

The Variability of Vision Loss Assessment in Federally Sponsored Surveys: Seeking Conceptual Clarity and Comparability

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- **PURPOSE:** To review U.S. national population-based surveys to evaluate comparability and conceptual clarity of vision measures.
- **DESIGN:** Perspective.
- **METHODS:** The vision questions in 12 surveys were mapped to the World Health Organization's *International Classification of Functioning, Disability and Health* framework under the domains of condition, impairment, activity limitation, participation, and environment. Surveys examined include the National Health Interview Survey, the Behavioral Risk Factor Surveillance Survey, National Health and Nutrition Examination Survey, the Census, and the Visual Function Questionnaire.
- **RESULTS:** Nearly 100 vision measures were identified in 12 surveys. These surveys provided no consistent measure of vision or vision impairment. Survey questions asked about differing characteristics of vision-related disease, function, and social roles. A question related to ability to read newspaper print was the most commonly asked question in surveys.
- **CONCLUSIONS:** Limited comparability of data and lack of conceptual clarity in the population-based surveys resulted in an inability to consistently characterize the population of people experiencing vision impairment. Consequently, vision surveillance was limited. (Am J Ophthalmol 2012;154:S31-S44. © 2012 Published by Elsevier Inc.)

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ASSESSING THE PREVALENCE AND DISTRIBUTION OF vision impairment is critical to developing effective public health policy, yet there is no systematic vision health surveillance system in the United States. Several large, federally sponsored surveys are used to measure vision loss. These surveys have led to a surprisingly large variation in estimates of the number of people with vision loss: 5.7 million people aged ≥ 65 years in one study,¹ 14 million people aged ≥ 12 years in another,² and 19.4 million people aged ≥ 18 years in a third.³ The large variation in the reported prevalence of vision loss can result from a combination of different thresholds for categorizing an individual as having vision loss and from the method used to measure the presence of vision loss.⁴ Some surveys rely on self-reported visual status during face-to-face or telephone interviews. Only the National Health and Nutrition Examination Survey (NHANES) directly measures visual acuity.

Developing self-report questions to assess vision loss can be challenging. Asking about specific diagnoses (eg, cataracts) relies on respondent knowledge and recall of diagnosis and perhaps patient access to vision care. In contrast, developing measures of function (eg, ability to read newspaper print) may suffer substantial limitations in terms of validity and reliability. Moreover, broad surveys are limited by length or cost in the number of vision-specific questions that can be asked.

The dilemma of creating a standard case definition for vision impairment among surveys is further complicated by the different purposes of specific investigations. Investigators, practitioners, and policymakers concerned with prevention and treatment would likely be more interested in causal factors or disease conditions, their incidence, prevalence, trajectories, and consequences. Knowledge of these characteristics might inform the design of prevention and treatment interventions. Planners and policymakers concerned about services (eg, vision rehabilitation) and accessibility of environments (eg, print size and illumination) would likely be more concerned about function (eg, ability to read print, difficulty going down steps in dim light) than in the diagnosis of eye diseases and relevant risk factors. Meanwhile, income transfer programs, such as Social Security, are interested in measures of visual disability for determining financial benefits.⁵

TABLE 1. Surveys Examined Regarding Measures of Vision

- Behavioral Risk Factor Surveillance System, Vision Impairment and Access to Eye Care Module. Administered by the Centers for Disease Control and Prevention. <http://www.cdc.gov/brfss/>
- National Health and Nutrition Examination Survey. Administered by the National Center for Health Statistics, Centers for Disease Control and Prevention. <http://www.cdc.gov/nchs/nhanes.htm>
- National Health Interview Survey. Administered by National Center for Health Statistics, Centers for Disease Control and Prevention. <http://www.cdc.gov/nchs/nhis.htm>
- Second Longitudinal Study on Aging. Supplement to the National Health Interview Survey. Administered by National Center for Health Statistics, Centers for Disease Control and Prevention. <http://www.cdc.gov/nchs/isoa/isoa2.htm>
- 2002, 2008 National Health Interview Survey, Vision Supplement. Administered by the National Center for Health Statistics, Centers for Disease Control and Prevention. http://www.cdc.gov/visionhealth/data/sources_nhis.htm
- US Census. <http://www.census.gov/>
- American Community Survey. Administered by the U. S. Census. <http://www.census.gov/acs/www/>
- Survey of Income and Program Participation. Administered by the U. S. Census. <http://www.census.gov/sipp/>
- Medical Expenditure Panel Survey. Administered by the Agency for Healthcare Research and Quality (AHRQ). <http://www.meps.ahrq.gov/mepsweb/>
- Medicare Current Beneficiary Survey. Administered by the Centers for Medicare and Medicaid Services. <http://www.cms.gov/MCBS/>
- Visual Functioning Questionnaire. Administered by RAND (http://www.rand.org/health/surveys_tools/vfq.html); supported by the National Eye Institute. <http://www.nei.nih.gov/>
- Health and Retirement Study. Supported by the National Institute on Aging <http://www.nia.nih.gov/>; administered by the University of Michigan. <http://hrsonline.isr.umich.edu/>

