

# FINAL REPORT

October 2024

## 2022 NHATS Summary Data Report:

For the Vision and Eye Health  
Surveillance System

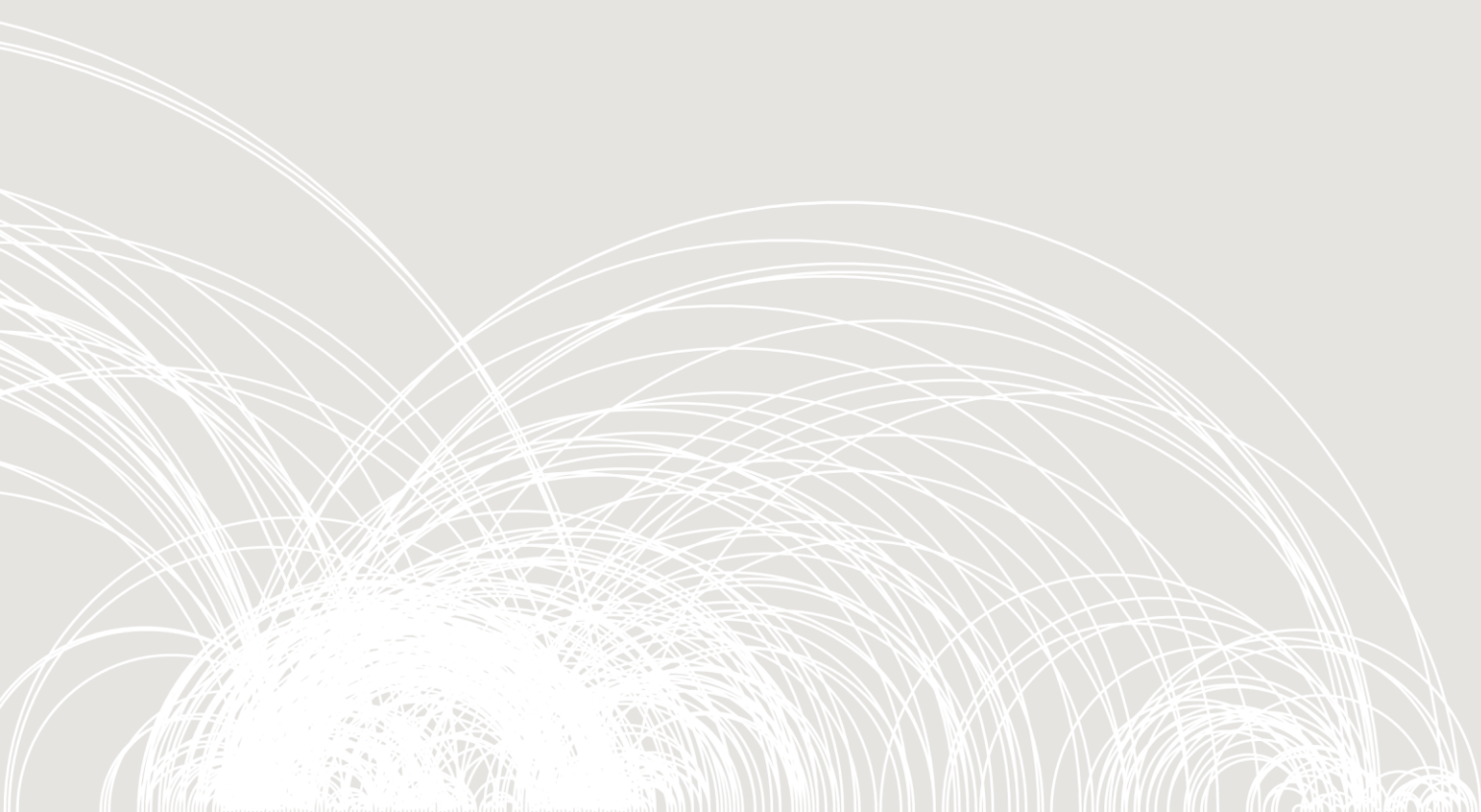
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## Dataset Description

Starting in 2011, the National Health and Aging Trends Study (NHATS) began gathering information on a nationally representative sample of Medicare beneficiaries ages 65 and older. Interviews are conducted annually and in-person. Detailed information is collected on participants' physical, cognitive, and sensory capacity, how activities of daily life are carried out, the social, physical, and technological environment, and participation in valued activities. A series of performance-based tests are conducted to provide complimentary measures of physical, cognitive, and sensory capacity.

The primary data collection instrument is the Sample Person (SP) Interview. Most sample persons respond to the SP interview for themselves. Proxy respondents are used in instances where the sample person cannot respond, and information is collected on the reasons a proxy is used. When the sample person is living in a residential care setting, a staff person at the place serves as a respondent to the Facility Questionnaire (FQ). When a sample person is deceased, the Last Month of Life portion of the SP interview is administered to a proxy, typically a family member (Freedman et al., 2023).

## Analysis Overview

Starting in Round 11, all NHATS participants who were eligible for a Sample Person (SP) interview were eligible for three vision activities: distance and near vision acuity, and contrast sensitivity. These tests were conducted with the aid of a tablet. Our analysis used the latest data from Round 12.

