

DOCUMENT RESUME

ED 063 719

EC 042 231

TITLE Binocular Visual Acuity of Children: Demographic and Socioeconomic Characteristics - United States.  
INSTITUTION National Center for Health Statistics (DHEW), Rockville, Md.  
REPORT NO DHEW-HSM-72-1031  
PUB DATE Feb 72  
NOTE 40p.  
AVAILABLE FROM Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402 (\$0.45)

EDRS PRICE MF-\$0.65 HC-\$3.29  
DESCRIPTORS \*Demography; \*Elementary School Students; Negro Youth; \*Research Projects; \*Socioeconomic Influences; Statistical Data; \*Visual Acuity; Visual Perception

ABSTRACT

Reported were estimates of the uncorrected binocular visual acuity levels of distance and near for children aged 6 to 11 years in the noninstitutional population of the United States in relation to their demographic and socioeconomic background. A sample of 7,119 children participated in the Health Examination Survey program of 1963-65. Findings indicated that the distribution of uncorrected distance and near binocular visual acuity among white and Negro children was similar. The proportion with defective distance acuity of 20/40 or less was found to increase with age among the white but not the Negro children. Additional findings were that children from the South and West had better binocular visual acuity at distance and near than children from the Northeast and Midwest. Also, visual acuity at distance and near tended to be better among white than Negro children in the Northeast and Midwest but the reverse in the South and West. Children living in rural areas were found to have better visual acuity at distance and near than did their peers living in urban communities. The proportion of children with defective distance acuity was found to increase with parental educational level and/or family income. Tables of extensive statistical data were included in the report. (CB)

ED 063719

**VITAL and HEALTH STATISTICS**

Series 11 - Number 112

DATA FROM THE NATIONAL HEALTH SURVEY

NCHS

**Binocular Visual Acuity  
of Children  
Demographic and Socioeconomic  
Characteristics - United States**

U. S. DEPARTMENT OF  
HEALTH, EDUCATION, AND WELFARE  
Public Health Service  
Health Services and Mental Health Administration



Series 11 reports present findings from the National Health Examination Survey, which obtains data through direct examination, tests, and measurements of samples of the U.S. population. Reports 1 through 37 relate to the adult program; additional reports concerning this program are forthcoming and will be numbered consecutively. The present report is one of a number of reports of findings from the children and youth programs, Cycles II and III of the Health Examination Survey. These reports, emanating from the same survey mechanism, are being published in Series 11 but are numbered consecutively beginning with 101. It is hoped this will guide users to the data in which they are interested.



Vital and Health Statistics-Series 11-No. 112

**Data from the  
NATIONAL HEALTH SURVEY**

**Series 11  
Number 112**

**U.S. DEPARTMENT OF HEALTH,  
EDUCATION & WELFARE  
OFFICE OF EDUCATION**  
THIS DOCUMENT HAS BEEN REPRO-  
DUCED EXACTLY AS RECEIVED FROM  
THE PERSON OR ORGANIZATION ORIG-  
INATING IT. POINTS OF VIEW OR OPIN-  
IONS STATED DO NOT NECESSARILY  
REPRESENT OFFICIAL OFFICE OF EDU-  
CATION POSITION OR POLICY

# **Binocular Visual Acuity of Children: Demographic and Socioeconomic Characteristics - United States**

Binocular central visual acuity findings at distance and near with-  
out correction for children 6-11 years of age, by race, region, size  
of place of residence, rate of population change from 1950 to 1960  
in place of residence, family income, education of parent, and grade  
in school.

DHEW Publication No. (HSM) 72-1031

---

**U.S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE**  
Public Health Service

Health Services and Mental Health Administration  
National Center for Health Statistics  
Rockville, Md.      February 1972

# NATIONAL CENTER FOR HEALTH STATISTICS

THEODORE D. WOOLSEY, *Director*

PHILIP S. LAWRENCE, Sc.D., *Associate Director*

OSWALD K. SAGEN, Ph.D., *Assistant Director for Health Statistics Development*

WALT R. SIMMONS, M.A., *Assistant Director for Research and Scientific Development*

JAMES E. KELLY, D.D.S., *Dental Advisor*

EDWARD E. MINTY, *Executive Officer*

ALICE HAYWOOD, *Information Officer*

## DIVISION OF HEALTH EXAMINATION STATISTICS

ARTHUR J. McDOWELL, *Director*

PAUL T. BRUYERE, M.D. *Deputy Director*

HENRY W. MILLER, *Chief, Operations and Quality Control Branch*

JEAN ROBERTS, *Chief, Medical Statistics Branch*

PETER V. V. HAMILL, M.D., *Medical Advisor, Children and Youth Program*

## 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.*

Vital and Health Statistics -Series 11-No.112

---

DHEW Publication No. (HSM) 72-1031

Library of Congress Catalog Card Number 72-169287

# CONTENTS

|   | Page |
|---|------|
| Introduction -----  | 1    |
| The Vision Examination-----   | 2    |
| Findings -----  | 3    |
| Race -----  | 3    |
| Region -----  | 6    |
| Size of Place of Residence-----   | 7    |
| Family Income-----  | 10   |
| Education of Parent-----  | 11   |
| Grade in School-----  | 11   |
| Summary-----  | 12   |
| References -----  | 12   |
| List of Detailed Tables-----  | 13   |
| Appendix I. Statistical Notes-----  | 31   |
| The Survey Design-----  | 31   |
| Reliability -----   | 31   |
| Sampling and Measurement Error-----   | 32   |
| Small Categories-----   | 32   |
| Appendix II. Demographic and Socioeconomic Variables and Related Terms----- | 33   |

**SYMBOLS**

|  |     |
|--|-----|
| Data not available-----  | --- |
| Category not applicable-----                                       | ... |
| Quantity zero-----   | -   |
| Quantity more than 0 but less than 0.05-----                       | 0.0 |
| Figure does not meet standards of<br>reliability or precision----- | *   |

# BINOCULAR VISUAL ACUITY OF CHILDREN: DEMOGRAPHIC AND SOCIOECONOMIC CHARACTERISTICS

Jean Roberts and Kenneth R. Duyan, *Division of Health Examination Statistics*

## INTRODUCTION

This report contains findings regarding uncorrected binocular visual acuity of noninstitutionalized children 6-11 years of age in the United States by demographic and socioeconomic characteristics, as estimated from the Health Examination Survey of 1963-65.

The Health Examination Survey from which these data derive 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 activity to determine the health status of the population.

Three different programs are used in carrying out the intent of the National Health Survey.<sup>1</sup> The Health Interview Survey, in which health information is collected from samples of people by household interview, focuses primarily on the impact of illness and disability upon the lives and actions of people. Through the Health Resources program, health data as well as health resource and utilization information are obtained in surveys of records in hospitals, nursing homes, and other resident institutions and on the entire range of personnel in the health occupations. The Health Examination Survey is the third major program.

In the Health Examination Survey, data are collected by direct physical examinations, tests, and measurements performed on the sample population under study. This method provides the best way to obtain actual diagnostic data on the prevalence of

certain medically defined illnesses. It is the only way to secure information on unrecognized and undiagnosed conditions and on a variety of physical, physiological, and psychological measures within the population. In addition, demographic and socioeconomic data are obtained on the sample population under study.

The Health Examination Survey is conducted as a series of separate programs referred to as "cycles." Each cycle is limited to some specific segment of the U.S. population and to certain aspects of health. Data on the prevalence of certain chronic diseases and on the distribution of various physical and physiological measurements and other characteristics in a defined adult population were obtained in the first cycle, as previously described.<sup>2,3</sup>

For the second cycle, on which this report is based, a probability sample of the noninstitutionalized children 6-11 years of age was selected and examined. This examination primarily assessed health factors related to growth and development. It included an examination by a pediatrician and by a dentist, tests administered by a psychologist, and a variety of tests and measurements by a technician. This survey plan, sample design, examination content, and operation have been described in a previous report.<sup>4</sup>

Field data collection operations for this cycle were started in July 1963 and completed in December 1965. Out of the 7,417 children selected in the sample, 7,119 or 96 percent were examined.

This national sample of examinees is closely representative of the roughly 24 million noninstitutionalized children 6-11 years of age in the United States with respect at least to age, sex, race, region, size of place of residence, and rate of change in size of place of residence from 1950 to 1960.

During his single visit to the mobile units specially designed for use in the survey, each child was given a standardized examination by the examining team. Prior to this examination, information about or related to the child was obtained from one of his parents. This included demographic and socioeconomic data on household members as well as medical history, behavioral, and related data on the child to be examined. Ancillary data for the child on grade placement, teacher's ratings of his behavior and adjustment, and health problems of the child known to the teacher were requested from the school he attended. A birth certificate for each child was obtained for verification of his age and information related to him at birth.

Statistical notes on the survey design, reliability of the data, and sampling and measurement error are shown in appendix I. Definitions of the demographic and socioeconomic variables considered here are included in appendix II.

## THE VISION EXAMINATION

Included in the vision examination for children in this study, as previously described,<sup>5</sup> were tests of color vision, monocular and binocular central visual acuity at distance and near, the degree of lateral and vertical eye muscle imbalance, bilateral accommodation, and binocularity. Except for color vision, tests were performed without glasses or other refractive lenses. Because of the small proportion of children of this age who wear glasses, no tests with correction were included.

In addition, each child was given an eye examination by a survey staff pediatrician to detect and identify disease or other eye defects.

Visual acuity for children who could read letters was tested with a commercial instrument—the Master Ortho-rater—which permitted rapid testing under controlled conditions of lighting and target distance from the examinee. The effective illumination on the target and the contrast between target letters and background were maintained within

optimum limits for such tests. Special letter targets developed by Dr. Louise Sloan of the Wilmer Eye Institute, Johns Hopkins University,<sup>6</sup> which were used in the Ortho-rater instead of the regular targets, permitted testing at 12 levels at distance and near—10 letters of identical size per line at levels corresponding to ones from 20/12 to 20/200 and 3 letters at 20/400 (Snellen notation). The order of unserifed letters on the target which were of nearly equal legibility were randomized and differed for each line, each eye, distance, and near.

For testing children who could not read letters or were not able to do so rapidly enough to complete the test in the time limit allowed, special wall charts for distance and cards for near vision, with Landolt ring symbols instead of letters, were used. These targets contained 5 symbols per line and permitted testing at 11 levels. In previous research Sloan had found the two forms of the acuity test—the letter and the Landolt ring targets as used in this study—to be essentially equivalent.<sup>7,8</sup> The degree of comparability of the various specific acuity levels used in the present study for readers and nonreaders was described previously.<sup>5</sup>

The acuity level for the child as determined here was that corresponding to the line with the smallest sized letters or symbols he was able to read with no more than the allowable number of errors. To be considered able to read a particular line, no more than three letters on lines of 10 could have been misread, no more than one symbol on lines of 5 and no misses were allowed on lines of 3 letters.

Vision tests were administered by the survey staff examining dentist because that member of the examining team had time available to do this. Each of the five dentists employed during the cycle was given special training and practice in vision testing techniques, which had been recommended by the consultants in Ophthalmology to the survey, to insure the consistency of test results.

The testing order of right eye, left eye, and binocular vision was maintained throughout the study with the sequence of near and distance tests alternated for successive examinees as a further safeguard to minimize the effects of fatigue and learning.

Findings in this study among the various demographic and socioeconomic subgroups considered here are limited to binocular visual acuity at dis-

tance and near without correction. Acuity levels are shown in Snellen notation where the numerator of the ratio shows the distance of the target from the eye(s) of the examinee (simulated in feet for distance vision and inches for near vision) and the denominator the distance at which the particular test line would need to be for someone with "normal" vision to be able to read it correctly, with no more than the allowable number of errors specified above. In this notation 20/20 and 14/14 are usually considered normal for distance and near vision, respectively.

## FINDINGS

Among all noninstitutionalized children 6-11 years of age in the United States, nearly three-fourths or an estimated 19.5 million were found to have at least "normal" or better than "normal" binocular distance vision without correction (20/20 or better).<sup>5</sup> The proportion reaching similar levels at near was only slightly less.

The proportion with defective binocular distance vision showed a remarkably consistent increase with age from 7 percent testing no better than 20/40 at age 6 years to 17 percent at age 11 years. The age trend for those with more seriously defective vision is even more pronounced. Among those testing no better than 20/100, the proportion increases consistently and steadily from less than 1 percent at age 6 years to nearly 8 percent at age 11 years. A similar trend with age is not found for those with defective binocular near vision, where the proportion varies between 5 and 7 percent testing no better than 14/28 over the age range in the study.

Boys were found to have slightly but significantly better binocular visual acuity at both distance and near than girls.

### Race

The distribution of uncorrected distance and near binocular visual acuity among white and Negro children 6-11 years of age is generally similar (figure 1 and tables 1 and 2). Findings for the other racial groups are not included because the combined group is so small and heterogeneous that estimates for it could not be considered reliable with the size and design of the sample used in the present study.

At distance, 75 percent of the white and 73 percent of the Negro children were found to have at least normal vision of 20/20 or better, a difference so small that it is probably due to sampling variability alone (table 3). Slightly more white than Negro children were also found to have defective distance vision, whether those considered were the entire group testing no better than 20/40 or those with a more severe defect testing no better than 20/100. The respective rates for white and Negro children were 11 and 10 percent at levels of 20/40 or less and 4 and 2 percent at levels of 20/100 or less. The corresponding population estimates of children with these levels of visual acuity are contained in table 4.

At near, no statistically significant differences were found in the distribution of visual acuity between the two races. Slightly more white than Negro children had at least normal near vision of 14/14 or better—73 percent compared with 71 percent—while a negligibly smaller proportion of white than Negro children had defective acuity of 14/28 or less—6 percent compared with 7 percent.

White boys were found to have better visual acuity than white girls. Seventy-eight percent of these boys had at least normal acuity at distance (20/20 or better) compared with 72 percent of the girls, while at the other extreme relatively fewer boys (10 percent) than girls (12 percent) had defective distance acuity of 20/40 or less. The differences at either extreme were large enough to be statistically significant. A similar pattern of better acuity among white boys than girls is also found for near vision.

Among Negro children this pattern of sex differences in visual acuity is not found. Negro boys had slightly, but not significantly, poorer acuity than girls of the same race. Relatively fewer of these boys than girls reached the normal or better levels at distance and near and relatively more had defective acuity of 20/40 or 14/28 or less although these differences were statistically negligible.

White boys had somewhat better visual acuity than Negro boys. However, only among those with at least normal distance visual acuity and those with defective near acuity (14/28 or less) were the differences large enough to be considered statistically significant. The reverse pattern was found among

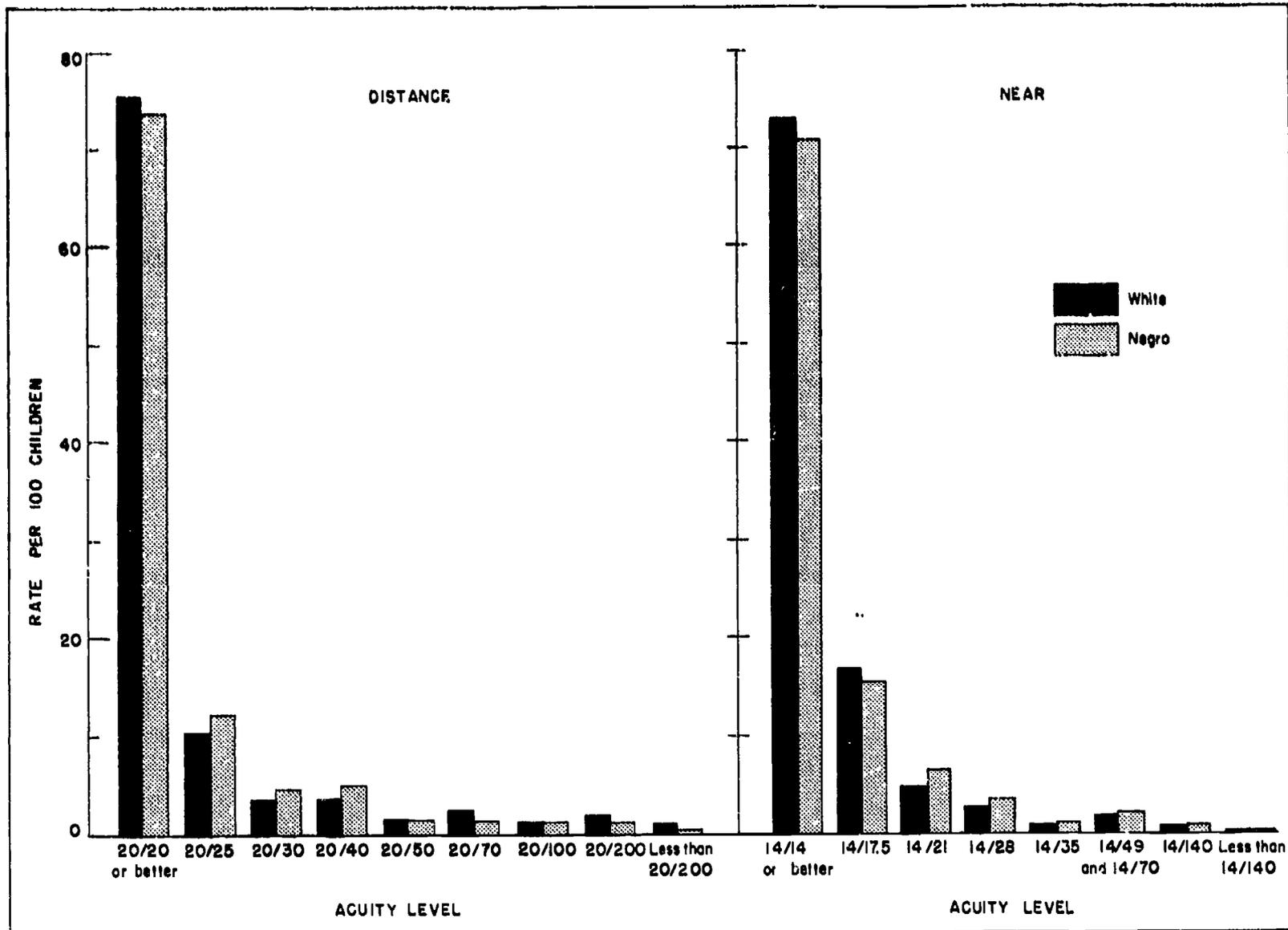


Figure 1. Number of white and Negro children per 100, 6-11 years of age, reaching specified acuity levels with uncorrected binocular distance and near vision, United States.

girls. White girls had slightly poorer acuity than Negro girls although the differences in the proportions with at least normal and with defective acuity at distance and near were not statistically significant with the size and design of the sample used in the survey.

The proportion with defective visual acuity at distance of 20/40 or less increased with age among white but not among Negro children. For white children the prevalence of this degree of visual defect more than doubled during this age span, increasing steadily from 7 percent at age 6 to 18 percent at age 11 years, with only a slight leveling off at 8 years of age. No such consistent age-related trend was found among Negro children for either distance or near vision or among white children for near vision (figure 2). This pattern was

consistent for both boys and girls—the only age-related trend being the increase in the prevalence of defective distance vision among white children.

