

VITAL and HEALTH STATISTICS

DATA FROM THE NATIONAL HEALTH SURVEY

**History and Examination
Findings Related to Visual
Acuity Among Adults**

United States - 1960 - 1962

Medical history and physical examination findings as related to central binocular and monocular visual acuity by age and sex.

DHEW Publication No. (HRA) 74-1284

U.S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
Public Health Service
Health Resources Administration
National Center for Health Statistics
Rockville, Maryland



Vital and Health Statistics-Series 11, No. 28

Reprinted as DHEW Publication No. (HRA) 74-1284
November 1973

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

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THIS REPORT PRESENTS medical history and examination findings related to visual acuity of American adults as determined from the Health Examination Survey in 1960-62. For the survey a probability sample of 7,710 persons was selected to represent the 111 million adults aged 18-79 years in the civilian, noninstitutional population of the United States. Of these, 6,672 adults, or more than 85 percent, were examined.

From the self-administered medical history, an estimated 60 percent of adults reported they wore glasses, and 32 percent said they wore them all of the time. Women were more likely to wear them than men, but for both sexes the rate increased with advancing age. Findings from surveys in Great Britain and Denmark were similar, but the adults of these two areas are more likely to wear glasses only part of the time in contrast with the adults in the United States.

History reports show that 7 percent (a rate which increases with age) have serious trouble seeing even with their glasses. These persons were more likely to have consulted a doctor about the condition than not.

About 20 percent of adults reported that they suffer from severe or frequent headaches, related or unrelated to eye conditions, and 50 percent reported infrequent, less severe ones. Comparable rates were somewhat greater for women than for men, but the overall prevalence rates for headaches in general for both sexes decreased with advancing age because of the decrease in infrequent, less severe headaches. Little change with age in the prevalence of frequent, more severe headaches was reported. Those with frequent headaches tended to have somewhat better acuity than those not reporting headaches.

More than 4 percent of the men and 1 percent of the women reported that they knew they had a color vision deficiency. Men were more likely than women to have learned of this through previous testing. Those with a color deficiency tended to have somewhat poorer visual acuity than those without.

It was found from the ophthalmic examination that about two-thirds of the adults had normal eyes. However, when there was evidence of pathology of one eye there was more likely than not to be similar pathology of the other eye.

About 30 percent of adults were found to have abnormalities of the fundus. Most of these were structural changes in the retina frequently associated with elevated blood pressure. These abnormalities were found more frequently among men, but the rates for both sexes increased with age.

Lens opacities were found among 4 percent of the population. Here also the condition affected more men than women, but the rates for both groups increased with age.

Uncorrected distance visual acuity was generally poorer for those with some evidence of pathology.

HISTORY AND EXAMINATION FINDINGS RELATED TO VISUAL ACUITY AMONG ADULTS

Jean Roberts and John Cochrane, *Division of Health Examination Statistics*

INTRODUCTION

This report from the Health Examination Survey in 1960-62 presents pertinent medical history data and physical examination findings as related to central visual acuity of U.S. adults.

The Health Examination Survey from which these data come was organized as part of the National Health Survey to obtain statistics on the health status of the population of the United States through direct examination. In the other two programs of the National Health Survey health related data are secured through household interviews and available medical records.

For this first cycle, the health examination was designed to determine the prevalence of certain chronic diseases, dental health status, and the distribution of certain sensory and other physiological and anthropometric characteristics among the adult civilian, noninstitutional population of the United States. Between October 1959 and December 1962, 6,672 persons were examined out of a nationwide probability sample of 7,710 persons 18-79 years of age selected from the 111 million of the population within that age range. Medical and other survey staff performed the standard examination, which lasted about 2 hours, in mobile clinics especially designed for this purpose.

Previous publications of the National Center for Health Statistics describe the general plan and initial program of the Health Examination Survey,¹ the sample population, the response, and the effect of nonresponse on the findings.² The vision testing methods and binocular visual acuity findings have also been described in other reports.^{3,4}

This report presents the relationship of monocular and binocular central visual acuity to relevant medical history and examination findings on the physical condition of the eyes.

MEDICAL HISTORY

A self-administered medical history, tailored to the special examination, was given each examinee prior to the start of the examination. When necessary, the receptionist-interviewer read the questions to the examinee but did not provide help in the way of defining terms or the like. The five questions related to vision on the history (shown in Appendix I) were about the occurrence of headaches, the purposes for which glasses are worn, the presence of serious trouble seeing even when wearing glasses, the presence of other eye trouble, and whether or not the examinee had a color vision defect.

The receptionist-interviewer reviewed the history for completeness and asked and recorded answers to any overlooked questions. Questions marked "Don't know" and "?" were explored with the examinee later by the physician during his examination.

EXAMINATION OF THE EYE

A fundusoscopic examination was performed by the physician with an ophthalmoscope during the physical examination. For this part the examinee was seated on a table, the shades were drawn, and the lights were turned off.

Gross abnormal findings, recorded on the Physical Examination Record shown in Appendix

I, included inability to visualize the fundus, abnormalities of the retina commonly associated with elevated blood pressure, and certain other eye conditions such as venous engorgement, lens opacities or cataract, other disc abnormalities, and iritis.

FINDINGS FROM THE HISTORY

Wearing Glasses

Health Examination Survey findings show that an estimated 60 percent of the adult population in this country wore glasses all or part of the time. More than half of this group (32 percent of all adults) wore glasses all of the time. Of those who wore their corrective lenses part of the time, the majority wore them for reading (table 1).

The proportion wearing glasses all or part of the time increased steadily with age from about 30 percent for those 18-24 years of age to over 90 percent for those 55 years and over. The proportion wearing glasses all of the time showed a similar pattern, increasing from 15 percent among young adults to 60 percent among older persons.

At all ages relatively more women than men wore glasses all of the time (29 percent overall for men as compared with 36 percent for women), the differential being greater among older than younger persons. Men in the age groups 18-45 were less likely than women to wear glasses part of the time but more likely, and increasingly so, to wear them part of the time at ages 45 and over. The residual proportion not wearing glasses was greater among men than among women, but the difference diminished with age after 35 years and reached insignificance at the older ages from 65 years on. Hence American men in general apparently start wearing glasses later in life than American women and are more likely than women to wear them only part of the time since their acuity tends to be slightly greater.⁴

Recent surveys in which the extent of the use of eyeglasses was determined have been carried out in Great Britain and Denmark. Gray⁵ reported on findings from the 1951 British Survey of Sickness in which a random sample of 13,495 men and women in England and Wales were interviewed. Hamtoft⁶ cited the findings among a sample of 23,292 persons questioned in the 1959 Danish

National Morbidity Survey. Comparisons of these two surveys with the recent findings in the United States show similar increases with advancing age in the use of glasses all or part of the time and higher rates of use among women than among men in all three areas, the latter trend being less marked among older persons (fig. 1). In contrast with their British and Danish counterparts, American men and women 45 years and over were more likely to wear glasses all of the time and less likely to wear them only part of the time.

As would be expected, findings on the association of uncorrected visual acuity and the wearing of glasses (as shown in table 2) indicate that persons who wore glasses all of the time tended to have poorer uncorrected visual acuity than did those who wore them only part of the time, and the latter group tended to have somewhat poorer acuity than those who did not wear glasses at all.

Among those who wore glasses all of the time, nearly half (43 percent) had uncorrected distance acuity no better than 20/100, and nearly two-thirds (64 percent) had near acuity of a comparable level without correction. At the other extreme, 15 percent tested at least 20/20 without correction at distance and 12 percent reached a comparable level at near without correction.

Among those who did not wear glasses, 86 percent tested at least 20/20 or better at distance and 80 percent reached an equivalent level at near, and 2 percent tested no better than 20/100 at distance and 4 percent read no better than the comparable level at near.

Only binocular acuity findings are considered here in relation to the wearing of glasses. Some of those who tested the equivalent of 20/20 or better without correction but wear glasses would be persons having defective vision in only one eye. The testing was limited to central visual acuity with no consideration of problems of muscular imbalance and the like for which corrective lenses may have been prescribed. Those who tested at least 20/20 at distance with and without correction would include persons with hyperopia whose condition would also be corrected or minimized with glasses.

Findings on the association of visual acuity with usual correction and the wearing of glasses (table 2) indicated that adults who wore glasses