## Data Indicators and Case Definitions

An NHATS Vision e-book developed by Ridgevue Vision: ridgevue.com (released 4/17/19) was used for each of the vision activities. Distance and near vision scores were expressed in logarithm of the minimum angle of resolution or logMAR scale and contrast sensitivity was defined in log contrast sensitivity or logCS scale. Distance acuity was calculated using the formula  $0.02 * (55 - SD)$ , where SD = sum of correct letters for distance acuity test. On this scale 0.0 corresponds to 20/20 vision and higher values indicate worse functioning. Near visual acuity was calculated as  $(0.02 * (55 - SN)) + \log_{10}(40/X)$ , where SN = sum of correct letters for near acuity test and X = reading distance in centimeters. Higher values indicate worse functioning. Contrast sensitivity score was computed as  $0.40 + (0.05 * SC)$ , where SC = sum of correct letters for contrast sensitivity test. Higher values indicate better visual functioning (Hu et al., 2023).

We generated NHATS estimates using three data indicator topics: Measured distance visual acuity, measured near visual acuity, and contrast sensitivity.

**Table 1. Visual Function Categories**

Category	Subgroup	Definition
Measured distance visual acuity	Presenting with normal vision	<0.2 logMAR
	Presenting with any vision loss	≥0.2 logMAR
	Presenting with visual impairment	≥0.2 logMAR to <1 logMAR
	Presenting with mild visual impairment	≥0.2 logMAR to <0.6 logMAR
	Presenting with moderate visual impairment	≥0.6 logMAR to <1.0 logMAR
	Presenting with US-defined blindness	≥1.0 logMAR
	Missing presenting acuity	No acuity measure classified above
Measured near visual acuity	Presenting with normal near visual acuity	<0.2 logMAR
	Presenting with any near visual acuity loss	≥0.2 logMAR
Contrast Sensitivity	Normal contrast sensitivity	>1.55 logCS
	Any Contrast Sensitivity Loss	≤1.55 logCS
	Mild Contrast Sensitivity Loss	>1.37 logCS to ≤1.55 logCS
	Severe Contrast Sensitivity Loss	≤1.37 logCS

## Denominator used to Calculate Prevalence Rates

Our analytical sample comprised of 6012 individuals who were eligible for a sample person (SP) interview and resided either in the community, nursing homes, or other residential care settings. It also included individuals who lived in nursing homes in Round 1 and Round 5 and were eligible for a facilities questionnaire. The denominator used to calculate prevalence rates are weighted frequencies.

### *Stratification Factors*

We report the summary outcomes of each data indicator overall, and by the stratification factors age group, gender, race/ethnicity, and risk factors. This report includes outcomes estimated for single levels of stratification. To estimate prevalence rates for specific multi-variable stratification categories, please visit the VEHS data visualization application.

### *Age Groups*

Beneficiary age was categorized into the VEHS-defined major age groups: 65+, 65-69, 70-74, 75-79, 80-84, 85-89, 90+.

## *Sex Categories*

Beneficiaries were classified as either Male or Female. Only a few beneficiaries had missing Sex data, and all cases were suppressed.

## *Race/Ethnicity Categories*

We used the VEHSS race/ethnicity identifiers. Few beneficiaries had missing race/ethnicity data and were excluded because their results would have been suppressed.

- Black (non-Hispanic)
- Hispanic
- White (non-Hispanic)
- Other (Am Indian/Asian/Native Hawaiian/Pacific Islander/other specify, non-Hispanic)
- All Races
- Unknown

## *Risk Factors*

Risk factors included were diabetes status, smoking status, and residential care status. Residential care status was defined as beneficiaries living in nursing homes or residential care settings.

## Suppression and Data Release Restrictions

To ensure patient privacy and protections, the VEHSS project implements additional data suppression on all publicly released data. All data incorporated into the VEHSS system is de-identified summary data. VEHSS does not report any patient-level data.

Suppression was determined using the National Center for Health Statistics Data Presentation Standards for Proportions.<sup>1</sup>

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<sup>1</sup> Parker JD, Talih M, Malec DJ, Beresovsky V, Carroll M, Gonzalez JF, Hamilton BE, Ingram DD, Kochanek K, McCarty F, Moriarity C, Shimizu I, Strashny A, Ward BW. National Center for Health Statistics Data Presentation Standards for Proportions. *Vital Health Stat 2*. 2017 Aug;(175):1-22. PMID: 30248016.