In the previous report presenting visual acuity findings among American children by age and sex<sup>5</sup> the effect of using two different targets—one for those who could readily read letters and the Landolt ring sets for those who could not—was assessed. It was shown that the Landolt ring symbol charts may have provided a slightly easier test than the letter targets. However, the proportion tested with these symbols was large enough only at 6 years and to a lesser extent at 7 years to have noticeably affected the overall distribution of acuity in the population under study. Because of these target differences the possible effect of any substantial differentials in letter-recognition ability between the white

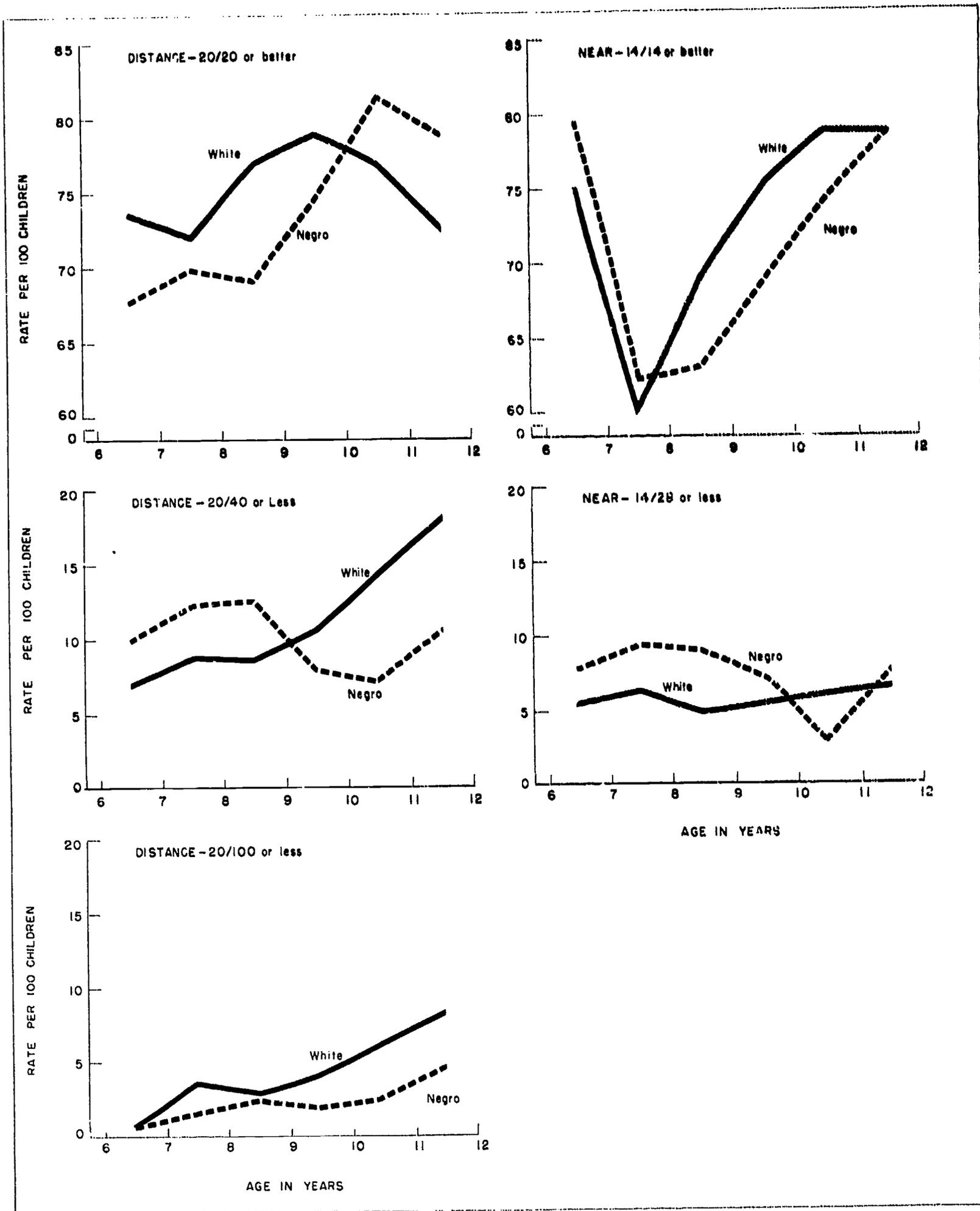


Figure 2. Number of white and Negro children per 100, reaching specified levels of uncorrected visual acuity at distance and near by age, United States.

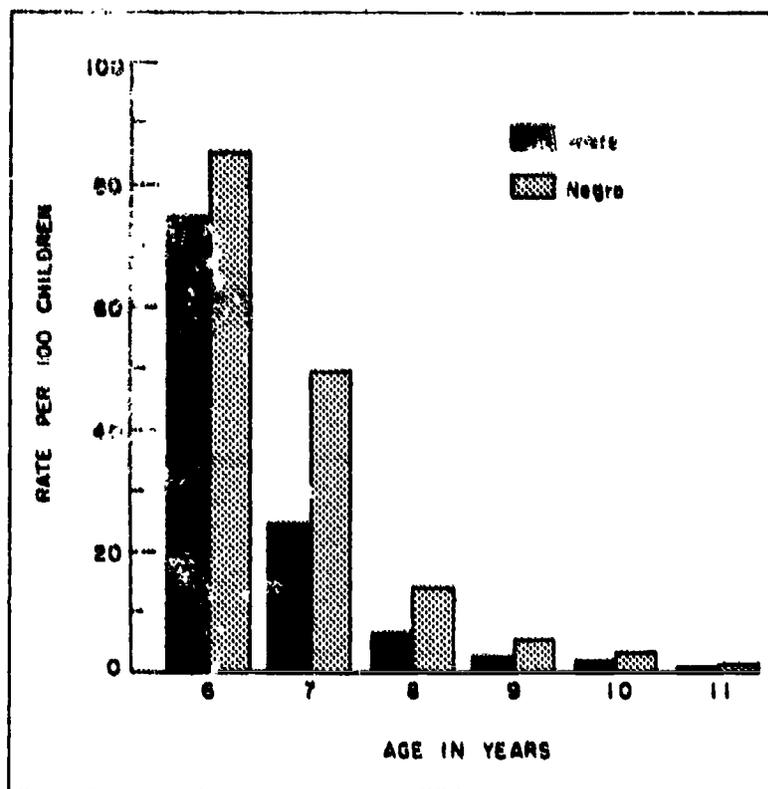


Figure 3. Number of white and Negro children per 100, tested with Landolt rings by age, United States.

and Negro groups needs to be considered. Proportionately more Negro than white children were tested with Landolt rings, 28 percent compared with 19 percent for the latter. At age 6 years nearly 86 percent of Negro children were tested with symbols compared with 75 percent of the white group. At age 7 years half of the Negro group compared with one-fourth of the white children were tested with the rings. The proportion so tested decreases rapidly with age for both groups, as shown in figure 3, until by 11 years only 1 percent of white children and less than 2 percent of Negro children were tested in this way. Thus it is apparent that at ages 6, 7, and possibly 8 years target differences could have affected the racial findings. Thus the poorer acuity levels found among Negro children under the age of 8 may actually understate the actual racial differentials in acuity for these younger children if, in fact, the Landolt ring sets did provide an easier test.

#### Region

Children from the South and West regions of the United States had better binocular visual acuity at

both distance and near than children from the Northeast and Midwest (figure 4 and tables 5 and 6).

At distance, the prevalence of at least normal vision (20/20 or better) is significantly greater among children in the South and West (77 percent) than those in the Northeast (71 percent) but only slightly more than in the Midwest (74 percent). Defective visual acuity at levels of 20/40 or less is significantly more prevalent among children in the Northeast (14 percent) than those in the South (8 percent) and West (10 percent) but only slightly more than among children in the Midwest (12 percent).

For near vision, the prevalence of normal or better acuity (14/14 or better) is significantly greater among children in the West (78 percent) and South (76 percent) than those in the Northeast (67 percent) and Midwest (69 percent). Defective near acuity (levels of 14/28 or less) is significantly more prevalent among children in the Northeast (8 percent) than those in the South (5 percent) and West (4 percent).

In each of the regions into which the country was divided for the purposes of this survey, the prevalence of defective distance but not near vision was found to increase with age from 6 to 11 years. The sharpest rate of increase was found in the West, where the prevalence among children 11 years of ages was 4 times that for the 6 year-olds, and in the Northeast and Midwest, where the rates more than doubled in this age span. No consistent age-related trend was found for defective near visual acuity rates in any of the regions (figure 5).

Boys tended to have better visual acuity than girls in each of the four regions. The proportion with at least normal acuity at distance and near was greater among boys than girls in each region, though the differences were not consistently large enough to be considered statistically significant throughout. Defective visual acuity at distance and near was slightly more prevalent among girls than boys in each region except for distance vision in the South and West, where the rates were identical. This pattern was consistent throughout the age range in the study with few exceptions.

When compensation is made for any differences in the age distribution of these children among the four regions, the prevalence of at least normal and defective visual acuity at distance and near remains

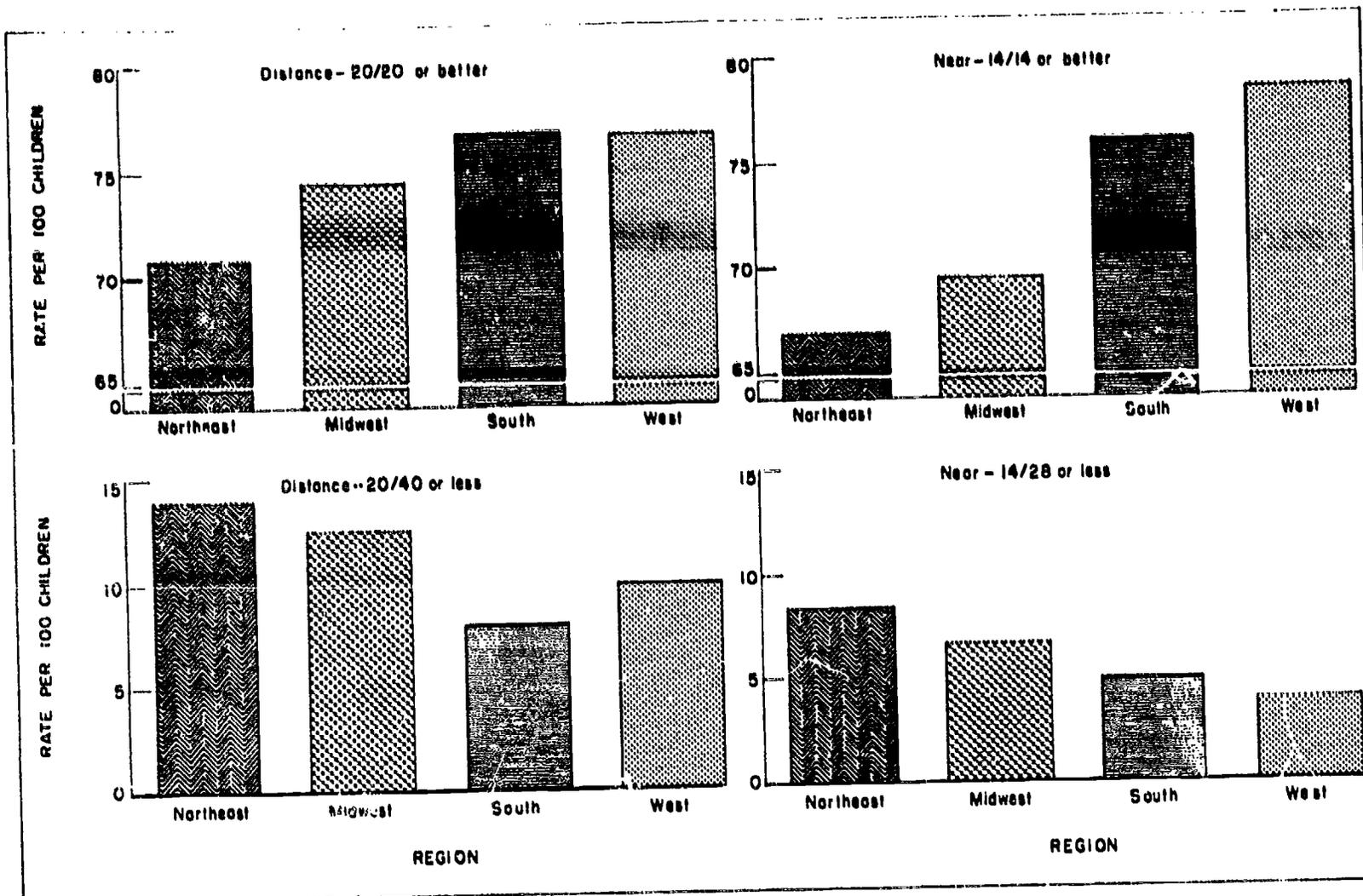


Figure 4. Number of children per 100, 6-11 years of age, reaching specified levels of uncorrected visual acuity at distance and near by region, United States.

essentially unchanged (table 7). Hence the regional differentials in these rates described above cannot be attributed to differences in age or sex distribution of children among the regions.

What racial differences were found in the prevalence of at least normal and of defective visual acuity among children 6-11 years of age in the country as a whole were not consistent in each of the four regions. Visual acuity at distance and near tended to be better among white than Negro children in the Northeast and Midwest but poorer in the South and West. However, only the differences in the prevalence rates for at least normal visual acuity at distance and near among white and Negro children in the Northeast and Midwest were large enough to be considered statistically significant at the 5-percent probability level. As apparent in table 8, the racial differences in acuity rates in the four

regions were not due to differences in age distribution between the two racial groups.

#### Size of Place of Residence

Children from rural areas of the United States in general were found to have better visual acuity at distance and near than those who live in urban communities. The prevalence of at least normal visual acuity at distance (78 and 73 percent, respectively) and near (75 and 72 percent) is significantly greater among rural than urban residents, while the proportion with defective acuity at distance no better than 20/40 (9 and 12 percent) is significantly less (table 9).

This pattern of rural-urban differences in these acuity rates for children is consistent over the entire age range in the study, as shown in figure 6,

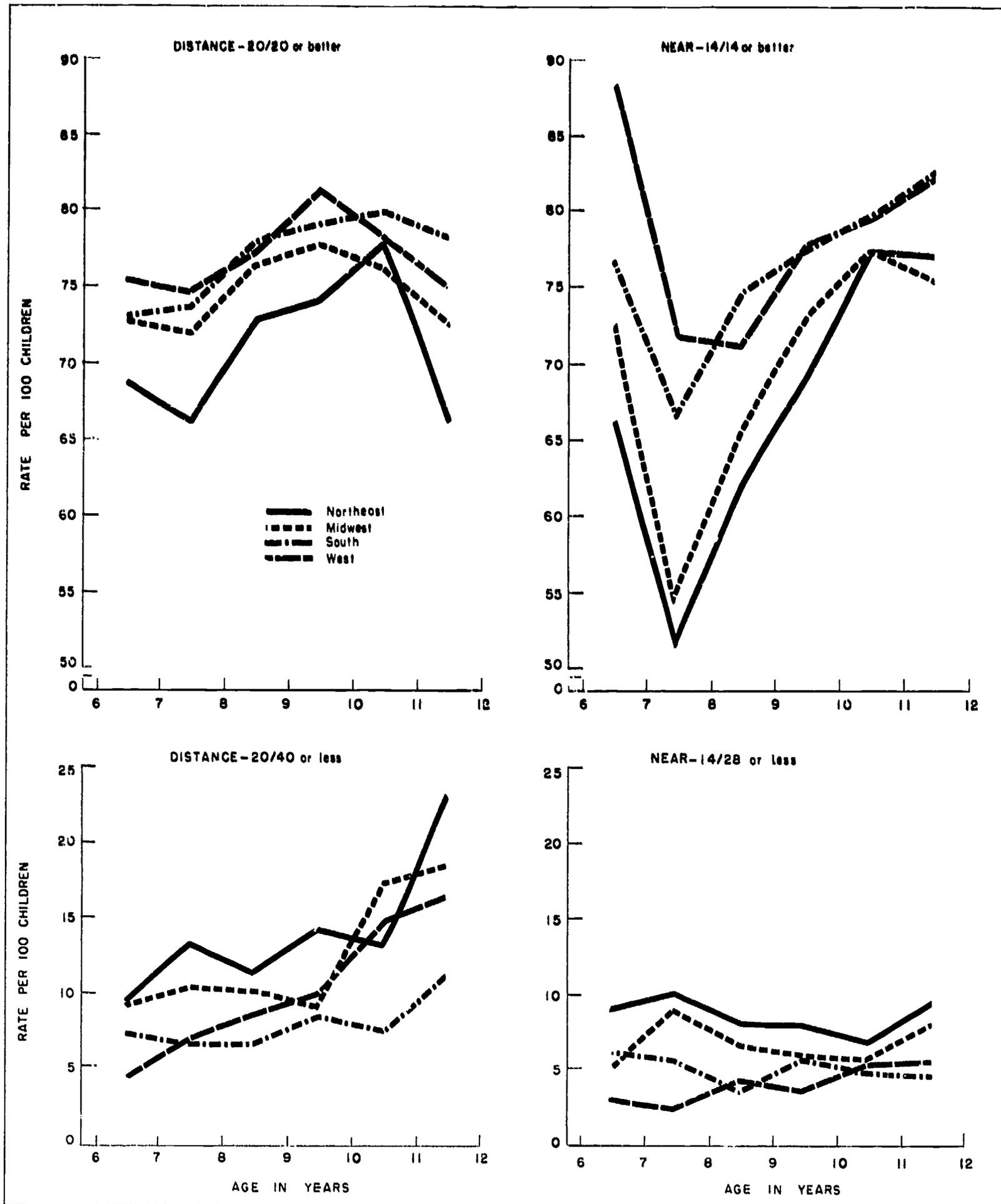


Figure 5. Number of children per 100, reaching specified levels of uncorrected visual acuity at distance and near by region and age, United States.

with one exception (age 6 for those with defective near vision) and for both boys and girls, although the differences are in general not consistently large enough to be statistically significant.

Children in large urban communities with 3 million or more population had somewhat poorer

visual acuity than those in smaller urban communities. As may be seen in table 10, urban-rural and the large-small size of urban place differences in these rates are eliminated when the effect of difference in the age-sex distribution of the children in these areas is removed.