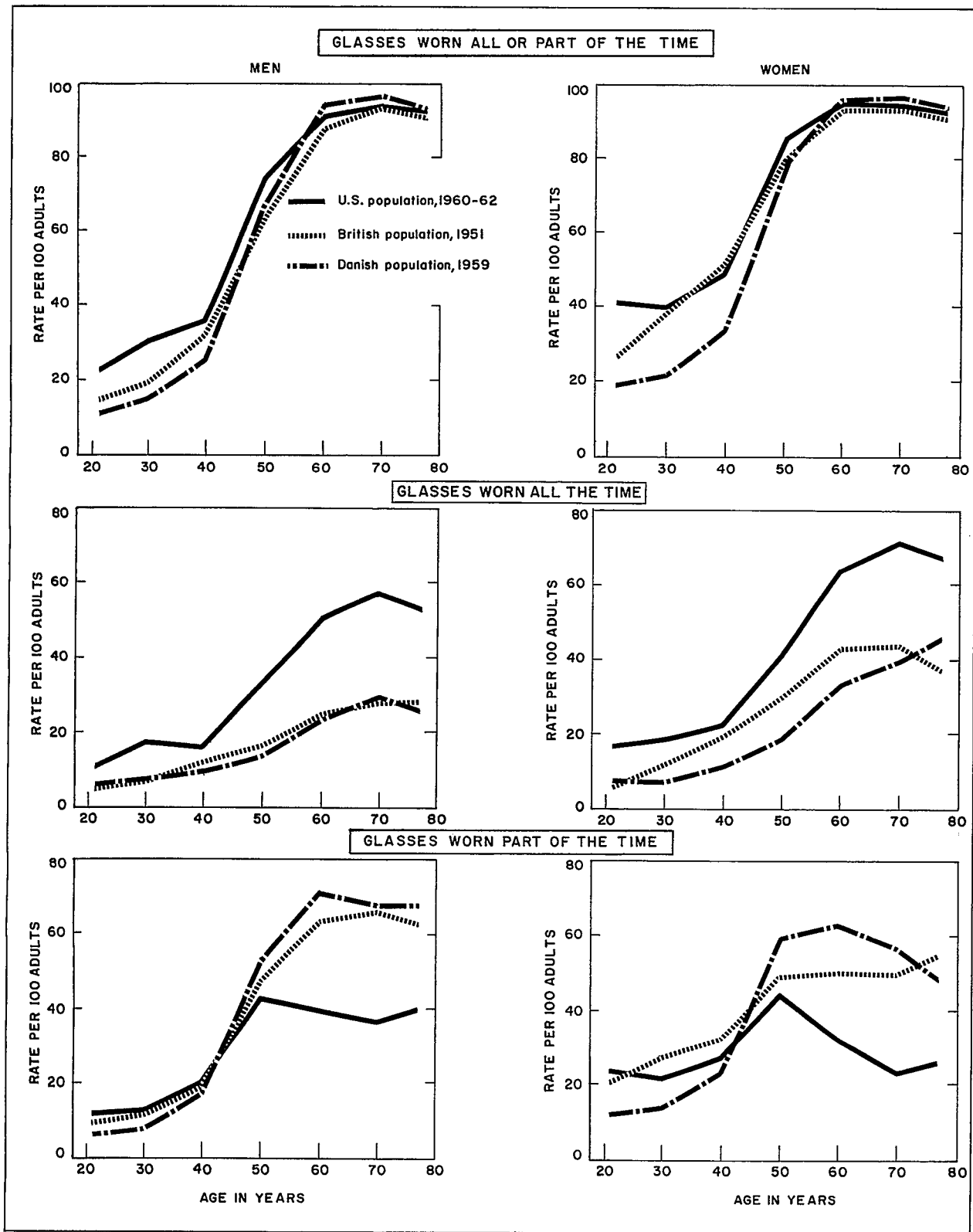


Figure 1. Prevalence rates for the use of glasses among adults, by frequency of their use, sex, and age.

all of the time had, with their usual correction, somewhat better visual acuity at distance (that is, more tested at least 20/20 and fewer 20/100 or less) than those who wore glasses only part of the time. Better near acuity rates were slightly, but not significantly, lower for those who wore glasses all of the time, while poorer near acuity rates were lower for them than for those who wore glasses only part of the time.

Medical history reports show that persons with frequent headaches were more likely to wear glasses all of the time or not wear them at all, those with less frequent headaches were more likely not to wear glasses, and those who reported no headaches were somewhat more likely not to wear glasses at all (fig. 2). The data further show that adults who wore glasses only part of the time for near vision or who did not wear them at all were less likely to have frequent headaches than those who wore glasses all of the time or just for distance vision.

Trouble Seeing

Survey findings show that an estimated 7 percent of the adult population in this country reported serious trouble seeing even when wearing glasses (table 3). The rate was slightly lower for men (5 percent) than for women (9 percent). With age the rate increased more rapidly for women than for men, from 3 percent for the youngest age group among both men and women to about 20 percent among those 75-79 years of age—14 percent for men and 26 percent for women.

Most persons who reported such trouble seeing even with glasses (95 percent) indicated that they have had this trouble within the past 12 months. They were only slightly more likely to have seen a doctor about it than not, a pattern that remained fairly consistent for men up to 75 years but for women only at ages 55 years and over.

Persons who had serious trouble seeing even when wearing glasses, according to reports on the medical history, were more likely than not to wear glasses all of the time, but if not all of the time, they were about as likely not to wear glasses at all as to wear them part of the time. Those who did not report serious trouble seeing were more likely not to wear glasses at all than to wear

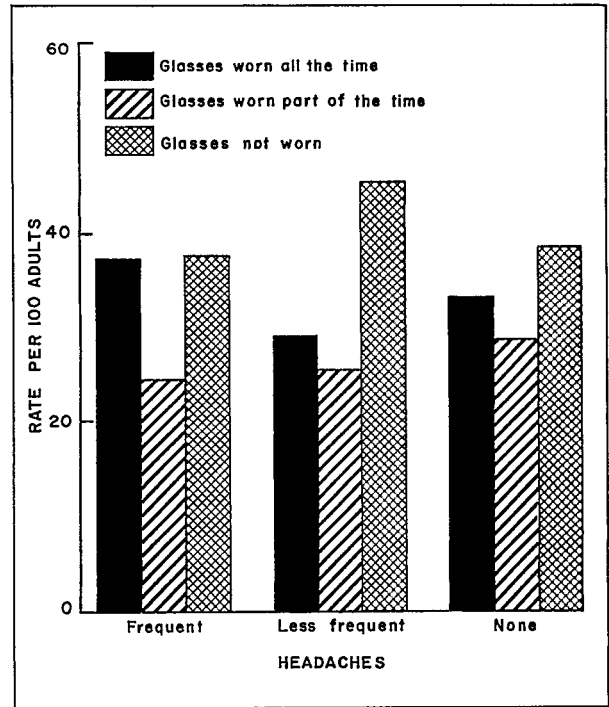


Figure 2. Prevalence rates for headaches among adults, by frequency of use of glasses.

them; but if glasses were worn they were about as likely to be worn part as all of the time (fig. 3).

Among persons who had serious trouble seeing even when wearing glasses, those who wore them all of the time were more likely to have seen their doctor about this condition than those who wore them only part of the time; the latter were somewhat more likely to have seen a doctor about this condition than those who had trouble seeing but did not wear glasses (fig. 4).

History findings also indicate that persons with frequent, severe headaches were somewhat more likely to have trouble seeing than those who had less severe or less frequent headaches or those who did not report headaches (fig. 5). However, these differences are not consistently statistically significant. Persons who did not report headaches were about as likely to have trouble seeing as the entire group who did report them.

In relation to their uncorrected acuity levels at distance and near, persons who reported trouble seeing even with glasses tended to have poorer acuity than those who did not report such trouble

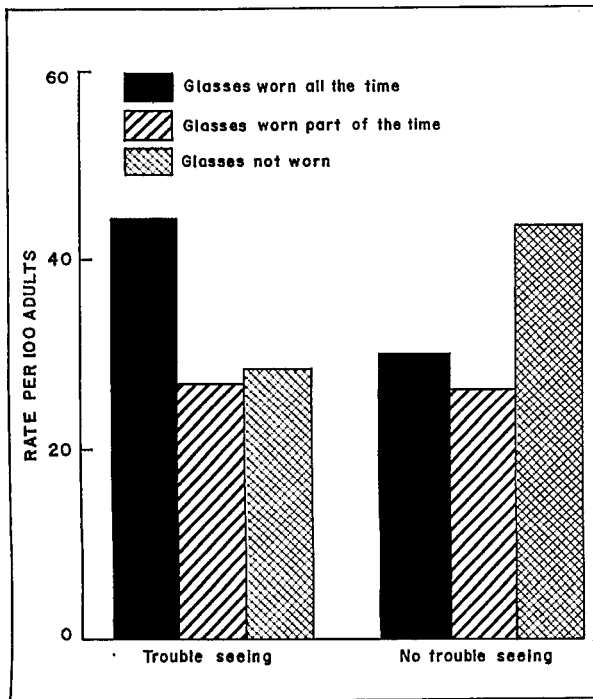


Figure 3. Prevalence rates for wearing of glasses among adults, by whether or not they reported trouble seeing.

(that is, fewer tested the equivalent of at least 20/20, and more did not exceed the 20/100 level). With a few exceptions that are probably due to chance, this pattern was found throughout the age range among both men and women (table 4).

Among those who reported having this trouble within the past year, adults were somewhat more likely to have consulted a doctor about it than not if their distance acuity was poor—that is, proportionately fewer adults with acuity of at least 20/20 and more adults with acuity no better than 20/100 had consulted a doctor about the trouble than not (table 3). This pattern is, however, not consistent throughout the age range for either men or women. At near, a similar pattern is found for women but not men.

Acuity rates for good vision, uncorrected at distance and near (the equivalent of 20/20 or better), were lower in general than expected on the basis of age-sex specific rates for the total group, while those for poorer vision (the equivalent of 20/100 or less) were greater than expected among persons who reported trouble seeing.

Headache

While it is generally recognized that refractive errors do not necessarily cause headaches and that headaches are frequently due to other conditions, it is well known that the use of the eyes with uncorrected errors of refraction, or muscle imbalance, or in unsuitable conditions of illumination cause ocular pain and discomfort (commonly known as "eye-strain"), headaches, migraine, and general malaise as indicated in *Parsons' Diseases of the Eye*.⁷

This report presents national estimates, based on Health Examination Survey findings, on the frequency of occurrence of headaches in association with selected levels of central visual acuity. Such data have previously been partially available only from a few scattered studies, 8-10 which are not in complete agreement.

About 20 percent of the adult population reported that they suffer from some type of severe

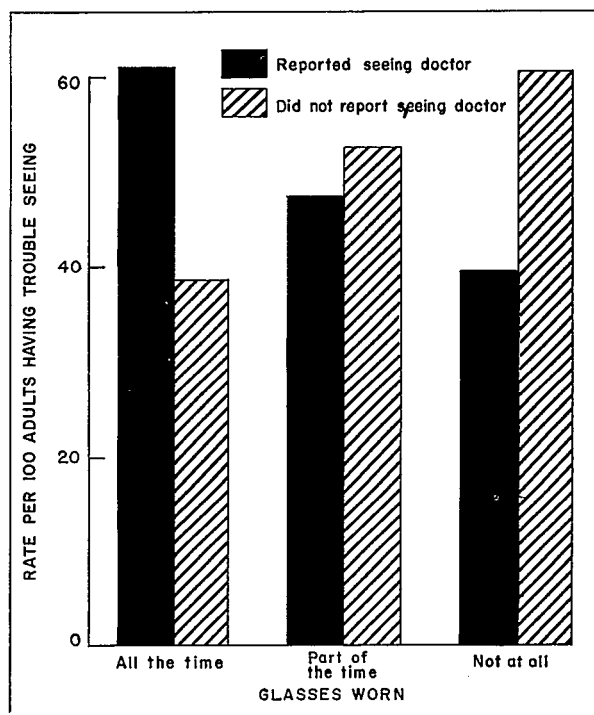


Figure 4. Relative frequency of medical consultation among adults having trouble seeing, by frequency of use of glasses.

or frequent headache and 50 percent reported that they suffer from infrequent, less severe types. The rates for women are higher than those for men—nearly 80 percent for women as compared with 60 percent for men. This differential exists at each age level, although the rates for the occurrence of headaches decreased for both sexes with advancing age (fig. 6 and table 5). Adults who reported having headaches were more likely to have them infrequently than frequently and to have ones which bother them only a little rather than a great deal. The prevalence of infrequent headaches which bother them only a little decreased with advancing age, while the more frequent and more severe headaches showed no similar consistent pattern.