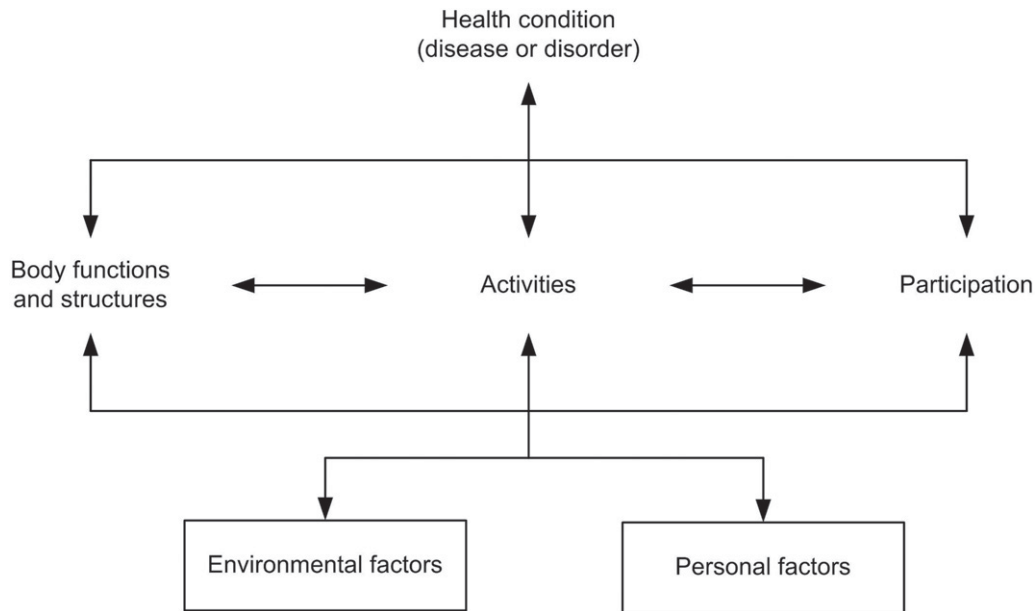


FIGURE. Interactions between components of the *International Classification of Functioning, Disability and Health*. World Health Organization, 2001.⁶

In 2001, the World Health Organization (WHO) approved the *International Classification of Functioning, Disability and Health (ICF)*⁶ as the companion document to the *International Classification of Diseases*,⁷ noting that “[t]he overall aim of the ICF classification is to provide a unified and standard language and framework for the description of health and health-related states” (p. 3).⁶ Although the *International Classification of Functioning, Disability and Health* is not about people with disabilities, it does provide a dimensional characterization of human

experience that is particularly useful in disability research. The common language and framework provided by the model allows for cross-cultural and cross-disciplinary comparisons. The classification system can also be employed to harmonize various measures in surveys.

The aim of this article is to describe vision measures used in national and state surveys, examine the conceptual clarity of questions employed in surveys, and determine comparability among surveys. For the purposes of this article, we used the classification, framework, and language

of the *International Classification of Functioning, Disability and Health* as an overarching conceptual framework for organizing the survey questions and resultant responses central to this discussion.

METHODS

• **NATIONAL SURVEYS:** We examined the vision health measures in 12 surveys (Table 1). Ten are national population-based surveys conducted by U.S. governmental agencies, including the National Health Interview Survey (NHIS), the U.S. Census, the Medicare Current Beneficiary Survey (MCBS), and the NHANES. The Behavioral Risk Factor Surveillance System (BRFSS) provides state-level data. We have also included in this review the National Eye Institute (NEI) Visual Functioning Questionnaire (VFQ-25), which has not been used in national population surveys but has been used in population-based studies.

NHIS has consistently used 2 measures to assess vision function in the adult sample, and 8 additional questions were added in the 2002 and 2008 Vision Supplements. The Second Longitudinal Study on Aging (LSOA II) asked 2 core questions plus an additional 4 questions about vision health. Across these 12 survey instruments, we identified nearly 100 vision questions. Some required a “yes or no” response; others had multiple responses. Some questions were repeated in multiple surveys.

• **CONCEPTUAL FRAMEWORK:** The *International Classification of Functioning, Disability and Health* creates a conceptual taxonomy for portraying human experience that is useful for disability research because it illustrates the dimensional characteristics of the lived experience of disability.⁸ As shown in this conceptual framework (Figure), a health condition is a disease, disorder, or injury associated with changes in body function and structure (impairment), activity limitation, and participation. Each of these terms is carefully defined in the model. Impairments are defined as changes in the body function and structure and are classified into 7 categories, including neuromusculoskeletal and movement-related functions, and sensory functions and pain. The *International Classification of Functioning, Disability and Health* provides options for how activities and participation can be differentiated. Option 1, which was used for this study, is a “[d]istinct set of activities domains and participation domains (no overlap)” (p. 234).⁶ The Activity domain includes communication, mobility, and self-care. The Participation domain includes interpersonal relationships and interactions and community, social, and civic life. The *International Classification of Functioning, Disability and Health* also classifies Environmental Factors, including built environment, policy, and attitudinal factors. A major contribution of the model has been identifying the role of the environment, which can both create barriers and provide facilitators for

people with disabilities.⁸ The importance of the environment has led some to define disability as the “fit” between the person and his or her environment.⁹ *Personal Factors* in the taxonomy include age, sex, and social status, but these contextual factors are not currently classified.