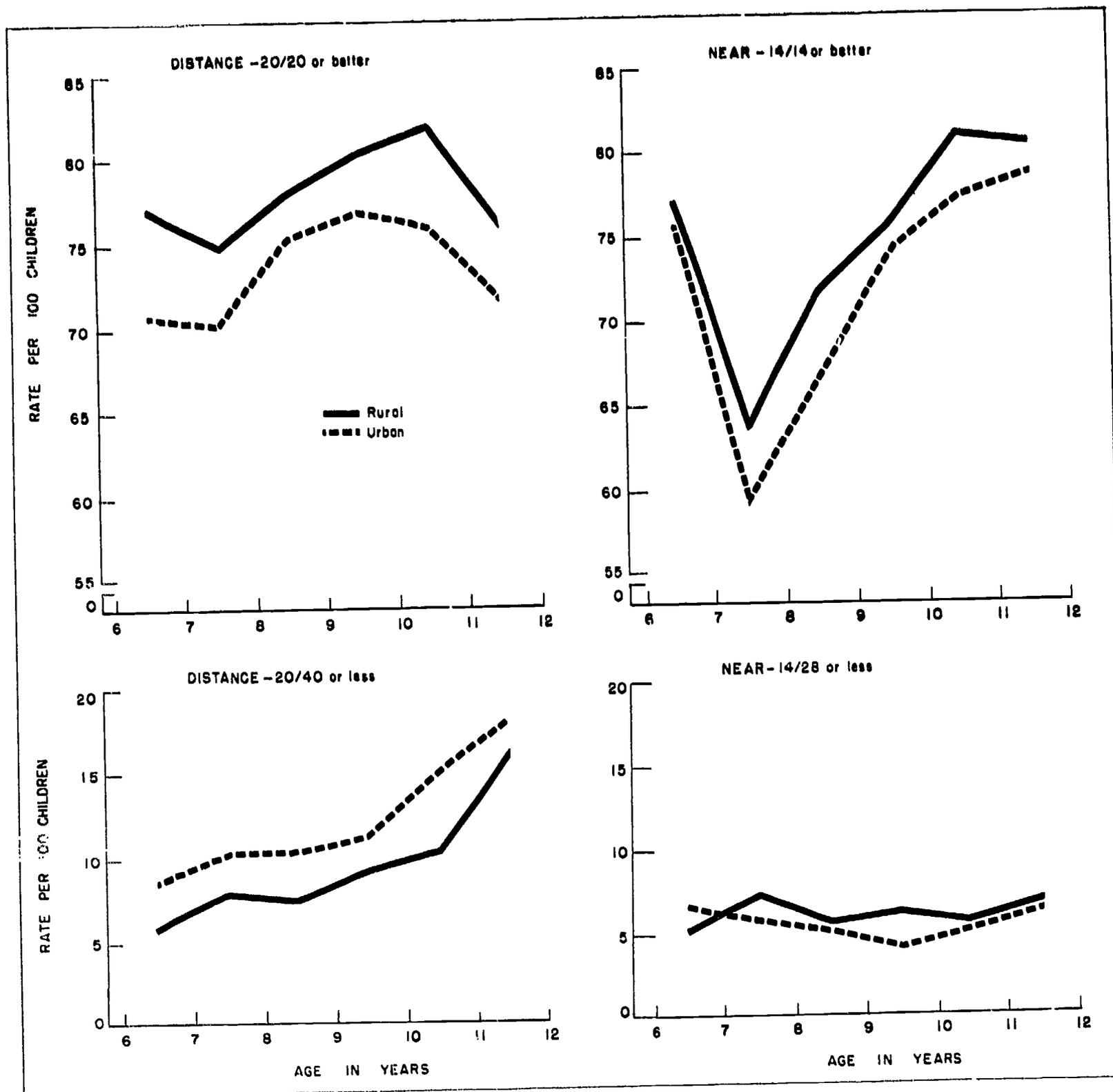


Figure 6. Number of children per 100, in rural and urban areas, reaching specified acuity levels for uncorrected distance and near vision by age, United States.

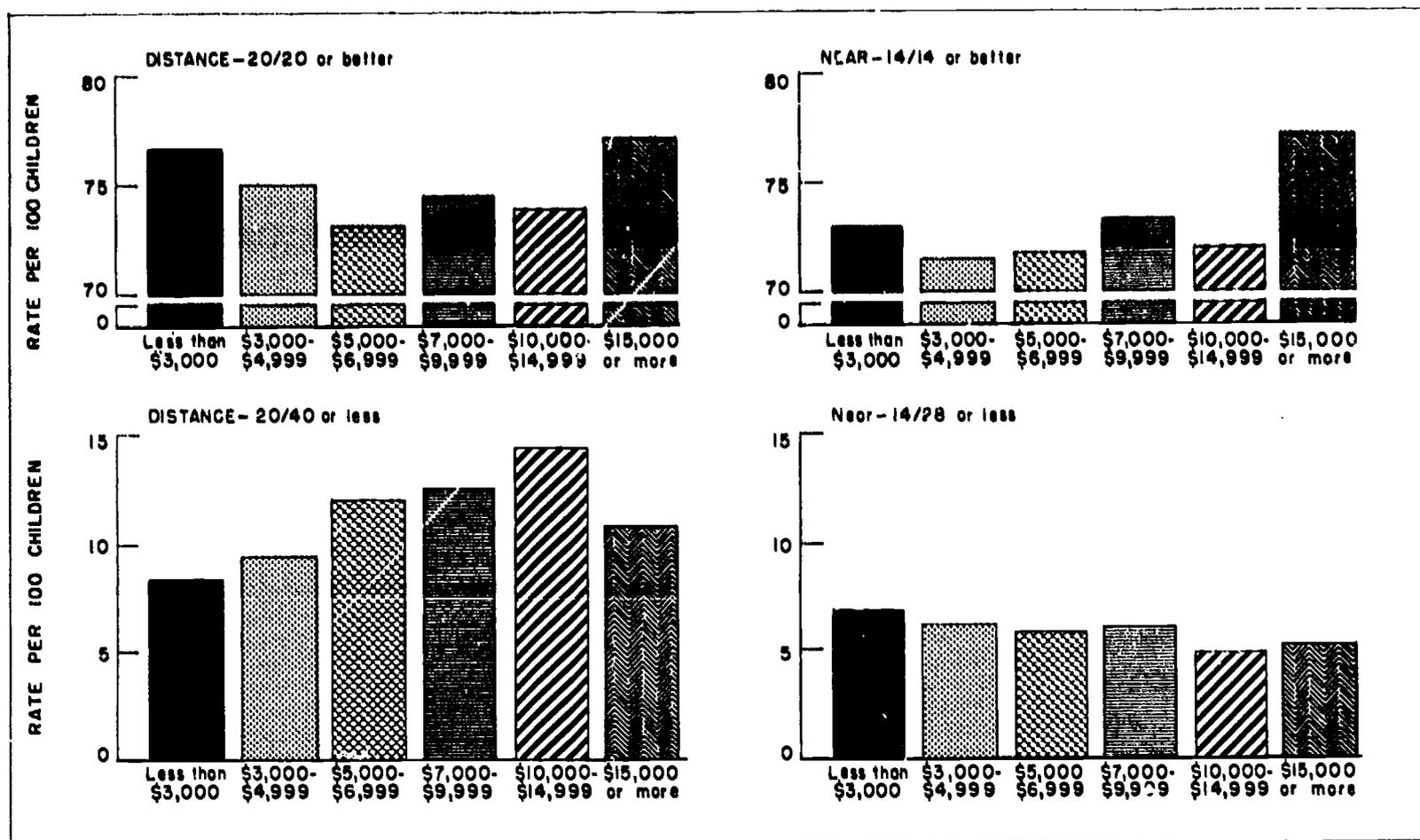


Figure 7. Number of children per 100, 6-11 years of age, with at least normal and with defective uncorrected visual acuity at distance and near by annual family income, United States.

These findings of better visual acuity among rural than among urban children are roughly consistent with those of Kephart and Unger among some 100 school children in grades 4-8 from a rural and an urban community in Indiana.<sup>9</sup>

**Rate of Population Change.**—One of the three axes of stratification used in the sampling frame for this survey was the extent and direction of change in population size of place of residence from 1950 to 1960. This was considered an index to the economic stability of the communities in which these children reside. Places showing an above-average gain in population during the decade were perhaps more likely to have a healthy expanding economy, while those experiencing a loss might tend to be communities with diminishing employment opportunities and resources for development. It might be expected that this factor would in turn be reflected to some extent in the visual acuity of the children living there insofar as this might be affected by the availability and adequacy of medical care.

No consistent pattern of relationship was found between the visual acuity of these children and this

index of economic stability of their community of residence (table 11).

#### Family Income

Defective visual acuity at distance of 20/40 or less was found more frequently among children 6-11 years of age from families with moderate or higher incomes than for those in the lower income brackets. The proportion of children with this degree of defect increased steadily with family income from 8 percent among those with less than \$3,000 per year to 14 percent among those from the \$10,000-\$14,999 level, then dropped off to 11 percent for children from families in the highest bracket (\$15,000 or more). Only the differences in the rates among those from families with incomes under \$5,000 and \$5,000-\$14,999 were large enough to be statistically significant at the 5-percent probability level. There was no evidence of any association between near acuity levels and family income for these children (figure 7 and table 12). The proportion with defective near acuity of 14/28 or less showed a negligible decline with income

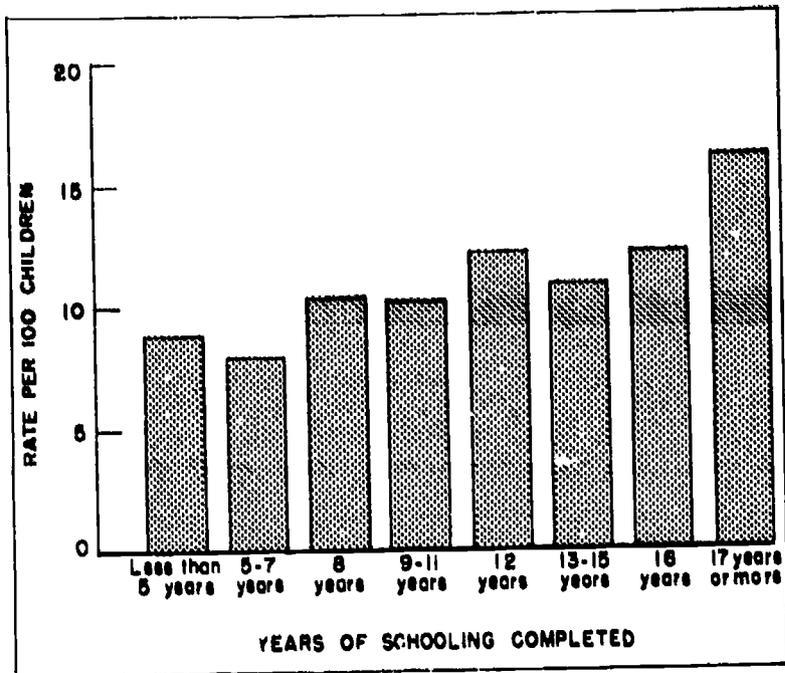


Figure 8. Number of children per 100, 6-11 years of age, with defective uncorrected distance binocular vision of 20/40 or less by education of parent, United States.

from 7 percent among families with less than \$3,000 to a low of approximately 5 percent for those in the two highest income brackets.

The general increase with age in the prevalence of defective visual acuity at distance but not near for these children was found with few exceptions within each income class up to \$10,000 and was present but somewhat less consistently for those from the higher income families.

Within each income class, boys tended to have somewhat better visual acuity than girls at distance and near, the differential being more marked at higher income levels of \$7,000 or more.

#### Education of Parent

A low degree of association was also found between defective distance, but not near, visual acuity of the child and the education of the parent considered the head of the household. The proportion of children with acuity no better than 20/40 increased from 8-9 percent among those whose parent had completed less than 8 years of formal schooling to 16 percent for those whose parent had 17 years or more. Only the difference between these extremes was large enough to be considered statistically significant here (figure 8 and table 13).

In general the prevalence of defective distance, but not near, vision was found to increase with age

of the children within each of the education-of-parent classes. While the progression with age was somewhat irregular over the age span in the study within most of the classes, the prevalence of this degree of visual defect (20/40 or less acuity) among 11-year-olds was more than twice that for the 6-year-olds whose parents had completed 8 years or 12 years or more formal schooling. For the remainder—those whose parents had completed 9-11 years or less than 8 years schooling—the increase was smaller but still statistically significant (46 to 78 percent more).

#### Grade in School

Prevalence rates for at least normal and for defective visual acuity at distance and near as described previously are shown in table 14 and figure 9 by the grade in which the children were at the time of the examination. These prevalence rates reflect the same general trends as those shown by age for these children, as would be expected since the majority of the children are in the normal grade placement for their age.

Since the age range in this survey was 6-11 years, those children in kindergarten and seventh grade are relatively smaller groups and cannot be considered typical of either the total or normal

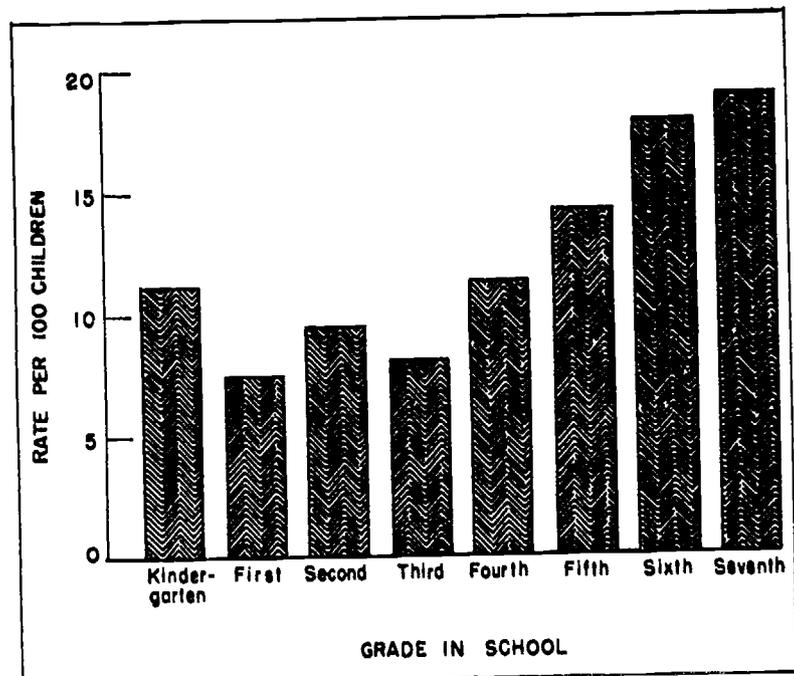


Figure 9. Number of children per 100, 6-11 years of age, with defective uncorrected distance binocular vision of 20/40 or less by grade in school, United States.

group of children in these two grades. The visual acuity findings, however, should be closely representative of noninstitutionalized children in grades 1-6.

Available previous studies among elementary school children are in general agreement with these findings showing a decrease in acuity with grade as well as with age.<sup>10,11</sup>

## SUMMARY

This report contains estimates of the uncorrected binocular visual acuity levels at distance and near for children 6-11 years of age in the noninstitutional population of the United States in relation to their demographic and socioeconomic background. The findings are based on tests given under uniformly controlled conditions with letter targets in a commercial instrument for children who could read letters easily and with nearly comparable Landolt ring charts for those who could not.

In the Health Examination Survey program of 1963-65, a probability sample of 7,417 children was selected to represent the 24 million noninstitutionalized children of this age in the United States. Of these, the 7,119 examined, or 96 percent, were closely representative of the child population from which they were drawn with respect to age, sex,

race, region, and other available demographic and socioeconomic variables.

The distribution of uncorrected distance and near binocular visual acuity among white and Negro children 6-11 years of age is generally similar. The proportion with defective distance acuity of 20/40 or less, however, increased with age among the white but not the Negro group. White boys had better visual acuity in general than white girls, while Negro boys had slightly but not significantly poorer acuity than girls of the same race.

Children from the South and West had better binocular visual acuity at distance and near than children from the Northeast and Midwest. Visual acuity at distance and near tended to be better among white than Negro children in the Northeast and Midwest but the reverse in the South and West.

Children living in rural areas of the United States in general had better visual acuity at distance and near than those who live in urban communities, irrespective of size.

The prevalence of defective acuity at distance among these children was found to be related to the education of their parents and to the size of their family income, the proportion with defective distance acuity increasing as parent's educational level or family income increased.

## REFERENCES

<sup>1</sup>National Center for Health Statistics: Origin, program, and operation of the U.S. National Health Survey. *Vital and Health Statistics*. PHS Pub. No. 1000-Series 1-No. 1, Public Health Service, Washington, U.S. Government Printing Office, Aug. 1963.

<sup>2</sup>National Center for Health Statistics: Plan and initial program of the Health Examination Survey. *Vital and Health Statistics*. PHS Pub. No. 1000-Series 1-No. 4, Public Health Service, Washington, U.S. Government Printing Office, July 1965.

<sup>3</sup>National Center for Health Statistics: Cycle I of the Health Examination Survey, sample and response, United States, 1960-1962. *Vital and Health Statistics*. PHS Pub. No. 1000-Series 11-No. 1, Public Health Service, Washington, U.S. Government Printing Office, Apr. 1964.

<sup>4</sup>National Center for Health Statistics: Plan, operation, and response results of a program of children's examinations. *Vital and Health Statistics*. PHS Pub. No. 1000-Series 1-No. 5, Public Health Service, Washington, U.S. Government Printing Office, Oct. 1967.

<sup>5</sup>National Center for Health Statistics: Visual acuity of children, United States. *Vital and Health Statistics*. PHS Pub. No. 1000-Series 11-No. 101, Public Health Service, Washington, U.S. Government Printing Office, Feb. 1970.

<sup>6</sup>Sloan, L.L.: New test charts for the measurement of visual acuity at far and near distance. *Am.J.Ophthalm.* 48(6):807-813, Dec. 1959.

<sup>7</sup>Sloan, L.L.; Rowland, W.M.; and Altman, A.: Comparison of three types of test target for the measurement of visual acuity. *Quart.Rev.Ophthalm.* 8(1):4-16, Mar. 1952.

<sup>8</sup>Altman, A., and Rowland, W.M.: Measures of acuity with optical simulation of distance. *Quart.Rev.Ophthalm.* 8(1):1-3, Mar. 1952.

<sup>9</sup>Kephart, N.C., and Unger, R.M.: An investigation of visual performance among selected groups of school children. *Am.J.Optom.* 30:635-643, Dec. 1953.

<sup>10</sup>Kephart, N.C.: Visual changes in children associated with school experience. *Am.J.Optom.* 27:195-199, Apr. 1950.

<sup>11</sup>Hirsch, M.J.: Effect of school experience on refraction of children. *Am.J.Optom.* 28:445-454, Sept. 1951.