**Table 2. NCHS Data Presentation Standards for Proportions**

Statistic	Standard
<b>Sample size</b>	Estimated proportions should be based on a minimum denominator sample size and effective denominator sample size (when applicable) of 30. Estimates with either a denominator sample size or an effective denominator sample size (when applicable) less than 30 should be suppressed. If the number of events is 0 (or its complement*), then the denominator sample size should be used to obtain confidence intervals. If all other criteria are met for presentation, an estimate based on 0 events (or its complement*) should be flagged for statistical review by the clearance official. The review could result in either the presentation or the suppression of the proportion.
<b>Confidence interval</b>	If the sample size criterion is met, calculate a 95% two-sided confidence interval using the Clopper-Pearson method, or the Korn-Graubard method for complex surveys, and obtain its width.
<b>Small absolute confidence interval width</b>	If the absolute confidence interval width is greater than 0.00 and less than or equal to 0.05, then the proportion can be presented if the number of events is greater than 0 and the degrees of freedom criterion (below) is met. If the number of events is 0 (or its complement*) and the degrees of freedom criterion is not met, then the estimate should be flagged for statistical review by the clearance official. The review could result in either the presentation or suppression of the proportion.
<b>Large absolute confidence interval width</b>	If the absolute confidence interval width is greater than or equal to 0.30, then the proportion should be suppressed.
<b>Relative confidence interval width</b>	If the absolute confidence interval width is between 0.05 and 0.30 and the relative confidence interval width is more than 130%, then the proportion should be suppressed.
<b>Relative confidence interval width</b>	If the absolute confidence interval width is between 0.05 and 0.30 and the relative confidence interval width is less than or equal to 130%, then the proportion can be presented if the degrees of freedom criterion below is met. If the degrees of freedom criterion is not met, then the estimate should be flagged for statistical review by the clearance official. The review could result in either presentation or suppression of the proportion.
<b>Degrees of freedom</b>	When applicable for complex surveys, if the sample size and confidence interval criteria are met and the degrees of freedom are less than or equal to 9, then the proportion should be flagged for statistical review by the clearance official. The review could result in either the presentation or suppression of the proportion.
<b>Complementary proportions</b>	If all criteria are met for presenting the proportion but not for its complement*, then both the proportion and its complement should be shown. A footnote indicating that the complement of the proportion may be unreliable should be provided.

\* The complement of a proportion  $p$  is  $(1 - p)$ . The complement of the number of events in the numerator for  $p$  is the number of events in the numerator for  $(1 - p)$ .

## Data Weighting

The vision data is designed to be nationally representative of Medicare beneficiaries. In order to make statements that are generalizable to this population, the data was weighted using final survey weights, and cluster and strata design variables were used to account for NHATS' complex survey design (Hu et al., 2023).

## Age Adjustment

In addition to crude estimates, we generated age-adjusted estimates to be able to eliminate differences in observed rates resulting from age differences in population composition. Age adjustment was done using the 2000 projected US population (Klein and Schoenborn, 2001).

## Validation

### Internal Validation

#### Sample Size

We assessed internal validity by examining and confirming that sample sizes across different subgroups within the visual function categories were consistent. After accounting for missing and inapplicable responses, the non-weighted and weighted sample sizes for the three categories are as follows:

**Table 3. Visual Function Sample Size**

Visual Function Categories	Non-Weighted Sample Size	Weighted Sample Size
Measured Distance Visual Acuity	5432	48114704
Measured Near Visual Acuity	5320	47123055
Contrast Sensitivity	5424	48084099

Additionally, we ensured that the prevalence estimates for the "All Responses" option aligned across the different stratification levels, further supporting the internal validity of our findings.

### External Validation

To assess external validity, we compared our prevalence estimates to those reported in Killeen et al. (2023), which examined the population prevalence of vision impairment in U.S. adults aged 71 years and older. This study used a cutoff of 20/40 for defining distance and near visual acuity loss, along with a contrast sensitivity impairment cutoff of  $\log CS < 1.37$ . In our analysis, we applied a cutoff of 20/32 for distance and near visual acuity loss to align with prior VEHS analyses. We classified individuals with scores 20/32 or more as having any distance and near visual acuity loss, and those with scores 1.55  $\log CS$  or less as having any contrast sensitivity impairment. Before calculating our own estimates with these adjusted cutoffs, we attempted to replicate the findings from Killeen et al. using their specified cutoffs. Our estimates varied slightly from those in their paper due to our use of Round 12 NHATS data instead of the Round 11 data they utilized.

**Table 4. Comparison Table for Visual Function Prevalence Estimates**

	Any Distance Visual Acuity Loss	Any Near Visual Acuity Loss	Contrast Sensitivity Impairment
<b>Killeen et al. Prevalence Estimates</b>	10.3%	22.3%	10.0%
<b>Replicate Prevalence Estimates</b>	10.3%	19.24%	9.9%
<b>NHATS Summary Data Report Prevalence Estimates</b>	26.3%	41.1%	21.8%

\* Killeen et al. paper used data from Round 11. There were 3817 respondents included in Round 11. After excluding respondents who did not complete the sample person interview ( $n = 429$ ) and those with missing vision data ( $n = 362$ ), there were 3026 participants.

\*Replicate and NHATS Summary Data Report prevalence estimates were calculated using Round 12 data.

## Potential Limitations

Below are some limitations of the analysis:

- There are no widely used contrast sensitivity thresholds in the literature. Since we wanted more granular prevalence estimates, we categorized contrast sensitivity into four levels. However, this is not a widely used convention/ there are no widely accepted definitions.
- Age adjustment was done using the 2000 projected US population instead of a more recent projected population.
- This data focuses on older adults; hence it is not generalizable to the overall US population, providing a narrow snapshot of vision related prevalence estimates.
- There's some missingness in the data which may be introducing bias in prevalence estimates.