Within the broad conceptual framework of the *International Classification of Functioning, Disability and Health*, an extensive set of codes has been developed for body structure and function (impairment), activity limitations, participation, and the environment. The *International Classification of Diseases (ICD 9–10)* specifies codes for different health conditions.⁷ Personal factors have not yet been coded. We have chosen not to employ codes in this article because of the lack of agreement regarding the utility of fitting codes to survey questions and the capacity to do so.

While survey questions may be discretely categorized using the model, to do so serves primarily a practical purpose. In reality, the concepts that belong to one category may be closely linked with those in other categories. The example below illustrates this dynamic and demonstrates the robustness of the model. A person diagnosed with macular degeneration (condition) might exhibit changes in structure of the macula that can diminish acuity, a measurable property (impairment). While vision problems can be characterized by changes to the structure and function of the eye, they are problematic for the person because they may affect the ability to perform various activities—reading, driving, shopping, record keeping, and meal preparation (activity limitation). These activities are arguably important, but the greater limitation of vision impairment might be the impact on social participation—getting together with friends, working, or pursuing educational and civic roles. The environment can serve as a barrier to or facilitator for people with vision loss. The environment might include signage, print size, lighting, transit systems, and access to technology. The environment might also include attitudes and policies. Improvements in lighting and increased print size, as well as the positive attitude of the public toward visually impaired persons, do much to ameliorate barriers in the environment. The availability of vision rehabilitation services, eye care providers, insurance, and caregivers all reside in the environmental domain. The framework components can be used to characterize individuals, groups, or populations, and the taxonomy distinguishes between the roles of providers and policymakers.

RESULTS

• **MAPPING VISION SURVEY QUESTIONS TO THE INTERNATIONAL CLASSIFICATION OF FUNCTIONING, DISABILITY AND HEALTH:** We mapped vision survey questions to the *International Classification of Functioning, Disability and Health* framework to gain insight into the conceptual clarity of these questions. Hendershot and associates ex-

TABLE 2. Vision Questions in National Surveys Mapped to the International Classification of Functioning, Disability and Health

Condition	Structure/Function	Activity	Participation	Environment
LONGITUDINAL SUPPLEMENT ON AGING II (AGES ≥70)				
Do you NOW have: Cataracts? Glaucoma?	Do you NOW have: Blindness in 1 eye? Blindness in both eyes? Do you have any other trouble seeing, EVEN when wearing glasses?			Do you use eyeglasses? Contact lenses? Do you use a magnifying glass to read or do other close work?
BEHAVIORAL RISK FACTOR SURVEILLANCE SYSTEM, VISION MODULE (AGES ≥40)				
Have you been told by an eye doctor or other health care professional that you NOW have cataracts? Have you EVER been told by an eye doctor or other health care professional that you have glaucoma? Have you EVER been told by an eye doctor or other health professional that you had age-related macular degeneration?	How much difficulty, if any, do you have recognizing a friend across the street? How much difficulty, if any, do you have reading print in newspaper , magazines, recipes, menus, or numbers on the telephone?			When was the last time you had your eyes examined by any doctor or eye care provider? What is the main reason you have not visited an eye care professional in the past 12 months? When was the last time you had an eye examination in which the pupils were dilated? Do you have any health insurance coverage for eye care?
NATIONAL HEALTH INTERVIEW SURVEY				
Do you have any trouble seeing, even when wearing glasses or contact lenses? Are you blind or unable to see at all?				
NATIONAL HEALTH INTERVIEW SURVEY, 2002 & 2008 VISION SUPPLEMENT				
Have you EVER been told by a doctor or other health professional that you had . . . Diabetic retinopathy? Cataracts? Glaucoma? Macular degeneration? During the past 12 months, have you had . . . Diabetic retinopathy? Cataracts? Glaucoma? Macular degeneration?	Even when wearing glasses or contact lenses, because of your eyesight, how difficult is it for you . . . To read ordinary print in newspapers? To go down steps, stairs, or curbs in dim light or at night? To drive during daytime in familiar places? To notice objects off to the side while you are walking along? To find something on a crowded shelf?		To do work or hobbies that require you to see well up close such as cooking, sewing, fixing things around the house, or using hand tools?	Do you use any vision services such as job training, counseling, or training in daily living skills and mobility? Do you use any adaptive devices such as telescopic or other prescriptive lenses, magnifiers, large print or talking materials, CCTV, white cane, or guide dog?