Persons who reported headaches tended, as a group, to have somewhat better vision than those who reported none (table 6)—that is, relatively more persons had uncorrected binocular acuity

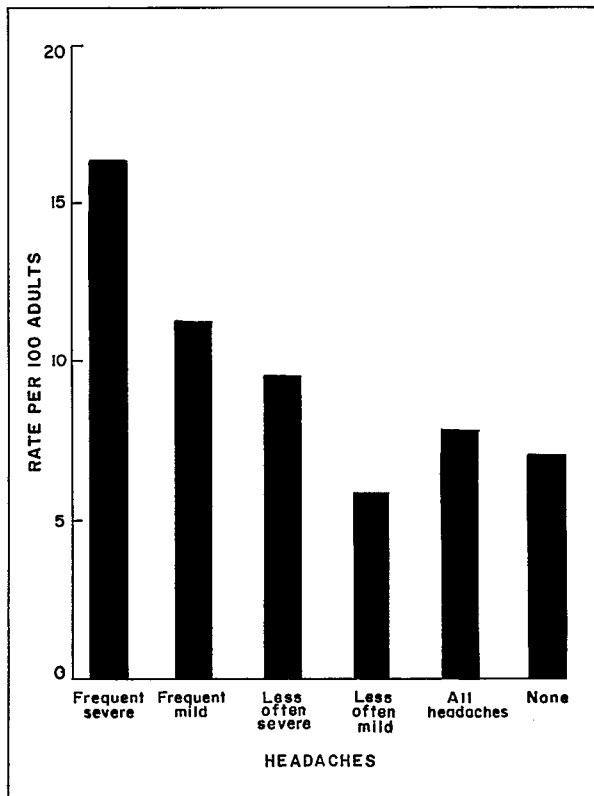


Figure 5. Prevalence rates for trouble seeing among adults, by frequency of occurrence and severity of headaches.

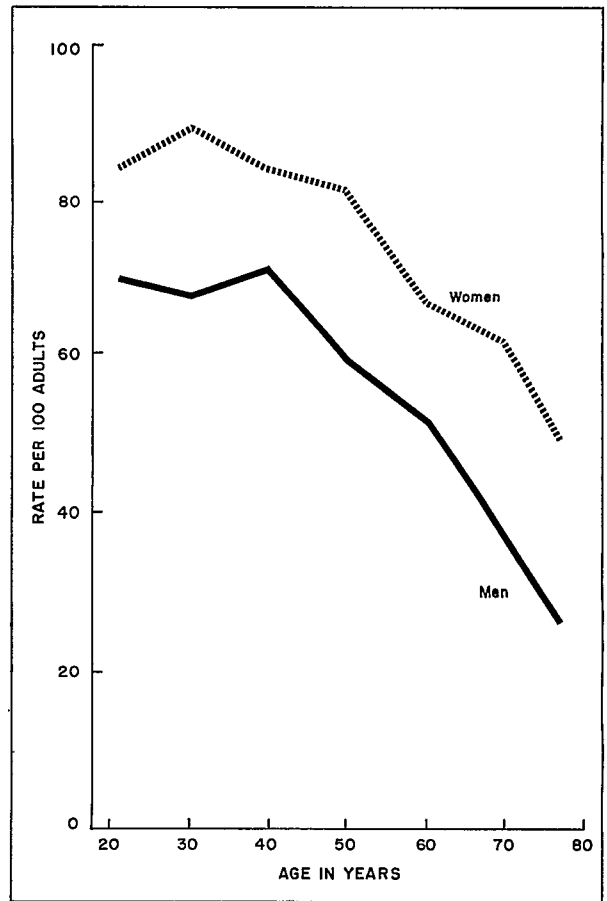


Figure 6. Prevalence rates for headaches among adults, by sex and age.

of 20/20 or better at distance and 14/14 or better at near, and fewer persons did not exceed the 20/100 or 14/70 levels. Those who reported severe or frequent headaches tended to have somewhat poorer acuity than those who had milder ones less often. Both groups tended to have somewhat better acuity than those who did not report headaches. This pattern was found with few exceptions among both men and women.

Comparison is also made here of the actual rates of good and poor acuity (as defined above) with expected rates obtained by applying the age-specific rates for each of these acuity level groups to the estimated population within the respective questionnaire category. At both distance and near, persons who had severe, frequent headaches tended to have poorer than expected acuity: fewer

persons reached the 20/20 and 14/14 levels and more exceeded 20/100 and 14/70. This pattern was found among both men and women. For persons reporting frequent but less severe headaches, women were found to have poorer distance and near acuity while men tended to have better distance but poorer near acuity than expected. Persons with less frequent headaches showed no such consistent pattern.

Other Eye Trouble

About 15 percent of the adult population reported that they had eye trouble other than that of seeing (table 7). Those who reported such trouble were somewhat more likely to have consulted a doctor about it than not, and when they did, they were more likely than not to have been told what the trouble was.

Adults with good distance or near vision (the equivalent of 20/20 or better) who reported other eye trouble were less likely to have seen a doctor about it than not, while the reverse is true for those with poor vision (the equivalent of 20/100 or less) at distance or near. This pattern was found among both men and women with poor acuity but only among women with better vision.

Those who did consult their doctor were more likely to have been told what the condition was if their vision was good but less likely if it was poor, the only exception being that the latter trend was found among women with poor distance vision but not men.

Those who reported other eye trouble were more likely to have better acuity, uncorrected, at distance and near than those who did not report such trouble (table 8).

Color Vision Deficiency

Questionnaire data from the survey showed that 4.4 percent of men and 1.2 percent of women in this country reported a color vision deficiency (table 7). Among men, 3.0 percent were found to have such a defect through testing, and 1.4 percent were aware of the defect but had not been tested. The reverse pattern was found among women: 0.3 percent reported that the condition was determined through testing and 0.9 percent knew of the condition but had not been tested. Substantially more

men than women have been given such tests (possibly in connection with military service or employment in industry or various licenses) accounting at least in part for the smaller proportion of color vision deficiency confirmed among women. The rates were slightly lower among young adults (18-24 years) and among older women (75-79 years). However, the sample of respondents was too small to give a reliable indication of the presence or absence of a trend in relation to age.

The confirmed part of these estimates are undoubtedly based on the results of many different color vision tests, which vary substantially in validity and reliability. The unconfirmed portion may represent an underestimate because some adults may not yet be aware of the defect, having compensated for the deficiency through attention to shade and texture. Estimates of the prevalence of gross congenital color deficiency contained in standard medical textbooks such as *May's Manual of the Diseases of the Eye*¹¹ and *Parson's Diseases of the Eye*⁷ are of the magnitude of the confirmed part of those from the present survey. Findings based on test results among various groups of the population vary considerably. In a recent review of some 149 published studies on sex-linked color vision deficiency in which testing was done with Ishihara plates, Post¹² noted a high degree of consistency in prevalence rates among the 33 samples from Europe, Great Britain, and the United States, where the rates were about 8 percent for men and ranged from less than 1 percent to as much as 2 percent for women (in the available studies from these areas).

Previous research studies have indicated some decrease of color discrimination ability among older persons,¹³ a finding which cannot be confirmed from the present study because the sample was too small to give adequate representation by age for the small proportion with this defect. History data from the present survey, however, indicated that persons reporting a color deficiency were more likely also to have reported having trouble seeing or other eye trouble than those who did not indicate a color defect (figs. 7 and 8). They further showed that those reporting a color defect unconfirmed by test were more likely to have reported trouble seeing or other eye trouble than those who said their color defect was confirmed.

EXAMINATION FINDINGS

Survey examination findings indicated that the condition of the eyes was normal for about two-thirds of the adult population (table 10). In general, either both eyes were found to be normal or both showed some evidence of pathology, and, if abnormal, were more likely to have the same type of condition than not (fig. 9).

For about 4 percent of the adults the fundus of the right or the left eye could not be visualized on examination with an ophthalmoscope because of clouding of the aqueous or vitreous humor, abnormalities of the cornea, or other conditions in the anterior chamber which blocked the view of the fundus. This rate was more prevalent among men than women but increased for both with age and somewhat more rapidly from 55 years on (fig. 10).

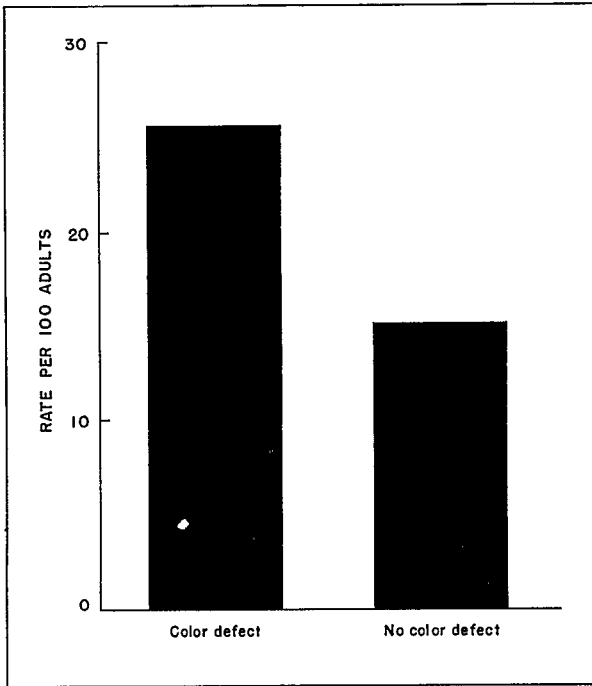


Figure 7. Prevalence rates for other eye trouble among adults with and without a color defect.

In relation to their uncorrected visual acuity, men and women who reported a color deficiency tended to have poorer visual acuity, uncorrected, at distance and near than those who did not report a color deficiency: fewer persons tested the equivalent of 20/20 or better, and more persons did not exceed the 20/100 level (table 9). Survey findings also showed that adults who were tested but did not have a color deficiency tended to have somewhat better distance vision—relatively more tested 20/20 or better, and fewer 20/100 or less—than those with a confirmed defect or those who were not tested, reflecting the pattern among men but not among women. However, men and women reporting themselves as having a color deficiency unconfirmed by test were found to have poorer distance acuity than the other groups.

