CONGRESSIONAL BRIEFING

Realizing Equitable Access to Vision and Eye Health Care Through Public Health Data and Surveillance

Prevent Blindness

Our Vision Is Vision.

PURPOSE and OBJECTIVES

- Place vision and eye health in the context of health equity, social determinants of health, access to care, and reducing the burden of disparities in health status on individuals, communities, and our nation.
- Use data points extracted from a meta-analysis of existing data sources that were published in May 2021 to present state and community-level data and new understandings about who is most affected.
- Allow for attendees to understand from a patient's perspective how data can help prevent blindness and preserve sight.

PREVENT BLINDNESS MISSION: To prevent blindness and preserve sight

- Prevent Blindness promotes vision and eye health for Americans of all ages, backgrounds, and circumstances.
- In 2017, vision loss cost the United States ***$134 billion***.
- Vision impairments and eye disease often contribute to or are complicated by costly chronic conditions such as diabetes, heart disease and stroke, depression, cognitive decline, and falls-related injury.
- Lack of mobility, decreased independence, longer hospitalization and readmission, and need for long-term care are all equally serious consequences of unaddressed vision problems.

PREVENT BLINDNESS MISSION: To prevent blindness and preserve sight

- 89% of the U.S. population is unaware that eye complications caused by diabetes have no warning symptoms.
- 46.7% of adults aged 65 and older with a severe vision impairment have also experienced a fall.
- 63.5% of children aged 3 to 5 years have not yet seen an eye care provider.
- 721 counties in the U.S. have no practicing eye care provider.
- 93 million adults in the U.S. are at high risk of vision loss; yet, only 60% received an eye exam, which could help detect eye diseases before they result in permanent vision loss.

SPEAKERS

Larry Woodard, Vice President of the Wake County Council of the Blind; Prevent Blindness A.S.P.E.C.T. Program alumnus

Elizabeth Lundeen, PhD, MPH, Vision Health Initiative, U.S. Centers for Disease Control and Prevention

David B. Rein, PhD, MPA, NORC at the University of Chicago

John Wittenborn, NORC at the University of Chicago

Sara D. Brown, MPA, Prevent Blindness (Moderator)

Before we begin…

- A recording will be made available on the Prevent Blindness website following the event. Speakers bio is available at: https://preventblindness.org/events/congressional-briefing-equitable-access-vision-care/
- Audience Q & A will follow today's presentations.
- Please use the Q&A function at the bottom of your screen to submit a question.
- Use the hashtag **#VisionDataBriefing** on Twitter to participate in today's event or to submit a question.

CDC's Vision Health Initiative: Current and Future Priorities

Elizabeth Lundeen, PhD, MPH

Centers for Disease Control and Prevention

National Center for Chronic Disease Prevention and Health Promotion

Division of Diabetes Translation

Importance of Vision and Eye Health

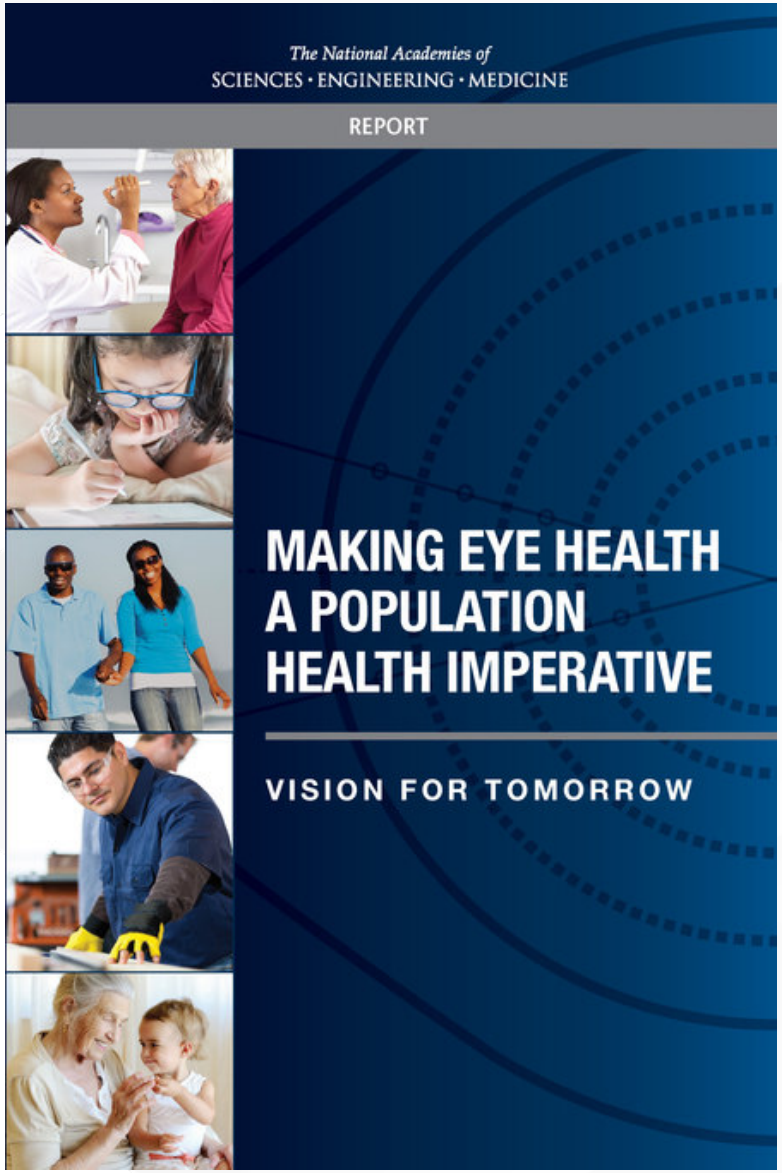
- **7.1 million** people in the U.S. are visually impaired or legally blind.
- Vision impairment is one of the **top 10 US disabilities**.
- Economic cost of vision loss was **$134 billion** in 2017.
- Vision impairment is associated with a **higher risk of chronic conditions** (heart disease, arthritis, asthma, diabetes).
- Early detection and treatment of eye diseases can **prevent vision loss**.

FLAXMAN, JAMA OPTHALMOLOGY, 2021. CDC, MMWR, 2009. REIN, OPHTHALMOLOGY, 2021. CREWS, AM J OPHTHALMOLOGY, 2017.

Vision Health Initiative
Centers for Disease Control and Prevention

- The Vision Health Initiative (VHI) began in 2002
- Located in CDC's Division of Diabetes Translation
- Mission: to promote vision health and quality of life for all populations throughout all life stages, by preventing and controlling eye disease, eye injury, and vision loss resulting in disability