## LIST OF DETAILED TABLES

|   | Page |
|---|------|
| Table 1. Number of white and Negro children per 100, reaching specified acuity levels for uncorrected binocular distance vision, by age and sex, with total standard error: United States, 1963-65-----   | 14   |
| 2. Number of white and Negro children per 100, reaching specified acuity levels for uncorrected binocular near vision, by age and sex, with total standard error: United States, 1963-65-----   | 15   |
| 3. Number of white and Negro children per 100, with specified levels of normal or defective uncorrected binocular distance and near vision, by age and sex, with total standard error: United States, 1963-65-----  | 16   |
| 4. Number of white and Negro children with specified levels of normal or defective uncorrected binocular distance and near vision, by age and sex: United States, 1963-65-----  | 17   |
| 5. Number of children per 100, with specified levels of normal or defective uncorrected binocular distance and near vision, by region, age, and sex, with total standard error: United States, 1963-65-----   | 18   |
| 6. Number of children with specified levels of normal or defective uncorrected binocular distance vision, by region, age, and sex: United States, 1963-65-----  | 21   |
| 7. Actual and expected number of children per 100, with specified levels of normal or defective uncorrected binocular distance and near vision, by region and sex: United States, 1963-65-----  | 22   |
| 8. Actual and expected number of white and Negro children per 100, with specified levels of normal or defective uncorrected binocular distance and near vision, by region: United States, 1963-65-----  | 23   |
| 9. Number of children per 100, in urban and rural areas with specified levels of uncorrected binocular distance and near vision, by age and sex, with total standard error: United States, 1963-65-----   | 24   |
| 10. Actual and expected number of children per 100, with specified levels of normal or defective uncorrected binocular distance and near vision, by size of place of residence: United States, 1963-65-----   | 25   |
| 11. Number of children per 100, with specified levels of normal or defective uncorrected binocular distance and near vision, by rate of population change in place of residence from 1950 to 1960, age, and sex, with total standard error: United States, 1963-65----- | 26   |
| 12. Number of children per 100, with specified levels of normal or defective uncorrected binocular distance and near vision and expected rate, by family income and age, with total standard error: United States, 1963-65-----   | 28   |
| 13. Number of children per 100, with specified levels of normal or defective uncorrected binocular distance and near vision and expected rate, by education of parent and age, with total standard error: United States, 1963-65-----                                   | 29   |
| 14. Number of children per 100, with specified levels of normal or defective uncorrected binocular distance and near vision and expected rate, by grade in school and sex: United States, 1963-65-----  | 30   |

Table 1. Number of white and Negro children per 100, reaching specified acuity levels for uncorrected binocular distance vision, by age and sex, with total standard error: United States, 1963-65

| Race, age, and sex    | 20/12 or better | 20/15 | 20/17 | 20/20 | 20/25 | 20/30 | 20/40 | 20/50 | 20/70 | 20/100 | 20/200 | Less than 20/200 |
|-----------------------|-----------------|-------|-------|-------|-------|-------|-------|-------|-------|--------|--------|------------------|
| <b>WHITE</b>          |                 |       |       |       |       |       |       |       |       |        |        |                  |
| <b>Both sexes</b>     |                 |       |       |       |       |       |       |       |       |        |        |                  |
| Rate per 100 children |                 |       |       |       |       |       |       |       |       |        |        |                  |
| 6-11 years----        | 2.7             | 19.6  | 26.1  | 26.8  | 10.2  | 3.5   | 3.6   | 1.4   | 2.4   | 1.1    | 1.5    | 0.8              |
| 6 years-----          | 3.1             | 20.3  | 21.2  | 28.9  | 14.3  | 5.0   | 4.5   | 1.0   | 1.1   | 0.2    | 0.2    | 0.2              |
| 7 years-----          | 2.0             | 11.5  | 22.9  | 35.6  | 15.6  | 3.6   | 3.9   | 1.2   | 2.4   | 0.3    | 0.3    | 0.2              |
| 8 years-----          | 1.5             | 15.7  | 27.2  | 32.6  | 10.1  | 4.2   | 2.7   | 1.8   | 1.4   | 0.9    | 0.8    | 0.9              |
| 9 years-----          | 2.2             | 21.2  | 32.1  | 23.3  | 7.5   | 3.1   | 3.7   | 0.8   | 1.8   | 1.3    | 2.2    | 0.7              |
| 10 years-----         | 3.3             | 24.6  | 28.6  | 20.7  | 6.3   | 2.2   | 3.1   | 1.4   | 3.8   | 1.9    | 3.4    | 0.9              |
| 11 years-----         | 4.3             | 24.6  | 24.7  | 18.7  | 6.8   | 2.8   | 3.6   | 2.3   | 4.0   | 2.3    | 3.8    | 2.2              |
| <b>Boys</b>           |                 |       |       |       |       |       |       |       |       |        |        |                  |
| Rate per 100 children |                 |       |       |       |       |       |       |       |       |        |        |                  |
| 6-11 years----        | 3.8             | 22.0  | 26.5  | 25.6  | 9.1   | 3.0   | 3.4   | 1.3   | 2.1   | 0.9    | 1.1    | 0.6              |
| 6 years-----          | 2.5             | 25.4  | 22.9  | 28.3  | 10.4  | 4.1   | 3.8   | 0.6   | 1.3   | 0.3    | -      | 0.3              |
| 7 years-----          | 2.9             | 12.1  | 24.3  | 32.8  | 15.6  | 3.8   | 3.5   | 1.0   | 2.3   | 0.3    | 1.1    | 0.2              |
| 8 years-----          | 2.2             | 19.0  | 26.6  | 31.4  | 9.4   | 3.6   | 3.1   | 2.2   | 1.0   | 0.3    | 0.9    | 0.4              |
| 9 years-----          | 2.9             | 24.2  | 31.8  | 23.6  | 6.0   | 2.1   | 3.5   | 0.6   | 1.5   | 1.4    | 1.6    | 0.7              |
| 10 years-----         | 5.4             | 27.7  | 28.6  | 18.8  | 6.0   | 1.7   | 2.7   | 1.3   | 3.1   | 1.3    | 2.6    | 0.7              |
| 11 years-----         | 6.8             | 23.9  | 25.0  | 17.7  | 6.7   | 2.7   | 3.8   | 2.2   | 3.6   | 2.0    | 3.7    | 1.7              |
| <b>Girls</b>          |                 |       |       |       |       |       |       |       |       |        |        |                  |
| Rate per 100 children |                 |       |       |       |       |       |       |       |       |        |        |                  |
| 6-11 years----        | 1.6             | 17.0  | 25.7  | 28.0  | 11.3  | 4.0   | 3.8   | 1.5   | 2.7   | 1.3    | 2.0    | 1.0              |
| 6 years-----          | 3.7             | 15.1  | 19.5  | 29.5  | 18.3  | 6.0   | 5.2   | 1.4   | 0.9   | -      | 0.4    | -                |
| 7 years-----          | 1.0             | 10.9  | 21.5  | 38.6  | 15.6  | 3.4   | 4.3   | 1.3   | 2.5   | 0.3    | 0.4    | 0.2              |
| 8 years-----          | 0.8             | 12.2  | 27.9  | 33.8  | 10.8  | 4.9   | 2.3   | 1.3   | 2.0   | 1.6    | 0.8    | 1.5              |
| 9 years-----          | 1.5             | 18.1  | 32.4  | 23.0  | 9.0   | 4.2   | 3.9   | 1.0   | 2.2   | 1.2    | 2.8    | 0.7              |
| 10 years-----         | 1.0             | 21.3  | 28.7  | 22.7  | 6.6   | 2.6   | 3.4   | 1.5   | 4.6   | 2.4    | 4.0    | 1.1              |
| 11 years-----         | 1.6             | 25.3  | 24.4  | 19.7  | 6.8   | 2.8   | 3.4   | 2.4   | 4.4   | 2.6    | 3.9    | 2.6              |
| Standard error        |                 |       |       |       |       |       |       |       |       |        |        |                  |
| Total-----            | 0.24            | 0.73  | 0.66  | 0.44  | 0.58  | 0.29  | 0.33  | 0.11  | 0.21  | 0.13   | 0.26   | 0.15             |
| <b>NEGRO</b>          |                 |       |       |       |       |       |       |       |       |        |        |                  |
| <b>Both sexes</b>     |                 |       |       |       |       |       |       |       |       |        |        |                  |
| Rate per 100 children |                 |       |       |       |       |       |       |       |       |        |        |                  |
| 6-11 years----        | 2.5             | 20.2  | 25.0  | 25.6  | 12.2  | 4.4   | 5.0   | 1.3   | 1.3   | 1.1    | 1.1    | 0.3              |
| 6 years-----          | 3.0             | 15.4  | 25.4  | 23.7  | 20.2  | 2.3   | 8.7   | -     | -     | 0.6    | -      | -                |
| 7 years-----          | 0.4             | 14.9  | 11    | 30.3  | 10.7  | 7.3   | 5.6   | 1.9   | 1.3   | 1.2    | 1.6    | 0.5              |
| 8 years-----          | 1.4             | 13.7  | 23.3  | 30.6  | 14.0  | 4.4   | 7.4   | 0.5   | 2.2   | 0.4    | 2.1    | -                |
| 9 years-----          | -               | 21.4  | 30.3  | 22.8  | 13.6  | 3.9   | 1.4   | 2.8   | 1.9   | 0.5    | 0.5    | 0.3              |
| 10 years-----         | 3.9             | 26.2  | 22.0  | 29.4  | 9.0   | 2.3   | 2.1   | 1.6   | 1.1   | 2.4    | -      | -                |
| 11 years-----         | 6.7             | 31.3  | 24.7  | 15.8  | 4.5   | 6.2   | 4.3   | 0.6   | 1.2   | 1.7    | 2.2    | 0.7              |
| <b>Boys</b>           |                 |       |       |       |       |       |       |       |       |        |        |                  |
| Rate per 100 children |                 |       |       |       |       |       |       |       |       |        |        |                  |
| 6-11 years----        | 3.0             | 21.8  | 22.5  | 25.3  | 12.0  | 3.8   | 5.4   | 1.8   | 1.5   | 1.3    | 1.5    | 0.2              |
| 6 years-----          | 3.4             | 13.1  | 27.1  | 28.8  | 17.1  | 2.2   | 7.3   | -     | -     | 1.1    | -      | -                |
| 7 years-----          | -               | 16.4  | 24.1  | 27.0  | 11.1  | 8.5   | 4.2   | 2.8   | 2.6   | 2.3    | 1.0    | -                |
| 8 years-----          | 2.9             | 15.0  | 17.9  | 24.8  | 16.5  | 3.7   | 11.6  | 1.0   | 2.3   | -      | 4.2    | -                |
| 9 years-----          | -               | 19.4  | 30.6  | 26.6  | 10.4  | 4.0   | 1.2   | 3.9   | 2.9   | -      | 1.0    | -                |
| 10 years-----         | 4.6             | 28.8  | 15.1  | 27.9  | 11.5  | 1.5   | 4.3   | 3.2   | -     | 3.0    | -      | -                |
| 11 years-----         | 7.4             | 40.5  | 19.9  | 15.7  | 4.5   | 2.4   | 3.2   | -     | 1.0   | 1.2    | 2.7    | 1.5              |
| <b>Girls</b>          |                 |       |       |       |       |       |       |       |       |        |        |                  |
| Rate per 100 children |                 |       |       |       |       |       |       |       |       |        |        |                  |
| 6-11 years----        | 2.0             | 18.6  | 27.4  | 25.9  | 12.3  | 5.0   | 4.6   | 0.8   | 1.1   | 0.9    | 0.6    | 0.4              |
| 6 years-----          | 2.6             | 17.9  | 23.8  | 18.4  | 23.4  | 2.4   | 10.1  | 1.3   | -     | -      | -      | -                |
| 7 years-----          | 0.9             | 13.5  | 24.2  | 33.6  | 10.3  | 6.1   | 7.1   | 1.0   | -     | -      | 2.3    | 1.1              |
| 8 years-----          | -               | 12.3  | 28.7  | 36.4  | 11.5  | 5.1   | 3.2   | -     | 2.0   | 0.8    | -      | -                |
| 9 years-----          | -               | 23.5  | 30.0  | 19.1  | 16.8  | 3.8   | 1.6   | 1.6   | 0.8   | 1.0    | -      | 1.6              |
| 10 years-----         | 3.1             | 23.6  | 28.8  | 30.8  | 6.6   | 3.2   | -     | -     | 2.2   | 1.7    | -      | -                |
| 11 years-----         | 6.1             | 22.1  | 29.6  | 16.0  | 4.5   | 10.0  | 5.4   | 1.1   | 1.3   | 2.2    | 1.6    | -                |
| Standard error        |                 |       |       |       |       |       |       |       |       |        |        |                  |
| Total-----            | 0.86            | 1.00  | 1.35  | 1.82  | 0.97  | 0.49  | 0.98  | 0.32  | 0.43  | 0.48   | 0.32   | 0.19             |

Table 2. Number of white and Negro children per 100, reaching specified acuity levels for uncorrected binocular near vision, by age and sex, with total standard error: United States, 1963-65

| Race, age, and sex    | 14/14 or better | 14/17.5 | 14/21 | 14/28 | 14/35 | 14/49 and 14/70 | 14/140 | Less than 14/140 |
|-----------------------|-----------------|---------|-------|-------|-------|-----------------|--------|------------------|
| <b>WHITE</b>          |                 |         |       |       |       |                 |        |                  |
| Both sexes            |                 |         |       |       |       |                 |        |                  |
| Rate per 100 children |                 |         |       |       |       |                 |        |                  |
| 6-11 years-----       | 72.9            | 16.7    | 4.6   | 2.7   | 0.7   | 1.5             | 0.5    | 0.2              |
| 6 years-----          | 75.2            | 14.9    | 4.5   | 3.2   | 0.6   | 1.2             | 0.2    | 0.1              |
| 7 years-----          | 60.5            | 26.0    | 7.1   | 3.4   | 0.9   | 1.5             | 0.5    | 0.1              |
| 8 years-----          | 69.0            | 20.9    | 5.2   | 1.8   | 0.6   | 1.0             | 0.7    | 0.8              |
| 9 years-----          | 75.5            | 16.0    | 3.2   | 2.7   | 0.9   | 1.0             | 0.6    | 0.1              |
| 10 years-----         | 78.9            | 11.1    | 4.1   | 3.0   | 0.5   | 1.7             | 0.7    | 0.1              |
| 11 years-----         | 78.8            | 11.1    | 3.5   | 2.4   | 0.8   | 2.9             | 0.4    | 0.2              |
| Boys                  |                 |         |       |       |       |                 |        |                  |
| 6-11 years-----       | 76.0            | 14.4    | 4.9   | 2.0   | 0.6   | 1.4             | 0.5    | 0.2              |
| 6 years-----          | 79.6            | 11.4    | 4.0   | 3.0   | 0.5   | 0.9             | 0.5    | 0.2              |
| 7 years-----          | 63.8            | 22.8    | 9.0   | 2.2   | 0.5   | 1.2             | 0.4    | 0.2              |
| 8 years-----          | 72.0            | 19.1    | 5.4   | 1.4   | 0.5   | 0.8             | 0.6    | 0.2              |
| 9 years-----          | 78.5            | 13.8    | 3.8   | 1.9   | 0.5   | 0.5             | 0.8    | 0.2              |
| 10 years-----         | 82.3            | 9.9     | 3.4   | 1.8   | 0.5   | 1.9             | 0.3    | -                |
| 11 years-----         | 80.4            | 9.0     | 3.9   | 1.8   | 1.1   | 3.1             | 0.3    | 0.3              |
| Girls                 |                 |         |       |       |       |                 |        |                  |
| 6-11 years-----       | 69.6            | 19.2    | 4.3   | 2.5   | 0.8   | 1.7             | 0.5    | 0.3              |
| 6 years-----          | 70.7            | 18.4    | 5.1   | 3.4   | 0.8   | 1.6             | -      | -                |
| 7 years-----          | 57.2            | 29.3    | 5.2   | 4.5   | 1.4   | 1.9             | 0.6    | -                |
| 8 years-----          | 65.8            | 22.7    | 5.0   | 2.3   | 0.8   | 1.1             | 0.8    | 1.5              |
| 9 years-----          | 72.4            | 18.2    | 2.5   | 3.6   | 1.3   | 1.5             | 0.5    | -                |
| 10 years-----         | 75.4            | 12.4    | 4.8   | 4.2   | 0.4   | 1.5             | 1.1    | 0.2              |
| 11 years-----         | 77.1            | 13.1    | 3.1   | 2.9   | 0.5   | 2.7             | 0.4    | 0.2              |
| Standard error        |                 |         |       |       |       |                 |        |                  |
| Total-----            | 0.78            | 0.54    | 0.35  | 0.21  | 0.13  | 0.22            | 0.08   | 0.07             |
| <b>NEGRO</b>          |                 |         |       |       |       |                 |        |                  |
| Both sexes            |                 |         |       |       |       |                 |        |                  |
| Rate per 100 children |                 |         |       |       |       |                 |        |                  |
| 6-11 years-----       | 70.8            | 15.3    | 6.5   | 3.5   | 1.0   | 2.0             | 0.7    | 0.2              |
| 6 years-----          | 79.2            | 10.4    | 2.4   | 5.0   | 1.8   | 1.2             | -      | -                |
| 7 years-----          | 62.0            | 20.8    | 7.7   | 2.7   | 1.7   | 2.7             | 1.1    | 1.2              |
| 8 years-----          | 62.8            | 18.4    | 9.9   | 2.9   | 1.8   | 2.9             | 1.4    | -                |
| 9 years-----          | 68.9            | 14.4    | 9.6   | 4.5   | -     | 1.8             | 0.8    | -                |
| 10 years-----         | 74.2            | 17.3    | 5.8   | 1.9   | 0.7   | -               | -      | -                |
| 11 years-----         | 78.6            | 10.1    | 3.7   | 3.9   | -     | 3.1             | 0.6    | -                |
| Boys                  |                 |         |       |       |       |                 |        |                  |
| 6-11 years-----       | 70.2            | 15.7    | 6.0   | 3.0   | 1.1   | 3.1             | 0.6    | 0.2              |
| 6 years-----          | 80.9            | 10.8    | -     | 5.3   | 1.9   | 1.1             | -      | -                |
| 7 years-----          | 61.3            | 23.6    | 5.3   | 2.3   | 1.0   | 5.3             | -      | 1.2              |
| 8 years-----          | 51.8            | 18.7    | 14.2  | 3.2   | 3.5   | 5.8             | 2.8    | -                |
| 9 years-----          | 72.0            | 14.2    | 11.2  | 1.6   | -     | 1.0             | -      | -                |
| 10 years-----         | 74.7            | 18.3    | 4.3   | 2.7   | -     | -               | -      | -                |
| 11 years-----         | 82.1            | 8.0     | 0.8   | 2.4   | -     | 5.4             | 1.2    | -                |
| Girls                 |                 |         |       |       |       |                 |        |                  |
| 6-11 years-----       | 71.4            | 14.9    | 7.1   | 4.0   | 0.9   | 0.8             | 0.7    | 0.2              |
| 6 years-----          | 77.5            | 9.9     | 4.9   | 4.7   | 1.7   | 1.3             | -      | -                |
| 7 years-----          | 62.8            | 18.0    | 10.2  | 3.2   | 2.4   | -               | 2.3    | 1.1              |
| 8 years-----          | 73.7            | 18.1    | 5.6   | 2.6   | -     | -               | -      | -                |
| 9 years-----          | 65.8            | 14.6    | 8.0   | 7.4   | -     | 2.6             | 1.6    | -                |
| 10 years-----         | 73.8            | 16.4    | 7.3   | 1.0   | 1.4   | -               | -      | -                |
| 11 years-----         | 75.0            | 12.1    | 6.5   | 5.4   | -     | 0.9             | -      | -                |
| Standard error        |                 |         |       |       |       |                 |        |                  |
| Total-----            | 2.01            | 1.22    | 0.93  | 0.66  | 0.44  | 0.42            | 0.30   | 0.14             |