Previous studies on the relation of acuity and color vision indicate the possibility that some persons with defective vision may do less well on certain color vision tests than others unless they wear correction.¹⁴

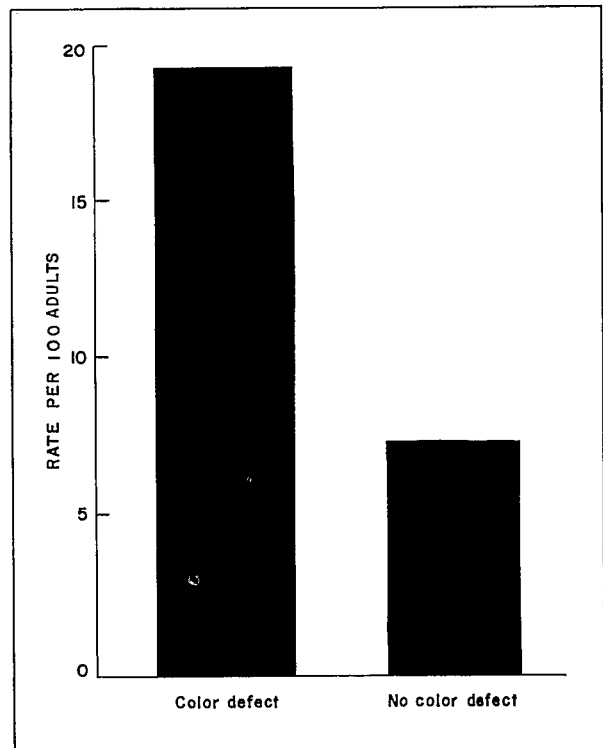


Figure 8. Prevalence rates for trouble seeing among adults with and without a color defect.

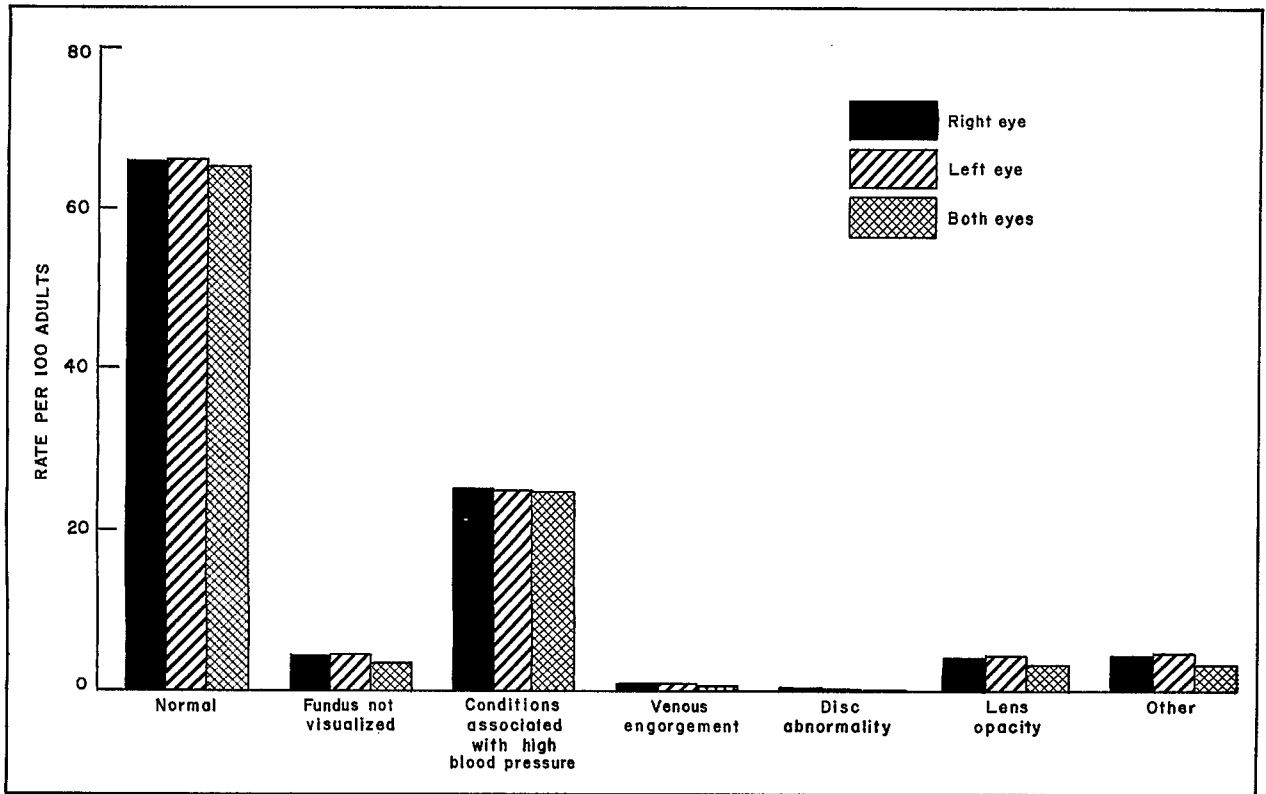


Figure 9. Relative frequency of occurrence of selected conditions in one or both eyes.

Abnormalities of the fundus and other conditions observable with the ophthalmoscope were found in the right or left eye of 30 percent of the adults. The prevalence of these conditions was slightly higher among the men than among the women, but it increased rapidly with age for both groups, as shown in figure 11 for the right eye. The majority of this group (27 percent of all adults) showed structural changes in the retina frequently associated with elevation in the systemic blood pressure¹⁵ (table 11) such as papilledema (noninflammatory swelling of the optic nerve head or disc), retinal hemorrhage, or exudate. The pattern of increase with age is similar to that for all abnormal eye conditions but slows somewhat from 55 to 65 years and levels off from 65 through 79 years for the right eye (fig. 12).

Lens opacities or cataracts, alone or in addition to other types of abnormalities, were found among 4 percent of adults (table 12) and were found to be present nearly twice as frequently in both as in just one eye. The condition was found

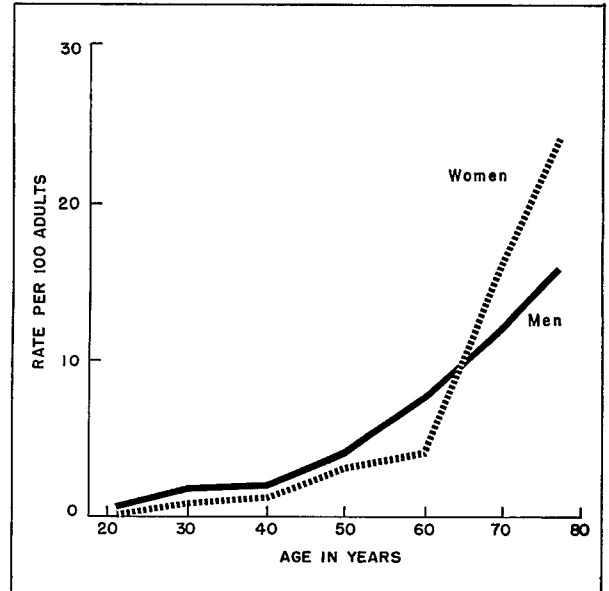


Figure 10. Relative frequency for fundus not being visualized in the right eye of adults, by sex and age.

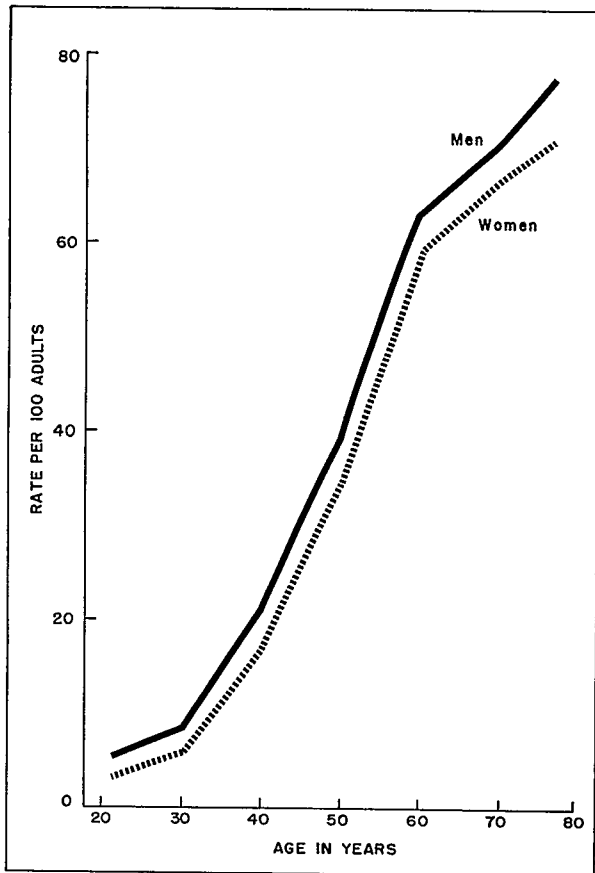


Figure 11. Prevalence rates for other abnormal conditions of the right eye (excluding fundus not visualized) among adults, by sex and age.

about as frequently among men as among women, but from age 65 years on the rate among the latter group was slightly higher (fig. 13).

The prevalence of other observed conditions of the eye—such as venous engorgement, other disc abnormalities, and iritis (alone or in addition to other abnormalities)—was found to be less than 1 percent.

In the limited examination of the eye given during the survey, it is likely that moderate and more severe manifestations of these conditions would seldom be missed and that there was some underreporting of the milder symptoms or conditions. The more severe stages of an abnormality would be expected to have a greater effect on visual acuity than the milder stages, but since these cannot be separated in the data available, the

true impact of the more severe forms on acuity cannot be determined here. However, as indicated in figures 14, 15, and 16, adults with lens opacities, retinal changes, or abnormal eye conditions in general were more likely to have reported trouble seeing than those whose eyes were found to be normal in the physical examination.