https://www.cdc.gov/visionhealth/index.htm

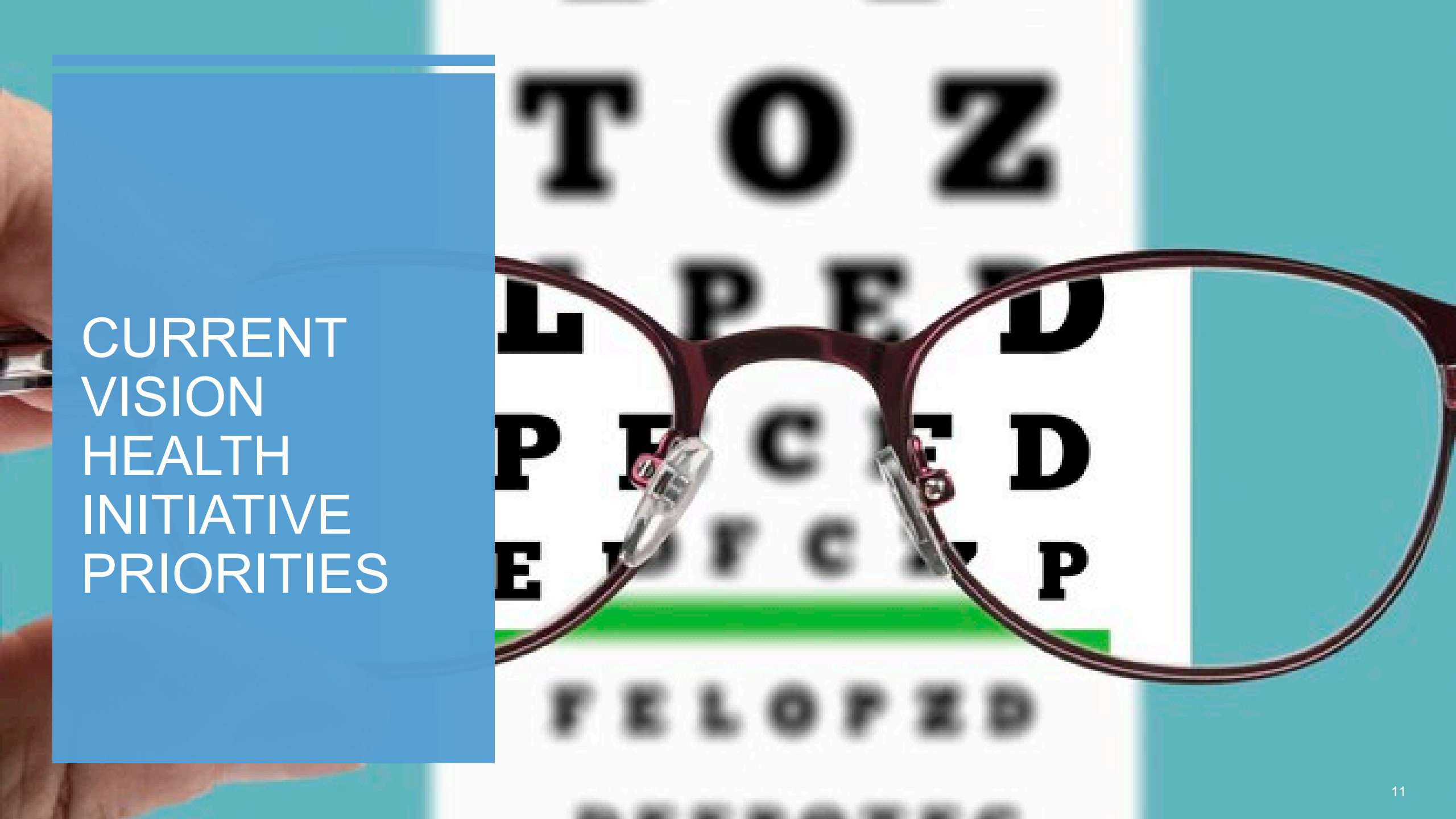


Vision Health Initiative

- Surveillance
- Effectiveness Research
- Public Health Programs & Policies

National Academies of Sciences, Engineering, and Medicine 2016. Making Eye Health a Population Health Imperative: Vision for Tomorrow. Washington, DC: The National Academies Press. https://doi.org/10.17226/23471.

CURRENT VISION HEALTH INITIATIVE PRIORITIES



Promoting Eye Health Equity and Reducing Health Disparities

- Conduct surveillance and epidemiological research to improve understanding of vision and eye health disparities by race/ethnicity, sex, geography, income, and other social determinants of health
- Develop interventions that promote eye health and prevent vision loss and blindness in groups at high risk
- Support partner organizations in implementing evidence-based interventions to reduce disparities in vision loss and eye disease

Glaucoma SIGHT Studies: Addressing Eye Health Disparities

Identify and reach populations at highest risk in community-based settings

Community-Based

Implement innovative approaches like telemedicine to detect glaucoma

Innovative

Address social determinants of health to ensure referral, follow-up, and treatment of glaucoma