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TABLE 2. Vision Questions in National Surveys Mapped to the International Classification of Functioning, Disability and Health (Continued)

Condition	Structure/Function	Activity	Participation	Environment
SURVEY OF INCOME AND PROGRAM PARTICIPATION				
		Do you have difficulty seeing words or letters in ordinary newspaper print even when wearing glasses or contact lenses if you usually wear them?		
		Are you able to see the words in ordinary newspaper print at all?		
MEDICAL EXPENDITURE PANEL SURVEY				
	Does anyone in the family have any difficulty seeing (with glasses or contacts, if they use them)?	With glasses or contacts, can the person see well enough to read ordinary newspaper print , even if the person cannot read?		Does anyone in the family wear eyeglasses or contact lenses?
	Can the person not see anything at all, that is, is the person blind?	With glasses or contacts, can the person see well enough to recognize familiar people 2 or 3 feet away?		
CENSUS (2000)				
	Does this person have any of the following long-lasting conditions: blindness, deafness, or severe vision or hearing impairment?			
AMERICAN COMMUNITY SURVEY (2008)				
	Is this person blind or does he/she have serious difficulty seeing even when wearing glasses?			
MEDICARE CURRENT BENEFICIARY SURVEY				
Have you ever had an operation for cataracts?	Which statement describes your vision: No trouble seeing, A little trouble, A lot of trouble, or No usable vision?	Because of your difficulty seeing, how much trouble do you have: With prescription labels or medical instructions? Finding out things you need to know about Medicare?	Obtaining medical care, such as finding care or getting there when you need it?	Do you wear eyeglasses or contact lenses?

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TABLE 2. Vision Questions in National Surveys Mapped to the International Classification of Functioning, Disability and Health (Continued)

Condition	Structure/Function	Activity	Participation	Environment
NATIONAL HEALTH AND NUTRITION EXAMINATION SURVEY (2007–2008, AGES ≥20 YEARS)				
Have you ever had a cataract operation?	With both eyes open, can you see light? (Yes, No)	How much difficulty do you have: Reading ordinary print in newspapers?	Doing work or hobbies that require you to see well up close such as cook, sewing, fixing things around the house, or using hand tools?	
Was the operation in your right eye, left eye, or both eyes?	Are you blind in both eyes? (Yes, No)	Going down steps, stairs, or curbs in dim light or at night?		
Have you ever been told by an eye doctor that you have glaucoma (sometimes referred to as “high pressure in your eyes”)?	At the present time, would you say your eyesight using both eyes, with glasses or contact lenses if you wear them, is: Excellent, Good, Fair, Poor, Very poor?	Noticing objects off to the side as you are walking along?	How limited are you in how long you can work or do other daily activities such as housework, child care, school or community activities, because of your vision?	
Was the glaucoma in your right eye, left eye, or both eyes?	Excellent, Good, Fair, Poor, Very poor?	Finding something on a crowded shelf?		
Have you ever been told by an eye doctor that you have age-related macular degeneration?	Very poor?	How much difficulty do you have driving during the daytime in familiar places?		
Was the age-related macular degeneration in your right eye, left eye, or both eyes?		(No difficulty, A little difficulty, Moderate difficulty, Extreme difficulty, Unable to do because of eyesight, or Do not do this for other reasons)		
NATIONAL EYE INSTITUTE VISUAL FUNCTIONING QUESTIONNAIRE				
	2. At the present time, would you say your eyesight using both eyes (with glasses or contact lenses if you wear them) is Excellent, Good, Fair, Poor, or Very poor, or Are you completely blind?	5. How much difficulty do you have: reading ordinary print newspapers? (No difficulty at all, A little difficulty, Moderate difficulty, Extreme difficulty, Stopped doing this because of your eyesight, Stopped doing this for other reasons, or Not interested in doing this)	6. How much difficulty do you have doing work or hobbies that require you to see well up close, such as cooking, sewing, fixing things around the house, or using hand tools?	24. I need a lot of help from others because of my eyesight (Definitely true, Mostly true, Not sure, Mostly false, Definitely false)
	4. How much pain or discomfort have you had in and around your eyes (for example, burning, itching, or aching)? Would you say it is: None, Mild, Moderate, Severe, or Very severe?	7. Because of your eyesight, how much difficulty do you have finding something on a crowded shelf?		23. Because of my eyesight, I have to rely too much on what other people tell me (Definitely true, Mostly true, Not sure, Mostly false, Definitely false)

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TABLE 2. Vision Questions in National Surveys Mapped to the International Classification of Functioning, Disability and Health (Continued)