# Summary Statistics

## Crude Prevalence Estimates

**Table 5. Measured distance visual acuity by Age Group**

Age Group	Normal Vision (%)	Any Vision Loss (%)	Visual Impairment (%)	Mild Impairment (%)	Moderate Impairment (%)	US Blindness (%)	Missing Acuity (%)
65 +	73.72 (71.53, 75.82)	26.28 (24.18, 28.47)	25.54 (23.44, 27.74)	23.90 (21.99, 25.89)	1.64 (1.20, 2.20)	0.74 (0.48, 1.08)	6.41 (5.50, 7.43)
65 to 69	82.41 (78.51, 85.85)	17.59 (14.15, 21.49)	17.02 (13.58, 20.92)	16.05 (12.66, 19.92)	0.97 (0.37, 2.06)	-	5.25 (3.07, 8.30)
70 to 74	78.29 (74.82, 81.48)	21.71 (18.52, 25.18)	21.10 (17.83, 24.67)	19.83 (16.61, 23.37)	1.27 (0.41, 2.95)	-	4.16 (2.94, 5.69)
75 to 79	72.32 (67.96, 76.39)	27.68 (23.61, 32.04)	27.15 (23.07, 31.53)	25.84 (22.06, 29.92)	1.30 (0.49, 2.78)	-	4.84 (3.78, 6.09)
80 to 84	65.92 (62.36, 69.34)	34.08 (30.66, 37.64)	33.34 (29.83, 36.99)	30.75 (27.34, 34.32)	2.59 (1.73, 3.71)	-	7.50 (5.50, 9.94)
85 to 89	52.63 (46.87, 58.35)	47.37 (41.65, 53.13)	45.01 (39.07, 51.06)	41.75 (36.02, 47.64)	3.26 (1.89, 5.21)	-	12.27 (9.08, 16.09)
90 +	42.79 (37.85, 47.84)	57.21 (52.16, 62.15)	56.08 (51.03, 61.03)	50.16 (45.61, 54.71)	5.92 (3.66, 8.98)	-	24.35 (19.33, 29.94)

**Table 6. Measured distance visual acuity by Gender**

Gender	Normal Vision (%)	Any Vision Loss (%)	Visual Impairment (%)	Mild Impairment (%)	Moderate Impairment (%)	US Blindness (%)	Missing Acuity (%)
All genders	73.72 (71.53, 75.82)	26.28 (24.18, 28.47)	25.54 (23.44, 27.74)	23.90 (21.99, 25.89)	1.64 (1.20, 2.20)	0.74 (0.48, 1.08)	6.41 (5.50, 7.43)
Female	73.71 (70.97, 76.33)	26.29 (23.67, 29.03)	25.49 (22.93, 28.18)	23.72 (21.27, 26.30)	1.77 (1.23, 2.45)	-	7.69 (6.36, 9.20)
Male	73.73 (70.91, 76.41)	26.27 (23.59, 29.09)	25.61 (22.91, 28.46)	24.12 (21.65, 26.73)	1.49 (0.87, 2.39)	-	4.84 (3.83, 6.03)

**Table 7. Measured distance visual acuity by Race/Ethnicity**

Race Ethnicity	Normal Vision (%)	Any Vision Loss (%)	Visual Impairment (%)	Mild Impairment (%)	Moderate Impairment (%)	US Blindness (%)	Missing Acuity (%)
All races	73.72 (71.53, 75.82)	26.28 (24.18, 28.47)	25.54 (23.44, 27.74)	23.90 (21.99, 25.89)	1.64 (1.20, 2.20)	0.74 (0.48, 1.08)	6.41 (5.50, 7.43)

Race Ethnicity	Normal Vision (%)	Any Vision Loss (%)	Visual Impairment (%)	Mild Impairment (%)	Moderate Impairment (%)	US Blindness (%)	Missing Acuity (%)
White, non-Hispanic	76.17 (73.62, 78.58)	23.83 (21.42, 26.38)	23.26 (20.84, 25.83)	21.78 (19.56, 24.14)	1.48 (0.94, 2.21)	-	5.35 (4.27, 6.61)
Black, non-Hispanic	68.93 (63.22, 74.25)	31.07 (25.75, 36.78)	29.94 (24.74, 35.55)	27.74 (22.80, 33.12)	2.20 (1.39, 3.29)	-	11.31 (8.98, 13.98)
Hispanic, any race	62.00 (57.29, 66.55)	38.00 (33.45, 42.71)	35.87 (31.28, 40.65)	33.68 (29.14, 38.47)	2.18 (1.16, 3.71)	-	10.45 (7.85, 13.55)
Other	60.08 (50.67, 68.97)	39.92 (31.03, 49.33)	39.46 (30.75, 48.70)	36.97 (28.35, 46.26)	-	-	-