Table 3. Number of white and Negro children per 100, with specified levels of normal or defective uncorrected binocular distance and near vision, by age and sex, with total standard error: United States, 1963-65

| Age and sex       | Distance acuity level |       |               |       |                |       | Near acuity level |       |               |       |
|-------------------|-----------------------|-------|---------------|-------|----------------|-------|-------------------|-------|---------------|-------|
|                   | 20/20 or better       |       | 20/40 or less |       | 20/100 or less |       | 14/14 or better   |       | 14/28 or less |       |
|                   | White                 | Negro | White         | Negro | White          | Negro | White             | Negro | White         | Negro |
| <u>Both sexes</u> | Rate per 100 children |       |               |       |                |       |                   |       |               |       |
| 6-11 years-----   | 75.1                  | 73.3  | 11.2          | 10.1  | 3.8            | 2.5   | 72.9              | 70.8  | 5.8           | 7.3   |
| 6 years-----      | 73.5                  | 67.7  | 7.1           | 9.9   | 0.5            | 0.6   | 75.2              | 79.4  | 5.4           | 8.0   |
| 7 years-----      | 72.0                  | 69.9  | 8.8           | 12.2  | 1.2            | 3.4   | 60.5              | 62.2  | 6.4           | 9.4   |
| 8 years-----      | 77.1                  | 69.2  | 8.6           | 12.6  | 2.7            | 2.5   | 69.0              | 62.9  | 4.9           | 9.0   |
| 9 years-----      | 78.9                  | 74.7  | 10.6          | 7.9   | 4.2            | 1.8   | 75.5              | 69.0  | 5.4           | 7.1   |
| 10 years-----     | 77.2                  | 81.5  | 14.4          | 7.2   | 6.0            | 2.4   | 78.9              | 74.4  | 5.9           | 2.6   |
| 11 years-----     | 72.3                  | 78.8  | 18.2          | 10.7  | 8.3            | 4.6   | 78.8              | 78.8  | 6.6           | 7.7   |
| <u>Boys</u>       |                       |       |               |       |                |       |                   |       |               |       |
| 6-11 years-----   | 77.8                  | 72.6  | 10.0          | 11.7  | 3.2            | 3.0   | 76.0              | 70.2  | 4.6           | 8.0   |
| 6 years-----      | 79.1                  | 72.4  | 6.3           | 8.4   | 0.6            | 1.1   | 79.6              | 80.9  | 4.9           | 8.3   |
| 7 years-----      | 72.1                  | 67.4  | 8.5           | 13.0  | 1.6            | 3.3   | 63.8              | 61.3  | 4.4           | 9.9   |
| 8 years-----      | 79.2                  | 60.6  | 7.8           | 19.2  | 1.6            | 4.2   | 72.0              | 51.8  | 3.5           | 15.3  |
| 9 years-----      | 82.6                  | 76.6  | 9.4           | 9.1   | 3.8            | 1.0   | 78.5              | 72.0  | 3.9           | 2.6   |
| 10 years-----     | 80.5                  | 76.4  | 11.8          | 10.6  | 4.6            | 3.0   | 82.3              | 74.7  | 4.5           | 2.7   |
| 11 years-----     | 73.5                  | 83.4  | 17.1          | 9.6   | 7.5            | 5.4   | 80.4              | 82.1  | 6.6           | 9.0   |
| <u>Girls</u>      |                       |       |               |       |                |       |                   |       |               |       |
| 6-11 years-----   | 72.4                  | 74.1  | 12.3          | 8.6   | 4.3            | 2.0   | 69.6              | 71.4  | 6.9           | 6.6   |
| 6 years-----      | 67.7                  | 62.7  | 7.9           | 11.5  | 0.4            | -     | 70.7              | 77.5  | 5.8           | 7.7   |
| 7 years-----      | 71.9                  | 72.2  | 9.0           | 11.4  | 0.8            | 3.4   | 57.2              | 62.8  | 8.4           | 8.9   |
| 8 years-----      | 74.8                  | 77.4  | 9.5           | 6.0   | 3.9            | 0.8   | 65.8              | 73.7  | 6.5           | 2.6   |
| 9 years-----      | 75.0                  | 72.6  | 11.8          | 6.7   | 4.7            | 2.7   | 72.4              | 65.8  | 6.9           | 11.6  |
| 10 years-----     | 73.7                  | 56.3  | 17.0          | 3.9   | 7.5            | 1.7   | 75.4              | 73.8  | 7.4           | 2.5   |
| 11 years-----     | 71.0                  | 73.8  | 19.3          | 11.7  | 9.1            | 3.9   | 77.1              | 75.0  | 6.6           | 6.3   |
|                   | Standard error        |       |               |       |                |       |                   |       |               |       |
| Both sexes-----   | 0.90                  | 1.66  | 0.56          | 0.97  | 0.38           | 0.59  | 0.78              | 2.01  | 0.40          | 0.81  |
| Boys-----         | 1.23                  | 2.81  | 0.82          | 1.94  | 0.44           | 1.01  | 1.04              | 2.90  | 0.54          | 1.49  |
| Girls-----        | 0.85                  | 2.13  | 0.71          | 1.03  | 0.58           | 0.77  | 1.07              | 1.43  | 0.64          | 0.77  |

Table 4. Number of white and Negro children with specified levels of normal or defective uncorrected binocular distance and near vision, by age and sex: United States, 1963-65

| Age and sex       | Distance acuity level |       |               |       |                |       | Near acuity level |       |               |       |
|-------------------|-----------------------|-------|---------------|-------|----------------|-------|-------------------|-------|---------------|-------|
|                   | 20/20 or better       |       | 20/40 or less |       | 20/100 or less |       | 14/14 or better   |       | 14/28 or less |       |
|                   | White                 | Negro | White         | Negro | White          | Negro | White             | Negro | White         | Negro |
| <u>Both sexes</u> | Number in thousands   |       |               |       |                |       |                   |       |               |       |
| 6-11 years-----   | 15,332                | 2,399 | 2,279         | 331   | 768            | 82    | 14,869            | 2,317 | 1,174         | 240   |
| 6 years-----      | 2,581                 | 386   | 249           | 56    | 18             | 3     | 2,640             | 451   | 188           | 46    |
| 7 years-----      | 2,519                 | 398   | 306           | 70    | 43             | 19    | 2,116             | 354   | 223           | 53    |
| 8 years-----      | 2,630                 | 387   | 294           | 71    | 93             | 14    | 2,354             | 352   | 168           | 50    |
| 9 years-----      | 2,676                 | 398   | 358           | 42    | 143            | 10    | 2,562             | 368   | 182           | 38    |
| 10 years-----     | 2,565                 | 431   | 478           | 38    | 201            | 13    | 2,623             | 393   | 197           | 14    |
| 11 years-----     | 2,361                 | 399   | 594           | 54    | 270            | 23    | 2,574             | 399   | 216           | 39    |
| <u>Boys</u>       |                       |       |               |       |                |       |                   |       |               |       |
| 6-11 years-----   | 8,088                 | 1,192 | 1,045         | 192   | 335            | 49    | 7,897             | 1,154 | 482           | 132   |
| 6 years-----      | 1,414                 | 209   | 112           | 24    | 11             | 3     | 1,423             | 234   | 88            | 24    |
| 7 years-----      | 1,284                 | 193   | 151           | 37    | 29             | 9     | 1,135             | 175   | 79            | 28    |
| 8 years-----      | 1,378                 | 170   | 136           | 54    | 27             | 12    | 1,251             | 145   | 60            | 43    |
| 9 years-----      | 1,429                 | 206   | 162           | 24    | 65             | 3     | 1,359             | 194   | 68            | 7     |
| 10 years-----     | 1,362                 | 202   | 200           | 28    | 78             | 8     | 1,392             | 197   | 77            | 7     |
| 11 years-----     | 1,221                 | 212   | 284           | 25    | 125            | 14    | 1,337             | 209   | 110           | 23    |
| <u>Girls</u>      |                       |       |               |       |                |       |                   |       |               |       |
| 6-11 years-----   | 7,244                 | 1,207 | 1,234         | 139   | 433            | 33    | 6,972             | 1,163 | 692           | 108   |
| 6 years-----      | 1,167                 | 176   | 137           | 32    | 7              | -     | 1,217             | 218   | 99            | 22    |
| 7 years-----      | 1,235                 | 205   | 155           | 32    | 14             | 10    | 981               | 178   | 144           | 25    |
| 8 years-----      | 1,252                 | 218   | 158           | 17    | 65             | 2     | 1,102             | 207   | 108           | 7     |
| 9 years-----      | 1,247                 | 192   | 196           | 18    | 78             | 7     | 1,204             | 174   | 114           | 31    |
| 10 years-----     | 1,203                 | 229   | 278           | 10    | 123            | 4     | 1,231             | 196   | 120           | 7     |
| 11 years-----     | 1,140                 | 187   | 310           | 30    | 146            | 10    | 1,237             | 190   | 107           | 16    |

Table 5. Number of children per 100, with specified levels of normal or defective uncorrected binocular distance and near vision, by region, age, and sex, with total standard error: United States, 1963-65

| Age and sex           | 20/20 or better |          |       |      | 20/40 or less |          |       |      |
|-----------------------|-----------------|----------|-------|------|---------------|----------|-------|------|
|                       | North-east      | Mid-west | South | West | North-east    | Mid-west | South | West |
| <u>Both sexes</u>     |                 |          |       |      |               |          |       |      |
| Rate per 100 children |                 |          |       |      |               |          |       |      |
| 6-11 years -----      | 70.8            | 74.5     | 76.8  | 76.7 | 13.8          | 12.5     | 7.9   | 9.9  |
| 6 years -----         | 68.7            | 73.1     | 73.1  | 75.4 | 9.4           | 9.1      | 7.3   | 4.3  |
| 7 years -----         | 66.3            | 72.0     | 73.6  | 74.6 | 13.2          | 10.4     | 6.7   | 6.7  |
| 8 years -----         | 72.8            | 76.3     | 77.7  | 77.1 | 11.2          | 10.2     | 6.4   | 8.5  |
| 9 years -----         | 74.5            | 77.6     | 79.1  | 81.0 | 14.2          | 9.1      | 8.5   | 10.0 |
| 10 years -----        | 77.9            | 76.1     | 79.9  | 77.9 | 13.1          | 17.4     | 7.2   | 14.8 |
| 11 years -----        | 66.1            | 72.6     | 78.3  | 74.9 | 23.2          | 18.6     | 11.2  | 16.3 |
| <u>Boys</u>           |                 |          |       |      |               |          |       |      |
| 6-11 years -----      | 74.0            | 77.6     | 77.6  | 78.5 | 12.4          | 10.6     | 7.8   | 10.1 |
| 6 years -----         | 78.0            | 80.2     | 77.2  | 77.6 | 7.1           | 3.6      | 7.6   | 7.9  |
| 7 years -----         | 66.7            | 72.1     | 70.5  | 75.8 | 11.8          | 10.7     | 6.4   | 7.4  |
| 8 years -----         | 73.2            | 75.4     | 77.8  | 79.1 | 10.8          | 10.9     | 6.4   | 9.0  |
| 9 years -----         | 76.6            | 82.9     | 81.9  | 83.4 | 13.4          | 7.9      | 7.8   | 8.3  |
| 10 years -----        | 80.3            | 78.3     | 81.3  | 80.8 | 10.7          | 14.2     | 6.6   | 13.4 |
| 11 years -----        | 68.7            | 76.8     | 77.4  | 75.0 | 21.1          | 15.8     | 12.6  | 15.1 |
| <u>Girls</u>          |                 |          |       |      |               |          |       |      |
| 6-11 years -----      | 67.7            | 71.4     | 76.0  | 74.7 | 15.3          | 14.4     | 8.0   | 9.7  |
| 6 years -----         | 59.4            | 65.5     | 68.2  | 73.3 | 11.7          | 14.6     | 6.9   | 1.0  |
| 7 years -----         | 65.8            | 71.8     | 76.4  | 72.5 | 14.4          | 10.1     | 7.0   | 5.5  |
| 8 years -----         | 72.3            | 77.1     | 77.4  | 74.6 | 11.5          | 9.3      | 6.5   | 7.9  |
| 9 years -----         | 72.1            | 72.1     | 76.0  | 78.1 | 15.0          | 10.2     | 9.2   | 11.8 |
| 10 years -----        | 74.6            | 73.4     | 78.6  | 75.0 | 16.0          | 21.1     | 7.7   | 16.2 |
| 11 years -----        | 63.2            | 68.2     | 78.9  | 74.4 | 25.4          | 21.4     | 10.0  | 17.7 |
| Standard error        |                 |          |       |      |               |          |       |      |
| Total -----           | 1.29            | 2.88     | 1.65  | 1.80 | 1.41          | 1.37     | 0.52  | 1.48 |
| Boys -----            | 2.71            | 3.49     | 1.86  | 1.88 | 2.31          | 2.00     | 1.11  | 1.83 |
| Girls -----           | 1.28            | 2.69     | 1.87  | 1.81 | 1.90          | 1.49     | 0.66  | 1.62 |

Table 5. Number of children per 100, with specified levels of normal or defective uncorrected binocular distance and near vision, by region, age, and sex, with total standard error: United States, 1963-65

| 20/100 or less        |          |       |      | 14/14 or better |          |       |      | 14/2A or less |          |       |      |
|-----------------------|----------|-------|------|-----------------|----------|-------|------|---------------|----------|-------|------|
| North-east            | Mid-west | South | West | North-east      | Mid-west | South | West | North-east    | Mid-west | South | West |
| Rate per 100 children |          |       |      |                 |          |       |      |               |          |       |      |
| 4.4                   | 4.3      | 1.9   | 3.6  | 66.6            | 69.4     | 76.0  | 78.5 | 8.4           | 6.6      | 4.9   | 3.9  |
| 1.3                   | 0.3      | 0.2   | 0.2  | 66.0            | 72.4     | 76.5  | 87.9 | 9.0           | 5.1      | 6.0   | 3.0  |
| 2.5                   | 1.7      | 1.3   | 0.7  | 51.9            | 54.4     | 66.4  | 71.7 | 9.9           | 8.9      | 5.5   | 2.4  |
| 3.4                   | 3.9      | 1.4   | 1.8  | 62.0            | 65.7     | 74.7  | 71.1 | 7.8           | 6.4      | 3.4   | 4.2  |
| 5.5                   | 3.5      | 2.5   | 4.2  | 69.2            | 73.0     | 77.2  | 77.8 | 7.7           | 5.7      | 5.5   | 3.4  |
| 3.5                   | 7.3      | 2.4   | 8.3  | 77.2            | 77.2     | 79.6  | 79.4 | 6.6           | 5.4      | 4.7   | 5.3  |
| 11.1                  | 9.2      | 4.0   | 6.9  | 76.8            | 75.2     | 82.2  | 81.9 | 9.3           | 8.1      | 4.4   | 5.3  |
| 4.6                   | 3.5      | 1.7   | 3.0  | 71.9            | 72.1     | 76.8  | 80.4 | 7.0           | 5.7      | 4.3   | 3.5  |
| 1.9                   | -        | 0.5   | 0.5  | 76.2            | 75.7     | 78.2  | 89.2 | 6.7           | 4.9      | 5.5   | 4.6  |
| 3.2                   | 1.9      | 1.2   | 1.2  | 55.6            | 57.1     | 67.6  | 72.7 | 9.1           | 6.3      | 4.3   | 1.7  |
| 2.1                   | 2.6      | 1.2   | 1.7  | 66.4            | 63.1     | 74.2  | 74.1 | 6.9           | 5.5      | 3.4   | 4.6  |
| 5.7                   | 3.8      | 1.9   | 2.2  | 75.4            | 77.0     | 77.6  | 81.2 | 4.5           | 4.5      | 4.5   | 1.3  |
| 1.9                   | 5.2      | 2.5   | 7.2  | 79.9            | 79.4     | 81.3  | 85.0 | 4.3           | 5.1      | 3.0   | 4.3  |
| 13.3                  | 7.3      | 3.4   | 5.3  | 78.1            | 80.2     | 82.8  | 81.7 | 10.7          | 7.9      | 5.0   | 4.4  |
| 4.2                   | 5.2      | 2.1   | 4.3  | 61.3            | 66.7     | 75.2  | 76.3 | 9.8           | 7.6      | 5.6   | 4.4  |
| 0.7                   | 0.7      | -     | -    | 55.9            | 68.7     | 74.3  | 86.5 | 11.3          | 5.4      | 6.5   | 1.5  |
| 1.8                   | 1.4      | 1.3   | -    | 48.2            | 51.9     | 65.0  | 70.0 | 10.7          | 11.1     | 6.6   | 3.5  |
| 4.5                   | 5.3      | 1.5   | 2.0  | 58.3            | 68.3     | 75.2  | 67.6 | 8.5           | 7.3      | 3.5   | 3.6  |
| 5.3                   | 3.3      | 3.0   | 6.4  | 62.5            | 68.9     | 76.6  | 76.1 | 11.1          | 6.8      | 6.5   | 5.6  |
| 5.6                   | 9.7      | 2.2   | 9.3  | 73.5            | 74.5     | 78.0  | 74.0 | 9.5           | 5.7      | 6.2   | 6.2  |
| 8.8                   | 11.1     | 4.4   | 8.9  | 75.4            | 70.1     | 81.6  | 82.0 | 7.7           | 9.2      | 3.8   | 6.5  |
| Standard error        |          |       |      |                 |          |       |      |               |          |       |      |
| 0.89                  | 0.49     | 0.34  | 1.11 | 1.32            | 2.24     | 1.77  | 1.60 | 1.19          | 0.69     | 0.48  | 0.87 |
| 1.13                  | 1.20     | 0.42  | 0.74 | 2.70            | 2.70     | 2.13  | 1.81 | 1.98          | 1.23     | 1.02  | 0.49 |
| 1.00                  | 0.71     | 0.54  | 1.81 | 1.77            | 2.19     | 1.81  | 2.23 | 1.65          | 1.02     | 0.71  | 1.32 |

