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Vision Impairment and Eye Care Utilization among Americans 50 and Older

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Abstract

Background—Few studies have provided population-based estimates of the vision impairment, eye disease and eye care in the United States. Using data from the Behavioral Risk Factor Surveillance System (BRFSS) this study reports the overall and age-race-specific prevalence of self-reported vision impairment, eye diseases, and eye care utilization among older adults.

Methods—Between 2005 and 2008 residents aged 50 and older in seventeen states responded to BRFSS questions concerning difficulty with distance and near vision-related tasks, self-reported eye diseases and reported eye care insurance and service utilization.

Results—The overall prevalence of difficulty with distance and near vision was 16.6% and 32.8%, respectively with no meaningful change with increasing age. The prevalence of cataract, glaucoma, and macular degeneration was 19.6%, 6.4%, and 5.8%; all of which increased dramatically with age. Nearly 69% of Whites and Blacks and 65% of Hispanics visited an eye care provider in the past year. Overall, among the approximately one-third of participants who did not visit an eye care provider in the past year, half indicated that they did not have any reason to go and 20% cited it was due to cost/insurance.

Conclusion—The continued and expanding use of the BRFSS *Visual Impairment and Access to Eye Care* module represents a unique opportunity to obtain population-based estimates of vision impairment, eye disease and, perhaps most uniquely, eye care utilization. Moreover, the integration of this and other BRFSS modules will provide researchers the opportunity to evaluate the relationship between these estimates and other measures of health status and health care utilization. However, the self-reported nature of the BRFSS data is an important limitation that must be considered when interpreting the results.

INTRODUCTION

Vision impairment is an important public health problem that affects more than 3.4 million older adults in the U.S.[1] The leading causes of vision impairment and blindness in the U.S. are primarily age-related eye diseases, such as age-related macular degeneration, cataract, and glaucoma. As the number of people with vision impairment is expected to increase with the aging U.S. population, accurate information on visual health and eye care utilization is needed to plan optimal services for this growing segment of the population.

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Surprisingly, there is little up-to-date research on the prevalence of vision impairment and eye care utilization in the U.S. Existing population-based studies on vision impairment and eye diseases in the U.S. are often geographically[2–5] and racially[6–13] homogenous, thereby limiting their generalizability. Further, some are outdated[11,25] or provide estimates based on aggregated samples from the U.S. and other countries.[1,14–18] One recent study on self-reported blindness and "trouble seeing" was based on a nationally representative sample and included multiple American racial groups, but the data on which the study is based is over 10 years old.[19] Even fewer studies have estimated the prevalence of eye care utilization, particularly stratified by demographic subgroups.[20–21] Given the importance of vision impairment and the limitations of the existing literature, there is a need to monitor its prevalence and the attendant trends in eye care utilization.

The Behavioral Risk Factor Surveillance System (BFRSS) is a population-based surveillance survey of health conditions and behaviors conducted annually in the U.S. In 2005, five states utilized the BRFSS *Visual Impairment and Access to Eye Care* module, which was administered to participants 50 years of age and older. These data have been published previously, though not according to age and race.[22] As of 2008 a total of seventeen states had implemented this module at least once. Thus, the objective of this study is to provide estimates for the overall and age-race-specific prevalence of self-reported vision impairment and eye care utilization based upon data from seventeen states.

MATERIALS AND METHODS

Study Population

The BRFSS is a cross-sectional surveillance survey involving collaboration between the Centers for Disease Control and Prevention (CDC) and U.S. states and territories.[23] It is an ongoing program designed to measure health-related behavioral risk factors from a random sample of individuals aged 18 and older (one per household) via a telephone survey. For the purposes of this study, data on age, gender, race, income, and education were obtained in addition to participants' self-reported medical history, including medical conditions and smoking history. Although all states administer a core set of modules, individual states also elect to use other modules focused on a variety of health-related topics. Between 2005 and 2008 seventeen states (Alabama, Arizona, Connecticut, Florida, Georgia, Indiana, Iowa, Louisiana, Missouri, New Mexico, New York, North Carolina, Ohio, Tennessee, Texas, West Virginia, Wyoming) had administered the *Visual Impairment and Access to Eye Care* module at least once. This module is not administered to all BRFSS participants, only to those who are 50 years of age and older (2005 and 2006) and those who are 40 years of age and older (2007 and 2008). In the interest of consistency, the results reported herein are limited to those 50 years of age and older. Additionally, for those states that had administered this module more than once during this time period, data from the most recent year was utilized.