Condition	Structure/Function	Activity	Participation	Environment
<p>19. How much does pain or discomfort in or around your eyes (for example, burning, itching, or aching) keep you from doing what you'd like to be doing? Would you say: All of the time, Most of the time, Some of the time, A little of the time, or None of the time?</p>	<p>8. How much difficulty do you have reading street signs or the names of stores? 9. Because of your eyesight, how much difficulty do you have going down steps, stairs, or curbs in dim light or at night? 10. Because of your eyesight, how much difficulty do you have noticing objects off to the side as you are walking along?</p>	<p>14. Because of your eyesight, how much difficulty do you have going out to see movies, plays, or sports events? 18. Are you limited in how long you can do work or other activities because of your vision? (All the time, Most of the time, Some of the time, A little of the time, None or the time). 20. I stay at home most of the time because of my eyesight. (Definitely true, Mostly true, Not sure, Mostly false, Definitely false)</p>		
	<p>11. Because of your eyesight, how much difficulty do you have seeing how people react to things you say? 12. Because of your eyesight, how much difficulty do you have picking out and matching your own clothes? 15. Now, I'd like to ask about driving a car. Are you currently driving, at least once in a while? (Yes, No). 15a. If NO, ASK: Have you never driven a car or have you given up? (Never drove or Gave up). 15b. If you gave up driving, was it mainly because of your eyesight, mainly for some other reason, or because of both your eyesight and other reasons? (Mainly eyesight, mainly other reasons, both eyesight and other reasons)</p>			

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TABLE 2. Vision Questions in National Surveys Mapped to the International Classification of Functioning, Disability and Health (Continued)

Condition	Structure/Function	Activity	Participation	Environment
		<p>15c. If currently driving, how much difficulty do you have driving during the daytime in familiar places? (No difficulty at all, a little difficulty, moderate difficulty, extreme difficulty)</p> <p>16. How much difficulty do you have driving at night? (No difficulty at all, a little difficulty, moderate difficulty, extreme difficulty, have stopped doing this because of your eyesight, have stopped doing this for other reasons, or are you not interested in doing this)</p> <p>16a. How much difficulty do you have driving in difficult conditions, such as in bad weather, during rush hour, on the freeway, or in city traffic?</p>		
		<p>17. Do you accomplish less than you would like because of your vision? (All the time, most of the time, some of the time, a little of the time, none of the time).</p>		
		<p>21. I feel frustrated a lot of the time because of my eyesight. (Definitely true, Mostly true, Not sure, Mostly false, Definitely false)</p>		

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TABLE 2. Vision Questions in National Surveys Mapped to the International Classification of Functioning, Disability and Health (Continued)

Condition	Structure/Function	Activity	Participation	Environment
		<p>22. I have much less control over what I do, because of my eyesight. (Definitely true, Mostly true, No sure, Mostly false, Definitely false)</p> <p>3. How much of the time do you worry about your eyesight? (None of the time, A little of the time, Some of the time, Most of the time, All the time)</p> <p>25. I worry about doing things that will embarrass myself and others, because of my eyesight. (Definitely true, Mostly true, Not sure, Mostly false, Definitely false)</p>		
HEALTH AND RETIREMENT STUDY				
	Can you see at all? (Yes/No)	<p>Are you usually able to see well enough to read ordinary newsprint without glasses or contact lenses? (Yes/No)</p> <p>Are you usually able to see well enough to read ordinary newsprint with glasses or contact lenses? (Yes/No)</p> <p>Are you usually able to see well enough to recognize a friend on the other side of the street without glasses or contact lenses? (Yes/No)</p>		

Bold font indicates a question like “read newspaper” that various surveys examined in this article asked, though with slightly differing stem.

amined several U.S. national surveys, including the NHIS and NHANES, and backcoded vision questions from the surveys to the framework.⁴ This article builds on that work by classifying vision measures from multiple other surveys to the framework domains. In the 12 instruments we reviewed, there were 14 questions addressing condition, 19 addressing impairment, 39 regarding activity limitation, 10 regarding the environment, and 12 regarding participation. Table 2 provides details on this classification effort.

Behavioral Risk Factor Surveillance System. The BRFSS Vision Impairment and Access to Eye Care Module (Vision Module) contains 9 questions. Two additional vision questions appear in the BRFSS Diabetes Module. The Vision Module asks about *conditions*, including cataract, glaucoma, and macular degeneration. The Diabetes Module asks about diabetic retinopathy. In addition, the Vision Module asks 2 questions about *activity limitations*: “recognizing a friend across the street” (distance vision) and “reading newspaper print” (near vision). Both questions have a severity scale—no difficulty, a little difficulty, moderate difficulty, extreme difficulty, or unable to do because of eyesight. Finally, 4 questions can be classified under *environment*: last time eyes examined by an eye doctor; last time for dilated eye examination; reason for not seeking eye examination; and health insurance coverage for eye care. These questions address environmental facilitators and barriers regarding access to eye care. Therefore, each vision-related question from the Vision Module or Diabetes Module can be classified into the condition, activity limitation, or environment categories. There are no questions about *impairment* or *participation*.