Social Determinants of Health

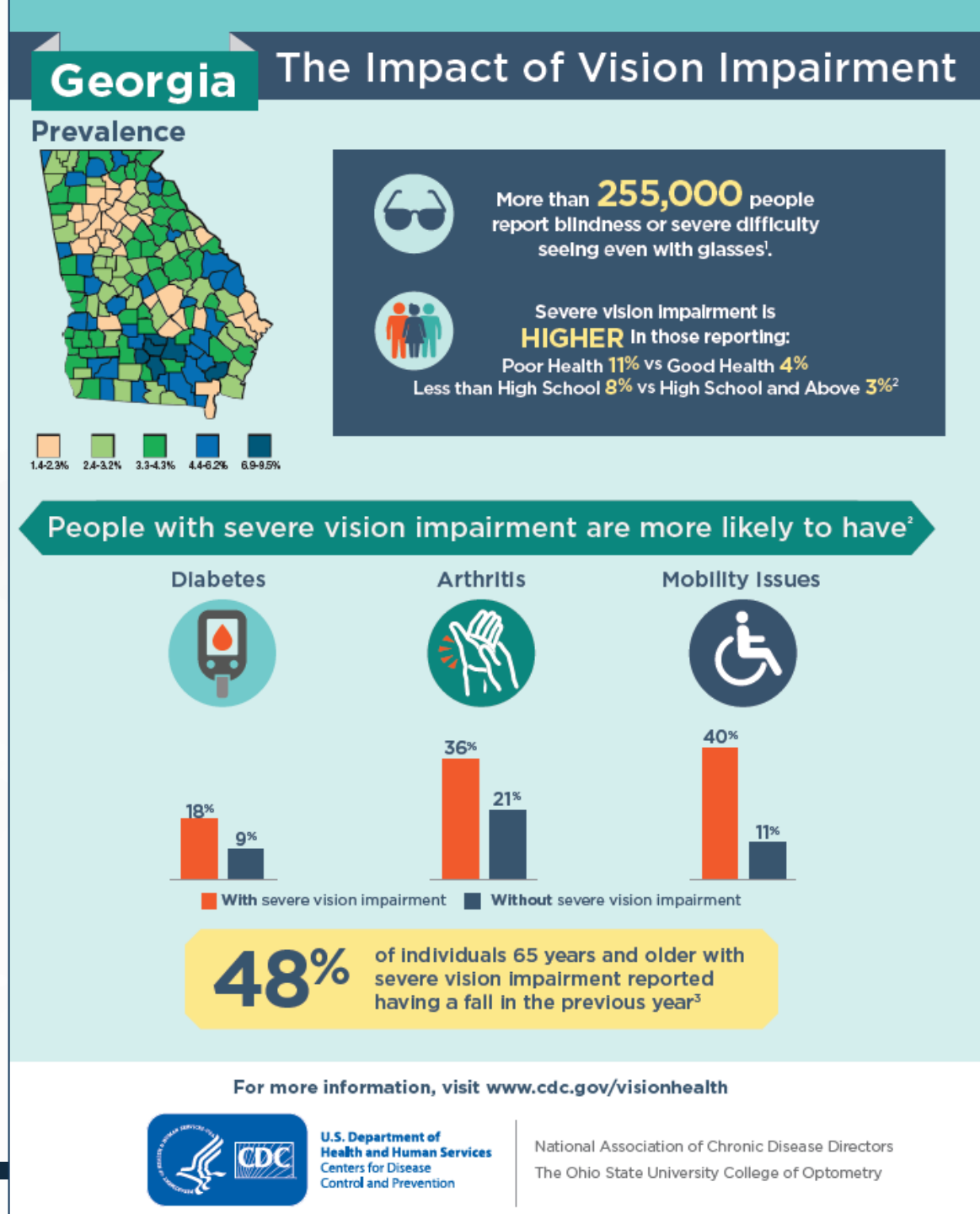
Glaucoma Detection Project

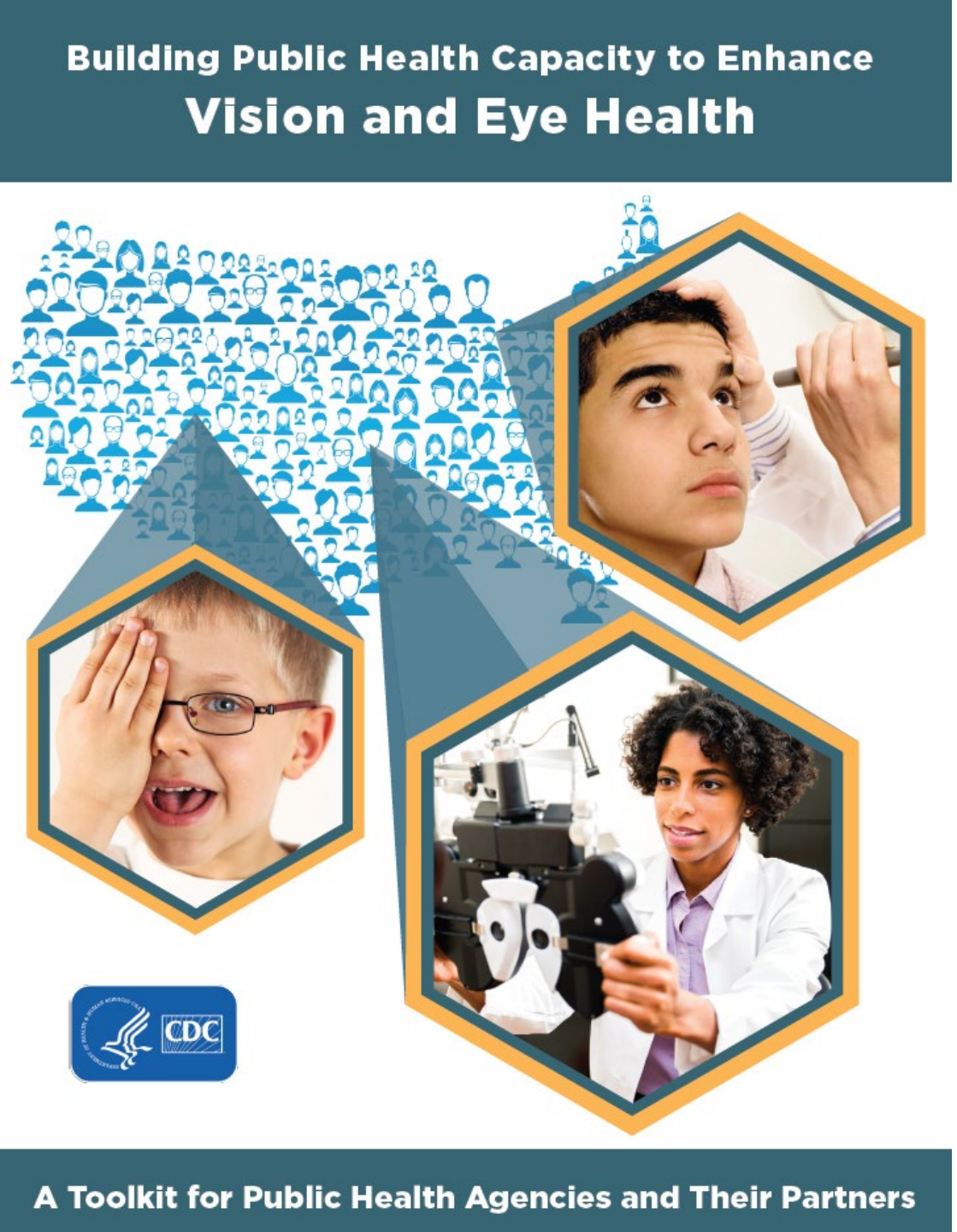
- **Columbia University (coordinating center)**
  - Community vision screening for people **living in affordable housing** in New York City
  - Patient navigators ensure follow-up eye care
- **University of Michigan**
  - **Telemedicine approach** to screen for glaucoma in community primary care clinics
  - Personalized counseling and education programs through an electronic platform
- **University of Alabama at Birmingham**
  - Primary care-based glaucoma screening program in rural **Federally Qualified Health Centers**
  - Using portable device taken directly to patients to conduct optic nerve structure assessments

https://sightstudies.org/

Building State Capacity

- CDC collaborates with the National Association of Chronic Disease Directors (NACDD) to:
  - Fund seven state partners
  - Provide access to vision screening in local health departments and community clinics
  - Deliver innovative telehealth services for people at high risk of vision loss
  - Integrate vision health activities into broader public health strategies and interventions
  - Assess burden of vision loss and eye diseases





CDC created a toolkit to help state, tribal, local, and territorial public health agencies and their partners:

- Assess the level of vision impairment in their communities
- Build effective partnerships
- Implement effective and sustainable interventions to improve vision and eye health
- Evaluate the impact of vision-related interventions

https://www.cdc.gov/visionhealth/programs/vision-toolkit.html

CDC's Surveillance of Vision and Eye Health in the U.S.

- Assesses the burden of vision loss and eye diseases at the national, state, and county level
- Monitors trends over time
- Identifies disparities and differences in vision loss and eye disease by geography, age, sex, racial/ethnic groups, and risk factors (diabetes)
- Provides data to inform public health priorities and resource allocation
- Evaluates the impact of public health programs

The Vision And Eye Health Surveillance System

A national data system for vision and eye health

- 10 datasets
  - National surveys
  - Administrative claims (Medicare, Medicaid, Marketscan)
  - Electronic health record registry: IRIS® (Intelligent Research in Sight)
- Over 200 vision and eye health indicators
  - Eye health conditions
  - Visual function
  - Healthcare service utilization
- National-, state-, and county-level estimates

https://www.cdc.gov/visionhealth/vehss/index.html

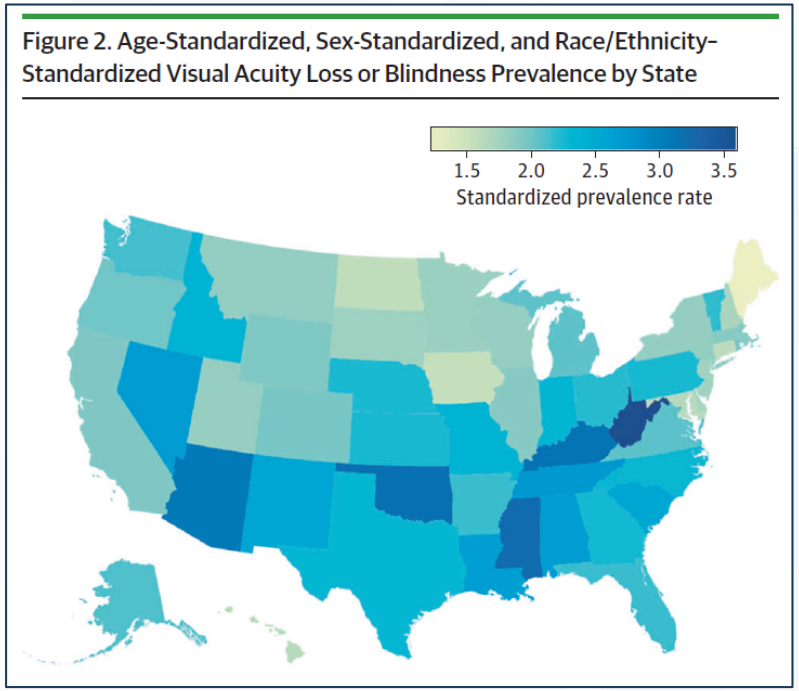
Advancing Science and Epidemiology

JAMA Ophthalmology | Original Investigation

Prevalence of Visual Acuity Loss or Blindness in the US
A Bayesian Meta-analysis

Abraham D. Flaxman, PhD; John S. Wittenborn, BS; Toshana Robalik, BS; Rohit Gulia, MS; Robert B. Gerzoff, MS; Elizabeth A. Lundeen, PhD, MPH; Jinan Saaddine, MD, MPH; David B. Rein, PhD, MPA; for the Vision and Eye Health Surveillance System study group