**Table 8. Measured distance visual acuity by Risk Factors**

Risk Factor	Normal Vision (%)	Any Vision Loss (%)	Visual Impairment (%)	Mild Impairment (%)	Moderate Impairment (%)	US Blindness (%)	Missing Acuity (%)
<b>Diabetes</b>							
No diabetes	76.15 (73.75, 78.43)	23.85 (21.57, 26.25)	23.12 (20.85, 25.52)	21.81 (19.76, 23.97)	1.32 (0.80, 2.03)	-	4.79 (3.87, 5.86)
Diabetes	66.26 (62.73, 69.66)	33.74 (30.34, 37.27)	32.99 (29.59, 36.53)	30.34 (27.07, 33.76)	2.65 (1.75, 3.84)	-	6.76 (4.92, 9.03)
<b>Smoking</b>							
Is not a smoker	74.06 (71.37, 76.61)	25.94 (23.39, 28.63)	25.57 (23.06, 28.20)	24.13 (21.74, 26.65)	1.44 (0.86, 2.24)	-	4.22 (3.25, 5.37)
Is a smoker	68.92 (62.39, 74.94)	31.08 (25.06, 37.61)	29.48 (23.28, 36.30)	27.65 (21.67, 34.27)	1.83 (0.61, 4.17)	-	-
<b>Residential care setting</b>							
Does not live in a nursing home/ residential care facility	74.92 (72.72, 77.02)	25.08 (22.98, 27.28)	24.38 (22.27, 26.58)	22.87 (20.96, 24.87)	1.51 (1.05, 2.09)	-	5.95 (5.06, 6.94)

Risk Factor	Normal Vision (%)	Any Vision Loss (%)	Visual Impairment (%)	Mild Impairment (%)	Moderate Impairment (%)	US Blindness (%)	Missing Acuity (%)
Lives in a nursing home/ residential care facility	46.38 (38.00, 54.92)	53.62 (45.08, 62.00)	52.27 (43.88, 60.57)	47.53 (39.62, 55.54)	-	-	15.96 (11.49, 21.34)

**Table 9. Measured near visual acuity by Age Group**

Age Group	Normal Near Visual Acuity (%)	Any Near Visual Acuity Loss (%)
65 +	58.88 (57.14, 60.61)	41.12 (39.39, 42.86)
65 to 69	68.66 (64.13, 72.93)	31.34 (27.07, 35.87)
70 to 74	62.58 (58.82, 66.22)	37.42 (33.78, 41.18)
75 to 79	57.83 (54.28, 61.33)	42.17 (38.67, 45.72)
80 to 84	49.18 (44.89, 53.48)	50.82 (46.52, 55.11)
85 to 89	38.84 (33.38, 44.53)	61.16 (55.47, 66.62)
90 +	28.59 (24.07, 33.45)	71.41 (66.55, 75.93)

**Table 10. Measured near visual acuity by Gender**

Gender	Normal Near Visual Acuity (%)	Any Near Visual Acuity Loss (%)
All genders	58.88 (57.14, 60.61)	41.12 (39.39, 42.86)
Female	57.52 (55.42, 59.60)	42.48 (40.40, 44.58)
Male	60.52 (58.00, 63.00)	39.48 (37.00, 42.00)

**Table 11. Measured near visual acuity by Race/Ethnicity**

Race Ethnicity	Normal Near Visual Acuity (%)	Any Near Visual Acuity Loss (%)
All races	58.88 (57.14, 60.61)	41.12 (39.39, 42.86)
White, non-Hispanic	61.19 (59.43, 62.94)	38.81 (37.06, 40.57)
Black, non-Hispanic	51.65 (47.22, 56.06)	48.35 (43.94, 52.78)
Hispanic, any race	44.54 (39.07, 50.10)	55.46 (49.90, 60.93)
Other	53.20 (42.90, 63.30)	46.80 (36.70, 57.10)

**Table 12. Measured near visual acuity by Risk Factors**

Risk Factor	Normal Near Visual Acuity (%)	Any Near Visual Acuity Loss (%)
Diabetes		
No diabetes	61.22 (59.27, 63.15)	38.78 (36.85, 40.73)
Diabetes	51.77 (47.75, 55.78)	48.23 (44.22, 52.25)

Risk Factor	Normal Near Visual Acuity (%)	Any Near Visual Acuity Loss (%)
<b>Smoking</b>		
Is not a smoker	60.27 (57.44, 63.05)	39.73 (36.95, 42.56)
Is a smoker	47.39 (40.90, 53.95)	52.61 (46.05, 59.10)
<b>Residential Care</b>		
Does not live in a nursing home/ residential care facility	59.82 (57.96, 61.66)	40.18 (38.34, 42.04)
Lives in a nursing home/ residential care facility	36.76 (27.78, 46.47)	63.24 (53.53, 72.22)

