4	4.8	1.3	3.3	72.5	21.1	2.9	2.8	0.5	0.2
6 years	58.8	30.9	6.4	3.1	0.5	0.3	51.5	44.5	1.6	2.4	-	-
7 years	55.1	32.6	5.5	4.2	1.0	1.6	70.2	23.4	3.8	2.6	-	-
8 years	59.8	27.9	3.6	5.2	1.1	2.4	75.3	20.5	0.5	2.4	0.2	1.1
9 years	67.8	19.6	3.6	4.5	1.1	3.4	80.1	10.2	3.7	3.1	2.9	-
10 years	67.2	17.3	2.5	5.7	2.4	4.9	81.4	14.2	4.0	0.3	-	0.1
11 years	64.1	15.9	4.6	5.8	2.2	7.4	74.3	16.5	2.9	6.2	0.1	-
Boys												
6-11 years	64.5	22.7	4.0	4.5	1.3	3.0	74.9	18.7	2.5	3.4	0.2	0.3
6 years	64.5	27.3	4.5	2.7	0.7	0.3	56.5	42.5	0.8	0.2	-	-
7 years	57.9	29.3	6.3	2.7	1.6	2.2	77.2	16.1	3.8	2.9	-	-
8 years	60.8	26.8	3.7	5.7	1.1	1.9	67.3	27.2	0.7	2.4	0.3	2.1
9 years	69.6	19.4	2.9	4.1	0.9	3.1	80.3	10.3	6.2	2.1	1.1	-
10 years	70.7	16.0	2.2	5.9	1.6	3.6	90.9	7.3	1.5	0.3	-	-
11 years	65.1	16.3	4.2	5.5	1.7	7.2	71.6	14.9	0.7	12.8	-	-
Girls												
6-11 years	59.3	25.8	4.9	5.1	1.4	3.5	70.1	23.5	3.3	2.2	0.9	0.0
6 years	53.0	34.7	8.4	3.4	0.2	0.3	46.8	46.5	2.4	4.3	-	-
7 years	52.3	35.8	4.7	5.9	0.4	0.9	61.1	32.9	3.7	2.3	-	-
8 years	58.6	28.9	3.6	4.8	1.2	2.9	83.4	13.9	0.3	2.4	-	-
9 years	66.1	19.8	4.4	4.8	1.2	3.7	79.9	9.9	1.0	4.3	4.9	-
10 years	63.5	18.6	2.9	5.7	3.2	6.1	72.9	20.3	6.3	0.4	-	0.1
11 years	62.8	15.7	4.9	6.2	2.7	7.7	76.8	18.1	4.9	-	0.2	-
Standard error												
Both sexes, 6-11 years . .	1.34	0.87	0.40	0.26	0.15	0.28	1.72	1.50	0.59	0.75	0.30	0.16
Boys, 6-11 years	1.65	1.09	0.48	0.45	0.22	0.40	2.63	2.33	0.73	1.14	0.20	0.31
Girls, 6-11 years	1.46	1.21	0.51	0.29	0.20	0.46	1.84	1.86	1.02	0.79	0.59	0.02

Table 14. Percent of adults age 18-79 years with defective binocular distance and/or near visual acuity with usual correction, by age and sex: United States, 1960-1962

Age and sex	Defective distance and near ¹	Defective distance	Defective near	Defective distance or near or both	
<u>Both sexes</u>		Percent			
18-79 years	---	---	---	---	
18-24 years	0.3	0.7	1.4	1.8	
25-34 years	0.7	1.5	1.7	2.5	
35-44 years	0.8	1.5	5.8	6.5	
45-54 years	1.6	4.3	26.5	29.2	
55-64 years	4.3	7.9	27.6	31.2	
65-74 years	10.4	16.3	33.6	39.5	
75-79 years	21.5	28.4	57.0	63.9	
<u>Males</u>					
18-79 years	---	---	---	---	
18-24 years	0.0	0.2	1.1	1.3	
25-34 years	0.5	0.9	2.3	2.7	
35-44 years	0.9	1.5	3.5	4.1	
45-54 years	1.2	3.5	27.0	29.3	
55-64 years	3.8	7.2	32.0	35.4	
65-74 years	9.9	16.2	35.2	41.5	
75-79 years	18.7	23.3	56.6	68.2	
<u>Females</u>					
18-79 years	---	---	---	---	
18-24 years	0.6	1.2	1.6	2.2	
25-34 years	1.0	1.9	1.3	2.2	
35-44 years	0.8	1.5	7.8	8.5	
45-54 years	2.0	5.0	25.9	28.9	
55-64 years	4.8	8.4	23.5	27.1	
65-74 years	10.8	16.3	32.6	38.1	
75-79 years	24.3	33.3	57.5	66.5	

¹Defective distance binocular acuity ≤ 20/50, usual; defective near binocular acuity ≤ 14/35, usual.