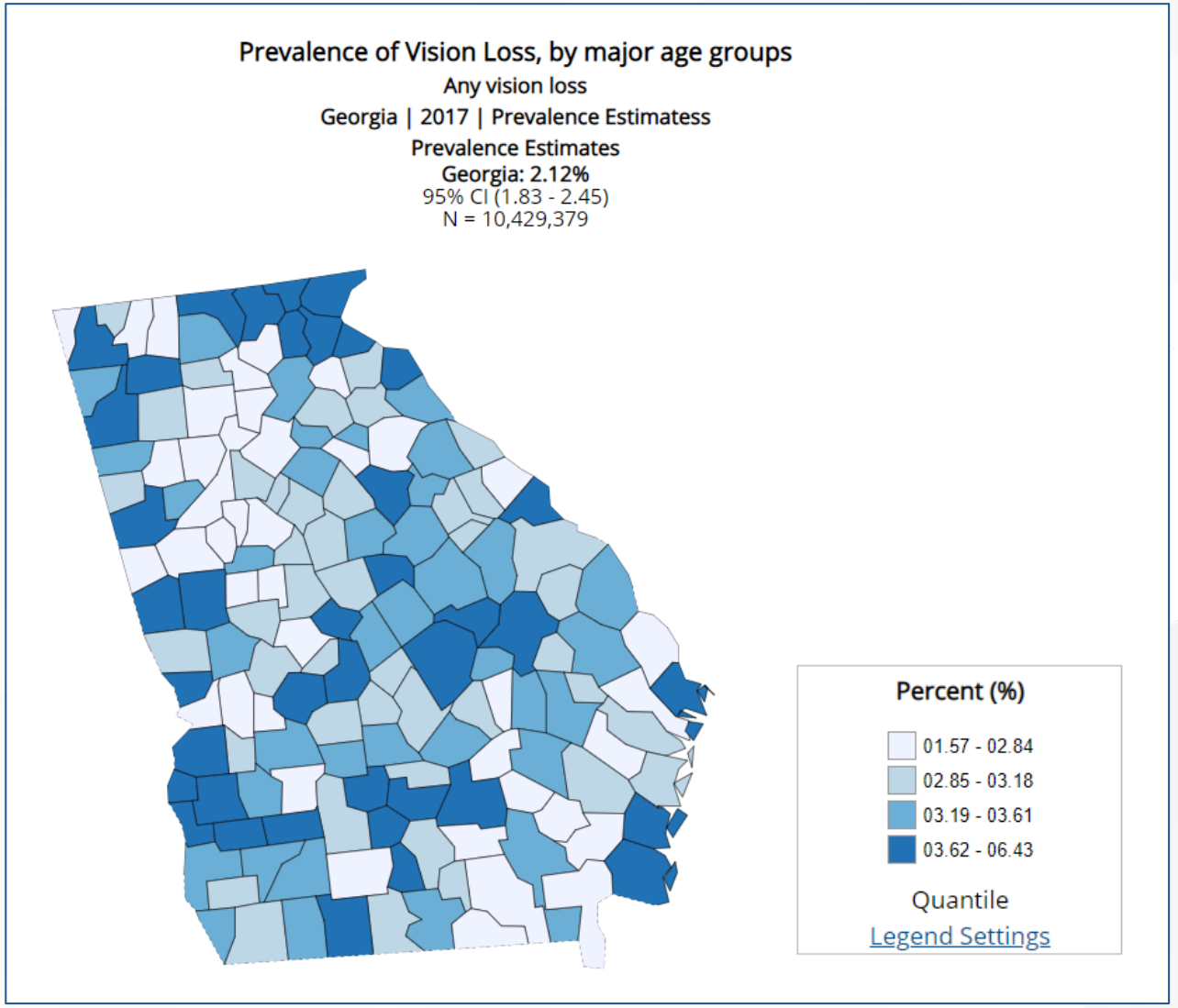
- Advanced statistical methods (Bayesian meta-analysis) to develop composite estimates of the prevalence of vision loss and blindness in the U.S.
- 7.1 million people in the U.S. living with vision loss
- 1.1 million of them are living with blindness
- Vision loss or blindness prevalence was lowest in Maine (1.4%) and highest in West Virginia (3.6%)



Flaxman, JAMA Ophthalmology, 2021.

Geographic Disparities: County-Level Surveillance Data

- Composite estimates of vision loss and blindness
- Medicare claims
- American Community Survey



Medicare Payments for the Major Eye Diseases

- Medicare fee-for-service payments for eye care services and drugs associated with the four major eye diseases estimated at $10.1 billion in 2018

Condition	Medicare Payments
Cataract	$3.6 billion
Age-related macular degeneration	$3.5 billion
Glaucoma	$2.2 billion
Diabetic retinopathy	$0.8 billion

Wittenborn, Ophthalmic Epidemiology, 2021.

Economic Burden of Vision Loss

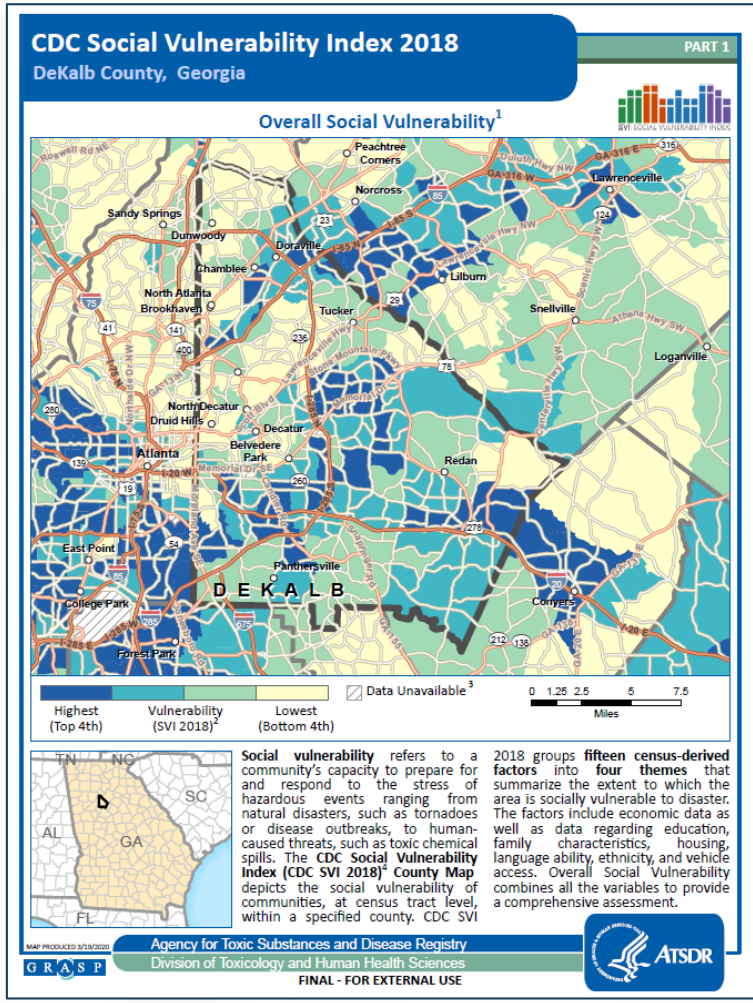
- Estimated the total U.S. economic burden of vision loss
  - $134.2 billion in 2017
  - New York, Connecticut, Massachusetts, Rhode Island, and Vermont had the highest costs per person with vision loss

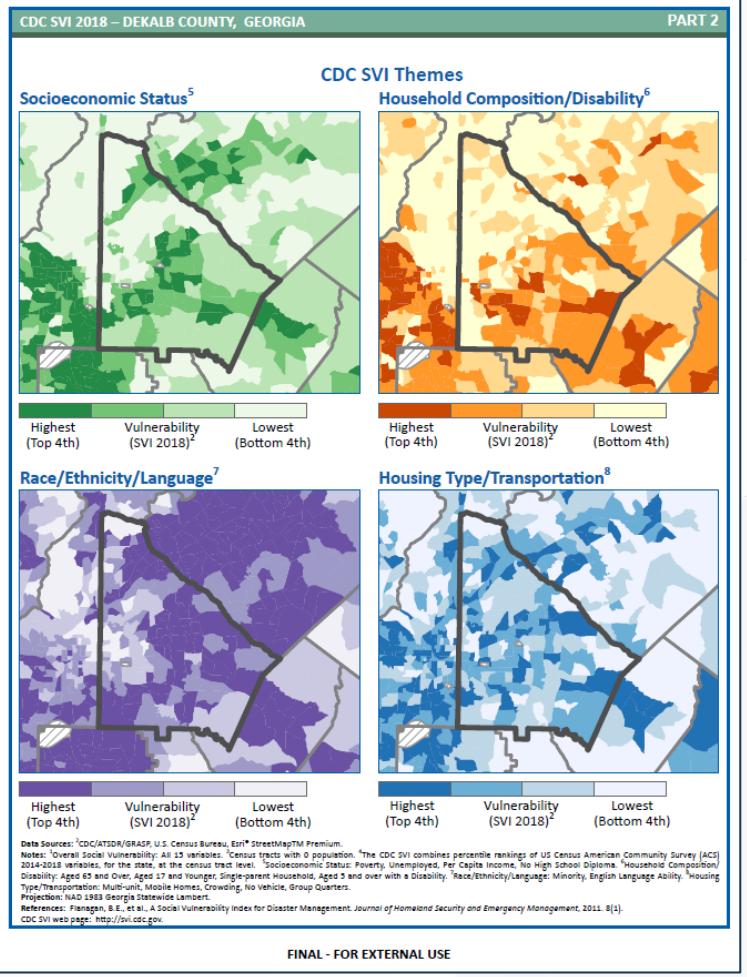
- Vision Loss Economics Explorer: online interactive data repository
  - State-specific economic burden of vision loss

Rein, Ophthalmology, 2021.