National Health Interview Survey. In contrast, the NHIS Sample Adult File asks 2 vision impairment questions: whether the respondent has “trouble seeing, even when wearing glasses or contact lenses” and whether he or she is “blind or unable to see at all.” The 2002 and 2008 NHIS Vision Supplement added 8 questions to the 2 vision impairment inquiries. Two questions address 4 eye conditions—diabetic retinopathy, cataracts, glaucoma, and macular degeneration: “Have you EVER been told by a doctor or eye care professional that you had . . . ?” and “During the past 12 months have you had . . . ?” Five questions address activity limitation: is the respondent able to “read newspaper print?”; “go down steps, stairs, or curbs in dim light or at night?”; “drive during daytime in familiar places?”; “notice objects off to the side while you are walking along?”; and “find something on a shelf?” One question asks about participation, which might also be classified with activity limitation: can the respondent, with correction, “do work or hobbies that require you to see well up close, such as cooking, sewing, fixing things around the house, or using hand tools?” The operable participation concept in this question is whether the respondent can “do work or hobbies.” The examples in the question are consid-

ered activity limitations. Finally, the Vision Supplement asks 2 environmental questions about having access to vision rehabilitation and the use of adaptive devices (telescopic or other prescriptive lenses, magnifiers, large print materials or screen readers, CCTV [closed-circuit television], white cane, or guide dog). Neither question addresses the quality or intensity of these environmental supports.

Visual Function Questionnaire. The Visual Function Questionnaire, developed under the auspices of the National Eye Institute, began with the goal to “measure the dimensions of self-reported, vision-targeted health status that are most important for persons who have chronic eye disease.” Because of this goal, the survey measures the influence of visual disability and visual symptoms on broader health issues, such as emotional well-being and social functioning, in addition to task-oriented domains related to daily visual functioning” (p. 1).¹⁰ The original 51-item survey was developed through focus groups of people experiencing vision problems. It was tested for psychometric qualities and then reduced to a 25-item scale called the VFQ-25.^{11–13} The instrument includes 13 subscales: general health, general vision, near vision, distance vision, role limitations due to vision, dependency on others due to vision, mental health symptoms due to vision, driving difficulties, peripheral vision, vision-specific social functioning, expectations for visual function, color vision, and ocular pain. These topical subscales (and the inclusive questions) of the VFQ-25 can be mapped to the impairment, activity limitation, participation, and environmental domains of the *International Classification of Functioning, Disability and Health*. A series of questions about reading, seeing street signs, and driving clearly address activity limitations. Several questions are specific to participation measures: going to movies, visiting friends and family, and entertaining friends and family. One question addresses “pain and discomfort . . . in and around your eyes.” Pain resides within the domain of body function in impairment. A follow-up question, which asks “How much does pain or discomfort in or around your eyes . . . keep you from doing what you’d like to be doing?,” bridges concepts of pain (*body function*) with participation. The VFQ-25 does not inquire about eye conditions. Hamzah and associates examined 33 instruments characterizing patient-reported outcomes in glaucoma research, and used the *International Classification of Functioning, Disability and Health* as a conceptual framework for the review.¹⁴ They found the VFQ-25 to be especially promising and coded each of the 25 questions to the framework’s domains. When a question bridged *International Classification of Functioning, Disability and Health* concept domains, the authors assigned the question to multiple domains.

National Health and Nutrition Examination Survey. The NHANES is administered by the National Center for Health Statistics. The 2007–2008 NHANES contains several components including an extensive questionnaire, a physical examination, and a nutrition assessment. The instrument

contains 17 vision questions. Two ask about specific *conditions*—glaucoma and macular degeneration—and 1 asks whether the respondent has had cataract surgery. Three follow-up questions ask about which eye is affected by glaucoma, macular degeneration, or cataract removal. Three questions address impairment: “With both eyes, can you see light?”; “Are you blind in both eyes?”; and “At the present time, would you say your eyesight, with glasses or contact lenses if you wear them, is . . . excellent, good, fair, poor, very poor, don’t know.” Six questions are the same as those included in the VFQ-25 and the 2002 and 2008 NHIS Vision Supplement regarding activity limitation, impairment (reading newspaper print; going down steps, stairs, or curbs in dim light or at night; noticing objects off to the side while walking; finding something on a crowded shelf; and difficulty driving) and 1 participation question appears in both the VFQ-25 and NHIS Vision Supplement: “How much difficulty do you have doing work or hobbies that require you to see well up close such as cooking, sewing, fixing things around the house, or using hand tools?” A second participation question in NHANES is “How limited are you in how long you can work or do other daily activities such as housework, child care, school, or community activities because of your vision?” This question is blended insofar as work, school, and community roles are participation measures; housework and child care are activities.

Census and American Community Survey. Prior to 2008, the U.S. Census and the American Community Survey (ACS) asked only a single multipart question: “Does this person have any of the following long-lasting conditions: blindness, deafness, or a severe vision or hearing impairment?” The response categories were “yes” or “no.” In 2008, the Census made changes to the disability questions in the American Community Survey to be more consistent with the concepts of functional limitation.¹⁵ The sensory disability inquiry was divided into 2 separate questions: “Is this person deaf or does he/she have serious difficulty hearing?” and “Is this person blind or does he/she have serious difficulty seeing even when wearing glasses?” These questions measure impairment.