Table 6. Number of children with specified levels of normal or defective uncorrected binocular distance vision, by region, age, and sex: United States, 1963-65

| Age and sex       | 20/20 or better     |          |       |       | 20/40 or less |          |       |      | 20/100 or less |          |       |      |
|-------------------|---------------------|----------|-------|-------|---------------|----------|-------|------|----------------|----------|-------|------|
|                   | North-east          | Mid-west | South | West  | North-east    | Mid-west | South | West | North-east     | Mid-west | South | West |
| <b>Both sexes</b> | Number in thousands |          |       |       |               |          |       |      |                |          |       |      |
| 6-11 years---     | 3,796               | 5,041    | 4,417 | 4,534 | 742           | 844      | 455   | 587  | 236            | 293      | 111   | 212  |
| 6 years-----      | 665                 | 758      | 737   | 816   | 92            | 94       | 74    | 46   | 12             | 3        | 3     | 3    |
| 7 years-----      | 613                 | 865      | 730   | 717   | 122           | 125      | 67    | 64   | 23             | 20       | 12    | 7    |
| 8 years-----      | 696                 | 846      | 681   | 802   | 107           | 113      | 57    | 88   | 33             | 43       | 12    | 19   |
| 9 years-----      | 679                 | 885      | 779   | 741   | 130           | 104      | 84    | 92   | 50             | 40       | 24    | 38   |
| 10 years-----     | 603                 | 887      | 748   | 769   | 101           | 203      | 67    | 147  | 27             | 85       | 22    | 82   |
| 11 years-----     | 540                 | 800      | 742   | 689   | 190           | 205      | 106   | 150  | 91             | 102      | 38    | 63   |
| <b>Boys</b>       |                     |          |       |       |               |          |       |      |                |          |       |      |
| 6-11 years---     | 1,979               | 2,660    | 2,231 | 2,439 | 331           | 365      | 226   | 315  | 122            | 120      | 50    | 92   |
| 6 years-----      | 375                 | 425      | 425   | 405   | 34            | 19       | 42    | 41   | 9              | -        | 3     | 3    |
| 7 years-----      | 298                 | 412      | 349   | 426   | 53            | 61       | 32    | 42   | 14             | 11       | 6     | 7    |
| 8 years-----      | 316                 | 444      | 357   | 433   | 47            | 65       | 29    | 49   | 9              | 15       | 6     | 9    |
| 9 years-----      | 357                 | 471      | 411   | 398   | 63            | 45       | 39    | 40   | 27             | 21       | 9     | 11   |
| 10 years-----     | 346                 | 486      | 347   | 390   | 46            | 88       | 28    | 65   | 8              | 33       | 11    | 35   |
| 11 years-----     | 287                 | 422      | 342   | 387   | 88            | 87       | 56    | 78   | 55             | 40       | 15    | 27   |
| <b>Girls</b>      |                     |          |       |       |               |          |       |      |                |          |       |      |
| 6-11 years---     | 1,817               | 2,381    | 2,186 | 2,095 | 411           | 479      | 229   | 272  | 114            | 173      | 61    | 120  |
| 6 years-----      | 291                 | 333      | 312   | 411   | 57            | 75       | 32    | 5    | 3              | 3        | -     | -    |
| 7 years-----      | 315                 | 453      | 381   | 291   | 69            | 64       | 35    | 22   | 9              | 9        | 6     | -    |
| 8 years-----      | 380                 | 402      | 323   | 369   | 61            | 48       | 27    | 39   | 24             | 28       | 6     | 9    |
| 9 years-----      | 322                 | 414      | 369   | 343   | 67            | 59       | 45    | 52   | 24             | 19       | 15    | 28   |
| 10 years-----     | 256                 | 401      | 400   | 379   | 55            | 115      | 39    | 82   | 19             | 53       | 11    | 47   |
| 11 years-----     | 253                 | 378      | 401   | 302   | 102           | 118      | 51    | 72   | 35             | 61       | 23    | 36   |

Table 7. Actual and expected number of children per 100, with specified levels of normal or defective uncorrected binocular distance and near vision, by region and sex: United States, 1963-65

| Acuity level and sex   | Actual     |          |       |      | Expected <sup>1</sup> |          |       |      |
|------------------------|------------|----------|-------|------|-----------------------|----------|-------|------|
|                        | North-east | Mid-west | South | West | North-east            | Mid-west | South | West |
| <u>20/20 or better</u> |            |          |       |      |                       |          |       |      |
| Rate per 100 children  |            |          |       |      |                       |          |       |      |
| Both sexes -----       | 70.8       | 74.5     | 76.8  | 76.7 | 74.7                  | 74.8     | 74.8  | 74.8 |
| Boys -----             | 74.0       | 77.6     | 77.6  | 78.5 | 77.1                  | 77.1     | 77.1  | 76.9 |
| Girls -----            | 67.7       | 71.4     | 76.0  | 74.7 | 72.4                  | 72.5     | 72.5  | 72.4 |
| <u>20/40 or less</u>   |            |          |       |      |                       |          |       |      |
| Both sexes -----       | 13.8       | 12.5     | 7.9   | 9.9  | 10.9                  | 11.1     | 11.1  | 11.0 |
| Boys -----             | 12.4       | 10.6     | 7.8   | 10.1 | 10.2                  | 10.3     | 10.1  | 10.3 |
| Girls -----            | 15.3       | 14.4     | 8.0   | 9.7  | 11.6                  | 12.0     | 12.1  | 11.8 |
| <u>20/100 or less</u>  |            |          |       |      |                       |          |       |      |
| Both sexes -----       | 4.4        | 4.3      | 1.9   | 3.6  | 3.5                   | 3.6      | 3.6   | 3.5  |
| Boys -----             | 4.6        | 3.5      | 1.7   | 3.0  | 3.2                   | 3.2      | 3.1   | 3.2  |
| Girls -----            | 4.2        | 5.2      | 2.1   | 4.3  | 3.8                   | 4.1      | 4.2   | 4.0  |
| <u>14/14 or better</u> |            |          |       |      |                       |          |       |      |
| Both sexes -----       | 66.6       | 69.4     | 76.0  | 78.5 | 72.4                  | 72.6     | 72.7  | 72.8 |
| Boys -----             | 71.9       | 72.1     | 76.8  | 80.4 | 75.4                  | 75.4     | 75.3  | 75.1 |
| Girls -----            | 61.3       | 66.7     | 75.2  | 76.3 | 69.4                  | 69.6     | 70.0  | 70.2 |
| <u>14/28 or less</u>   |            |          |       |      |                       |          |       |      |
| Both sexes -----       | 8.4        | 6.6      | 4.9   | 3.9  | 5.9                   | 6.0      | 6.0   | 5.9  |
| Boys -----             | 7.0        | 5.7      | 4.3   | 3.5  | 5.1                   | 5.1      | 5.1   | 5.1  |
| Girls -----            | 9.8        | 7.6      | 5.6   | 4.4  | 6.8                   | 6.9      | 6.8   | 6.7  |

<sup>1</sup>Assuming age-sex specific rates are identical in each region.

Table 8. Actual and expected number of white and Negro children per 100, with specified levels of normal or defective uncorrected binocular distance and near vision, by region: United States, 1963-65

| Acuity level and race | Actual                |          |       |      | Expected <sup>1</sup> |          |       |      |
|-----------------------|-----------------------|----------|-------|------|-----------------------|----------|-------|------|
|                       | North-east            | Mid-west | South | West | North-east            | Mid-west | South | West |
| 20/20 or better:      | Rate per 100 children |          |       |      |                       |          |       |      |
| White-----            | 71.9                  | 75.5     | 76.3  | 76.7 | 70.9                  | 74.6     | 76.8  | 76.7 |
| Negro-----            | 63.8                  | 66.1     | 78.1  | 79.9 | 70.7                  | 74.4     | 76.7  | 76.3 |
| 20/40 or less:        |                       |          |       |      |                       |          |       |      |
| White-----            | 13.2                  | 12.4     | 8.3   | 10.1 | 13.8                  | 12.5     | 7.9   | 9.9  |
| Negro-----            | 16.8                  | 13.5     | 6.8   | 7.8  | 14.2                  | 12.5     | 7.8   | 9.8  |
| 20/100 or less:       |                       |          |       |      |                       |          |       |      |
| White-----            | 4.4                   | 4.3      | 2.1   | 3.9  | 4.4                   | 4.3      | 2.0   | 3.6  |
| Negro-----            | 4.7                   | 5.0      | 1.4   | "    | 4.6                   | 4.3      | 1.8   | 3.5  |
| 14/14 or better:      |                       |          |       |      |                       |          |       |      |
| White-----            | 67.9                  | 70.2     | 75.2  | 78.5 | 66.6                  | 69.4     | 76.0  | 78.5 |
| Negro-----            | 57.7                  | 60.9     | 77.9  | 77.8 | 66.8                  | 69.0     | 75.8  | 78.4 |
| 14/28 or less:        |                       |          |       |      |                       |          |       |      |
| White-----            | 7.5                   | 6.3      | 5.1   | 4.0  | 8.4                   | 6.6      | 4.9   | 3.9  |
| Negro-----            | 15.2                  | 9.8      | 4.5   | 2.7  | 8.5                   | 6.7      | 5.0   | 4.0  |

<sup>1</sup> Assuming age-sex specific rates are identical for white and Negro children.

Table 9. Number of children per 100, in urban and rural areas with specified levels of uncorrected binocular distance and near vision, by age and sex, with total standard error: United States, 1963-65

| Age and sex           | 20/20 or better |       | 20/40 or less |       | 20/100 or less |       | 14/14 or better |       | 14/28 or less |       |
|-----------------------|-----------------|-------|---------------|-------|----------------|-------|-----------------|-------|---------------|-------|
|                       | Urban           | Rural | Urban         | Rural | Urban          | Rural | Urban           | Rural | Urban         | Rural |
| <b>Both sexes</b>     |                 |       |               |       |                |       |                 |       |               |       |
| Rate per 100 children |                 |       |               |       |                |       |                 |       |               |       |
| 6-11 years -----      | 73.2            | 77.8  | 12.0          | 9.3   | 3.8            | 3.1   | 71.6            | 74.6  | 6.1           | 5.6   |
| 6 years -----         | 70.5            | 77.1  | 8.5           | 5.6   | 1.0            | 0.6   | 75.6            | 76.9  | 5.2           | 6.7   |
| 7 years -----         | 70.1            | 74.8  | 10.1          | 7.8   | 2.2            | 0.2   | 59.4            | 63.6  | 7.3           | 5.9   |
| 8 years -----         | 75.2            | 77.8  | 10.1          | 7.4   | 2.6            | 2.9   | 66.6            | 71.6  | 5.6           | 5.2   |
| 9 years -----         | 76.9            | 80.2  | 11.0          | 9.2   | 4.8            | 2.2   | 74.0            | 75.7  | 6.3           | 4.2   |
| 10 years -----        | 75.9            | 81.7  | 15.0          | 10.4  | 5.8            | 5.3   | 77.1            | 80.9  | 5.6           | 5.3   |
| 11 years -----        | 71.8            | 76.0  | 17.9          | 16.0  | 7.6            | 8.1   | 78.3            | 80.4  | 6.9           | 6.5   |
| <b>Boys</b>           |                 |       |               |       |                |       |                 |       |               |       |
| 6-11 years -----      | 75.2            | 80.7  | 11.2          | 8.3   | 3.7            | 2.2   | 74.7            | 76.6  | 5.1           | 5.1   |
| 6 years -----         | 75.1            | 84.9  | 7.0           | 5.8   | 0.6            | 0.8   | 80.8            | 78.6  | 4.7           | 6.8   |
| 7 years -----         | 69.9            | 75.0  | 10.1          | 7.2   | 2.6            | 0.4   | 63.8            | 63.3  | 5.2           | 5.2   |
| 8 years -----         | 74.9            | 80.1  | 11.2          | 5.8   | 2.4            | 1.0   | 66.1            | 75.7  | 5.9           | 3.5   |
| 9 years -----         | 80.9            | 82.3  | 9.9           | 8.2   | 4.4            | 1.6   | 78.4            | 76.9  | 4.0           | 3.3   |
| 10 years -----        | 77.0            | 86.5  | 13.8          | 7.0   | 4.8            | 3.6   | 80.1            | 84.2  | 3.9           | 5.1   |
| 11 years -----        | 74.7            | 75.3  | 15.7          | 16.7  | 7.7            | 6.2   | 80.0            | 82.7  | 7.0           | 6.8   |
| <b>Girls</b>          |                 |       |               |       |                |       |                 |       |               |       |
| 6-11 years -----      | 71.1            | 75.0  | 12.8          | 10.3  | 4.0            | 4.1   | 68.4            | 72.6  | 7.2           | 6.2   |
| 6 years -----         | 65.7            | 69.2  | 10.0          | 5.4   | 0.3            | 0.5   | 70.2            | 75.1  | 5.6           | 6.7   |
| 7 years -----         | 70.4            | 74.4  | 10.0          | 8.4   | 1.9            | -     | 54.8            | 63.6  | 9.5           | 6.5   |
| 8 years -----         | 75.5            | 75.2  | 8.9           | 9.1   | 2.8            | 4.9   | 67.1            | 66.9  | 5.3           | 7.1   |
| 9 years -----         | 72.7            | 77.9  | 12.1          | 10.3  | 5.3            | 2.7   | 69.3            | 74.2  | 8.8           | 5.1   |
| 10 years -----        | 74.7            | 77.0  | 16.3          | 13.5  | 6.8            | 6.9   | 74.0            | 77.6  | 7.4           | 5.4   |
| 11 years -----        | 68.7            | 76.6  | 20.1          | 15.2  | 7.5            | 9.9   | 76.4            | 78.2  | 6.8           | 6.1   |
| Standard error        |                 |       |               |       |                |       |                 |       |               |       |
| Total -----           | 0.91            | 0.93  | 0.54          | 0.77  | 0.33           | 0.59  | 0.83            | 1.22  | 0.37          | 0.97  |

Table 10. Actual and expected number of children per 100, with specified levels of normal or defective uncorrected binocular distance and near vision, by size of place of residence: United States, 1963-65

| Acuity level and rate       | Urbanized areas       |               |                 |                   | Urban places outside urbanized areas |               |             | Rural areas |
|-----------------------------|-----------------------|---------------|-----------------|-------------------|--------------------------------------|---------------|-------------|-------------|
|                             | 3 million or more     | 1-2.9 million | 250,000-999,999 | Less than 250,000 | 25,000 or more                       | 10,000-24,999 | 2,500-9,999 |             |
| <u>Distance</u>             | Rate per 100 children |               |                 |                   |                                      |               |             |             |
| 20/20 or better:            |                       |               |                 |                   |                                      |               |             |             |
| Actual-----                 | 69.6                  | 76.5          | 72.8            | 75.3              | 75.7                                 | 73.4          | 72.7        | 77.8        |
| Expected <sup>1</sup> ----- | 74.8                  | 74.8          | 74.8            | 75.1              | 74.7                                 | 75.0          | 74.7        | 74.8        |
| 20/40 or less:              |                       |               |                 |                   |                                      |               |             |             |
| Actual-----                 | 13.6                  | 12.2          | 11.9            | 10.3              | 11.7                                 | 7.8           | 11.1        | 9.3         |
| Expected <sup>1</sup> ----- | 10.9                  | 11.1          | 11.2            | 11.0              | 10.9                                 | 11.0          | 11.0        | 11.0        |
| 20/100 or less:             |                       |               |                 |                   |                                      |               |             |             |
| Actual-----                 | 4.0                   | 4.1           | 4.6             | 3.4               | 1.2                                  | 2.1           | 4.8         | 3.1         |
| Expected <sup>1</sup> ----- | 3.5                   | 3.6           | 3.7             | 3.6               | 3.5                                  | 3.6           | 3.5         | 3.6         |
| <u>Near</u>                 |                       |               |                 |                   |                                      |               |             |             |
| 14/14 or better:            |                       |               |                 |                   |                                      |               |             |             |
| Actual-----                 | 65.7                  | 72.7          | 74.1            | 72.0              | 78.8                                 | 75.4          | 73.2        | 74.6        |
| Expected <sup>1</sup> ----- | 72.2                  | 72.8          | 72.9            | 73.2              | 72.1                                 | 73.1          | 72.7        | 72.5        |
| 14/28 or better:            |                       |               |                 |                   |                                      |               |             |             |
| Actual-----                 | 8.6                   | 6.6           | 4.6             | 4.8               | 5.1                                  | 2.7           | 4.8         | 5.6         |
| Expected <sup>1</sup> ----- | 6.0                   | 5.9           | 5.9             | 5.9               | 5.9                                  | 5.9           | 6.0         | 6.0         |

<sup>1</sup> Assuming age-specific rates are identical for all places.

Table 11. Number of children per 100, with specified levels of normal or defective uncorrected binocular distance and near vision, by rate of population change in place of residence from 1950 to 1960, age, and sex, with total standard error: United States, 1963-65

| Age and sex       | 20/20 or better           |                    |              |                    | 20/40 or less |                    |              |                    |
|-------------------|---------------------------|--------------------|--------------|--------------------|---------------|--------------------|--------------|--------------------|
|                   | Rate of population change |                    |              |                    |               |                    |              |                    |
|                   | Loss                      | Below-average gain | Average gain | Above-average gain | Loss          | Below-average gain | Average gain | Above-average gain |
| <u>Both sexes</u> | Rate per 100 children     |                    |              |                    |               |                    |              |                    |
| 6-11 years -----  | 77.0                      | 70.8               | 73.7         | 77.6               | 9.3           | 12.3               | 11.6         | 11.0               |
| 6 years -----     | 75.1                      | 65.6               | 70.7         | 80.5               | 5.9           | 9.3                | 7.4          | 7.3                |
| 7 years -----     | 75.1                      | 63.5               | 70.9         | 76.2               | 8.1           | 13.7               | 8.3          | 7.6                |
| 8 years -----     | 75.8                      | 74.1               | 76.2         | 78.2               | 8.9           | 8.6                | 8.6          | 10.6               |
| 9 years -----     | 79.7                      | 76.6               | 76.4         | 76.8               | 7.6           | 9.4                | 13.1         | 11.2               |
| 10 years -----    | 83.8                      | 71.6               | 76.0         | 79.4               | 7.8           | 17.7               | 15.7         | 12.8               |
| 11 years -----    | 73.1                      | 74.8               | 72.5         | 72.6               | 18.2          | 16.1               | 17.9         | 16.4               |
| <u>Boys</u>       |                           |                    |              |                    |               |                    |              |                    |
| 6-11 years -----  | 79.2                      | 71.5               | 76.6         | 80.6               | 7.9           | 14.3               | 9.7          | 9.3                |
| 6 years -----     | 81.5                      | 74.2               | 73.9         | 84.0               | 5.4           | 11.5               | 3.4          | 6.8                |
| 7 years -----     | 74.8                      | 58.4               | 75.3         | 75.0               | 6.7           | 18.2               | 6.8          | 6.3                |
| 8 years -----     | 76.6                      | 71.7               | 75.2         | 82.9               | 6.5           | 10.5               | 11.1         | 9.3                |
| 9 years -----     | 81.7                      | 76.5               | 84.0         | 82.8               | 7.9           | 10.2               | 9.2          | 9.7                |
| 10 years -----    | 87.7                      | 71.9               | 77.9         | 82.1               | 4.1           | 19.1               | 13.5         | 10.0               |
| 11 years -----    | 72.9                      | 75.2               | 74.2         | 76.7               | 17.1          | 16.8               | 16.3         | 13.9               |
| <u>Girls</u>      |                           |                    |              |                    |               |                    |              |                    |
| 6-11 years -----  | 74.9                      | 70.1               | 70.4         | 74.3               | 10.8          | 10.4               | 13.7         | 12.8               |
| 6 years -----     | 68.9                      | 58.4               | 66.5         | 76.2               | 6.3           | 7.5                | 12.4         | 7.8                |
| 7 years -----     | 75.4                      | 68.1               | 65.7         | 77.2               | 9.5           | 9.5                | 10.0         | 8.8                |
| 8 years -----     | 75.1                      | 75.4               | 77.1         | 73.4               | 11.4          | 6.5                | 5.9          | 11.9               |
| 9 years -----     | 77.5                      | 76.6               | 68.7         | 75.3               | 7.3           | 8.5                | 16.9         | 12.9               |
| 10 years -----    | 80.0                      | 71.2               | 74.0         | 76.0               | 11.3          | 16.4               | 18.0         | 16.0               |
| 11 years -----    | 72.9                      | 74.2               | 70.5         | 68.3               | 19.2          | 15.3               | 19.6         | 18.8               |
|                   | Standard error            |                    |              |                    |               |                    |              |                    |
| Total -----       | 1.76                      | 2.38               | 1.46         | 1.16               | 1.11          | 1.33               | 1.27         | 1.30               |