Visual acuity at distance, uncorrected, tended to be poorer (that is, relatively fewer persons tested 20/20 or better) among those whose fundus could not be visualized and among the entire group with abnormal eye conditions, including those with retinal changes associated with high blood pressure and those with lens opacities or cataracts, than among those whose eyes were found to be normal (table 11). This trend was consistent up to the oldest age groups among both men and women whose fundus could not be visualized. However, the pattern was not present consistently throughout the age range for either

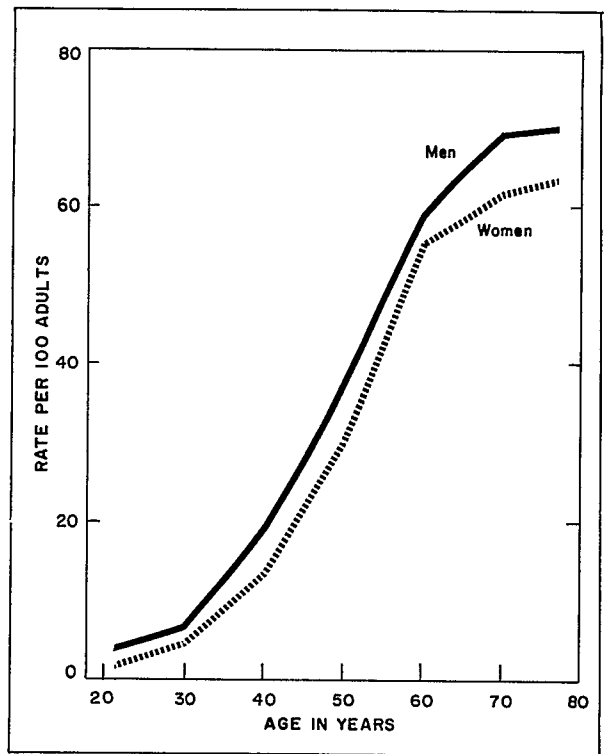


Figure 12. Prevalence rates for abnormal retinal findings (related to elevated blood pressure) in the right eye among adults, by sex and age.

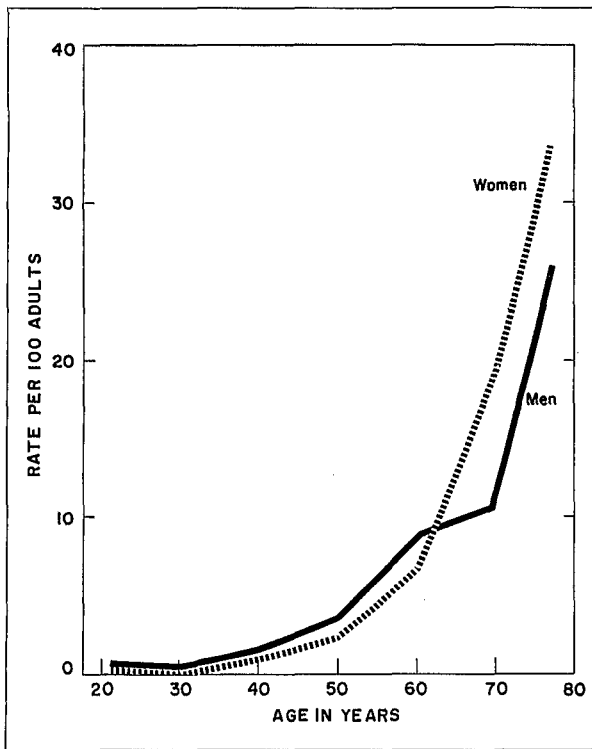


Figure 13. Prevalence rates for lens opacities in the right eye among adults, by sex and age.

men or women with retinal changes, lens opacities, or abnormal findings of the eye in general.

SUMMARY

This report contains Health Examination Survey findings from a self-administered medical history and an ophthalmic examination which are relevant to visual acuity findings. These findings gathered on civilian, noninstitutional adults in the United States aged 18-79 years are analyzed as to their relation with selected levels of binocular and monocular visual acuity and population estimates from them are presented here.

From the self-administered medical history it was shown that:

1. Sixty percent of the population wear glasses at some time; 32 percent wear

glasses all of the time. The use of glasses increases with advancing age. Men, who were found in general to have somewhat better visual acuity than women, were also less likely to wear glasses. These findings on the frequency with which glasses were worn were similar to those determined from recent surveys in Great Britain and Denmark. However, in these two countries adults 45 years and over were shown as more likely to wear glasses part of the time and less likely to wear them all of the time than were their American counterparts.

2. Seven percent of persons reported serious trouble seeing even when wearing glasses, and most of these have had such trouble within the past year. These per-

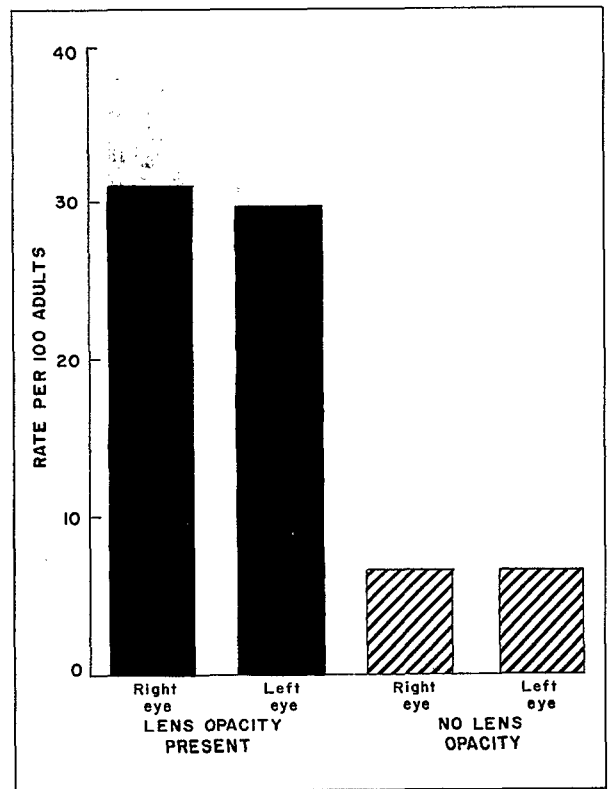


Figure 14. Prevalence rates for trouble seeing among adults with and without lens opacities.

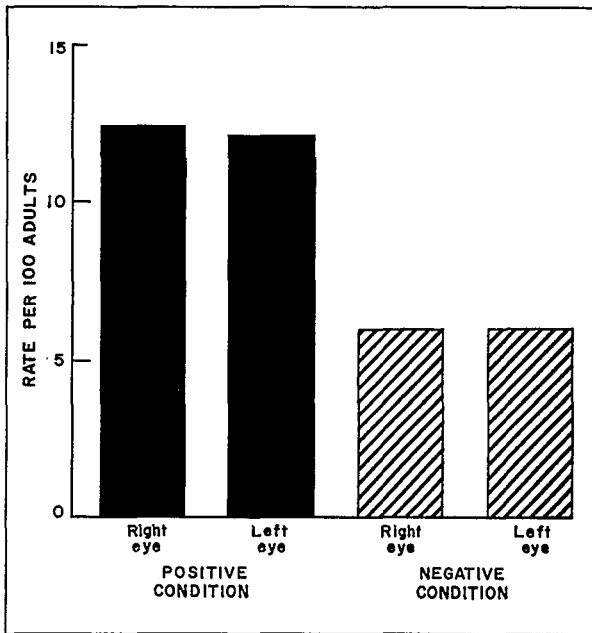


Figure 15. Prevalence rates for trouble seeing among adults with and without retinal findings related to elevated blood pressure.

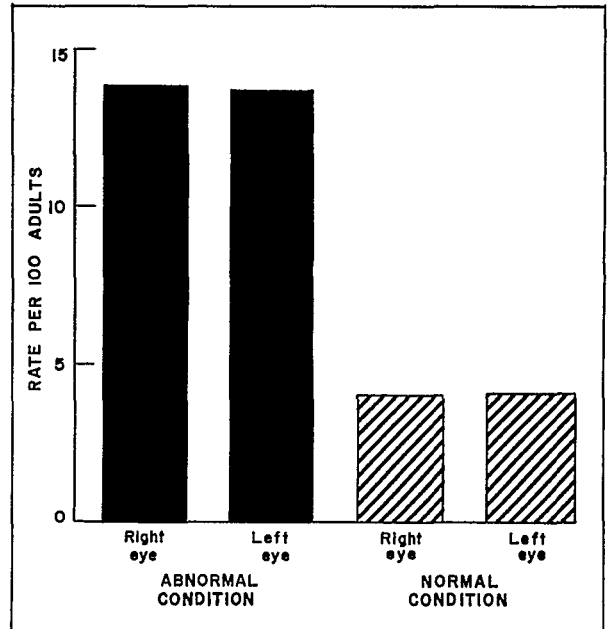


Figure 16. Prevalence rates for trouble seeing among adults with normal and abnormal eye conditions.

sons were slightly more likely to have seen a doctor about the condition than not. Those who report such serious trouble seeing were more likely to wear glasses all of the time than not.

3. About 20 percent of the adult population reported that they suffered from frequent or severe headaches, the rate being higher for women than for men. The prevalence of infrequent, less severe headaches tended to decrease with advancing age while that for the more frequent, more severe types showed no similar consistent pattern. Persons who reported frequent or severe headaches tended to have somewhat better vision—more had uncorrected binocular acuity of 20/20 or 14/14 and fewer did not exceed the 20/100 or 14/70 levels—than those who did not report such a condition.

4. Other eye trouble was reported by 15 percent of the adults. Those with good acuity were less likely to seek medical attention than those with poor acuity.
5. Slightly more than 4 percent of the men and 1 percent of the women reported knowing that they had a color vision deficiency. Men were more likely than women to have learned this through previous testing. Those with defective color vision tended to have somewhat poorer acuity.

From the ophthalmic examination it was shown that:

1. About two-thirds of the eyes examined were normal. When one eye showed evidence of pathology the other eye was more likely to show evidence of similar pathology than not.

2. About 30 percent were found to have some abnormality in the fundusoscopic examination. Most of these showed structural changes in the retina frequently associated with elevated blood pressure. Abnormalities were slightly more frequent for men, and for all adults rates increased rapidly with age.
3. Lens opacities were found among 4 percent of the population. The condition af-

ected more men than women, but the rates increased with age for both groups.

4. Venous engorgement, other disc abnormalities, and iritis were found in less than 1 percent of the population.
5. Uncorrected distance visual acuity was generally poorer for those with some evidence of pathology.