**Table 13. Contrast sensitivity by Age Group**

Age Group	Normal Contrast Sensitivity (%)	Any Contrast Sensitivity (%)	Mild Contrast Sensitivity (%)	Severe Contrast Sensitivity (%)
65 +	78.21 (76.37, 79.97)	21.79 (20.03, 23.63)	11.91 (10.81, 13.08)	9.88 (8.54, 11.36)
65 to 69	85.02 (81.37, 88.20)	14.98 (11.80, 18.63)	5.82 (3.90, 8.30)	9.16 (6.74, 12.11)
70 to 74	82.70 (79.32, 85.74)	17.30 (14.26, 20.68)	10.64 (8.45, 13.16)	6.66 (4.70, 9.11)
75 to 79	79.25 (75.79, 82.42)	20.75 (17.58, 24.21)	12.67 (10.58, 15.02)	8.07 (5.85, 10.81)
80 to 84	69.02 (65.40, 72.46)	30.98 (27.54, 34.60)	17.85 (14.92, 21.08)	13.14 (10.62, 16.00)
85 to 89	59.10 (54.86, 63.25)	40.90 (36.75, 45.14)	21.17 (16.77, 26.11)	19.73 (15.71, 24.27)
90 +	47.50 (41.46, 53.60)	52.50 (46.40, 58.54)	27.34 (22.03, 33.16)	25.16 (20.10, 30.78)

**Table 14. Contrast sensitivity by Gender**

Gender	Normal Contrast Sensitivity (%)	Any Contrast Sensitivity (%)	Mild Contrast Sensitivity (%)	Severe Contrast Sensitivity (%)
All genders	78.21 (76.37, 79.97)	21.79 (20.03, 23.63)	11.91 (10.81, 13.08)	9.88 (8.54, 11.36)
Female	78.10 (76.12, 79.99)	21.90 (20.01, 23.88)	11.84 (10.42, 13.38)	10.05 (8.58, 11.69)
Male	78.33 (75.52, 80.96)	21.67 (19.04, 24.48)	11.99 (10.33, 13.82)	9.68 (7.91, 11.68)

**Table 15. Contrast sensitivity by Race/Ethnicity**

Race Ethnicity	Normal Contrast Sensitivity (%)	Any Contrast Sensitivity (%)	Mild Contrast Sensitivity (%)	Severe Contrast Sensitivity (%)
All races	78.21 (76.37, 79.97)	21.79 (20.03, 23.63)	11.91 (10.81, 13.08)	9.88 (8.54, 11.36)
White, non-Hispanic	80.08 (78.03, 82.02)	19.92 (17.98, 21.97)	11.56 (10.17, 13.06)	8.36 (6.99, 9.91)
Black, non-Hispanic	74.00 (69.82, 77.88)	26.00 (22.12, 30.18)	13.53 (11.18, 16.16)	12.47 (9.75, 15.63)
Hispanic, any race	69.90 (64.38, 75.03)	30.10 (24.97, 35.62)	12.66 (9.16, 16.90)	17.44 (13.22, 22.35)
Other	67.59 (58.03, 76.19)	32.41 (23.81, 41.97)	13.84 (8.07, 21.58)	18.57 (12.64, 25.82)

**Table 16. Contrast sensitivity by Risk Factors**

Risk Factor	Normal Contrast Sensitivity (%)	Any Contrast Sensitivity (%)	Mild Contrast Sensitivity (%)	Severe Contrast Sensitivity (%)
<b>Diabetes</b>				
No diabetes	80.24 (78.18, 82.19)	19.76 (17.81, 21.82)	10.91 (9.85, 12.05)	8.84 (7.32, 10.57)
Diabetes	72.01 (69.15, 74.73)	27.99 (25.27, 30.85)	14.98 (12.46, 17.79)	13.01 (10.91, 15.36)
<b>Smoking</b>				
Is not a smoker	78.68 (75.65, 81.50)	21.32 (18.50, 24.35)	12.96 (11.05, 15.06)	8.36 (6.68, 10.31)
Is a smoker	73.24 (67.44, 78.51)	26.76 (21.49, 32.56)	12.71 (8.78, 17.58)	14.05 (8.83, 20.81)
<b>Residential Care</b>				
Does not live in a nursing home/ residential care facility	79.06 (77.13, 80.90)	20.94 (19.10, 22.87)	11.53 (10.42, 12.71)	9.41 (8.06, 10.91)
Lives in a nursing home/ residential care facility	58.51 (49.70, 66.93)	41.49 (33.07, 50.30)	20.80 (13.26, 30.17)	20.70 (14.95, 27.46)

## Age-adjusted Prevalence Estimates

**Table 17. Measured distance visual acuity by Gender**

Age Group	Normal Vision (%)	Any Vision Loss (%)	Visual Impairment (%)	Mild Impairment (%)	Moderate Impairment (%)	US Blindness (%)	Missing Acuity (%)
65 +	72.79 (70.68, 74.89)	27.21 (25.11, 29.32)	26.45 (24.35, 28.56)	24.70 (22.78, 26.63)	1.75 (1.28, 2.21)	0.76 (0.48, 1.05)	6.62 (5.64, 7.59)