Variable Definitions

Eligible participants were asked how much difficulty, if any, they had doing two types of vision-related activities: 1) Distance vision was assessed by difficulty associated with recognizing a friend across the street; 2) Near vision was assessed by difficulty related to reading print in a newspaper, magazine, recipe, menu, or numbers on the telephone. Participants who reported wearing glasses or contact lenses were asked to rate the difficulty of these tasks when wearing them. Those who responded "A little difficulty," "Moderate difficulty," "Extreme difficulty," and "Unable to do because of eyesight" were all classified as having "Any difficulty" with distance and near vision, respectively. They are compared to those who reported "No difficulty" with these tasks. Such a dichotomization has been used

previously when analyzing BRFSS visual difficulty questions as well as other related self-reported measures of visual difficulty.[24]

In addition, respondents were asked if they had been told by an eye doctor or other health care professional that they had cataract, glaucoma, or macular degeneration. Participants were also asked when was the last time they visited an eye care professional, as well as had a dilated eye exam. If applicable, participants were asked about the main reason they did not visit an eye professional in the past year.

Statistical Analysis

Overall and age-race-specific prevalence of self-reported vision difficulties and eye diseases were calculated; the proportion of respondents reporting eye care insurance coverage and utilization of eye care services were similarly calculated. The BRFSS sampling weights were applied to provide state estimates by accounting for individual selection probabilities, and adjusting for non-response and post-stratification. Chi-square tests were conducted to evaluate whether any observed differences within the overall and race-specific groups differed by age accounting for the sampling design employed by the BRFSS. P-values ≤ 0.05 (two-sided) were considered statistically significant.

RESULTS

Table 1 presents demographic characteristics of the BRFSS participants who completed the *Visual Impairment and Access to Eye Care* module in seventeen states between 2005 and 2008. The 64,753 actual observations when weighted represent approximately 39 million people aged 50 and older in these states. The mean age is 63.7 years; there are slightly more females (54.3%) than males. The majority of participants are non-Hispanic White (76.0%), followed by Black (10.0%), Hispanic (9.4%), and other races (4.6%). The majority of participants are from three states including Florida (15.4%), New York (14.7%), Texas (13.7%).

Vision Difficulties

Table 2 presents overall and age-race-specific prevalences for difficulty with three types of vision-related tasks. The overall prevalence of distance vision impairment is 16.6%; the prevalence is relatively stable among those who are 50 to 79 years of age, but sharply increases (to 18.9%) among those 80 years and older. This general trend is evident among all racial groups, though the prevalence is highest among Hispanics, followed by Blacks and Whites. Near vision impairment is reported by 32.8% of all participants with Blacks having the highest prevalence (40.7%), followed by Hispanics (37.1%) and Whites (31.0%). For all racial groups from the 50s to the 60s there is a decline in the prevalence of near vision impairment; the prevalence then remains stable through the 80s.

Eye Diseases

Table 2 also presents overall and age-race-specific prevalences for specific self-reported eye diseases. The overall prevalence of cataract increases with age, from 6.6% among persons aged 50 to 59 years, to peaking at 31.6% in the 70–79 year age group; this pattern is also observed for Whites and Hispanics. The peak prevalence among Blacks is not observed until the 80 and older age group. The overall prevalence of glaucoma is 6.5%, which also increases with age; similar patterns are observed within each racial group. The prevalence is the highest among Blacks (9.9%), followed by Hispanics (7.0%) and Whites (5.7%). Whites have the lowest prevalence in all age groups compared to age-equivalent Blacks and Hispanics; conversely, Blacks have the highest prevalence in all age groups. Macular degeneration is reported by 5.8% of all participants. The prevalence is highest among

Whites (5.4%), followed by Hispanics (5.0%) and Blacks (3.5%). For Whites and Hispanics, the prevalence of macular degeneration increases with age; a similar pattern is observed for Blacks though the increase is less precipitous.