APPENDIX I

STATISTICAL NOTES

The Survey Design

The sampling plan for the first 65 stands of the Health and Nutrition Examination Survey (HANES) followed a stratified, multistage probability design in which a sample of the civilian noninstitutionalized population, 1-74 years of age, of the coterminous United States, was selected. Excluded from the selection were persons residing in Alaska and Hawaii and those within the coterminous United States who were confined to institutions or residing on reservation lands of American Indians. Successive elements dealt with in the process of sampling were the primary sampling unit, census enumeration district, segment (a cluster of households), household, eligible persons, and, finally, sample persons.

The starting points in the first stage of this design were the 1960 decennial census lists of addresses and the nearly 1,900 primary sampling units (PSU's) into which the entire United States was divided. Each PSU is either a standard metropolitan statistical area (SMSA), a single county, or two or three contiguous counties. The PSU's were grouped into 357 strata for use in the Health Interview Survey and subsequently collapsed into 40 superstrata for use in Cycles II and III of the Health Examination Survey and HANES.

Fifteen of the forty superstrata contained a single large metropolitan area of more than 2 million population. These 15 large metropolitan areas were selected for the sample with certainty. The 25 noncertainty strata were classified into 4 broad geographic regions of approxi-

mately equal population and cross-classified into 4 broad population density groups in each region. 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 so that proportionate representation of specified State groups and rate of population change classes was maintained in the sample. In this matter a total first stage sample of 65 PSU's was selected. These 65 sample PSU's or stands are the areas within which samples of persons would be selected for examination over a 3-year survey period.

In order to produce national estimates of the nutritional status of the U.S. population at an earlier date, a probability subsample of 35 stands of the 65 stands was selected. This 35-stand subsample also made it possible to produce national estimates of certain other aspects of health status in the population that were critically needed at an earlier date and examination components that for logistic reasons could not be continued for the remainder of the 65 stands. Included among the 35 stands were 10 of the 15 large certainty metropolitan areas and 1 stand from each of the 25 noncertainty superstrata. The reduction from 15 to 10 large metropolitan areas was accomplished by randomly selecting one stand from multiple-stand standard metropolitan statistical areas; e.g., selecting the southern half of the Chicago SMSA to represent the entire SMSA. (This selection procedure was based on operational considerations, and although unbiased, is recognized as

not being statistically optimal.) It is this sub-sample of 35 stands upon which the findings contained in this report are based.

Although the 1970 census data were used as the frame for selecting the sample within PSU's when they became available, the calendar of operations required that 1960 census data be used for the 35-stand sample of HANES. Census enumeration districts (ED's) in each PSU were divided into segments of an expected six housing units each. In urban ED's the segments were clusters of six addresses from the 1960 census listing books. For ED's not having usable addresses, area sampling was employed and consequently some variation in the segment size occurred. To make the sample representative of the then-current population of the United States, the address or list segments were supplemented by a sample of housing units which had been constructed since 1960.

Within each PSU a systematic sample of segments was selected. The enumeration districts 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 income of less than \$3,000 in 1959 (based on 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 those sample segments in nonpoverty stratum ED's, the selected segments were divided into eight random subgroups and one of the subgroups was chosen to remain in the HANES sample. This procedure permitted 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.

To select the persons in sample segments to be examined in HANES, all household members age 1-74 in each segment were 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 below was listed on the worksheet under the appropriate age-sex group column. The sample selection worksheets were then put in segment number order and a systematic random sample of persons in each age-sex group was selected to be examined using the following sampling rates:

<i>Age in years</i>	<i>Rate</i>
1-5	1/2
6-19	1/4
20-44, male	1/4
20-44, female	1/2
45-64	1/4
65-74	1

The persons selected in the 35-stand sample of HANES comprised a representative sample of the target population and included 14,147 sample persons 1-74 years of age of whom 10,126 or 71.6 percent were examined. When adjustments are made for differential sampling for high-risk groups, the response rate becomes 72.8 percent.

All data presented in this report are based on weighted observations; that is, data recorded for each sample 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 which increases precision by bringing survey results into closer alignment with known U.S. population figures.

