

Research Article

Frequency of Self-Reported Eye Diseases and Vision-Related Functional Difficulties among Survey Respondents

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ABSTRACT

Background: Eye diseases and functional visual difficulties impose a substantial burden, but diagnostic history and daily-life visual limitations capture different dimensions of eye health. Public National Health and Nutrition Examination Survey (NHANES) vision codebooks provide directly auditable response counts for two US survey cycles.

Objective: To describe the unweighted frequency of reported glaucoma, age-related macular degeneration, cataract-operation history and selected vision-related functional difficulties among eligible NHANES respondents in 2005-2006 and 2007-2008.

Methods: We independently transcribed definitive response counts from the CDC VIQ_D and VIQ_E published frequency tables. Disease responses were yes versus no; visual difficulty was defined as any reported difficulty or inability due to eyesight; invalid, inapplicable and “does not do for other reasons” responses were excluded from each item’s denominator. We recalculated unweighted percentages separately for each cycle. No patient-level file, examination data, weights, variance strata or clusters were available in this analysis.

Results: For 2007-2008, reported glaucoma occurred in 263/4,010 (6.6%) eligible respondents aged 40 years or older, and reported macular degeneration in 148/3,992 (3.7%). Previous cataract surgery was reported by 631/5,931 (10.6%) respondents aged 20 years or older. Reading difficulty was reported by 1,375/5,829 (23.6%), and difficulty seeing steps in dim lighting by 1,061/5,777 (18.4%). Comparable 2005-2006 counts were 219/3,032 (7.2%), 141/3,019 (4.7%), 440/4,974 (8.8%), 1,091/4,925 (22.2%) and 880/4,883 (18.0%), respectively.

Conclusions: These verified published survey counts demonstrate substantial self-reported visual functional difficulty, while glaucoma and macular degeneration histories were less frequently reported. Estimates are descriptive sample proportions, not design-weighted US population prevalence, changes over time or clinically adjudicated disease frequencies. A publishable population-inference study would require patient-level data and NHANES complex-survey analysis.

Keywords: Eye Disease, Glaucoma, Macular Degeneration, Cataract Surgery, Visual Difficulty, Vision Function, Nhanes, Secondary Analysis.

INTRODUCTION

Vision affects reading, mobility, independent living and participation in daily activities. The

World Health Organization and the Lancet Global Health Commission have identified vision impairment and avoidable eye disease

as important global public-health concerns [1,2]. Cataract, glaucoma and age-related macular degeneration represent clinically distinct conditions that cannot be accurately represented by a single generic vision-disability measure [2,3].

Glaucoma may produce few noticeable early symptoms and can lead to peripheral field loss, whereas macular degeneration predominantly compromises central vision in later disease [4,5]. Self-reported diagnoses and activity-based questionnaires can therefore provide complementary, but non-interchangeable, indicators of visual health. Crucially, participants who experience functional difficulty may not have a diagnosed eye disease, and conversely participants with diagnosed disease may report relatively preserved everyday function.

US NHANES collected standardized interview responses on self-rated eyesight, selected visual activities, eye disease and cataract-operation history during the 2005–2006 and 2007–2008 cycles. The CDC provides official, unrestricted codebooks containing response counts by variable and category [6,7]. This analysis uses those public aggregate data to generate a transparent description of sample frequencies and to demonstrate exactly what is, and is not, supported without accessing individual participant files.

MATERIALS AND METHODS

Study design and data sources

We conducted a documentary secondary analysis of the published NHANES Vision Questionnaire (VIQ) codebook frequency distributions for 2005–2006 (VIQ_D) and 2007–2008 (VIQ_E). These are archived CDC summary tabulations, not a newly collected hospital cohort. The source documents report 7,267 and 7,173 response records, respectively, for the general age-12+ vision questions [6,7].

Population and outcome eligibility

Eye-disease history questions about glaucoma and macular degeneration were directed to respondents aged 40 years or older; cataract-surgery and visual-task questions were directed to those aged 20 years or older; general eyesight quality was assessed at age 12 years or older. Disease history was based on recall of having been informed by an eye doctor. Previous cataract surgery was distinguished from active cataract.