Eye Care Utilization

About two-thirds of all participants report that they visited an eye care provider within the past year; this is similar for all racial groups (Table 3). Moreover, the proportion of those who visited an eye care provider in the past year increases with age, for the overall sample as well as within each racial group. The most common (49.0%) reason given for not visiting an eye doctor within past year was no reason to go. Among Whites, the proportion citing this reason slightly increases with age. Overall, approximately 1 in 5 participants who had not seen an eye doctor within the past year report cost and/or (lack of) insurance as the reason with the latter decreasing and the former increasing with age among all participants and racial groups. With respect to the most recent eye dilated exam, the overall proportion reporting a dilated eye exam within past year is 57.3%, which increases with age for the overall sample and uniformly for all racial groups.

DISCUSSION

This study provides current overall and race-specific self-reported prevalences for a number of vision concerns, including vision impairment reflected in near and far tasks, eye diseases, and eye care insurance coverage and utilization among older Americans. Population-based data from such a large number of states has not been previously available. And beyond overall estimates, analyses stratified by race and age represent an important opportunity for monitoring the prevalence and attendant trends in vision impairments, eye diseases, and eye care utilization for specific subgroups. However, the self-reported nature of these measures must be considered when interpreting the observed results.

Comparing the findings to the existing literature is problematic for several reasons. Only a limited number of investigations have included more than one racial/ethnic group, so in most cases it is not possible to assess inter-racial differences and compare these to our findings. Also, many studies aggregated American and non-American samples for particular racial groups (e.g., White Australian and/or Dutch participants combined with White American participants; Black Barbadians combined with Black Americans).[1,14–18] This is relevant because of research suggesting that prevalences vary depending on race and nationality (at least for age-related maculopathy and glaucoma).[15,25] The BRFSS sample only includes Americans so caution must be exercised when comparing our findings to studies conducted outside the United States.

The findings of this study suggest that the overall prevalence of having any difficulty with distance vision and near vision is 16.6% and 32.8%, respectively. Overall and within each age group, Hispanics generally have a higher prevalence of difficulties with distance vision tasks compared to their White and Black counterparts, a finding consistent with at least one other study.[14] Further, based on objective measures of visual acuity[14] or self-reported vision impairment[19], prior research largely finds that vision impairments increase with age for all racial groups. The results of the current study generally corroborate this trend for measures of distance vision tasks, both overall and within each racial group. However, for near vision tasks, no consistent overall or intra-racial age-related patterns emerged. One possible explanation for this is that visual function deficits identified by clinical eye exams (i.e., acuity) do not necessarily manifest in all day-to-day vision-oriented tasks.[26–28] With respect to near-vision tasks, perhaps people have a greater capacity to compensate for otherwise general vision impairments (e.g., through the use of a magnifying lens or “drugstore readers,” or holding an object at a comfortable distance to see). Thus, these results suggest

that in the face of increasing vision impairment as one ages, such deficits may not hinder all daily vision-related tasks.

With respect to the major eye diseases, our findings demonstrate that, although the overall prevalence of cataract is highest among Whites, this is not true for every age group. For the youngest age group examined (50–59 years), both Blacks and Hispanics have higher prevalences of cataract. And although previous research[16] found the prevalence to be higher for Whites than Blacks among those aged 80 years and older, we find the reverse. Perhaps the difference in these results is a reflection of differing populations across investigations.[1,14–18] That the prevalence of cataract declines from the 70–79 age group to the 80+ age group may also reflect the fact that individuals with cataract are associated with an increased mortality rate.[39] Because the BRFSS data are based on self-report, compared to clinical exams in other studies, disease presence may be misclassified more often in this study.