FUTURE VISION HEALTH INITIATIVE PRIORITIES

Research and Surveillance on the Social Determinants of Vision and Eye Health

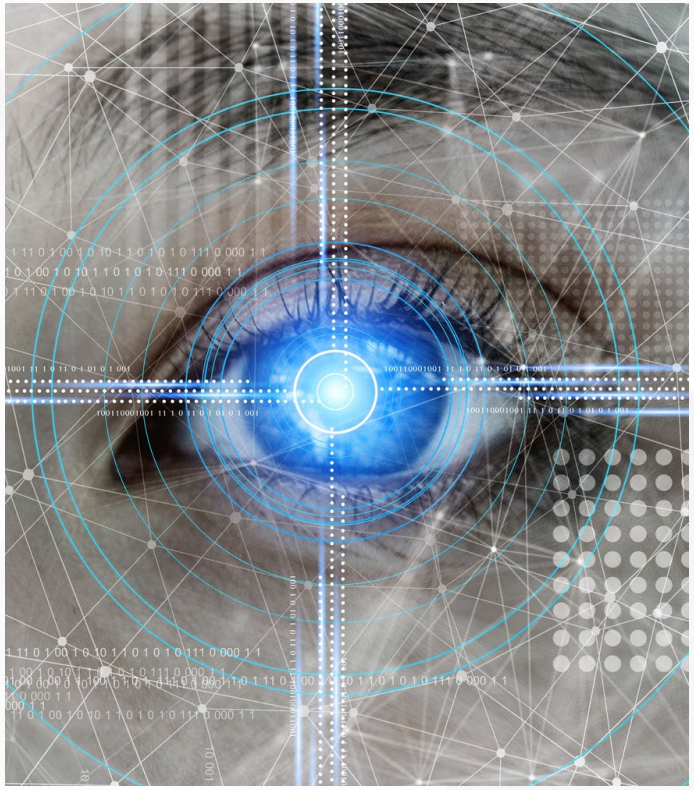




https://health.gov/healthypeople/objectives-and-data/social-determinants-health
https://www.atsdr.cdc.gov/placeandhealth/svi/index.html

NHANES Retinal Fundus Photo Artificial Intelligence Project

- National Health and Nutrition Examination Survey (NHANES) 2005–2008
  - Performing a validation study comparing retinal fundus photo grading for diabetic retinopathy performed by deep learning algorithms to the gold standard ophthalmologist grading
  - Evaluate the potential for using deep learning algorithms in future NHANES surveys to provide faster and less expensive grading of retinal photos



Support Future NHANES Ophthalmology Module

- National Health and Nutrition Examination Survey (NHANES) ophthalmology module (last implemented in 2005–2008)

- Only nationally representative prevalence estimates using measured vision and eye health data:
  - Visual acuity
  - Eye diseases
    - Diabetic retinopathy
    - Glaucoma
    - Age-related macular degeneration

Thank You

https://www.cdc.gov/visionhealth/index.htm

CONTACT:

JENNIFER GREASER/ CDC-WASHINGTON

JGREASER@CDC.GOV

Centers for Disease Control and Prevention

National Center for Chronic Disease Prevention and Health Promotion

Division of Diabetes Translation

The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.

Vision and Eye Health Surveillance System: Data to Inform Public Health Policy and Practice

Realizing Equitable Access to Vision and Eye Health Care Through Public Health Data and Surveillance

November 2, 2021

Presented by: David Rein
NORC at the University of Chicago

NORC at the University of Chicago

01 Social Determinants of Health and Vision Loss

02 Vision Loss and Life Outcomes

03 Costs of Vision Loss

04 Surveillance Can Inform Policy and Planning

Social Determinants of Health (SDoH) and Vision Loss

NORC at the University of Chicago

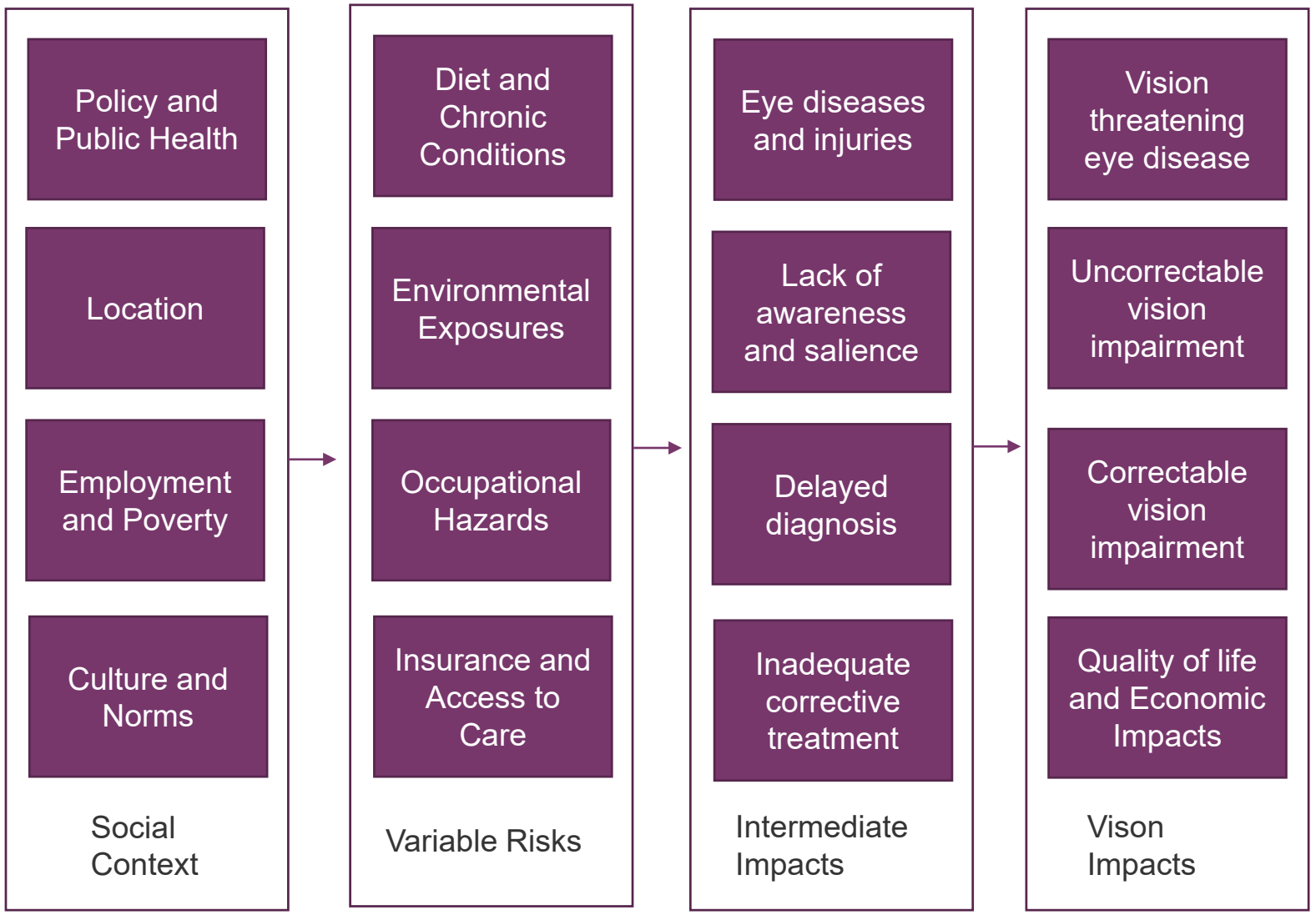
Social determinants of health (SDOH) are the conditions in the environments … that affect a wide range of health, functioning, and quality-of-life outcomes and risks.[1]

SDoH are shaped by socioeconomic position, … which are influenced by socioeconomic and political factors (e.g., policies, culture, and societal values).[2]

Social determinants are both positive and negative: "social factors confer health benefits to certain populations and cause harm in others."[3]

Significance: Achieving health and well-being requires eliminating health disparities, achieving health equity, and attaining health literacy.[4]

1. Healthy People 2030. Accessible from https://health.gov/healthypeople/objectives-and-data/social-determinants-health
2. CDC, NCHHSTP Social Determinants of Health. Accessible from https://www.cdc.gov/nchhstp/socialdeterminants/faq.html
3. Katie Green, Megan Zook. (2019) "When Talking about Social Determinants, Precision Matters." Health Affairs Blog. Accessible from: https://www.healthaffairs.org/do/10.1377/hblog20191025.776011/full/
4. Gomez, C. A., Kleinman, D. V., Pronk, N., Wrenn Gordon, G. L., Ochiai, E., Blakey, C., . . . Brewer, K. H. (2021). Addressing Health Equity and Social Determinants of Health Through Healthy People 2030. *J Public Health Manag Pract, 27*(Suppl 6), S249-S257. doi:10.1097/PHH.0000000000001297