Table 11. Number of children per 100, with specified levels of normal or defective uncorrected binocular distance and near vision, by rate of population change in place of residence from 1950 to 1960, age, and sex, with total standard error: United States, 1963-65--Con.

| 20/100 or less            |                    |              |                    | 14/14 or better |                    |              |                    | 14/28 or less |                    |              |                    |
|---------------------------|--------------------|--------------|--------------------|-----------------|--------------------|--------------|--------------------|---------------|--------------------|--------------|--------------------|
| Rate of population change |                    |              |                    |                 |                    |              |                    |               |                    |              |                    |
| Loss                      | Below-average gain | Average gain | Above-average gain | Loss            | Below-average gain | Average gain | Above-average gain | Loss          | Below-average gain | Average gain | Above-average gain |
| Rate per 100 children     |                    |              |                    |                 |                    |              |                    |               |                    |              |                    |
| 2.9                       | 3.5                | 4.1          | 3.9                | 73.7            | 71.7               | 72.4         | 72.5               | 6.2           | 5.0                | 6.6          | 5.9                |
| -                         | 1.2                | 0.3          | 0.7                | 78.4            | 76.4               | 74.9         | 73.8               | 6.2           | 3.5                | 6.8          | 6.4                |
| 1.1                       | 2.2                | 1.4          | 1.2                | 69.6            | 54.4               | 61.9         | 58.3               | 5.7           | 8.2                | 6.7          | 6.7                |
| 3.4                       | 1.2                | 2.5          | 3.6                | 66.8            | 66.7               | 71.3         | 67.9               | 6.9           | 3.9                | 6.2          | 4.9                |
| 1.9                       | 4.0                | 6.8          | 2.6                | 72.7            | 75.3               | 73.0         | 77.2               | 4.9           | 3.6                | 7.2          | 6.4                |
| 3.4                       | 7.5                | 5.0          | 6.6                | 79.3            | 76.1               | 77.0         | 80.8               | 6.2           | 5.7                | 4.8          | 5.0                |
| 8.0                       | 4.9                | 9.2          | 8.6                | 78.0            | 81.6               | 78.3         | 78.4               | 7.3           | 5.8                | 7.6          | 6.1                |
| 1.9                       | 4.2                | 3.5          | 3.2                | 75.7            | 71.9               | 76.3         | 77.0               | 5.0           | 6.0                | 5.3          | 4.2                |
| -                         | 1.9                | 0.4          | 0.5                | 83.1            | 76.7               | 82.6         | 76.1               | 4.5           | 4.9                | 4.9          | 7.5                |
| 1.1                       | 3.8                | 1.5          | 1.3                | 73.9            | 50.0               | 66.5         | 60.3               | 4.1           | 10.0               | 3.4          | 4.2                |
| 1.3                       | 1.2                | 3.2          | 2.1                | 66.6            | 66.9               | 69.2         | 74.6               | 4.4           | 5.5                | 7.2          | 3.1                |
| 2.1                       | 4.0                | 4.8          | 2.6                | 72.4            | 76.1               | 79.9         | 82.5               | 4.8           | 2.6                | 3.7          | 3.7                |
| 0.6                       | 8.4                | 2.9          | 5.6                | 80.2            | 78.1               | 80.6         | 86.0               | 6.1           | 6.4                | 4.1          | 0.7                |
| 6.5                       | 6.0                | 9.1          | 7.0                | 78.7            | 82.6               | 80.0         | 81.8               | 6.0           | 6.9                | 8.6          | 6.0                |
| 3.9                       | 2.8                | 4.6          | 4.7                | 71.7            | 71.5               | 68.1         | 67.8               | 7.4           | 4.1                | 8.0          | 7.8                |
| -                         | 0.6                | -            | 0.8                | 73.9            | 76.0               | 65.0         | 70.9               | 7.8           | 2.3                | 9.2          | 5.1                |
| 1.2                       | 1.3                | 1.1          | 1.2                | 60.7            | 58.4               | 56.3         | 56.2               | 7.4           | 6.5                | 10.5         | 9.0                |
| 5.5                       | 1.2                | 1.7          | 5.2                | 66.9            | 66.4               | 73.3         | 61.0               | 9.4           | 2.2                | 5.1          | 6.6                |
| 1.7                       | 4.1                | 8.9          | 2.6                | 72.8            | 74.3               | 65.9         | 71.1               | 5.0           | 4.5                | 10.7         | 9.5                |
| 6.0                       | 6.5                | 7.1          | 7.8                | 78.3            | 74.0               | 73.2         | 74.6               | 6.3           | 5.1                | 5.5          | 10.1               |
| 9.4                       | 3.6                | 9.3          | 10.2               | 77.1            | 80.2               | 76.1         | 74.8               | 8.6           | 4.6                | 6.4          | 6.3                |
| Standard error            |                    |              |                    |                 |                    |              |                    |               |                    |              |                    |
| 0.81                      | 0.46               | 0.65         | 0.92               | 1.89            | 2.77               | 2.38         | 1.84               | 0.75          | 1.00               | 0.86         | 0.95               |

Table 12. Number of children per 100, with specified levels of normal or defective uncorrected binocular distance and near vision and expected rate, by family income and age, with total standard error: United States, 1963-65

| Acuity level and age                        | Less than \$3,000 | \$3,000-\$4,999 | \$5,000-\$6,999 | \$7,000-\$9,999 | \$10,000-\$14,999 | \$15,000 or more |
|---|-------------------|-----------------|-----------------|-----------------|-------------------|------------------|
| <b>DISTANCE</b>                             |                   |                 |                 |                 |                   |                  |
| <u>20/20 or better</u>                      |                   |                 |                 |                 |                   |                  |
| 6-11 years-----                             | 76.6              | 75.0            | 73.1            | 74.4            | 73.9              | 77.1             |
| 6 years-----                                | 75.2              | 69.4            | 71.2            | 76.6            | 68.3              | 76.2             |
| 7 years-----                                | 74.4              | 71.6            | 71.3            | 70.2            | 69.9              | 80.9             |
| 8 years-----                                | 75.6              | 73.5            | 73.5            | 78.6            | 81.2              | 72.9             |
| 9 years-----                                | 76.9              | 81.6            | 72.2            | 77.2            | 82.7              | 81.7             |
| 10 years-----                               | 80.5              | 78.8            | 78.3            | 77.1            | 79.0              | 77.9             |
| 11 years-----                               | 77.3              | 77.1            | 73.2            | 70.8            | 62.0              | 76.4             |
| <u>20/40 or less</u>                        |                   |                 |                 |                 |                   |                  |
| 6-11 years-----                             | 8.3               | 9.4             | 12.0            | 12.5            | 14.4              | 10.8             |
| 6 years-----                                | 5.1               | 9.9             | 5.9             | 7.4             | 10.6              | 7.7              |
| 7 years-----                                | 7.6               | 7.9             | 10.6            | 8.8             | 14.7              | 2.0              |
| 8 years-----                                | 7.7               | 8.6             | 10.7            | 8.1             | 7.9               | 15.2             |
| 9 years-----                                | 8.9               | 5.5             | 15.5            | 14.2            | 9.7               | 4.8              |
| 10 years-----                               | 7.6               | 12.3            | 14.2            | 17.3            | 16.0              | 14.8             |
| 11 years-----                               | 14.2              | 12.7            | 15.9            | 20.2            | 28.2              | 18.1             |
| <u>20/100 or less</u>                       |                   |                 |                 |                 |                   |                  |
| 6-11 years-----                             | 2.2               | 2.7             | 4.2             | 4.3             | 5.0               | 3.9              |
| 6 years-----                                | -                 | 0.8             | 0.6             | 0.7             | -                 | -                |
| 7 years-----                                | 0.8               | 0.9             | 3.0             | 2.3             | -                 | -                |
| 8 years-----                                | 1.9               | 1.7             | 3.2             | 2.2             | 3.7               | 2.8              |
| 9 years-----                                | 1.3               | 2.4             | 6.4             | 6.3             | 3.0               | 2.1              |
| 10 years-----                               | 4.0               | 5.4             | 5.9             | 6.2             | 6.8               | 8.2              |
| 11 years-----                               | 6.2               | 5.7             | 6.5             | 8.4             | 16.1              | 9.5              |
| <b>NEAR</b>                                 |                   |                 |                 |                 |                   |                  |
| <u>14/14 or better</u>                      |                   |                 |                 |                 |                   |                  |
| 6-11 years-----                             | 73.0              | 71.5            | 71.8            | 73.3            | 72.0              | 77.3             |
| 6 years-----                                | 79.6              | 79.2            | 76.9            | 71.8            | 67.9              | 76.0             |
| 7 years-----                                | 68.2              | 57.9            | 60.0            | 58.8            | 57.3              | 76.9             |
| 8 years-----                                | 66.0              | 68.3            | 62.7            | 73.0            | 75.8              | 65.0             |
| 9 years-----                                | 71.1              | 70.0            | 74.7            | 76.5            | 77.0              | 87.1             |
| 10 years-----                               | 77.6              | 75.7            | 79.1            | 80.1            | 78.9              | 81.1             |
| 11 years-----                               | 75.5              | 78.8            | 79.7            | 81.2            | 73.6              | 80.8             |
| <u>14/28 or less</u>                        |                   |                 |                 |                 |                   |                  |
| 6-11 years-----                             | 6.8               | 6.1             | 5.8             | 6.0             | 4.9               | 5.2              |
| 6 years-----                                | 6.7               | 8.6             | 4.0             | 5.5             | 5.3               | 1.2              |
| 7 years-----                                | 7.0               | 7.2             | 7.6             | 6.1             | 5.7               | 1.7              |
| 8 years-----                                | 6.6               | 4.9             | 6.0             | 4.1             | 4.1               | 6.2              |
| 9 years-----                                | 5.8               | 5.9             | 4.8             | 8.8             | 2.8               | 3.6              |
| 10 years-----                               | 6.8               | 5.8             | 5.5             | 5.0             | 2.3               | 7.7              |
| 11 years-----                               | 7.8               | 4.0             | 6.7             | 6.6             | 9.8               | 10.6             |
| <b>TOTAL</b>                                |                   |                 |                 |                 |                   |                  |
| Expected rate <sup>1</sup> per 100 children |                   |                 |                 |                 |                   |                  |
| 20/20 or better-----                        | 74.6              | 74.8            | 74.7            | 74.8            | 75.0              | 74.9             |
| 20/40 or less-----                          | 11.0              | 10.9            | 11.0            | 11.0            | 11.1              | 11.2             |
| 20/100 or less-----                         | 3.6               | 3.5             | 3.6             | 3.6             | 3.7               | 3.7              |
| 14/14 or better-----                        | 72.4              | 72.6            | 72.0            | 72.5            | 73.1              | 73.3             |
| 14/28 or less-----                          | 6.0               | 6.0             | 6.0             | 5.9             | 5.9               | 5.9              |
| <b>TOTAL</b>                                |                   |                 |                 |                 |                   |                  |
| Standard error                              |                   |                 |                 |                 |                   |                  |
| 20/20 or better-----                        | 1.25              | 1.46            | 0.86            | 1.57            | 2.02              | 3.92             |
| 20/40 or less-----                          | 0.83              | 1.05            | 0.74            | 0.90            | 1.30              | 2.34             |
| 20/100 or less-----                         | 0.49              | 0.65            | 0.54            | 0.54            | 0.58              | 1.19             |
| 14/14 or better-----                        | 1.55              | 1.50            | 1.26            | 1.95            | 1.55              | 3.35             |
| 14/28 or less-----                          | 0.63              | 0.68            | 0.60            | 0.57            | 0.92              | 1.20             |

<sup>1</sup>Assuming age-sex specific rates are identical for all incomes.

Table 13. Number of children per 100, with specified levels of normal or defective uncorrected binocular distance and near vision and expected rate, by education of parent and age, with total standard error: United States, 1963-65

| Acuity level and age                        | Years of schooling completed |           |         |            |          |             |          |                  |
|---|------------------------------|-----------|---------|------------|----------|-------------|----------|------------------|
|   | Less than 5 years            | 5-7 years | 8 years | 9-11 years | 12 years | 13-15 years | 16 years | 17 years or more |
| <b>DISTANCE</b>                             |                              |           |         |            |          |             |          |                  |
| <u>20/20 or better</u>                      |                              |           |         |            |          |             |          |                  |
| 6-11 years-----                             | 75.2                         | 78.0      | 74.6    | 73.2       | 74.8     | 75.0        | 75.3     | 72.6             |
| 6 years-----                                | 71.4                         | 76.6      | 72.1    | 67.9       | 74.2     | 74.4        | 76.0     | 71.7             |
| 7 years-----                                | 62.7                         | 77.6      | 73.7    | 69.8       | 72.2     | 78.1        | 67.0     | 71.9             |
| 8 years-----                                | 81.0                         | 68.6      | 73.7    | 76.7       | 77.7     | 74.1        | 81.2     | 70.4             |
| 9 years-----                                | 80.2                         | 83.8      | 78.1    | 78.2       | 73.5     | 80.8        | 80.4     | 86.0             |
| 10 years-----                               | 82.6                         | 81.1      | 78.6    | 76.0       | 78.3     | 75.4        | 76.2     | 73.0             |
| 11 years-----                               | 75.3                         | 81.8      | 72.4    | 72.2       | 73.4     | 67.5        | 73.0     | 64.4             |
| <u>20/40 or less</u>                        |                              |           |         |            |          |             |          |                  |
| 6-11 years-----                             | 8.9                          | 8.0       | 10.4    | 10.2       | 12.2     | 10.9        | 12.2     | 16.2             |
| 6 years-----                                | 7.6                          | 4.6       | 7.3     | 10.4       | 7.6      | 5.3         | 6.3      | 5.8              |
| 7 years-----                                | 14.6                         | 7.5       | 6.4     | 9.4        | 8.7      | 7.5         | 8.7      | 17.6             |
| 8 years-----                                | 4.4                          | 13.6      | 9.8     | 7.5        | 9.4      | 4.4         | 10.0     | 16.0             |
| 9 years-----                                | 6.8                          | 6.6       | 8.2     | 9.7        | 13.8     | 13.0        | 9.9      | 7.9              |
| 10 years-----                               | 5.7                          | 7.5       | 10.6    | 9.6        | 15.4     | 19.9        | 21.6     | 22.4             |
| 11 years-----                               | 13.6                         | 7.1       | 18.3    | 15.2       | 19.8     | 19.3        | 18.0     | 27.7             |
| <u>20/100 or less</u>                       |                              |           |         |            |          |             |          |                  |
| 6-11 years-----                             | 2.5                          | 1.9       | 4.2     | 2.5        | 4.4      | 3.9         | 3.7      | 5.4              |
| 6 years-----                                | -                            | -         | 0.8     | 0.4        | 0.9      | 0.8         | -        | -                |
| 7 years-----                                | 2.3                          | 1.0       | 1.6     | 1.3        | 1.9      | 1.2         | -        | 3.3              |
| 8 years-----                                | 3.3                          | 3.8       | 4.2     | 1.1        | 2.0      | 2.2         | 1.0      | 8.0              |
| 9 years-----                                | 2.6                          | -         | 3.4     | 1.6        | 6.2      | 1.5         | 4.0      | 1.5              |
| 10 years-----                               | 1.0                          | 3.1       | 6.0     | 4.2        | 6.9      | 7.5         | 8.0      | 7.9              |
| 11 years-----                               | 6.2                          | 3.2       | 7.8     | 4.1        | 9.8      | 13.0        | 9.8      | 10.8             |
| <b>NEAR</b>                                 |                              |           |         |            |          |             |          |                  |
| <u>14/14 or better</u>                      |                              |           |         |            |          |             |          |                  |
| 6-11 years-----                             | 74.3                         | 72.9      | 71.4    | 69.7       | 72.8     | 72.3        | 76.5     | 75.9             |
| 6 years-----                                | 79.4                         | 84.8      | 77.2    | 73.9       | 75.1     | 69.6        | 82.9     | 74.3             |
| 7 years-----                                | 65.8                         | 70.9      | 63.3    | 54.0       | 59.6     | 65.5        | 56.2     | 66.6             |
| 8 years-----                                | 79.2                         | 61.6      | 60.2    | 68.4       | 68.4     | 71.5        | 75.1     | 66.1             |
| 9 years-----                                | 70.7                         | 70.2      | 70.7    | 72.1       | 74.3     | 75.5        | 85.1     | 87.8             |
| 10 years-----                               | 76.2                         | 72.2      | 77.0    | 76.1       | 81.5     | 79.1        | 82.4     | 80.7             |
| 11 years-----                               | 77.3                         | 81.3      | 78.6    | 77.1       | 79.8     | 77.7        | 80.5     | 80.4             |
| <u>14/28 or less</u>                        |                              |           |         |            |          |             |          |                  |
| 6-11 years-----                             | 6.0                          | 7.8       | 6.2     | 6.2        | 5.6      | 5.6         | 4.3      | 5.8              |
| 6 years-----                                | 2.9                          | 7.7       | 7.2     | 6.3        | 6.7      | 3.9         | 1.3      | 2.6              |
| 7 years-----                                | 10.4                         | 7.4       | 6.4     | 9.5        | 5.0      | 2.9         | 5.7      | 7.7              |
| 8 years-----                                | 3.3                          | 12.6      | 6.3     | 4.2        | 4.2      | 5.2         | 2.8      | 8.6              |
| 9 years-----                                | 8.0                          | 4.4       | 4.2     | 5.1        | 6.2      | 6.9         | 5.4      | 5.7              |
| 10 years-----                               | 4.9                          | 7.7       | 7.6     | 4.6        | 3.3      | 11.3        | 3.6      | 4.6              |
| 11 years-----                               | 5.8                          | 6.5       | 5.6     | 7.0        | 8.0      | 3.5         | 7.0      | 6.4              |
| <b>TOTAL</b>                                |                              |           |         |            |          |             |          |                  |
| Expected rate <sup>1</sup> per 100 children |                              |           |         |            |          |             |          |                  |
| 20/20 or better-----                        | 74.7                         | 75.2      | 74.7    | 74.7       | 74.8     | 74.4        | 74.9     | 75.2             |
| 20/40 or less-----                          | 11.3                         | 11.2      | 11.4    | 11.0       | 11.0     | 10.8        | 11.0     | 11.1             |
| 20/100 or less-----                         | 3.7                          | 3.8       | 3.9     | 3.5        | 3.5      | 3.3         | 3.6      | 3.7              |
| 14/14 or better-----                        | 72.8                         | 73.0      | 73.0    | 72.3       | 72.5     | 72.0        | 72.7     | 73.3             |
| 14/28 or less-----                          | 6.0                          | 5.9       | 6.0     | 6.0        | 5.9      | 5.9         | 5.9      | 6.0              |
| <b>TOTAL</b>                                |                              |           |         |            |          |             |          |                  |
| Standard error                              |                              |           |         |            |          |             |          |                  |
| 20/20 or better-----                        | 2.55                         | 2.06      | 1.66    | 1.38       | 1.45     | 1.65        | 2.42     | 2.90             |
| 20/40 or less-----                          | 1.77                         | 1.21      | 1.16    | 0.87       | 0.83     | 1.60        | 1.84     | 2.62             |
| 20/100 or less-----                         | 0.71                         | 0.75      | 0.72    | 0.52       | 0.53     | 1.14        | 0.93     | 1.46             |
| 14/14 or better-----                        | 3.45                         | 1.85      | 1.42    | 1.57       | 1.60     | 1.88        | 2.33     | 3.60             |
| 14/28 or less-----                          | 1.14                         | 1.44      | 0.88    | 0.58       | 0.37     | 0.83        | 1.05     | 1.80             |

<sup>1</sup>Assuming age-sex specific rates are identical for all educational levels.