However, age- and race-related patterns for glaucoma are much more congruent with past research. Specifically, as expected, Blacks have the highest overall prevalence of glaucoma, followed by Hispanics and Whites.[15,17,29] This is true for each age group as well. And, as with past research[15,17,29], the prevalence of glaucoma increased with age, both overall and for each racial group.

There is ample literature on the incidence and prevalence of age-related macular degeneration (AMD); however, given the varied criteria used to define AMD, comparisons with the current results are more tenuous. Nonetheless, our results are consistent with past studies which have generally found that Hispanics have the highest prevalence of (early) AMD at earlier old ages, and Whites supersede them at older ages.[13,25,30] For advanced AMD, the literature is less clear; some research suggests that, at younger old ages, Black women have a higher prevalence of advanced AMD compared to White women, and White males have a higher prevalence than Blacks at all ages.[18] With gender aggregated, other research finds that for the early 50s age group, Whites have the highest prevalence of late AMD, which is superseded by Blacks for a couple of age cohorts before Whites again demonstrate the highest prevalences for the remainder of all age groups.[13] And, consistent with past research, the overall and inter-racial prevalences of AMD increase with age.[13,18,25,30]

Despite the fact that the BRFSS provides self-reported information on eye disease and visual difficulty, the population-based nature of this information and the potential to evaluate state-specific longitudinal trends makes it a valuable resource. Added to this is the information on eye care utilization, a topic for which the availability of population-based data has been largely non-existent. We observed an increase in the proportion of older adults that had been to an eye care provider in the last year as well as having received a dilated eye exam. This increase was observed for all racial groups. Given the age-related increase in the prevalence of eye disease and vision impairment, such increases in eye care utilization should not be surprising. Recent work provides evidence support of this relationship and our finding that cost and insurance represent a significant impediment to eye care utilization.[31–32] However, perhaps equally important is the fact that the majority of those who had not visited an eye care provider in the past year saw no reason to do so. Thus, while prior work as advocated for dramatically increasing health insurance as a means to improve eye care utilization[31], education surrounding preventative eye care screenings may be equally important. Also of interest was the observation that, while less common than cost and not seeing a need, transportation was reported as an increasing impediment to eye care utilization with age. This is consistent with other findings and underscores the fact that reducing the burden of vision impairment, as with other health conditions, will require a multi-disciplinary

approach. This approach should involve the medical as well as the larger community and focus on improving the availability of and access to health care resources and the public's knowledge regarding the importance of preventative health care.[33–35]

The results of this study should be interpreted in light of several strengths and limitations. In contrast to prior research, the BRFSS represents data with both geographic and demographic diversity. This permits more comprehensive estimates of the prevalence of certain visual problems than has been available in the past. However certain limitations must also be acknowledged. All of the information in the BRFSS is based upon self-report thus introducing the possibility of misclassification. Though the reliability and validity of BRFSS data has been previously evaluated,[36–38] these studies did not include the *Visual impairment and Access to Eye Care* module. With respect to visual difficulties there is little concern as these measures are meant to represent an individual's own experiences and because research has suggested that the specific tasks referred to in the BRFSS visual near and distance difficulty questions (e.g., reading print in a newspaper) are associated with central vision impairment.[40] This is in contrast to eye diseases and eye care utilization where self-report may produce biased prevalence estimates; however, with respect to macular degeneration and cataract there is evidence that self-report can yield valid and reliable information.[41,42] It should also be noted that eye disease prevalence may be underestimated. This is attributable to the fact that not 100% of the respondents had seen an eye care provider in the prior year. However, this bias is likely to be minimal as the vast majority of respondents indicated they had seen an eye care provider within the past two years.

The results of the current study provide a unique perspective on vision impairment, eye disease and eye care utilization not previously available. That the results presented herein are largely supported by prior research is encouraging in that this underscores the value of the continued use of the BRFSS *Visual Impairment and Access to Eye Care* module for documenting and monitoring trends. Moreover, when combined with the abundance of health behavior data in the BRFSS generally, there are numerous opportunities to evaluate, albeit in a cross-sectional manner, correlates of self-reported vision impairment, eye disease, and eye care utilization.