Policy and Public Health
Location
Employment and Poverty
Culture and Norms
Social Context
Diet and Chronic Conditions
Environmental Exposures
Occupational Hazards
Insurance and Access to Care
Variable Risks
Eye diseases and injuries
Lack of awareness and salience
Delayed diagnosis
Inadequate corrective treatment
Intermediate Impacts
Vision threatening eye disease
Uncorrectable vision impairment
Correctable vision impairment
Quality of life and Economic Impacts
Vison Impacts

We know more about associations of SDoH and Vision, than causal pathways

1. Access to Health Care

Health insurance and high income are associated with greater eye care use.[1]

2. Low socio-economic status

Self-reported vision loss associated with lower education, unemployment, food insecurity, problems paying medical bills.[2]

3. Community factors

Higher rates of ocular hospitalizations associated with distressed community environment (high rates of air pollution, high rate of housing problems, single-parent families, violent crime, drug overdose).[3]

1. Wagner, L. D., & Rein, D. B. (2013). Attributes associated with eye care use in the United States: a meta-analysis. *Ophthalmology, 120*(7), 1497-1501. doi:10.1016/j.ophtha.2012.12.030
2. Su, N. H., Moxon, N. R., Wang, A., & French, D. D. (2020). Associations of Social Determinants of Health and Self-Reported Visual Difficulty: Analysis of the 2016 National Health Interview Survey. *Ophthalmic Epidemiol, 27*(2), 93-97. doi:10.1080/09286586.2019.1680703
3. French, D. D., Wang, A., Prager, A. J., & Margo, C. E. (2019). Association of the Robert Wood Johnson Foundations' Social Determinants of Health and Medicare Ocular Hospitalizations: A Cross Sectional Data Analysis. *Ophthalmol Ther, 8*(4), 611-622. doi:10.1007/s40123-019-00220-1

4. Non-utilization or lack of access to corrective refraction

In the National Health and Nutrition Examination Survey (NHANES), presenting near vision impairment was associate with non-white race, older age, being male, less than high school education, lack of private health insurance, income less than poverty level, lacking/not using near-vision correction at time of examination.[4]

5. Race/ethnicity is significantly associated with best-corrected visual impairment after controlling for age and poverty. [5,6]

4. Zebardast, N., Friedman, D. S., & Vitale, S. (2017). The Prevalence and Demographic Associations of Presenting Near-Vision Impairment Among Adults Living in the United States. *Am J Ophthalmol, 174*, 134-144. doi:10.1016/j.ajo.2016.11.004
5. Ko, F., Vitale, S., Chou, C. F., Cotch, M. F., Saaddine, J., & Friedman, D. S. (2012). Prevalence of nonrefractive visual impairment in US adults and associated risk factors, 1999-2002 and 2005-2008. *JAMA, 308*(22), 2361-2368. doi:10.1001/jama.2012.85685
6. Flaxman, A. D., Wittenborn, J. S., Robalik, T., Gulia, R., Gerzoff, R. B., Lundeen, E. A., . . . Eye Health Surveillance System study, g. (2021). Prevalence of Visual Acuity Loss or Blindness in the US: A Bayesian Meta-analysis. *JAMA Ophthalmol, 139*(7), 717-723. doi:10.1001/jamaophthalmol.2021.0527

Vision Loss and Life Outcomes

NORC at the University of Chicago

COSTS OF VISION LOSS

A function of

Prevention

Treatment

Vision loss when prevention and treatment fail

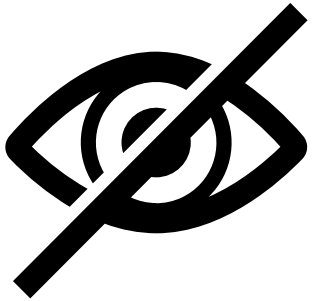
Ideally, we'd like to spend more on

Effective and widespread prevention

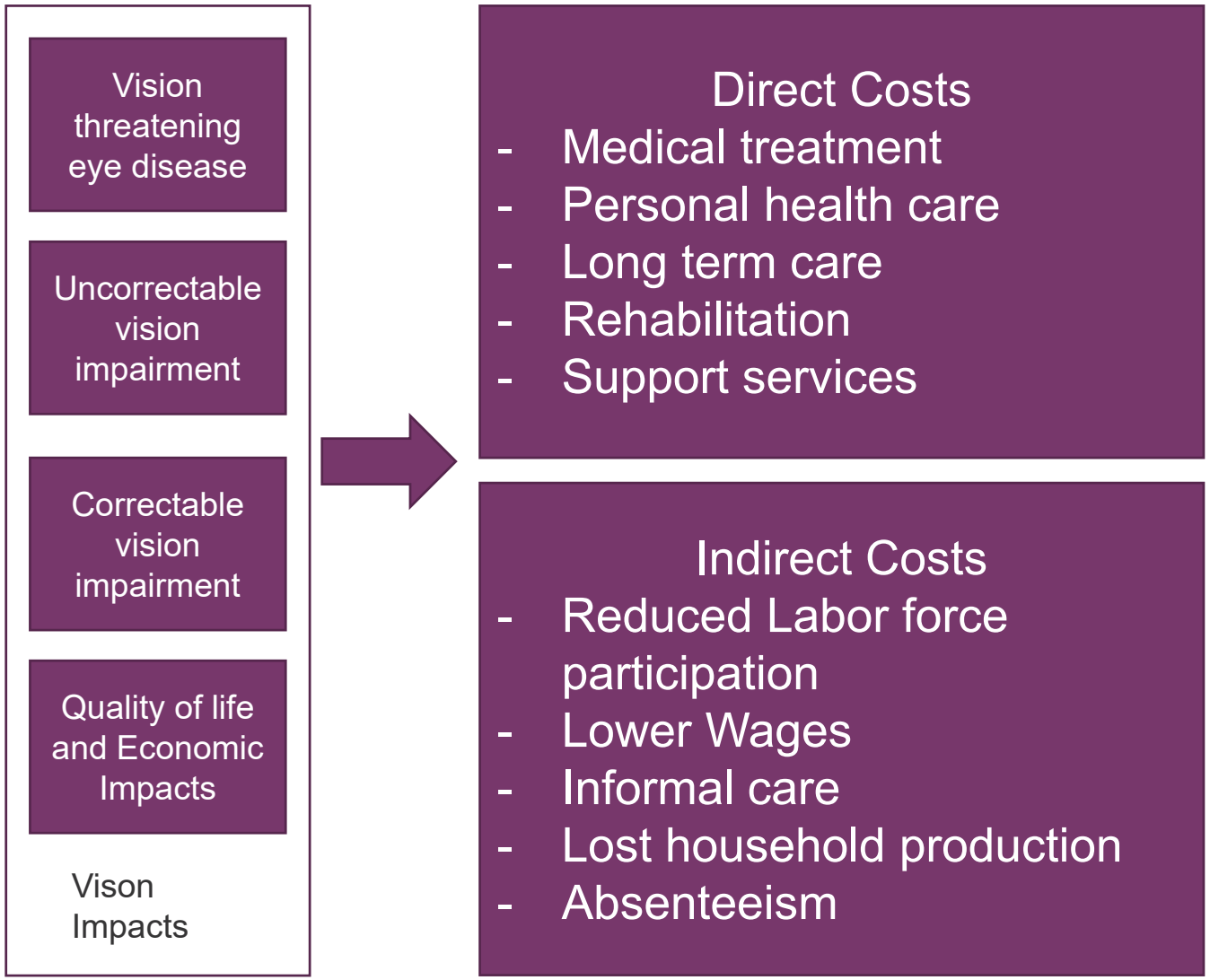
Better treatment

& Spend less on

The consequences of vision loss



Vision loss increases direct and indirect costs



Costs of Vision Loss

NORC at the University of Chicago

ECONOMIC BURDEN OF VISION IMPAIRMENT OR BLINDNESS

Burden of VL or Blindness

$134 bn

(UI, $76 - $218)

Cost per Person with VL or Blindness

$16,838

(UI, $9,535 – $27,352)