A more detailed description of the survey design and selection technique can be found in the Plan and Operation of a Health and Nutrition Examination Survey, United States, 1971-1973, *Vital and Health Statistics*, Series 1, No. 10a.⁶

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. Usually a sizable number of sample persons will not participate in the examination. Whether or not an individual participates is determined by many factors, some of which are uncontrollable and, therefore, may be reasonably treated as an outcome of a random event with a particular probability of occurrence. If these probabilities of participation were known and greater than zero for all persons, then the examined persons would constitute a probability sample from which unbiased estimates of the target population could be derived. In this situation, the effect of nonparticipation would only be to reduce the sample size, thereby increasing the sampling errors of examination findings. However, in practice, a potential for bias due to nonresponse exists since the exact probabilities are never known. A further potential for bias exists if a sizable proportion of sample persons have a zero probability of participation, that is, they would never agree to participate in an examination survey of the same procedures and inducements, and if these persons differ from other sample persons with respect to characteristics under examination. It is for these reasons that intensive efforts are made in HANES 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 in the "Plan and Operation of the Health and Nutrition Examination Survey," Series 1, No. 10a.⁶

Despite these intensive efforts, 27.2 percent of the sample persons from the first 35 stands 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. For instance, only a small proportion of persons gave reasons for nonparticipation which would lead to the belief that they would never agree to participate in examination surveys and that they may differ from examined persons with respect to the characteristic under examination. Only 15 percent of the nonrespondents gave as their reasons for nonparticipation "personal illness," "physically unable," "pregnant," "antidoctor," or "fear of finding some-

thing wrong." Typical among the reasons given by the other nonrespondents were the following: "unable because of work, school, or household duties"; "suspicious" or "skeptical of the program"; "just not interested in participating"; and "private medical care sufficient" or "just visited doctor."

An analysis of medical history data obtained for most nonexaminees as well as examinees also supports the belief that the likelihood of sizable bias due to nonresponse is small. No large differences were found between the examined group and nonexamined group for the statistics compared. For example, 11 percent of persons examined reported having an illness or condition that interfered with their eating as compared to 9 percent of persons who were not examined but who had completed a medical history. The percent of persons examined who reported ever being told by a doctor that they had arthritis was 20 percent; the percent for high blood pressure was 18 percent, and for diabetes was 4 percent. The corresponding percents for nonexamined persons were 17 percent for arthritis, 21 percent for high blood pressure, and 4 percent for diabetes.

As mentioned earlier, the data in this report are based on weighted observations, and one of the components of the weight assigned to an examined person was an adjustment for nonresponse. Since the probabilities of participation are not known for sample persons in HANES, a procedure was adopted which multiplies the reciprocal of the probability of selection of sample persons by a factor that brings estimates based only on examined persons up to a level that would have been achieved if all sample persons had been examined. This nonresponse adjustment factor is the ratio of the sum of sampling weights for all sample persons within a relatively homogeneous class defined by age, sex, and poverty status, to the sum of sampling weights for all responding sample persons within the same homogeneous class. To the degree that homogeneous groups can be defined which are also homogeneous with respect to the characteristics under study, the procedure can be effective in reducing the potential bias from nonresponse.

For the 35-stand sample of HANES, persons were grouped into 20 age-sex-poverty status groups within each stand, yielding 700 separate

cells with an average membership of about 20 sample persons each. These adjustment factors are distributed among examined persons as shown in table I.

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 informa-

tion for examined persons. The extent of missing data for the visual acuity testing ranged from 3 to 5 percent for persons age 6-74 years but among 4- and 5-year-olds more than one-fifth (22 percent) did not have visual acuity readings. The extent of missing data for those visual acuity tests is shown in table II.

Estimates were made for the missing visual acuity scores as follows. For each examined person with some (but incomplete) record of visual acuity, a visually examined respondent of the same age, sex, race, and income group with relevant findings similar to those available for the incompletely examined person was selected at random and the remainder of those test results were assigned to the individual with those missing values.

In doing this imputation, persons whose examination showed an enucleated globe were classed as blind in that eye; selection of missing data for persons with cataracts was made from among those with cataracts whose visual acuity had been determined. If visual acuity for one eye was available and other examination findings indicated no problems with the other eye, the vision data for that eye were imputed to the other eye. For those examined persons whose visual acuity had not been recorded, a visually examined respondent of the same age, sex, race,

Table I. Percent distribution of nonresponse adjustment factors: Health and Nutrition Examination Survey, Stands 1-35, 1971-1972.

Size of factor	Percent distribution
Total	100.0
1.00-1.24	38.4
1.25-1.49	31.6
1.50-1.74	12.9
1.75-1.99	8.4
2.00-2.49	6.1
2.50-2.99	1.2
3.00-3.03	1.4

Table II. Number of examinees and extent of visual acuity tests imputed, by age: HANES I, 1971-1972

Examinees and acuity tests imputed	Age in years									
	4-74	4-5	6-11	12-17	18-24	25-34	35-44	45-54	55-64	65-74 ¹
	Number of examinees									
All examinees	9,263	626	1,067	1,045	1,015	1,259	1,170	793	630	1,658
Number not tested	504	136	47	47	31	49	60	27	24	83
(Percent)	(5.4)	(21.7)	(4.4)	(4.5)	(3.1)	(3.9)	(5.1)	(3.4)	(3.8)	(5.0)
Uncorrected:										
Right eye	14	3	1	1	2	-	2	2	1	2
Left eye	11	-	1	2	1	1	2	1	1	2
Both eyes	354	133	45	40	24	41	32	12	5	22
Corrected:										
Right eye	15	-	-	-	-	-	-	3	2	10
Left eye	23	-	-	2	-	1	3	3	3	11
Both eyes	87	-	-	2	4	6	21	6	12	36

¹Includes eight 75-year-olds.

and income group was selected at random and his test results were assigned to the individual with missing acuity data.