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TABLE 1

Demographic Characteristics of Individuals 50 Years of Age and Older Residing in 17 States, 2005–2008

		N	%
Age	50–59	16,298,520	41.9
	60–69	10,984,893	28.2
	70–79	7,762,076	20.0
	80+	3,847,799	9.9
Gender	Male	17,835,155	45.9
	Female	21,058,131	54.1
Race	White	30,267,362	77.8
	Black	3,670,119	9.4
	Hispanic	3,020,835	7.8
	Other	1,537,609	4.0
State	Alabama	1,472,076	3.8
	Arizona	1,639,114	4.2
	Connecticut	1,120,985	2.9
	Florida	6,001,110	15.4
	Georgia	2,240,255	5.8
	Indiana	1,865,599	4.8
	Iowa	928,149	2.4
	Louisiana	1,082,173	2.8
	Missouri	1,861,558	4.8
	New Mexico	594,200	1.5
	New York	5,696,102	14.7
	North Carolina	2,753,946	7.1
	Ohio	3,579,599	9.2
	Tennessee	1,889,616	4.9
	Texas	5,343,757	13.7
	West Virginia	656,621	1.7
	Wyoming	168,426	0.4

TABLE 2

Overall, Age-Specific, and Race-Specific Prevalence (%) of Visual Difficulty and Eye Disease

Age Range	All	50–59	60–69	70–79	80+	p-value
ALL						
Any difficulty with distance vision[a]	16.6	15.4	14.3	15.5	18.9	<0.0001
Any difficulty with near vision[c]	32.8	35.8	30.1	29.4	30.9	<0.0001
Cataract	19.6	6.6	20.9	31.6	24.4	<0.0001
Glaucoma	6.4	3.3	5.3	10.0	13.6	<0.0001
Macular degeneration	5.8	2.7	3.5	7.9	15.2	<0.0001
WHITE						
Any difficulty with distance vision[a]	14.3	13.9	12.7	14.6	19.0	<0.0001
Any difficulty with near vision[c]	31.0	34.7	27.6	28.6	30.5	<0.0001
Cataract	17.8	6.3	21.4	32.3	23.2	<0.0001
Glaucoma	5.7	2.5	4.9	9.3	12.5	<0.0001
Macular degeneration	5.4	2.6	3.3	8.2	16.5	<0.0001
BLACK						
Any difficulty with distance vision[a]	19.1	18.6	20.5	17.6	20.8	0.3278
Any difficulty with near vision[c]	40.7	42.8	40.1	35.6	39.7	0.0761
Cataract	15.8	7.2	19.1	27.8	36.6	<0.0001
Glaucoma	9.9	6.0	8.8	18.2	23.4	<0.0001
Macular degeneration	3.5	2.5	4.3	4.6	4.3	0.2248
HISPANIC						
Any difficulty with distance vision[a]	21.8	23.8	18.5	22.7	19.5	0.1751
Any difficulty with near vision[c]	37.1	38.7	38.2	32.8	30.5	<0.0001
Cataract	15.2	8.3	17.5	27.6	27.1	<0.0001
Glaucoma	7.0	5.1	5.2	12.3	17.1	0.0007
Macular degeneration	5.0	4.4	4.1	7.2	8.8	0.2926

[a]Assessed by level of difficulty in “recognizing a friend across the street”

[c]Assessed by level of difficulty in “reading print in newspaper, magazine, recipe, menu, or numbers on the telephone”

TABLE 3

Overall, Age-Specific, and Race-Specific Prevalences (%) for Eye Care Utilization and Insurance