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Table 1. Prevalence rates for use of glasses among adults showing frequency of their use, by sex and age: United States, 1960-62

Sex and age	Glasses worn									Glasses not worn at all
	All or part of the time	All the time	Part of the time	Part of the time for						
				Distance only	Reading only	TV only	Other only	Reading and other	Other	
<u>Both sexes</u>	Rate per 100 adults									
All ages, 18-79 years-----	60.1	32.5	27.6	1.1	13.7	0.3	2.1	2.5	7.8	39.9
<u>Men</u>										
All ages, 18-79 years-----	55.1	28.6	26.5	1.0	15.4	0.2	2.3	1.9	5.7	44.9
18-24 years-----	22.8	10.9	11.9	1.1	3.1	0.4	1.7	0.4	5.1	77.2
25-34 years-----	30.5	17.6	12.9	1.4	2.2	0.1	3.4	0.5	5.3	69.5
35-44 years-----	35.3	15.6	19.7	1.5	7.7	0.6	4.4	1.0	4.3	64.8
45-54 years-----	75.4	33.0	42.4	1.8	31.0	-	1.0	3.5	5.5	24.6
55-64 years-----	90.5	50.9	39.6	0.3	28.2	-	0.6	4.1	6.4	9.5
65-74 years-----	93.6	57.3	36.3	0.2	26.0	-	1.2	2.5	6.4	6.4
75-79 years-----	92.4	52.4	40.0	-	21.6	-	2.2	-	16.0	7.6
<u>Women</u>										
All ages, 18-79 years-----	64.7	36.1	28.6	1.2	12.1	0.3	2.0	3.1	9.8	35.3
18-24 years-----	40.1	16.5	23.6	2.3	7.7	0.1	1.6	0.5	11.3	59.9
25-34 years-----	39.8	18.2	21.6	1.7	6.2	0.5	2.9	0.8	9.5	60.2
35-44 years-----	48.9	22.2	26.7	1.5	7.6	0.6	3.1	3.4	10.5	51.1
45-54 years-----	85.3	41.1	44.2	1.0	23.9	0.3	2.1	5.3	11.5	14.7
55-64 years-----	95.5	64.0	31.5	0.4	17.5	-	0.5	5.3	7.8	4.5
65-74 years-----	94.9	72.8	22.1	-	9.3	-	0.6	4.6	8.6	5.1
75-79 years-----	92.8	67.2	25.6	-	18.0	-	0.7	2.6	4.1	7.2

Table 2. Prevalence rates among adults wearing eyeglasses for good distance (20/20 or better) or near (14/14 or better) vision and poor distance (20/100 or less) and near (14/70 or less) vision, by sex and age: United States, 1960-62

Sex and age	Glasses worn all the time							
	20/20+ uncorrected	20/20+ with usual correction	14/14+ uncorrected	14/14+ with usual correction	20/100 or less uncorrected	20/100 or less with usual correction	14/70 or less uncorrected	14/70 or less with usual correction
<u>Both sexes</u>	Rate per 100 adults							
All ages, 18-79 years----	15.2	64.7	12.5	52.5	42.7	2.2	63.6	3.7
<u>Men</u>								
All ages, 18-79 years-----	16.3	70.2	14.7	58.0	36.5	2.1	60.7	3.2
18-24 years-----	11.3	77.2	42.6	80.1	49.5	-	26.6	-
25-34 years-----	22.5	85.9	48.8	89.1	37.1	1.8	22.7	1.6
35-44 years-----	31.6	89.9	44.2	83.4	30.0	1.4	19.1	2.1
45-54 years-----	24.4	86.4	6.5	61.8	24.4	-	66.6	1.4
55-64 years-----	13.6	64.9	-	47.6	34.3	2.1	78.5	4.9
65-74 years-----	2.3	46.6	-	35.7	47.4	5.1	84.3	4.9
75-79 years-----	-	20.4	-	16.7	59.4	4.9	82.8	6.1
<u>Women</u>								
All ages, 18-79 years-----	14.4	60.7	11.0	48.6	47.2	2.3	65.6	4.0
18-24 years-----	10.9	82.9	29.8	84.3	55.2	1.1	19.0	-
25-34 years-----	30.2	83.5	44.2	85.9	38.2	2.5	20.4	1.7
35-44 years-----	35.9	90.1	28.8	71.4	27.8	-	31.5	1.1
45-54 years-----	17.3	71.3	3.3	44.1	36.1	0.8	69.4	2.1
55-64 years-----	7.6	51.8	0.8	40.1	52.3	2.0	87.6	3.2
65-74 years-----	2.5	33.9	-	26.4	64.7	4.9	86.9	7.3
75-79 years-----	-	14.2	-	13.5	53.7	7.6	96.2	22.0

Table 2. Prevalence rates among adults wearing eyeglasses for good distance (20/20 or better) or near (14/14 or better) vision and poor distance (20/100 or less) and near (14/70 or less) vision, by sex and age: United States, 1960-62—Con.

Glasses worn part of the time only								Glasses not worn at all			
20/20+ uncorrected	20/20+ with usual correction	14/14+ uncorrected	14/14+ with usual correction	20/100 or less uncorrected	20/100 or less with usual correction	14/70 or less uncorrected	14/70 or less with usual correction	20/20 or better	14/14 or better	20/100 or less	14/70 or less
Rate per 100 adults											
57.8	60.9	28.7	54.7	3.1	4.3	36.4	7.8	85.7	79.7	1.6	4.2
56.4	58.5	23.5	50.8	2.9	4.2	41.0	10.0	87.1	80.2	1.0	4.1
75.3	77.5	91.7	91.7	-	-	-	-	91.8	93.5	-	-
92.5	94.7	95.3	95.0	1.1	1.1	3.3	1.1	94.3	95.3	0.2	0.2
79.2	89.6	64.2	84.8	-	-	7.0	0.7	92.3	85.4	0.4	0.8
65.3	68.1	5.8	45.8	1.0	2.2	45.7	9.5	67.5	24.7	2.3	19.3
39.1	35.6	-	37.5	2.4	5.5	64.9	13.2	35.4	10.8	7.5	40.4
23.3	23.0	-	19.2	10.3	11.1	68.6	21.8	19.0	-	16.7	32.0
-	-	-	-	16.3	19.8	31.7	23.5	-	-	19.3	43.6
59.4	63.6	34.5	58.9	3.4	4.4	31.3	5.4	84.2	79.1	2.4	4.3
82.9	93.2	89.5	96.5	-	-	-	-	86.5	91.4	0.7	0.4
80.6	86.9	89.8	88.7	1.7	1.7	1.7	1.7	88.9	90.5	0.3	0.4
82.7	89.0	57.8	85.2	-	-	9.6	-	89.3	81.7	0.4	1.9
54.5	55.4	6.5	42.6	4.4	6.0	48.8	8.0	72.5	16.6	6.3	21.2
43.7	47.4	-	36.6	4.0	4.0	51.4	6.7	17.8	-	23.7	44.5
6.1	9.0	-	28.3	7.1	12.9	56.6	14.3	-	-	60.6	64.2
8.7	8.7	-	-	21.7	22.4	63.3	17.5	-	-	44.6	31.3

Table 3. Prevalence rates for adults with trouble seeing even when wearing glasses, by sex and age: United States, 1960-62

Sex and age	Serious trouble seeing even with glasses					No trouble seeing reported
	Total with trouble seeing	Within past year		Earlier or unknown		
		Saw doctor	Doctor not seen	Saw doctor	Doctor not seen	
<u>Both sexes</u>		Rate per 100 adults				
All ages, 18-79 years-----	7.1	3.7	3.1	0.2	0.1	92.9
<u>Men</u>						
All ages, 18-79 years-----	5.0	2.7	2.1	0.1	0.1	94.9
18-24 years-----	3.6	2.4	0.8	0.4	-	96.4
25-34 years-----	3.7	2.1	1.4	0.2	-	96.2
35-44 years-----	2.5	1.2	1.3	-	-	97.4
45-54 years-----	6.0	3.4	2.6	-	-	94.0
55-64 years-----	6.6	3.3	2.8	0.2	0.3	93.3
65-74 years-----	8.8	4.9	3.7	-	0.2	91.2
75-79 years-----	13.9	5.1	8.8	-	-	86.0
<u>Women</u>						
All ages, 18-79 years-----	8.8	4.5	4.0	0.2	0.1	91.1
18-24 years-----	3.0	1.1	1.8	-	0.1	97.0
25-34 years-----	3.1	1.3	1.5	0.2	0.1	96.8
35-44 years-----	5.4	2.3	3.0	-	0.1	94.7
45-54 years-----	10.3	4.7	4.9	0.5	0.2	89.6
55-64 years-----	14.2	7.5	6.2	0.2	0.3	85.8
65-74 years-----	21.1	13.2	7.4	0.5	-	78.9
75-79 years-----	26.0	13.9	11.4	-	0.7	73.8

Table 4. Prevalence rates for adults with good distance (20/20 or better) or near (14/14 or better) vision and poor distance (20/100 or less) or near (14/70 or less) vision, uncorrected, with and without trouble seeing, by sex and age: United States, 1960-62

Sex and age	Trouble seeing				No trouble seeing			
	20/20 or better	14/14 or better	20/100 or less	14/70 or less	20/20 or better	14/14 or better	20/100 or less	14/70 or less
<u>Both sexes</u>	Rate per 100 adults							
All ages, 18-79 years-----	25.0	13.1	32.7	60.4	56.1	47.2	14.8	29.6
<u>Men</u>								
All ages, 18-79 years-----	33.6	18.6	22.7	52.4	58.9	49.2	11.7	28.5
18-24 years-----	50.6	58.4	-	10.2	80.6	88.2	6.0	2.7
25-34 years-----	47.4	49.8	23.3	20.3	81.0	87.8	6.8	3.7
35-44 years-----	57.7	37.4	18.7	22.5	80.3	76.0	4.6	4.5
45-54 years-----	46.2	8.5	5.7	58.0	50.5	12.5	9.7	45.8
55-64 years-----	23.6	-	33.1	68.3	24.9	1.1	19.8	69.5
65-74 years-----	4.5	-	36.4	81.8	9.8	-	33.3	74.6
75-79 years-----	-	-	53.4	92.9	1.4	8.2	37.0	55.9
<u>Women</u>								
All ages, 18-79 years-----	70.6	10.3	38.0	64.5	53.5	45.2	17.8	30.7
18-24 years-----	34.7	48.1	31.5	10.7	71.9	80.6	9.6	3.2
25-34 years-----	48.7	52.7	28.1	24.3	76.1	82.1	6.9	3.7
35-44 years-----	57.3	29.2	5.4	31.0	75.0	64.8	6.6	9.7
45-54 years-----	26.4	1.1	20.0	63.0	40.8	7.7	17.8	49.5
55-64 years-----	9.5	1.1	46.6	85.9	18.8	0.6	37.1	73.7
65-74 years-----	1.8	-	64.5	80.4	3.2	-	50.9	81.6
75-79 years-----	-	-	45.8	85.7	2.2	-	44.7	81.4

Table 5. Prevalence rates for headaches among adults, with reported frequency and severity, by sex and age: United States, 1960-62