**Table 18. Measured distance visual acuity by Gender**

Gender	Normal Vision (%)	Any Vision Loss (%)	Visual Impairment (%)	Mild Impairment (%)	Moderate Impairment (%)	US Blindness (%)	Missing Acuity (%)
All genders	72.79 (70.68, 74.89)	27.21 (25.11, 29.32)	26.45 (24.35, 28.56)	24.70 (22.78, 26.63)	1.75 (1.28, 2.21)	0.76 (0.48, 1.05)	6.62 (5.64, 7.59)
Female	73.07 (70.46, 75.68)	26.93 (24.32, 29.54)	26.11 (23.54, 28.67)	24.26 (21.81, 26.71)	1.84 (1.25, 2.44)	-	7.61 (6.23, 8.99)
Male	72.61 (69.97, 75.26)	27.39 (24.74, 30.03)	26.70 (24.03, 29.37)	25.09 (22.65, 27.54)	1.60 (0.97, 2.24)	-	5.33 (4.24, 6.41)

**Table 19. Measured distance visual acuity by Race/Ethnicity**

Race Ethnicity	Normal Vision (%)	Any Vision Loss (%)	Visual Impairment (%)	Mild Impairment (%)	Moderate Impairment (%)	US Blindness (%)	Missing Acuity (%)
All races	72.79 (70.68, 74.89)	27.21 (25.11, 29.32)	26.45 (24.35, 28.56)	24.70 (22.78, 26.63)	1.75 (1.28, 2.21)	0.76 (0.48, 1.05)	6.62 (5.64, 7.59)
White, non-Hispanic	75.55 (73.11, 77.98)	24.45 (22.02, 26.89)	23.86 (21.41, 26.30)	22.32 (20.07, 24.58)	1.54 (0.97, 2.11)	-	5.47 (4.29, 6.65)
Black, non-Hispanic	67.20 (62.42, 71.98)	32.80 (28.02, 37.58)	31.50 (26.70, 36.30)	29.21 (24.71, 33.72)	2.28 (1.40, 3.17)	-	12.09 (9.79, 14.38)
Hispanic, any race	59.48 (55.51, 63.45)	40.52 (36.55, 44.49)	38.29 (34.13, 42.46)	35.61 (31.43, 39.80)	2.68 (1.38, 3.98)	-	11.51 (8.46, 14.56)
Other	57.55 (48.94, 66.16)	42.45 (33.84, 51.06)	41.97 (33.55, 50.38)	39.10 (30.65, 47.55)	-	-	-

**Table 20. Measured distance visual acuity by Risk Factors**

Risk Factor	Normal Vision (%)	Any Vision Loss (%)	Visual Impairment (%)	Mild Impairment (%)	Moderate Impairment (%)	US Blindness (%)	Missing Acuity (%)
<b>Diabetes</b>							
No diabetes	75.08 (72.81, 77.36)	24.92 (22.64, 27.19)	24.16 (21.90, 26.42)	22.74 (20.68, 24.80)	1.42 (0.86, 1.97)	-	4.93 (3.92, 5.94)
Diabetes	65.59 (62.19, 68.98)	34.41 (31.02, 37.81)	33.62 (30.21, 37.03)	30.83 (27.55, 34.12)	2.79 (1.79, 3.79)	-	7.17 (5.09, 9.25)
<b>Smoking</b>							
Is not a smoker	74.05 (71.53, 76.57)	25.95 (23.43, 28.47)	25.56 (23.07, 28.04)	24.06 (21.66, 26.47)	1.49 (0.88, 2.10)	-	4.31 (3.23, 5.39)
Is a smoker	64.52 (58.81, 70.23)	35.48 (29.77, 41.19)	33.33 (27.38, 39.29)	30.88 (25.19, 36.58)	2.45 (0.80, 4.10)	-	-
<b>Residential care setting</b>							
Does not live in a nursing home/	73.58 (71.48, 75.68)	26.42 (24.32, 28.52)	25.65 (23.55, 27.76)	23.98 (22.06, 25.90)	1.67 (1.19, 2.15)	-	6.39 (5.43, 7.34)

Risk Factor	Normal Vision (%)	Any Vision Loss (%)	Visual Impairment (%)	Mild Impairment (%)	Moderate Impairment (%)	US Blindness (%)	Missing Acuity (%)
residential care facility							
Lives in a nursing home/ residential care facility	55.10 (43.00, 67.20)	44.90 (32.80, 57.00)	43.59 (31.65, 55.53)	40.20 (28.26, 52.13)	-	-	12.54 (5.42, 19.67)

**Table 21. Measured near visual acuity by Age Group**

Age Group	Normal Near Visual Acuity (%)	Any Near Visual Acuity Loss (%)
65 +	57.94 (56.31, 59.58)	42.06 (40.42, 43.69)

**Table 22. Measured near visual acuity by Gender**

Gender	Normal Near Visual Acuity (%)	Any Near Visual Acuity Loss (%)
All genders	57.94 (56.31, 59.58)	42.06 (40.42, 43.69)
Female	57.01 (54.96, 59.06)	42.99 (40.94, 45.04)
Male	59.06 (56.71, 61.41)	40.94 (38.59, 43.29)