Outcome coding and denominator specification

For glaucoma (VIQ090), age-related macular degeneration (VIQ310) and cataract surgery (VIQ071), the numerator was the count recorded “Yes” and the denominator was “Yes” plus “No”. For self-rated eyesight (VIQ031), fair/poor/very poor corresponded to response categories 3–5 and poor/very poor to categories 4–5. For task difficulties VIQ051A–E and VIQ056, “any difficulty” comprised little, moderate, extreme or unable because of eyesight (categories 2–5); the denominator was categories 1–5. In the driving question, participants who never drove were excluded. For activity limitation (VIQ061), the numerator comprised categories 1–4 and the denominator categories 0–4. Refusal, “don’t know”, inapplicable and not-done-for-other-reasons responses were excluded; therefore denominators vary by question.

Statistical analysis

All estimates were calculated by division of the published affirmative category counts by the defined valid denominator, multiplied by 100. The two cycles were displayed separately to avoid obscuring underlying sample sizes and differences in who responded. Differences were not interpreted as population trends; no design-based hypothesis tests, adjusted odds ratios or confidence intervals were calculated. Survey weights, strata and primary sampling units are not present in published one-way codebook tabulations, so design-consistent nationally representative estimation is not possible using this analytic input [8]. Calculations were independently implemented in Python and archived in a separate accompanying CSV.

Research ethics

The analysis used only openly accessible aggregate CDC frequency tables. No identifiable records were obtained, no participants were recruited and no local hospital data were used. Any institutional requirement for confirmation of exemption or non-human-subjects determination should be checked before journal submission.

RESULTS

Sample and disease-history frequencies

The general vision questionnaires contained 7,267 records in the 2005–2006 codebook and 7,173 in the 2007–2008 codebook. Only subsets of participants were eligible for disease-specific questions; for example, the

definite glaucoma-response denominator was 3,032 in 2005–2006 and 4,010 in 2007–2008. Table 1 summarizes the frequencies of disease

and prior cataract surgery, without implying that these represent nationally weighted prevalence estimates.

Outcome and eligibility	2005–06 n/N (%)	2007–08 n/N (%)
Glaucoma, ever told by eye doctor (age 40+)	219/3,032 (7.2%)	263/4,010 (6.6%)
Macular degeneration, ever told by eye doctor (age 40+)	141/3,019 (4.7%)	148/3,992 (3.7%)
Previous cataract operation (age 20+)	440/4,974 (8.8%)	631/5,931 (10.6%)

Glaucoma history was reported in 219/3,032 (7.2%) and 263/4,010 (6.6%) eligible respondents; age-related macular degeneration in 141/3,019 (4.7%) and 148/3,992 (3.7%). Cataract-operation history was reported in 440/4,974 (8.8%) and 631/5,931 (10.6%). Counts correspond to reported histories rather than expert-confirmed current diagnoses.

Self-rated eyesight and vision-related functional difficulties

Fair or worse eyesight was reported by 1,149/7,258 (15.8%) in 2005–2006 and by 1,468/7,160 (20.5%) in 2007–2008. Across both survey cycles, reading ordinary print was the most frequently reported difficulty among the selected tasks. Table 2 contains the extracted numerators, valid denominators and recalculated proportions for each vision-function question.

Measure (eligible ages)	2005–06 n/N (%)	2007–08 n/N (%)
Fair, poor, or very poor eyesight (age 12+)	1,149/7,258 (15.8%)	1,468/7,160 (20.5%)
Poor or very poor eyesight (age 12+)	237/7,258 (3.3%)	335/7,160 (4.7%)
Any difficulty reading newspaper print (age 20+)	1,091/4,925 (22.2%)	1,375/5,829 (23.6%)
Any difficulty with close work (age 20+)	879/4,914 (17.9%)	1,075/5,832 (18.4%)
Any difficulty seeing steps in dim light (age 20+)	880/4,883 (18.0%)	1,061/5,777 (18.4%)
Any difficulty noticing objects to the side (age 20+)	527/4,954 (10.6%)	658/5,894 (11.2%)
Any difficulty locating objects on crowded shelf (age 20+)	633/4,948 (12.8%)	756/5,889 (12.8%)
Vision limits time spent on daily activities (age 20+)	600/4,975 (12.1%)	791/5,923 (13.4%)
Any difficulty driving in daytime (drivers, age 20+)	211/4,414 (4.8%)	281/5,152 (5.5%)

For the 2007–2008 sample, 1,375 of 5,829 (23.6%) respondents reported at least a little difficulty reading ordinary print, while 1,061 of 5,777 (18.4%) reported difficulty negotiating steps or curbs in dim light. Difficulty noticing objects off to the side was reported by 658 of 5,894 (11.2%). Limitations in the duration of usual activities because of vision were reported by 791 of 5,923 (13.4%).