This imputation procedure was used because it would tend to distort the national estimates less (than the alternative of deleting all those persons with missing visual acuity data) if one assumed that the distribution of visual acuity values among those persons with missing data by age, sex, race, and other variables would be similar to values for those tested.

Small Numbers

In some tables, magnitudes are shown for cells for which the sample size is so small that the sampling error may be several times as great as the statistic itself. Obviously in such instances the numbers, if shown, have been included to convey an impression of the overall story of the table.

Sampling and Measurement Error

In the present report, reference has been made to efforts to minimize bias and variability of measurement techniques. The potential of residual bias due to the high nonresponse rate has also been discussed.

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 and Nutrition 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 that will either completely include both or treat one or the other separately; (2) the survey design and estimation procedures are complex and, accordingly, require computationally involved techniques for the calculation of variances; and (3) hundreds of statistics are presented in the tables in this report, many for subclasses of the population for which there were small numbers 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 the standard errors for selected statistics used in this report are presented in the detailed tables. These estimates have been prepared by a replication technique that yields overall variability through observation of variability among random subsamples of the total sample. Again, readers are reminded that these estimated sampling errors do not reflect any residual bias that might still be present after the attempted correction for nonresponse. 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 has been surveyed. As calculated for this report, the standard error also reflects part of the variation that arises in the measurement process. It does not include estimates of any biases that might exist in the data. 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.



APPENDIX II

DEMOGRAPHIC AND SOCIOECONOMIC TERMS

Age.—The age recorded for each examinee was the age at last birthday at the time of examination. The age criterion for inclusion in the sample used in this survey was defined as age at time of census interview. In this sample there were a few examinees who were 74 years of age at the time of interview but 75 years of age at examination. In the adjustment and weighting procedures used to produce national estimates, these persons were included in the 74-year-old group.

Race.—Race was recorded as “white,” “Negro,” or “other.” “Other” includes Japanese, Chinese, American Indian, Korean, Eskimo, and all races other than white and Negro. Mexicans were included with white unless definitely known to be American Indian or of other nonwhite race. Negroes and persons of mixed Negro and other parentage were recorded as Negro. When a person of mixed racial background was uncertain about his race, the race of his father was recorded.

Geographic region.—The 48 contiguous States and the District of Columbia (not Alaska and Hawaii) were stratified into 4 broad geographic regions of about equal population size. With a few exceptions the compositions of the regions were as follows:

<i>Region</i>	<i>States included</i>
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

In a few instances the actual boundaries of the regions do not follow State lines. Some strata in the Midwest and South include PSU's actually located in the West. Similarly, some strata in the West contain PSU's located in the Midwest and South.

Urban-rural.—The classification of urban-rural areas is that used in the 1960 census. According to the 1960 definition, those areas considered urban 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 contain no incorporated municipalities as subdivisions and have either 2,500 inhabitants or more, or a population of 2,500 to 25,000 and a density of 1,500 persons per square mile; (4) counties in States other than 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 which are not included in any urban fringe. The remaining population is classified as rural.

By means of the first digit of the identification code on the household questionnaire, the urban and rural population is divided into the following categories according to population: (1) urban, 3,000,000 or more; (2) urban, 1,000,000-2,999,999; (3) urban, 250,000-999,999; (4) urban, under 250,000; (5) urban not in urbanized area, 25,000 or more; (6) urban not in urbanized areas, 10,000-24,999; (7) urban not in urbanized area, 2,500-9,999; and (8) rural.

Family income.—The income recorded is the total income received during the 12 months prior to the interview by the head of the household and all other household members related to the head. This income is the gross cash income (excluding pay in kind) except in the case of a family with its own farm or business. In that instance net income is recorded. Also included is the income of a member of the Armed Forces living at home with his family

(even though he is not considered a household member). If he is not living at home, allotments and other money received by the family from him are included in the family income figure.

Education.—The only grades counted are those that have been attended in a “regular” school where persons are given formal education—either graded public or private schools, day or night, full-time or part-time attendance. A regular school is one that advances a person toward an elementary certificate 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 is not counted in determining the highest grade of school 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 highest grade attended is assigned.



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