Age Range	All	50–59	60–69	70–79	80+	p-value
			ALL			
Last time visited eye care provider						
<1 year ago	67.1	60.6	66.1	76.1	79.3	<0.0001
≥1 year but <2 year ago	16.0	18.6	16.6	12.5	10.5	
≥2 years ago	15.7	18.9	16.3	11.0	10.0	
Never	1.2	1.9	1.0	0.4	0.2	
Reason did not use eye doctor past 12 months						
Cost/insurance	21.8	26.9	21.2	12.0	6.5	<0.0001
Transportation	1.4	1.0	0.8	2.6	4.4	
No reason to go	49.0	43.2	52.1	57.9	61.2	
Have not thought of it	6.7	7.3	6.6	5.3	5.2	
Other	21.1	21.6	19.4	22.3	22.7	
When last eye dilated exam						
<1 year ago	57.3	49.5	56.9	67.3	71.3	<0.0001
≥1 year but <2 year ago	15.2	17.5	15.4	12.6	10.4	
≥2 years ago	21.3	24.8	21.9	16.4	14.9	
Never	6.2	8.2	5.8	3.8	3.5	
			WHITE			
Last time visited eye care provider						
<1 year ago	67.6	60.0	66.6	77.0	80.2	<0.0001
≥1 year but <2 year ago	16.2	19.2	16.9	12.5	10.3	
≥2 years ago	15.4	19.4	15.8	10.3	9.4	
Never	0.8	1.4	0.7	0.2	0.1	
Reason did not use eye doctor past 12 months						
Cost/insurance	19.5	23.9	19.8	10.3	5.5	<0.0001
Transportation	1.1	0.8	0.7	2.0	3.8	
No reason to go	51.7	46.5	54.2	59.0	63.2	
Have not thought of it	6.9	7.8	6.4	5.7	5.3	
Other	20.8	21.0	19.0	23.1	22.3	
When last eye dilated exam						
<1 year ago	57.9	48.9	57.6	68.1	72.4	<0.0001
≥1 year but <2 year ago	15.7	18.3	15.9	13.1	10.3	
≥2 years ago	21.3	25.9	21.5	15.9	14.4	
Never	5.1	6.8	5.0	2.9	2.9	
			BLACK			
Last time visited eye care provider						
<1 year ago	67.1	64.4	65.3	74.1	76.9	<0.0001
≥1 year but <2 year ago	14.8	16.2	14.9	11.6	11.8	

Age Range	All	50–59	60–69	70–79	80+	p-value
≥2 years ago	16.5	16.8	18.8	13.7	11.2	
Never	1.7	2.6	1.0	0.7	0.2	
Reason did not use eye doctor past 12 months						
Cost/insurance	27.6	34.4	21.8	20.4	7.2	
Transportation	1.6	1.0	0.4	4.4	8.6	
No reason to go	41.6	33.1	49.8	49.7	62.8	<0.0001
Have not thought of it	7.5	7.9	8.5	5.2	2.2	
Other	21.8	23.7	19.5	20.2	19.2	
When last eye dilated exam						
<1 year ago	56.5	53.9	54.1	63.9	68.8	
≥1 year but <2 year ago	14.3	15.2	15.1	11.2	11.0	0.0011
≥2 years ago	20.9	21.0	22.8	19.4	15.1	
Never	8.4	9.9	8.0	5.6	5.2	
HISPANIC						
Last time visited eye care provider						
<1 year ago	64.0	61.0	64.6	70.2	70.2	
≥1 year but <2 year ago	16.6	17.7	17.1	14.0	12.1	0.3418
≥2 years ago	15.7	16.5	15.9	12.8	14.9	
Never	3.7	4.8	2.5	3.0	2.8	
Reason did not use eye doctor past 12 months						
Cost/insurance	32.8	38.6	32.2	17.8	15.2	
Transportation	2.7	2.1	1.1	8.1	4.4	
No reason to go	36.2	60.5	38.8	50.2	43.1	0.0312
Have not thought of it	5.7	5.3	7.4	2.6	8.8	
Other	22.6	23.6	20.5	21.4	28.5	
When last eye dilated exam						
<1 year ago	53.0	48.3	52.7	63.5	64.0	
≥1 year but <2 year ago	14.1	15.9	13.3	10.8	11.2	0.0027
≥2 years ago	20.6	20.2	23.8	16.2	19.6	
Never	12.4	15.6	10.2	9.6	5.2	