Sex and age	Total reporting headaches	Headaches				
		Every few days		Less often		None or unknown
		Quite a bit	Just a little	Quite a bit	Just a little	
<u>Both sexes</u>		Rate per 100 adults				
All ages, 18-79 years-----	70.6	7.4	4.2	9.3	49.6	29.4
<u>Men</u>						
All ages, 18-79 years-----	61.1	4.0	3.7	5.6	47.7	38.9
18-24 years-----	70.1	3.0	4.3	5.2	57.5	29.9
25-34 years-----	67.9	3.1	2.7	6.7	55.3	32.1
35-44 years-----	71.4	3.8	3.7	6.1	57.8	28.6
45-54 years-----	59.8	5.5	3.9	5.4	45.1	40.2
55-64 years-----	51.9	5.2	4.6	5.7	36.4	48.1
65-74 years-----	36.6	4.0	3.5	3.3	25.8	63.4
75-79 years-----	26.2	1.3	3.5	4.5	16.8	73.8
<u>Women</u>						
All ages, 18-79 years-----	79.1	10.5	4.6	12.7	51.4	20.9
18-24 years-----	84.2	8.6	5.0	10.7	60.0	15.8
25-34 years-----	89.4	12.8	4.4	14.3	57.9	10.6
35-44 years-----	84.6	10.4	3.2	16.0	55.0	15.4
45-54 years-----	81.1	11.2	4.3	14.0	51.7	18.9
55-64 years-----	66.8	10.1	4.1	11.6	41.0	33.2
65-74 years-----	61.6	9.4	7.7	7.2	37.3	38.4
75-79 years-----	49.7	7.5	6.5	3.1	32.5	50.3

Table 6. Prevalence rates for adults with good distance (20/20 or better) or near (14/14 or better) vision, and poor distance (20/100 or less) or near (14/70 or less) vision, uncorrected, with and without headaches, by sex and age: United States, 1960-62

Sex and age	Severe or frequent headaches				Infrequent less severe headaches				No headaches reported			
	20/20 or better	14/14 or better	20/100 or less	14/70 or less	20/20 or better	14/14 or better	20/100 or less	14/70 or less	20/20 or better	14/14 or better	20/100 or less	14/70 or less
<u>Both sexes</u>	Rate per 100 adults											
All ages, 18-79 years-	52.5	43.2	16.6	33.9	59.6	51.5	13.7	25.3	45.4	34.6	19.7	41.1
<u>Men</u>												
All ages, 18-79 years-	57.2	44.6	11.0	31.4	63.6	56.2	10.5	22.6	50.6	38.2	14.8	37.7
18-24 years-----	85.8	88.9	3.4	6.1	75.6	86.4	6.5	1.2	84.4	88.0	5.6	4.8
25-34 years-----	84.8	87.5	1.0	1.0	76.4	85.9	10.3	5.6	83.5	86.8	4.8	3.5
35-44 years-----	79.6	70.7	5.9	5.9	76.7	75.2	6.0	3.5	81.9	76.4	2.6	7.5
45-54 years-----	40.9	7.6	8.7	53.2	55.8	15.5	9.6	45.6	47.5	10.2	9.5	45.1
55-64 years-----	23.0	0.0	24.5	73.2	25.1	1.1	16.5	68.4	25.1	1.3	22.7	68.9
65-74 years-----	9.3	0.0	38.5	66.2	10.4	-	30.9	75.6	8.8	-	33.7	76.6
75-79 years-----	0.0	0.0	20.2	50.9	-	-	45.2	84.7	1.7	9.5	40.3	56.9
<u>Women</u>												
All ages, 18-79 years-	50.5	42.6	19.0	35.0	56.2	47.5	16.5	27.6	36.6	28.4	28.1	46.9
18-24 years-----	70.9	82.0	8.3	3.5	71.2	78.0	11.1	3.9	68.7	82.2	10.3	1.4
25-34 years-----	74.3	79.1	7.0	4.9	76.6	82.5	7.5	3.2	70.6	80.3	9.4	8.9
35-44 years-----	72.7	58.8	6.1	14.4	76.3	65.6	5.9	9.2	68.8	60.9	9.7	10.0
45-54 years-----	34.6	6.2	15.7	54.6	40.5	6.5	17.0	48.2	43.4	9.6	24.5	52.4
55-64 years-----	16.0	0.6	44.6	80.2	19.5	0.3	36.2	73.3	16.2	1.2	36.5	74.3
65-74 years-----	0.0	0.0	60.5	91.6	4.6	-	50.9	80.3	3.1	-	52.2	76.3
75-79 years-----	0.0	0.0	52.8	92.9	5.0	-	45.2	79.7	-	-	42.1	80.6

Table 7. Prevalence rates for adults with other eye trouble and color vision defects, by sex and age: United States, 1960-62

Sex and age	Reported other eye trouble				No other eye trouble reported	Reported color vision defect		Tested no color defect
	Total reporting other eye trouble	Reported seeing doctor		Did not report seeing doctor		On test	No test	
		Told condition	Not told condition					
<u>Both sexes</u>	Rate per 100 adults							
All ages, 18-79 years-----	15.0	6.5	1.9	6.6	85.0	1.6	1.2	29.9
<u>Men</u>								
All ages, 18-79 years-----	13.1	5.3	1.6	6.1	86.9	3.0	1.4	44.7
18-24 years-----	10.8	4.9	0.5	5.4	89.2	2.8	0.3	44.3
25-34 years-----	12.5	5.5	2.2	4.7	87.5	3.3	1.1	59.6
35-44 years-----	12.4	4.9	1.5	6.0	87.6	5.2	0.9	59.8
45-54 years-----	15.9	5.6	1.6	8.7	84.1	1.4	2.0	37.9
55-64 years-----	12.7	6.4	1.7	4.6	87.3	2.6	1.4	28.9
65-74 years-----	12.9	5.1	2.2	5.6	87.1	2.7	2.7	25.4
75-79 years-----	16.1	2.3	1.2	12.6	83.9	-	4.1	14.9
<u>Women</u>								
All ages, 18-79 years-----	16.8	7.5	2.1	7.1	83.3	0.3	0.9	16.4
18-24 years-----	12.7	4.7	1.2	6.8	87.3	0.3	0.1	20.2
25-34 years-----	16.2	6.2	1.2	8.8	83.8	0.3	1.0	19.3
35-44 years-----	17.3	6.9	1.7	8.7	82.7	0.3	0.9	20.4
45-54 years-----	14.1	6.7	1.6	5.8	85.9	0.3	1.1	15.4
55-64 years-----	17.9	8.2	3.2	6.5	82.1	0.8	1.6	12.6
65-74 years-----	22.6	12.4	5.3	4.9	77.4	0.2	0.9	6.7
75-79 years-----	26.5	20.3	1.8	4.4	73.5	-	0.8	6.2

Table 8. Prevalence rates for adults with good distance (20/20 or better) or near (14/14 or better) vision and poor distance (20/100 or less) or near (14/70 or less) vision, uncorrected, with and without other eye trouble, by sex and age: United States, 1960-62

Sex and age	Other eye trouble				No other eye trouble			
	20/20 or better	14/14 or better	20/100 or less	14/70 or less	20/20 or better	14/14 or better	20/100 or less	14/70 or less
<u>Both sexes</u>	Rate per 100 adults							
All ages, 18-79 years-----	48.6	39.1	18.3	34.0	54.9	45.8	15.7	31.4
<u>Men</u>								
All ages, 18-79 years-----	52.5	39.3	13.4	28.4	58.4	48.8	12.0	30.0
18-24 years-----	75.7	79.3	2.0	2.1	80.0	87.5	6.3	3.0
25-34 years-----	79.1	82.4	3.0	3.2	79.8	86.9	8.0	4.6
35-44 years-----	76.8	63.0	4.8	5.2	80.1	76.5	5.0	5.0
45-54 years-----	43.0	9.0	7.9	43.5	51.6	12.7	9.7	47.2
55-64 years-----	19.8	-	36.8	61.3	25.5	1.1	18.3	70.7
65-74 years-----	7.8	-	36.8	65.5	9.5	-	33.0	76.8
75-79 years-----	-	-	41.4	57.9	1.5	9.0	38.9	60.5
<u>Women</u>								
All ages, 18-79 years-----	45.8	39.0	21.8	38.0	51.5	42.8	19.2	32.8
18-24 years-----	64.1	81.9	6.3	0.9	71.7	79.3	10.9	3.8
25-34 years-----	74.6	81.4	9.9	6.9	75.4	81.1	7.1	3.8
35-44 years-----	71.6	62.1	5.8	9.3	74.7	63.1	6.7	11.2
45-54 years-----	41.4	4.1	16.0	51.6	39.0	7.5	18.4	50.8
55-64 years-----	15.3	1.7	40.6	80.4	18.0	0.5	38.0	74.3
65-74 years-----	1.7	-	56.0	82.7	3.3	-	53.1	81.0
75-79 years-----	-	-	43.6	84.5	2.2	-	45.5	81.7

Table 9. Prevalence rates for adults with good distance (20/20 or better) and near (14/14 or better) vision and poor distance (20/100 or less) and near (14/70 or less) vision, uncorrected, with and without color vision defects, by sex and age: United States, 1960-62

Sex and age	Color vision defect				No color vision defect			
	20/20 or better	14/14 or better	20/100 or less	14/70 or less	20/20 or better	14/14 or better	20/100 or less	14/70 or less
<u>Both sexes</u>	Rate per 100 adults							
All ages, 18-79 years-----	48.0	46.5	19.6	35.9	54.1	44.7	16.0	31.6
<u>Men</u>								
All ages, 18-79 years-----	51.1	50.5	19.4	35.8	58.0	47.5	11.9	29.4
18-24 years-----	46.3	65.6	13.2	13.2	80.6	87.9	5.6	2.6
25-34 years-----	75.7	85.3	10.4	4.4	79.9	86.4	7.3	4.4
35-44 years-----	74.5	89.3	12.3	-	80.1	74.0	4.5	5.3
45-54 years-----	60.4	7.4	-	60.0	49.9	12.4	9.8	46.0
55-64 years-----	3.9	-	31.3	91.5	25.6	1.1	20.2	68.5
65-74 years-----	3.6	-	52.9	96.8	9.6	-	32.4	74.0
75-79 years-----	-	-	100.0	100.0	1.3	7.3	36.7	59.3
<u>Women</u>								
All ages, 18-79 years-----	38.2	33.6	20.2	36.2	50.7	42.3	19.6	33.7
18-24 years-----	34.2	34.2	41.3	41.3	70.9	79.8	10.2	3.3
25-34 years-----	83.8	84.2	-	-	75.2	81.1	7.6	4.4
35-44 years-----	52.4	68.2	20.7	-	74.4	62.8	6.4	11.0
45-54 years-----	27.8	9.9	-	32.4	39.5	7.0	18.3	51.1
55-64 years-----	17.3	-	33.0	68.7	17.5	0.7	38.6	75.6
65-74 years-----	-	-	64.1	100.0	3.0	-	53.6	81.2
75-79 years-----	-	-	-	100.0	1.7	-	45.3	82.2