Survey of Income and Program Participation. The Survey of Income and Program Participation (SIPP), also administered by the U.S. Census, contains 2 impairment questions. The first asks whether the respondent has “difficulty seeing words or letters in ordinary newsprint” with glasses. If the response is “yes,” then a second question asks whether the respondent can see “words in ordinary newsprint at all.” Census analysts have used the 2 questions to create a severity scale of “difficulty seeing” or “severe difficulty seeing.”¹⁶

Medical Expenditure Panel Survey. The Medical Expenditure Panel Survey (MEPS), which can be linked to NHIS, contains 5 vision questions. Two are impairment

questions (“difficulty seeing” and “not see anything at all, that is, blind”); 2 are activity limitation questions (“read ordinary newspaper print” and “see well enough to recognize familiar people 2 or 3 feet away”); and 1 is an environmental question (“wear glasses or contact lenses”). Spencer and associates¹⁷ and Frick and associates¹⁸ used MEPS vision questions to create a severity measure and created categories of vision impairment and blindness.

Health and Retirement Study. The Health and Retirement Study (HRS) contains 3 vision questions about the ability to read newspaper print or to recognize a friend across the street, and, finally, “can you see at all?” The first 2 questions address near and distance visual ability and can be classified under activity. The third question can be classified under impairment.

DISCUSSION

OUR AIM WAS TO EXAMINE VISION QUESTIONS IN FEDERALLY sponsored surveys in terms of conceptual clarity within each survey and comparability across surveys. We also sought to promote coherence in case definitions of survey questions about vision health. In Table 2, we have mapped each of the questions in 12 surveys into 1 or more of the 5 *International Classification of Functioning, Disability and Health* domains—condition, impairment, activity limitation, participation, and environment.

• **APPLYING THE INTERNATIONAL CLASSIFICATION OF FUNCTIONING, DISABILITY AND HEALTH MODEL TO VISION MEASURES:** The *International Classification of Functioning, Disability and Health* was not designed to be a measurement tool, but to be an organizational system for mapping human health experiences. The aim of the model is to create a classification system, not to replace existing clinical tools. It has been employed to construct core sets into which chronic health conditions can be organized, to organize functional status in health records, and to refine measures of clinical services.^{19–21} It has been employed in Italy to create a common disability framework for public services and benefits and in Ireland to operationalize service planning for people with disabilities.^{22,23}

In vision research, the classification system has been used to refine measures of impairment (eye function) and activities (person functions) to illustrate the specificity and utility of vision measures in rehabilitation,^{24,25} to portray the activity limitation and participation effects of comorbid conditions among older people with vision loss,^{1,26,27} and to demonstrate the relation of vision impairment to activity and social participation.^{28–30} Hamzah and associates used the framework to help judge the utility of patient-reported outcomes in glaucoma research.¹⁴

In addition, investigators have focused on methods for mapping international disability survey questions—including

ing measures of vision impairment—to *International Classification of Functioning, Disability and Health* domains and codes. Swanson and associates observed, “ICF provides a well-defined structure for survey question comparison,” noting that “[f]or questions about seeing, countries include both vision impairment (and difficulty seeing) and activity questions (seeing newsprint or faces)” (p. 669).³¹

Preharmonizing and postharmonizing disability questions in international disability surveys and censuses poses substantial obstacles, attributable in part to cultural and economic differences. Bullinger notes, “The issue of health monitoring and reporting has received increasing attention from within the public health field. A recent development within this field is an increasing demand for international health surveys, which provoke discussion about conceptual clarity, methodology, and practical applications in the international health field” (p. 5).³² With that concern in mind, Hendershot and Crews examined vision questions from disability surveys in 6 nations in the DISTAB (Disability Tabulation) Project. They then postharmonized questions to categories in the *International Classification of Functioning, Disability and Health* framework.³³

• **FITTING VISION MEASURES IN SURVEYS TO THE INTERNATIONAL CLASSIFICATION OF FUNCTIONING, DISABILITY AND HEALTH:** Mapping questions from various surveys to the *International Classification of Functioning, Disability and Health* categories could help to resolve ambiguity when questions pertain to more than 1 concept.⁴ For example, the NHIS Vision Supplement, NHANES, and the Visual Function Questionnaire ask the same question about going down steps, stairs, or curbs in dim light or at night. “Going down steps” is an activity; “dim light” is part of the environment. Similarly, the question about driving in the same 3 surveys asks about driving in familiar places in daylight. Driving—an activity—is qualified by environmental elements: “daylight” and “familiar places.” The participation question “doing work or hobbies” in these 3 surveys is qualified by the impairment question about the ability to “see well up close” to be able to perform activities such as “cooking, sewing, fixing things around the house.” In addition, the question asking whether respondents “notice objects off to the side while you are walking along,” used in the NHIS Vision Supplement, NHANES, and the Visual Function Questionnaire, could be designed as an activity limitation question (walking), but could also be classified as impairment, that is, a restriction in visual field function. These questions demonstrate increased attention to participation and environmental measures, and perhaps, as Hendershot suggests, reflect a “new paradigm of disability” that “places a greater emphasis on the environment as a causal factor in a person’s level of functioning and social participation” (p. 821).⁴