Direct Costs

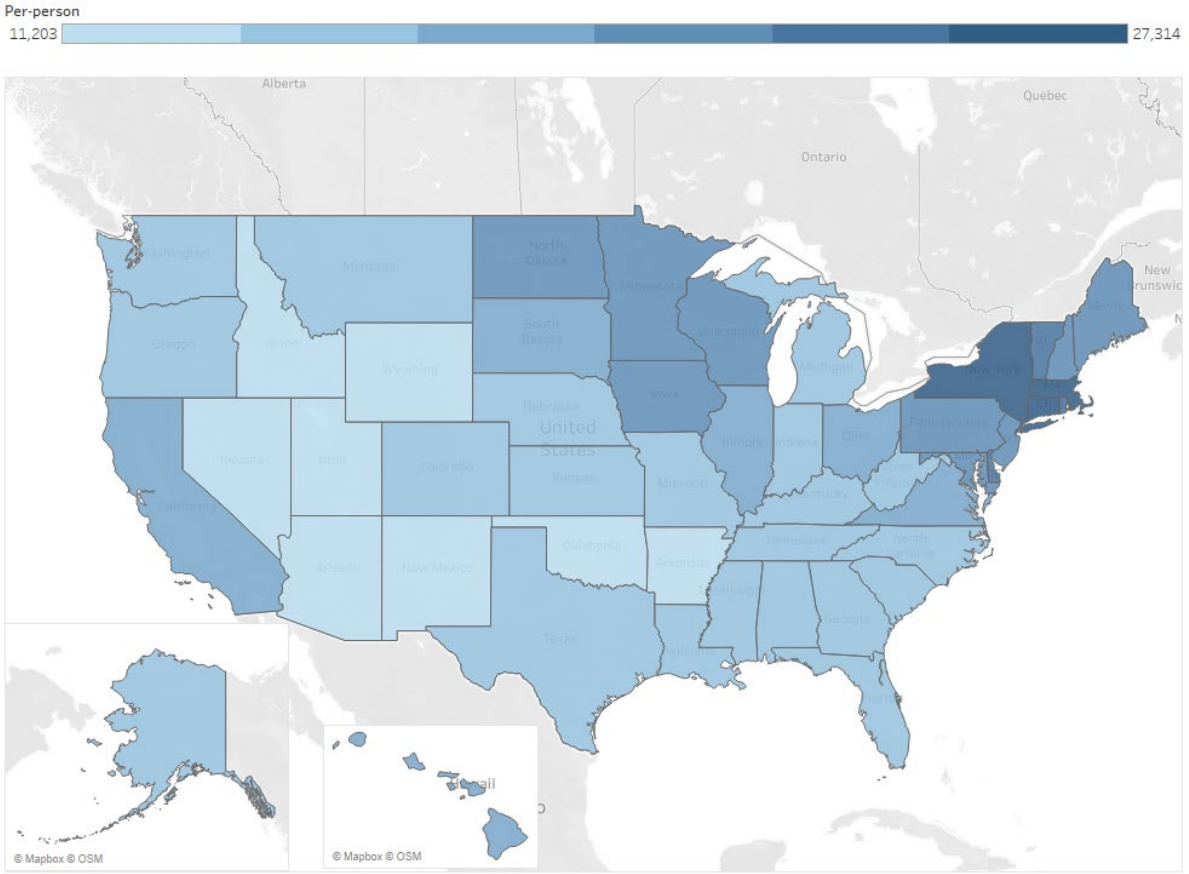
$98.7 bn

Indirect Costs

$35.5 bn

Includes only the costs of VL & Blindness. Including costs of eye care for people without VL would increase these costs.

Rein, D. B., Wittenborn, J. S., Zhang, P., Sublett, F., Lamuda, P. A., Lundeen, E. A., & Saaddine, J. (2021). The Economic Burden of Vision Loss and Blindness in the United States. *Ophthalmology*. doi:10.1016/j.ophtha.2021.09.010