Table 10. Prevalence rates for adults on general condition of the right and left eyes as determined by examination, by sex and age: United States, 1960-62

Sex and age	Right eye			Left eye		
	Normal	Fundus not visualized	Abnormality noted	Normal	Fundus not visualized	Abnormality noted
<u>Both sexes</u>						
Rate per 100 adults						
All ages, 18-79 years-----	65.7	4.1	30.2	65.9	4.3	29.8
<u>Men</u>						
All ages, 18-79 years-----	63.4	4.4	32.2	63.9	4.0	32.1
18-24 years-----	93.5	0.8	5.7	93.6	2.9	5.5
25-34 years-----	89.3	1.8	8.9	89.9	1.1	9.0
35-44 years-----	76.8	2.1	21.1	77.1	1.7	21.2
45-54 years-----	56.3	4.1	39.6	57.8	3.3	38.9
55-64 years-----	29.4	7.5	63.1	29.8	8.0	62.2
65-74 years-----	16.7	12.4	70.9	15.7	10.8	73.5
75-79 years-----	6.7	15.7	77.6	6.7	20.3	73.0
<u>Women</u>						
All ages, 18-79 years-----	67.8	3.9	28.3	67.7	4.5	27.8
18-24 years-----	96.9	-	3.1	97.0	0.2	2.8
25-34 years-----	93.1	1.0	5.9	92.4	1.1	6.5
35-44 years-----	81.8	1.3	16.9	81.4	2.2	16.4
45-54 years-----	62.4	3.2	34.4	62.3	3.2	34.5
55-64 years-----	36.7	4.1	59.2	36.4	5.8	57.8
65-74 years-----	17.0	16.3	66.7	18.0	17.0	65.0
75-79 years-----	5.2	24.1	70.7	5.2	26.0	68.8

Table 11. Prevalence rates for adults with good monocular distance vision (20/20 or better uncorrected) according to condition of the corresponding eye as found on examination, by sex and age: United States, 1960-62

Sex and age	Total, right eye 20/20 or better	Right eye			Total, left eye 20/20 or better	Left eye		
		Normal	Fundus not vis- ualized	Abnor- mality noted		Normal	Fundus not vis- ualized	Abnor- mality noted
<u>Both sexes</u>								
Rate 20/20 or better per 100 adults								
All ages, 18-79 years---	39.6	50.8	7.1	19.7	39.7	50.6	6.8	20.5
<u>Men</u>								
All ages, 18-79 years-----	42.4	54.5	10.8	22.9	43.0	54.2	9.3	24.8
18-24 years-----	63.4	12.0	52.9	25.9	64.4	65.5	20.4	55.3
25-34 years-----	65.4	65.2	22.5	41.8	61.9	63.3	14.7	54.3
35-44 years-----	57.9	66.8	15.3	61.7	61.9	63.8	7.6	59.3
45-54 years-----	32.9	61.5	12.0	49.2	35.1	36.8	26.4	33.4
55-64 years-----	11.9	34.0	14.1	33.5	10.6	10.4	8.9	10.9
65-74 years-----	5.6	7.0	7.6	4.9	5.6	4.4	1.8	6.5
75-79 years-----	0.7	-	4.2	-	-	-	-	-
<u>Women</u>								
All ages, 18-79 years-----	37.1	47.6	3.4	16.3	36.8	47.5	4.8	16.1
18-24 years-----	55.5	55.4	-	59.2	54.1	54.1	-	58.9
25-34 years-----	61.9	63.4	-	49.5	59.3	61.6	-	37.3
35-44 years-----	55.4	57.6	20.0	47.4	55.6	58.6	21.4	45.1
45-54 years-----	22.1	23.3	13.3	20.7	24.0	25.8	13.7	21.9
55-64 years-----	7.8	7.6	-	8.4	8.8	7.6	4.4	10.1
65-74 years-----	1.0	-	-	1.4	0.2	-	-	0.3
75-79 years-----	-	-	-	-	-	-	-	-

Table 12. Prevalence rates for adults with retinal findings related to high blood pressure and lens opacities as found on examination, by sex and age: United States, 1960-62

Sex and age	Right eye		Left eye		Right eye		Left eye	
	Retinal findings		Retinal findings		Opacities		Opacities	
	Positive	Negative	Positive	Negative	Present	Absent	Present	Absent
<u>Both sexes</u>	Rate per 100 adults							
All ages, 18-79 years---	27.5	72.5	27.4	72.6	4.2	95.8	4.4	95.6
<u>Men</u>								
All ages, 18-79 years-----	29.9	70.1	29.6	70.4	4.0	96.0	3.9	96.1
18-24 years-----	4.2	95.8	4.2	95.8	0.5	99.5	-	100.0
25-34 years-----	6.8	93.2	6.9	93.1	0.3	99.9	-	100.0
35-44 years-----	19.1	80.9	18.9	81.1	1.2	98.8	1.2	98.8
45-54 years-----	37.1	62.9	36.4	63.6	3.5	96.5	2.9	97.1
55-64 years-----	59.6	40.4	57.4	42.6	8.9	91.1	10.3	89.7
65-74 years-----	69.4	30.6	70.8	29.2	10.6	89.4	11.0	89.0
75-79 years-----	70.0	30.0	72.5	27.5	25.9	74.1	22.7	77.3
<u>Women</u>								
All ages, 18-79 years-----	25.3	74.7	25.4	74.6	4.4	95.6	4.8	95.2
18-24 years-----	1.8	98.2	2.0	98.0	0.1	99.9	0.3	99.7
25-34 years-----	4.6	95.4	4.7	95.3	-	100.0	0.1	99.9
35-44 years-----	13.9	86.1	13.7	86.3	0.8	99.2	0.9	99.1
45-54 years-----	30.8	69.2	30.9	69.1	2.3	97.7	3.1	96.9
55-64 years-----	55.7	44.3	55.4	44.6	6.6	93.4	7.0	93.0
65-74 years-----	61.6	38.4	62.2	37.8	19.7	80.3	20.4	79.6
75-79 years-----	63.3	36.7	63.5	36.5	33.6	66.4	37.0	63.0

APPENDIX I

HISTORY AND EXAMINATION FORMS

Health Examination Survey

History - Self-Administered

HES-204

1. a. In the past few years have you had any headaches? Yes No ?
- If Yes b. How often? Every few days Less often
- c. Do they bother you quite a bit just a little
46. a. Do you wear glasses? Yes No ?
- If Yes b. Do you wear them all the time Yes No ?
- If you don't wear them all the time, check below when you do wear them.
- c. For seeing at a distance
- d. For reading
- e. For watching T V
- f. At other times When? _____
47. a. Do you have serious trouble with seeing, even when wearing glasses? Yes No ?
- If Yes b. Have you had this trouble in the past 12 months? Yes No ?
- c. Have you ever seen a doctor about it?
48. a. Do you have any other trouble with your eyes? Yes No ?
- If Yes b. Have you seen a doctor about it?
- c. What did he say it was? _____
60. a. Do you have any reason to think you are color blind? Yes No ?
- b. Have you ever had a test to see whether you are color blind? Yes No ?

Physical Examination
HES-205

Ocular Fundi	Right	Left
4. Normal		
5. Fundus not Visualized		
6. Globe Absent		
7. Increased Light Reflex		
8. Narrow Arterioles		
9. Tortuous Arterioles		
10. AV Compression		
11. Hemorrhage		
12. Exudate		
13. Venous Engorgement		
14. Papilledema		
15. Disc Abnormal		
16. Lens Opacities		
17. Iritis		
18. Other (Specify)		



APPENDIX II

STATISTICAL NOTES

The Survey Design

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

Reliability

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

The first-stage evaluation of the survey was reported in reference 2, which dealt principally with an analysis of the faithfulness with which the sampling design was carried out. This study notes that out of the 7,700 sample persons the 6,670 who were examined—a response rate of over 86 percent—gave evidence that they were a highly representative sample of the civilian, noninstitutional population of the United States. Imputation of nonrespondents was accomplished by attributing to nonexamined persons the characteristics of compa-

rable examined persons as described in reference 2. The specific procedure used amounted to inflating the sampling weight for each examined person in order to compensate for sample persons at that stand of the same age-sex group who were not examined.

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

Sampling and Measurement Errors

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

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

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

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

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

In accordance with usual practice, the interval estimate for any statistic may be considered the range

within one standard error of the tabulated statistic, with 68 percent confidence; or the range within two standard errors of the tabulated statistic, with 95 percent confidence.

Small Categories

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

Table I. Relative sampling errors of rates for selected history and examination findings and acuity levels: United States, 1960-62

Vision factor	Total	18-24 years	45-54 years	75-79 years
<u>Wears glasses all the time</u>				
20/20 or better acuity-----	0.05	0.10	0.10	1.00
20/100 or less acuity-----	0.06	0.15	0.13	0.15
<u>Trouble seeing</u>				
20/20 or better acuity-----	0.14	0.30	0.25	1.00
20/100 or less acuity-----	0.16	0.35	0.30	0.35
<u>Headaches</u>				
20/20 or better acuity-----	0.06	0.10	0.12	1.00
20/100 or less acuity-----	0.15	0.25	0.20	0.70
<u>Other eye trouble</u>				
20/20 or better acuity-----	0.05	0.10	0.13	1.00
20/100 or less acuity-----	0.13	0.70	0.40	0.45
<u>Color blindness</u>				
20/20 or better acuity (men)-----	0.15	0.40	0.40	1.00
20/100 or less acuity (men)-----	0.35	1.00	0.90	1.00
<u>Ocular fundi findings--right eye</u>				
20/20 or better acuity-----	0.04	0.07	0.10	1.00
20/100 or less acuity-----	0.05	0.12	0.10	0.16
<u>Lens opacities--right eye</u>				
20/20 or better acuity-----	1.00	1.00	1.00	1.60
20/100 or less acuity-----	0.12	1.00	0.30	0.25



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