The U.S. Census, the ACS, and the SIPP all contained impairment questions related to blindness, vision impairment, and seeing. The U.S. Census and ACS question that asked about the respondent having “blindness, deafness, or

severe vision of hearing impairment” was particularly problematic because the “yes or no” response option did not allow investigators to distinguish the type—vision or hearing—or level—profound or severe—of the impairment. When the vision and hearing questions were separated, the vision question retained ambiguity in the concept of severity, as the response options to “serious difficulty seeing,” were “yes” or “no.” Therefore, as Brault observed, respondents with *less severe* vision impairment, lacking a more specific response, may provide a negative response to the question as currently worded.³⁴ That hypothesis was tested when Brault compared responses to the ACS’s “serious difficulty seeing” question with responses to the SIPP’s “difficulty seeing words or letters in ordinary newsprint” question and found estimates of vision difficulty to be statistically lower in the ACS.³⁴

This mapping exercise also reveals the strengths of the surveys as well as potential gaps in the conceptual clarity, the utility of the questions, and the comparability across the surveys. For those interested in addressing eye diseases, the NHIS Vision Supplement, NHANES, and the BRFSS Vision Module provide information to identify specific eye conditions. Thus, one can better understand the vision health characteristics of populations, including disparities among groups, trends, state and regional variations, and risk factors, by self-reported eye condition. Understanding these characteristics at the population level helps identify the populations most at risk and subsequently make decisions about whom to target with interventions for preventing vision problems and improving access to vision care.

Specifying eye conditions tells us something about function, but not enough, for example, to predict how to improve illumination or increase font size. By contrast, self-reported functional questions—about near or distance visual acuity—provide broad insight into how people perceive visual capacity. Self-reported vision loss serves as a measure of the magnitude of the problem and can inform potential environmental changes regarding print size, signage, or the need for rehabilitation, for example. If 1 shared aim of questions about functional impairment is to inform policy, then one would expect more comparability across surveys and some convergence in estimates of vision loss from the responses.

Among the surveys we examined, 7 (BRFSS Vision Module, NHIS Vision Supplement, SIPP, MEPS, NHANES, NEI VFQ-25, and HRS) ask a “read newspaper”-like question, shown in bold in Table 2. The stem differs slightly, but the questions address the same concept. The Medicare Current Beneficiary Survey asks about trouble “with [reading] prescription labels,” a slightly different concept. To our knowledge, no one has employed the “read newspaper” question across these 7 surveys to create comparable prevalence estimates. The NHIS Vision Supplement was implemented in 2002 and 2008, thus providing 2 data points for measuring change. The BRFSS Vision Module provides state-level data to respond to the dilated eye examination objective and to eye conditions causing vision impairment, thereby informing progress on 2 *Healthy People 2020* objectives.³⁵ The BRFSS Vision Module samples people ≥ 40 years of age

and, therefore, does not capture children. The BRFSS also does not ask about eye injury, protective eyewear, refractive error, or vision rehabilitation. State-level data for these elements would likely be useful for informing state policy and interventions.

The link between the public health functions of assessment and its use in policy development is demonstrated in *Healthy People 2020*. The Vision Chapter of *Healthy People 2020* contains 8 vision objectives under the broad goal to “Improve the visual health of the Nation through prevention, early detection, treatment, and rehabilitation.”³⁵ Objectives address dilated eye examinations, vision screening for children, vision impairment in children and adolescents, visual impairment (refractive errors, diabetic retinopathy, glaucoma, cataract, and macular degeneration), occupational eye injury, protective eyewear, and vision rehabilitation services and devices. The 2008 *HP 2010* progress report cites the NHIS and NHANES as the data sources for 10 objectives.³⁶

CONCLUSIONS

THIS REVIEW SUGGESTS A NUMBER OF CONCLUSIONS. Surveys may not be required to base internal conceptual clarity on the *International Classification of Functioning, Disability and Health* model, but internal conceptual clarity would seem to be a desirable goal. Having similar questions or similar clusters of questions among surveys

would also seem to be a desirable objective towards the goal of comparability between surveys. Given the variability of vision measures among surveys, it seems reasonable to be more deliberate and perhaps more economical in the selection of survey questions to achieve greater comparability.

Wholesale changes to survey questions would not be required to create convergence in describing vision in a population. For example, ensuring that there is some variation of the question about “reading newspaper print with best vision correction” in each survey would allow for reasonable comparability. “Reading newspaper print” might not be the gold-standard question for surveys, but a self-report question or set of questions that reasonably captures function could potentially create a basis for comparability of responses. Eliminating questions that do not appear to have a purpose, that is, those for which the responses are not analyzed by investigators, could create an opportunity to add questions of greater quality, utility, and dimension.

Mapping vision questions to the *International Classification of Functioning, Disability and Health* is a postharmonizing exercise. Survey designs that consider this framework at the outset might more equitably address the distribution and logic of questions across impairment, activity limitation, participation, and environmental domains to better capture the dimensional experience of vision loss.

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Biosketch

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