**Table 23. Measured near visual acuity by Race/Ethnicity**

Race Ethnicity	Normal Near Visual Acuity (%)	Any Near Visual Acuity Loss (%)
All races	57.94 (56.31, 59.58)	42.06 (40.42, 43.69)
White, non-Hispanic	60.53 (58.80, 62.25)	39.47 (37.75, 41.20)
Black, non-Hispanic	49.88 (45.99, 53.77)	50.12 (46.23, 54.01)
Hispanic, any race	41.59 (37.29, 45.90)	58.41 (54.10, 62.71)
Other	50.45 (41.32, 59.58)	49.55 (40.42, 58.68)

**Table 24. Measured near visual acuity by Risk Factors**

Risk Factor	Normal Near Visual Acuity (%)	Any Near Visual Acuity Loss (%)
Diabetes		
No diabetes	60.15 (58.30, 62.00)	39.85 (38.00, 41.70)
Diabetes	51.32 (47.68, 54.95)	48.68 (45.05, 52.32)
Smoking		
Is not a smoker	60.03 (57.36, 62.69)	39.97 (37.31, 42.64)

Risk Factor	Normal Near Visual Acuity (%)	Any Near Visual Acuity Loss (%)
Is a smoker	42.49 (36.40, 48.57)	57.51 (51.43, 63.60)
Residential Care		
Does not live in a nursing home/ residential care facility	58.50 (56.77, 60.23)	41.50 (39.77, 43.23)
Lives in a nursing home/ residential care facility	44.29 (30.84, 57.74)	55.71 (42.26, 69.16)

**Table 25. Contrast sensitivity by Age Group**

Age Group	Normal Contrast Sensitivity (%)	Any Contrast Sensitivity (%)	Mild Contrast Sensitivity (%)	Severe Contrast Sensitivity (%)
65 +	77.24 (75.44, 79.04)	22.76 (20.96, 24.56)	12.36 (11.22, 13.50)	10.41 (9.00, 11.81)

**Table 26. Contrast sensitivity by Gender**

Gender	Normal Contrast Sensitivity (%)	Any Contrast Sensitivity (%)	Mild Contrast Sensitivity (%)	Severe Contrast Sensitivity (%)
All genders	77.24 (75.44, 79.04)	22.76 (20.96, 24.56)	12.36 (11.22, 13.50)	10.41 (9.00, 11.81)
Female	77.47 (75.57, 79.37)	22.53 (20.63, 24.43)	12.11 (10.64, 13.57)	10.43 (8.89, 11.96)
Male	77.13 (74.59, 79.67)	22.87 (20.33, 25.41)	12.61 (10.94, 14.29)	10.26 (8.41, 12.11)

**Table 27. Contrast sensitivity by Race/Ethnicity**

Race Ethnicity	Normal Contrast Sensitivity (%)	Any Contrast Sensitivity (%)	Mild Contrast Sensitivity (%)	Severe Contrast Sensitivity (%)
All races	77.24 (75.44, 79.04)	22.76 (20.96, 24.56)	12.36 (11.22, 13.50)	10.41 (9.00, 11.81)
White, non-Hispanic	79.38 (77.34, 81.42)	20.62 (18.58, 22.66)	11.84 (10.41, 13.28)	8.78 (7.31, 10.24)
Black, non-Hispanic	71.19 (67.49, 74.89)	28.81 (25.11, 32.51)	15.23 (12.74, 17.72)	13.58 (10.77, 16.40)
Hispanic, any race	67.50 (62.74, 72.26)	32.50 (27.74, 37.26)	14.50 (10.42, 18.58)	18.00 (13.92, 22.08)
Other	65.95 (57.58, 74.33)	34.05 (25.67, 42.42)	13.87 (8.06, 19.69)	20.17 (12.77, 27.58)

**Table 28. Contrast sensitivity by Risk Factors**

Risk Factor	Normal Contrast Sensitivity (%)	Any Contrast Sensitivity (%)	Mild Contrast Sensitivity (%)	Severe Contrast Sensitivity (%)
Diabetes				
No diabetes	79.18 (77.24, 81.12)	20.82 (18.88, 22.76)	11.45 (10.33, 12.58)	9.37 (7.80, 10.94)



Risk Factor	Normal Contrast Sensitivity (%)	Any Contrast Sensitivity (%)	Mild Contrast Sensitivity (%)	Severe Contrast Sensitivity (%)
Diabetes	71.18 (68.39, 73.96)	28.82 (26.04, 31.61)	15.04 (12.41, 17.67)	13.78 (11.45, 16.12)
Smoking				
Is not a smoker	78.32 (75.50, 81.15)	21.68 (18.85, 24.50)	13.04 (11.07, 15.00)	8.64 (6.85, 10.43)
Is a smoker	67.34 (62.03, 72.64)	32.66 (27.36, 37.97)	15.63 (11.49, 19.77)	17.03 (11.76, 22.31)
Residential Care				
Does not live in a nursing home/ residential care facility	77.63 (75.81, 79.44)	22.37 (20.56, 24.19)	12.24 (11.11, 13.38)	10.13 (8.75, 11.52)
Lives in a nursing home/ residential care facility	66.05 (54.25, 77.84)	33.95 (22.16, 45.75)	18.82 (7.41, 30.23)	15.14 (9.46, 20.81)

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