Descriptive differences between respondent samples

The codebook-based percentage for self-rated poor or very poor eyesight was 3.3% in 2005–2006 and 4.7% in 2007–2008, and reported previous cataract surgery was 8.8% versus 10.6%. In contrast, reported glaucoma was 7.2% versus 6.6%. These are simple unweighted contrasts from two cross-sectional response sets. The available frequency tables do not permit adjustment for age distribution, nonresponse, survey design or respondent characteristics; no trend, increase, decrease or etiological difference is inferred.

DISCUSSION

This descriptive exercise demonstrates that vision-related tasks and eye-disease history yield different information in large public health questionnaires. In both NHANES survey cycles, reports of difficulty reading print were more frequent than reported glaucoma and macular degeneration histories, albeit among differing age-eligible groups. Such comparisons should be interpreted as separate response distributions, not disease-attributable visual disability. The clinical relevance lies in recognising a spectrum that ranges from self-reported functional inconvenience to a history of diagnosed structural eye disease. Recent population-based research has similarly demonstrated the importance of distinguishing visual-function impairment from self-reported vision difficulties [10].

The task-specific questions capture practical consequences of eyesight with habitual optical correction. Reading print, finding items on a shelf and working at near distance require adequate central vision and refraction. Navigation in dim light also depends on contrast sensitivity and illumination. Recent investigations have highlighted the importance of near visual acuity and contrast sensitivity when evaluating visual impairment in older adults [11]. The questions cannot, however, identify which ocular pathology causes the limitation. Refractive error, cataract, dry eye, retinal disease and neurological or systemic factors may overlap. A respondent with glaucoma may have no symptoms, and symptoms cannot be used alone as a glaucoma screening diagnosis [4]. Contemporary glaucoma prevalence estimates also demonstrate that a substantial proportion of affected individuals remain undiagnosed [12].

The distinction between an eye disease and a service-use measure is particularly important for cataract surgery. A positive cataract-operation history indicates prior treatment, not the presence of an untreated cataract. Similarly, self-reported glaucoma and macular degeneration reflect knowledge of being given a diagnosis and may underestimate undetected disease; ophthalmic examination, optical coherence tomography, tonometry, perimetry and retinal photography would address other questions. Recent community-based screening research has demonstrated the importance of direct examination and identifying previously unrecognised ocular disease among individuals with limited eye-

care utilisation [13]. Published NHANES retinal imaging and visual examination modules could support stronger clinically characterized outcomes if individual-level data and proper weights were obtained [6,7].

The interpretation is also affected by the age gates built into the instrument. Age 40+ participants answered the glaucoma and macular degeneration questions, whereas the eyesight-rating sample included persons as young as 12 years. Therefore, the relative size of the unweighted proportions across those variables cannot establish disease priority or age-adjusted risk. Comparisons with global figures from WHO or Global Burden of Disease analyses would be methodologically inappropriate because those reports estimate population-level impairment using different definitions and models [1–3]. Recent US investigations have also demonstrated substantial geographic and socioeconomic differences in visual impairment, emphasizing the importance of appropriate population weighting, demographic adjustment and clearly defined outcome measures [14,15].

Strengths and limitations

The primary strength is exact traceability: every displayed numerator and denominator can be checked against named CDC question codes in the original codebooks. Additional advantages include consistent instruments across two cycles and explicit treatment of nonresponse and nonparticipation categories. The principal limitation is lack of age stratification, subgroup analysis, linkage to examination findings, survey-weighted inference or adjusted.

CONCLUSION

Across two historical NHANES respondent samples, difficulty reading print and functioning in dim light were frequently reported, while smaller subsets of age-eligible respondents reported glaucoma or macular degeneration diagnoses.

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