Table 14. Number of children per 100, with specified levels of normal or defective uncorrected binocular distance and near vision and expected rate, by grade in school and sex: United States, 1963-65

| Acuity level and sex                        | Grade in school |       |        |       |        |       |       |         |
|---|-----------------|-------|--------|-------|--------|-------|-------|---------|
|   | Kindergarten    | First | Second | Third | Fourth | Fifth | Sixth | Seventh |
| <u>20/20 or better</u>                      |                 |       |        |       |        |       |       |         |
| Both sexes-----                             | 53.3            | 74.0  | 72.6   | 76.7  | 78.1   | 76.7  | 72.2  | 73.7    |
| Boys-----                                   | 59.5            | 77.5  | 73.4   | 78.3  | 80.0   | 80.7  | 73.9  | 71.9    |
| Girls-----                                  | 47.0            | 70.1  | 71.8   | 74.9  | 76.3   | 72.5  | 70.7  | 75.0    |
| <u>20/40 or less</u>                        |                 |       |        |       |        |       |       |         |
| Both sexes-----                             | 11.1            | 7.4   | 9.5    | 8.1   | 11.3   | 14.2  | 17.8  | 18.9    |
| Boys-----                                   | 11.4            | 6.6   | 9.0    | 8.3   | 10.9   | 11.5  | 16.5  | 19.2    |
| Girls-----                                  | 10.8            | 8.3   | 10.0   | 7.9   | 11.7   | 17.0  | 18.8  | 18.6    |
| <u>20/100 or less</u>                       |                 |       |        |       |        |       |       |         |
| Both sexes-----                             | -               | 0.7   | 1.8    | 2.6   | 3.7    | 6.0   | 8.9   | 7.5     |
| Boys-----                                   | -               | 0.8   | 2.1    | 2.3   | 2.8    | 5.0   | 7.6   | 9.9     |
| Girls-----                                  | -               | 0.6   | 1.6    | 3.0   | 4.6    | 7.1   | 10.0  | 5.9     |
| <u>14/14 or better</u>                      |                 |       |        |       |        |       |       |         |
| Both sexes-----                             | 83.8            | 74.7  | 60.7   | 68.3  | 74.5   | 80.1  | 79.3  | 80.5    |
| Boys-----                                   | 83.5            | 78.2  | 61.4   | 71.7  | 79.0   | 82.6  | 81.4  | 87.0    |
| Girls-----                                  | 84.0            | 70.8  | 60.0   | 64.7  | 70.0   | 77.6  | 77.4  | 76.2    |
| <u>14/28 or less</u>                        |                 |       |        |       |        |       |       |         |
| Both sexes-----                             | 5.6             | 5.8   | 6.5    | 5.2   | 5.9    | 5.4   | 6.6   | 7.8     |
| Boys-----                                   | 9.4             | 5.2   | 5.6    | 4.3   | 4.0    | 4.0   | 6.5   | 9.3     |
| Girls-----                                  | 1.7             | 6.5   | 7.4    | 6.1   | 7.7    | 6.8   | 6.7   | 6.8     |
| <u>20/20 or better</u>                      |                 |       |        |       |        |       |       |         |
| Expected rate <sup>1</sup> per 100 children |                 |       |        |       |        |       |       |         |
| Both sexes-----                             | 72.5            | 72.5  | 72.8   | 76.0  | 77.3   | 76.7  | 73.7  | 72.7    |
| Boys-----                                   | 77.9            | 76.5  | 73.9   | 77.2  | 80.0   | 78.7  | 75.5  | 74.7    |
| Girls-----                                  | 67.0            | 68.2  | 71.8   | 74.6  | 74.6   | 74.6  | 72.0  | 71.4    |
| <u>20/40 or less</u>                        |                 |       |        |       |        |       |       |         |
| Both sexes-----                             | 7.6             | 8.0   | 9.1    | 9.6   | 11.2   | 13.9  | 16.6  | 17.4    |
| Boys-----                                   | 6.5             | 7.2   | 8.9    | 9.5   | 10.3   | 12.5  | 15.3  | 16.1    |
| Girls-----                                  | 8.7             | 8.9   | 9.4    | 9.8   | 12.2   | 15.3  | 17.8  | 18.3    |
| <u>20/100 or less</u>                       |                 |       |        |       |        |       |       |         |
| Both sexes-----                             | 0.5             | 0.8   | 1.7    | 2.9   | 4.3    | 5.9   | 7.4   | 7.8     |
| Boys-----                                   | 0.7             | 1.0   | 1.8    | 2.4   | 3.7    | 5.0   | 6.7   | 7.2     |
| Girls-----                                  | 0.4             | 0.6   | 1.6    | 3.5   | 4.9    | 6.8   | 8.1   | 8.3     |
| <u>14/14 or better</u>                      |                 |       |        |       |        |       |       |         |
| Both sexes-----                             | 75.2            | 72.0  | 64.5   | 69.1  | 74.7   | 77.8  | 78.6  | 78.4    |
| Boys-----                                   | 79.3            | 75.4  | 67.3   | 71.3  | 77.9   | 80.6  | 80.8  | 80.7    |
| Girls-----                                  | 71.0            | 68.3  | 61.6   | 66.8  | 71.5   | 74.9  | 76.6  | 76.9    |
| <u>14/28 or less</u>                        |                 |       |        |       |        |       |       |         |
| Both sexes-----                             | 5.8             | 6.0   | 6.4    | 5.6   | 5.6    | 5.8   | 6.5   | 6.7     |
| Boys-----                                   | 5.4             | 5.3   | 5.1    | 4.8   | 4.2    | 4.9   | 6.5   | 6.9     |
| Girls-----                                  | 6.2             | 6.7   | 7.6    | 6.5   | 7.0    | 6.7   | 6.6   | 6.6     |

<sup>1</sup> Assuming age-sex specific rate are identical for all grades.

## APPENDIX I

### STATISTICAL NOTES

#### The Survey Design

The sample design for the second cycle of the Health Examination Survey, similar to the one used for the first cycle, was that of a multistage, stratified probability sample of loose clusters of persons in land-based segments. Successive elements dealt with in the process of sampling are primary sampling units (PSU), census enumeration district (ED), segment, household, eligible child (EC), and, finally, the sample child (SC).

At the first stage, the nearly 2,000 PSU's into which the United States (including Hawaii and Alaska) has been divided and then grouped into 357 strata for use in the Current Population Survey and the Health Interview Survey were further grouped into 40 super-strata for use in Cycle II of the Health Examination Survey. The average size of each Cycle II stratum was 4.5 million persons, and all strata fell between the limits of 3.5 and 5.5 million. Grouping into 40 strata was done in a way that maximized homogeneity of the PSU's included in each stratum, particularly with regard to degree of urbanization, geographic proximity, and degree of industrialization. The 40 strata were classified into four broad geographic regions (each with 10 strata) of approximately equal population and cross-classified into four broad population density groups (each having 10 strata). Each of the 16 cells contained either two or three strata. A single stratum might include only one PSU, only part of a PSU (e.g., New York City, which represented two strata), or several score PSU's.

To take account of the possible effect that the rate of population change between the 1950 and 1960 Census might have had on health, the 10 strata within each region were further classified into four classes ranging from those with no increase to those with the greatest relative increase. Each such class contained either two or three strata.

One PSU was then selected from each of the 40 strata. A controlled selection technique was used in which the probability of selection of a particular PSU

was proportional to its 1960 population. In the controlled selection an attempt was also made to maximize the spread of the PSU's among the States. While not every one of the 64 cells in the 4x4x4 grid contributes a PSU to the sample of 40 PSU's, the controlled selection technique ensured the sample's matching the marginal distributions in all three dimensions and being closely representative of all cross-classifications.

Generally, within a particular PSU, 20 ED were selected with the probability of selection of a particular ED proportional to its population in the age group 5-9 years in the 1960 Census, which by 1963 roughly approximated the population in the target age group for Cycle II. A similar method was used for selecting one segment (cluster of households) in each ED. Each of the resultant 20 segments was either a bounded area or a cluster of households (or addresses). All the children in the age range properly resident at the address visited were EC's. Operational considerations made it necessary to reduce the number of prospective examinees at any one location to a maximum of 200. The EC's to be excluded for this reason from the SC group were determined by systematic subsampling.

The total sample included 7,417 children from 25 different States in the 6-11 years age group with approximately 1,000 in each of the single years of age.

#### Reliability

Measurement processes employed in the survey were highly standardized and closely controlled. Of course this does not mean that the correspondence between the real world and the survey results is exact. 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 report on Cycle II<sup>1</sup> describes in detail the faithfulness with which the sampling design was carried out. It notes that out of the 7,417 sample children the 7,119 who were examined—a response rate of 96

percent—gave evidence that they were a highly representative sample of children of this age in the noninstitutional population of the United States. The response levels for the various demographic subgroups—including those for age, sex, race, region, population density, parent's educational level, and family income—show no marked differentials. Hence it appears unlikely that nonresponse could bias the findings much in these respects.

Measures used to control the quality of data from this survey in general have been cited previously;<sup>4</sup> those relating specifically to the vision sections of the examination are outlined in an earlier publication of findings from this study.<sup>5</sup>

Data recorded for each sample child are inflated in the estimation process to characterize the larger universe of which the sample child is representative. The weights used in this inflation process are a product of the reciprocal of the probability of selecting the child, an adjustment for nonresponse cases, and a poststratified ratio adjustment which increases precision by bringing survey results into closer alignment with known U.S. population figures by color and sex within single years of age 6-11.

In the second cycle of the Health Examination Survey the sample was the result of three stages of selection—the single PSU from each stratum, the 20 segments from each sample PSU, and the sample children from the eligible children. The probability of selecting an individual child is the product of the probability of selection at each stage.

Since the strata are roughly equal in population size and a nearly equal number of sample children were examined in each of the sample PSU's, the sample design is essentially self-weighting with respect to the target population; that is, each child 6-11 years old had about the same probability of being drawn into the sample.

The adjustment upward for nonresponse is intended to minimize the impact of nonresponse on final estimates by imputing to nonrespondents the characteristics of "similar" respondents. Here "similar" respondents were judged to be examined children in a sample PSU having the same age (in years) and sex as children not examined in that sample PSU.

The poststratified ratio adjustment used in the second cycle achieved most of the gains in precision which would have been attained if the sample had been drawn from a population stratified by age, color, and sex and made the final sample estimates of population agree exactly with independent controls prepared by the Bureau of Census for the noninstitutional population of the United States as of August 1, 1964 (approximate mid-survey point), by color and sex for each single year of age 6-11. The weight of every responding sample child in each of the 24 age, color, and sex classes is adjusted upward or downward so that the weighted total within the class equals the independent population control.

## Sampling and Measurement Error

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

The probability design of the survey makes possible the calculation of sampling errors. The sampling error is used here to determine how imprecise the survey test results may be because they come from a sample rather than from the measurements 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 cases. Estimates of sampling error are obtained from the sample data and are themselves subject to sampling error which may be large 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 the detailed tables. 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. The latter is used as the level of significance in this report.

An approximation of the standard error of a difference  $d = x - y$  of two statistics  $x$  and  $y$  is given by the formula  $S_d = (S_x^2 + S_y^2)^{1/2}$  where  $S_x$  and  $S_y$  are the sampling errors, respectively of  $x$  and  $y$ , shown in the detailed tables.

## Small Categories

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 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 may help to convey an impression of the overall story of the table.

## APPENDIX II

### DEMOGRAPHIC AND SOCIOECONOMIC VARIABLES AND RELATED TERMS

**Age.**--The age recorded for each child was the age at last birthday on the date of examination. The age criterion for inclusion in the sample used in this survey was defined in terms of age at time of interview. Since the examination usually took place 2 to 4 weeks after the interview, some of those who were 11 years old at the time of interview became 12 years old by the time of examination. There were 72 such cases. In the adjustment and weighting procedures used to produce national estimates, these 72 were included in the 11-year-old group.

**Race.**--Race was recorded as "white," "Negro," or "other races." The last category included American Indians, Chinese, Japanese, and all races other than white or Negro. Mexican persons were included with "white" unless definitely known to be American Indian or of another race. Negroes and persons of mixed Negro and other parentage were recorded as "Negro."

**Geographic region.**--For purposes of stratification the United States was divided into four broad geographic regions of approximately equal population. These regions, which correspond closely to those used by the U.S. Bureau of the Census, were as follows:

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

**Urban and rural areas.**--The definition of urban and rural areas was the same as that used in the 1960 Census. According to this definition, the urban population was comprised of all persons living in (a) places of 2,500 inhabitants or more incorporated as cities, boroughs, villages, and towns (except towns in New England, New York, and Wisconsin); (b) the densely settled urban fringe, whether incorporated or unin-

corporated, of urbanized areas; (c) towns in New England and townships in New Jersey and Pennsylvania which contained no incorporated municipalities as subdivisions and had either 2,500 inhabitants or more, or a population of 2,500 to 25,000 and a density of 1,500 persons or more per square mile; (d) counties in States other than the New England States, New Jersey, and Pennsylvania that had no incorporated municipalities within their boundaries and had a density of 1,500 persons or more per square mile; and (e) unincorporated places of 2,500 inhabitants or more not included in any urban fringe. The remaining population was classified as rural.

Urban areas are further classified by population size for places within urbanized areas and other urban places outside urbanized areas.

**Grade in school.**--The grade that the child attended at the time of interview was used here and later verified against school records. The grade of those children on summer vacation was considered to be the grade that they would enter when school resumed.

**Education of parent or guardian.**--The highest grade completed in school was recorded. The only grades counted were those attended in a regular graded public or private school where persons were given formal education, whether during the day or at night and whether attendance was full or part time. A "regular" school is one which advances a person toward an elementary or high school diploma, or a college, university, or professional school degree. Education in vocational, trade, or business schools outside the regular school system was not counted in determining the highest grade of school completed.

**Family income.**--The income recorded was the total income of the past 12 months received by the head of the household and all other household members related to the head by blood, marriage, or adoption. This income was the gross cash income (excluding pay in kind) except in the case of a family with their own farm or business, in which case net income was recorded.

**Parent.**--A parent was the natural parent or, in the case of adoption, the legal parent of the child.

**Guardian.**--A guardian was responsible for the care and supervision of the child. He (or she) did not have to be the legal guardian to be considered the guardian for this survey. A guardianship could only exist when the parent(s) of the child did not reside within the sample household.

**Head of household.**--Only one person in each household was designated as the "head." He (or she) was the person who was regarded as the "head" by the members of the household. In most cases the head was the chief breadwinner of the family although this was not always true. In some cases the head was the parent of the chief earner or the only adult member of the household.

## VITAL AND HEALTH STATISTICS PUBLICATION SERIES

Formerly Public Health Service Publication No. 1000

- Series 1. *Programs and collection procedures.***—Reports which describe the general programs of the National Center for Health Statistics and its offices and divisions, data collection methods used, definitions, and other material necessary for understanding the data.
- Series 2. *Data evaluation and methods research.***—Studies of new statistical methodology including: experimental tests of new survey methods, studies of vital statistics collection methods, new analytical techniques, objective evaluations of reliability of collected data, contributions to statistical theory.
- Series 3. *Analytical studies.***—Reports presenting analytical or interpretive studies based on vital and health statistics, carrying the analysis further than the expository types of reports in the other series.
- Series 4. *Documents and committee reports.***—Final reports of major committees concerned with vital and health statistics, and documents such as recommended model vital registration laws and revised birth and death certificates.
- Series 10. *Data from the Health Interview Survey.***—Statistics on illness, accidental injuries, disability, use of hospital, medical, dental, and other services, and other health-related topics, based on data collected in a continuing national household interview survey.
- Series 11. *Data from the Health Examination Survey.***—Data from direct examination, testing, and measurement of national samples of the civilian, noninstitutional population provide the basis for two types of reports: (1) estimates of the medically defined prevalence of specific diseases in the United States and the distributions of the population with respect to physical, physiological, and psychological characteristics; and (2) analysis of relationships among the various measurements without reference to an explicit finite universe of persons.
- Series 12. *Data from the Institutional Population Surveys.***—Statistics relating to the health characteristics of persons in institutions, and their medical, nursing, and personal care received, based on national samples of establishments providing these services and samples of the residents or patients.
- Series 13. *Data from the Hospital Discharge Survey.***—Statistics relating to discharged patients in short-stay hospitals, based on a sample of patient records in a national sample of hospitals.
- Series 14. *Data on health resources: manpower and facilities.***—Statistics on the numbers, geographic distribution, and characteristics of health resources including physicians, dentists, nurses, other health occupations, hospitals, nursing homes, and outpatient facilities.
- Series 20. *Data on mortality.***—Various statistics on mortality other than as included in regular annual or monthly reports—special analyses by cause of death, age, and other demographic variables, also geographic and time series analyses.
- Series 21. *Data on natality, marriage, and divorce.***—Various statistics on natality, marriage, and divorce other than as included in regular annual or monthly reports—special analyses by demographic variables, also geographic and time series analyses, studies of fertility.
- Series 22. *Data from the National Natality and Mortality Surveys.***—Statistics on characteristics of births and deaths not available from the vital records, based on sample surveys stemming from these records, including such topics as mortality by socioeconomic class, hospital experience in the last year of life, medical care during pregnancy, health insurance coverage, etc.

For a list of titles of reports published in these series, write to: Office of Information  
National Center for Health Statistics  
Public Health Service, HSMHA  
Rockville, Md. 20852

Series 11 - No. 112

**DHEW Publication No. (HSM) 72-1031**

**U.S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE**  
**PUBLIC HEALTH SERVICE**  
Health Services and Mental Health Administration  
5600 Fishers Lane  
Rockville, Maryland 20852

**OFFICIAL BUSINESS**  
Penalty for Private Use \$300

**POSTAGE AND FEES PAID**  
**U.S. DEPARTMENT OF HEW**