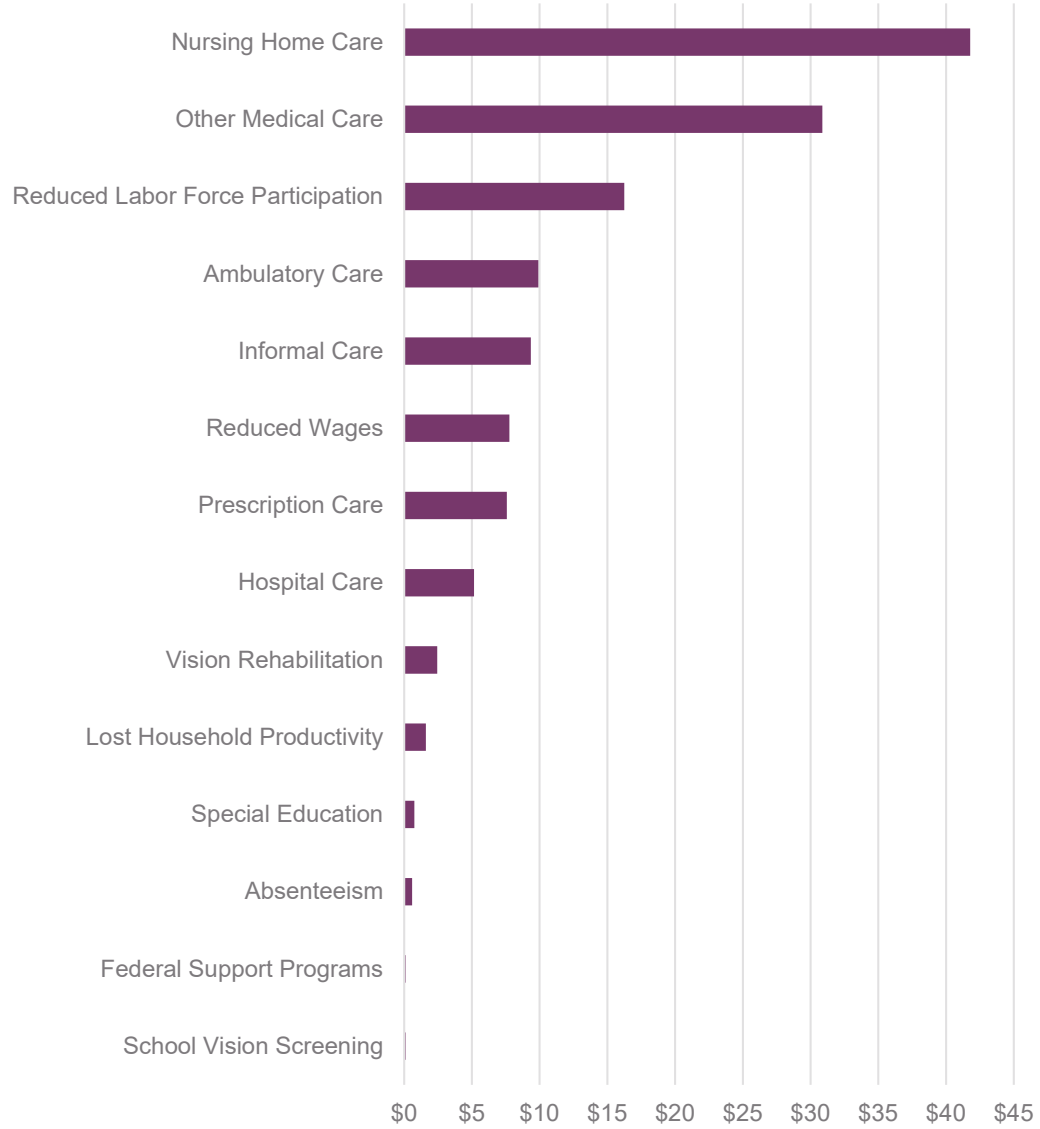
Highest Costs Per Person

New York, Connecticut, Massachusetts, Rhode Island, Vermont

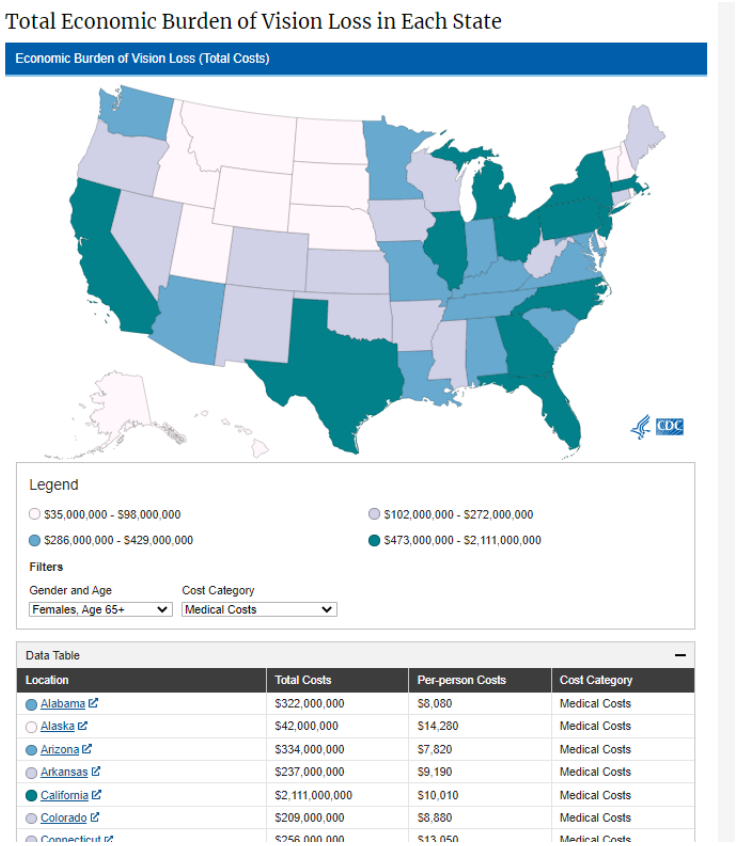
Lowest Costs Per Person

Nevada, Arizona, New Mexico, Idaho, Oklahoma

COSTS BY COST TYPE ($BN)



CDC VISION LOSS ECONOMIC EXPLORER



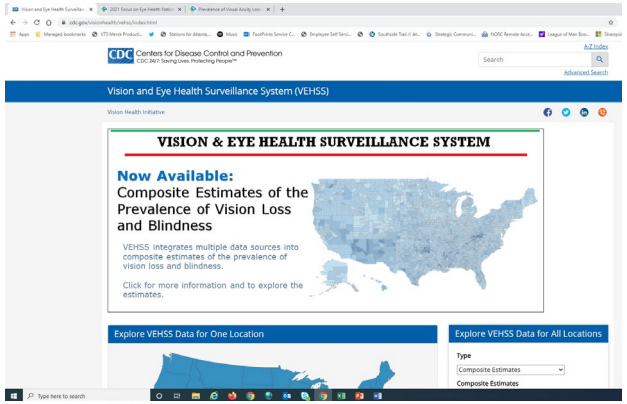
cdc.gov/visionhealth/economics

Surveillance Can Inform Policy and Planning

NORC at the University of Chicago

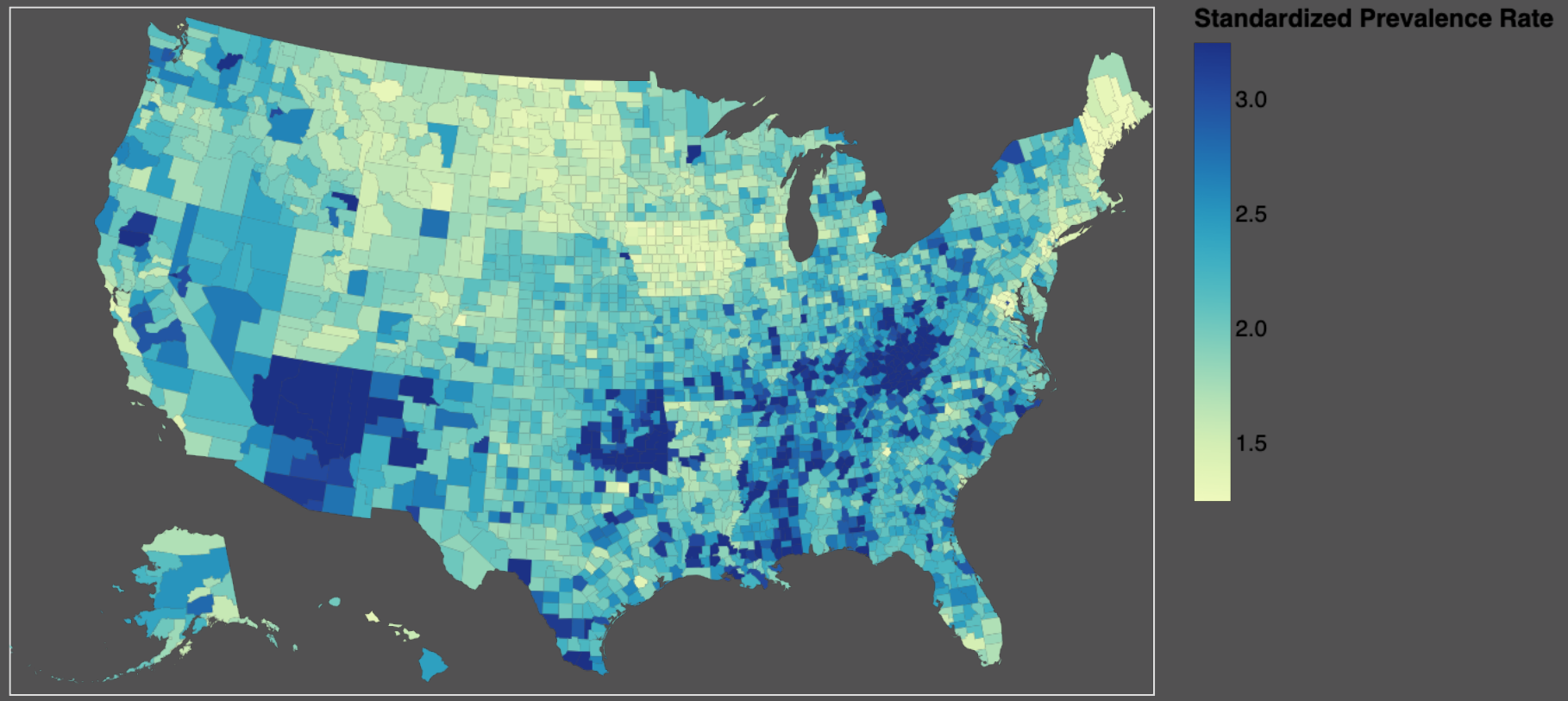
EXAMPLES FROM THE CDC'S VISION AND EYE HEALTH SURVEILLANCE SYSTEM (VEHSS)

- **Google: VEHSS CDC**



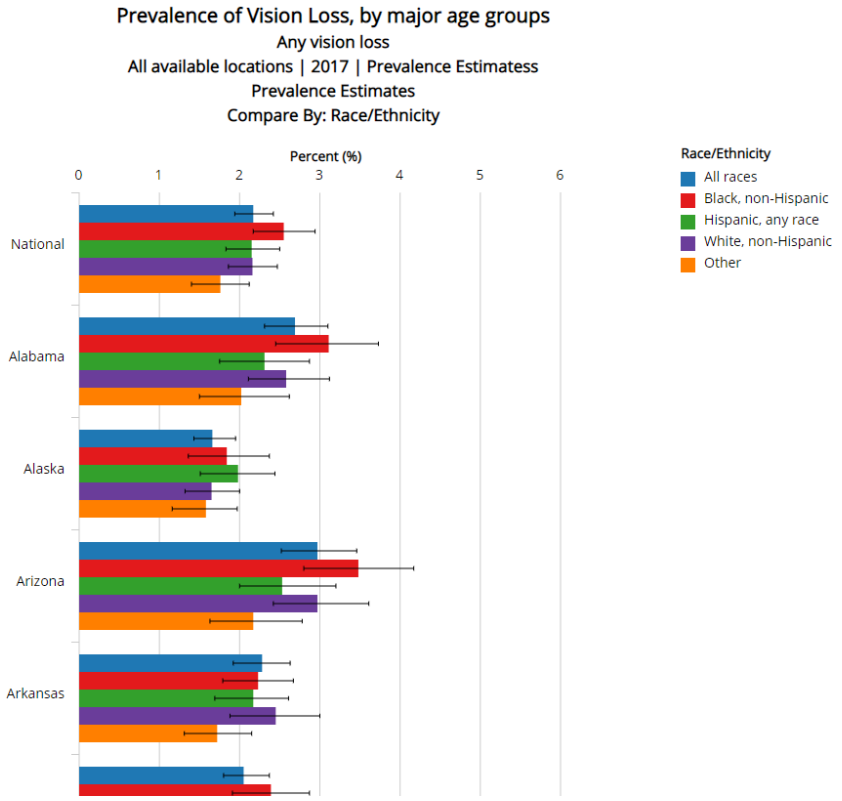
SURVEILLANCE FOR POLICY AND PLANNING

How does surveillance help address SDoH and vision problems in the United States?



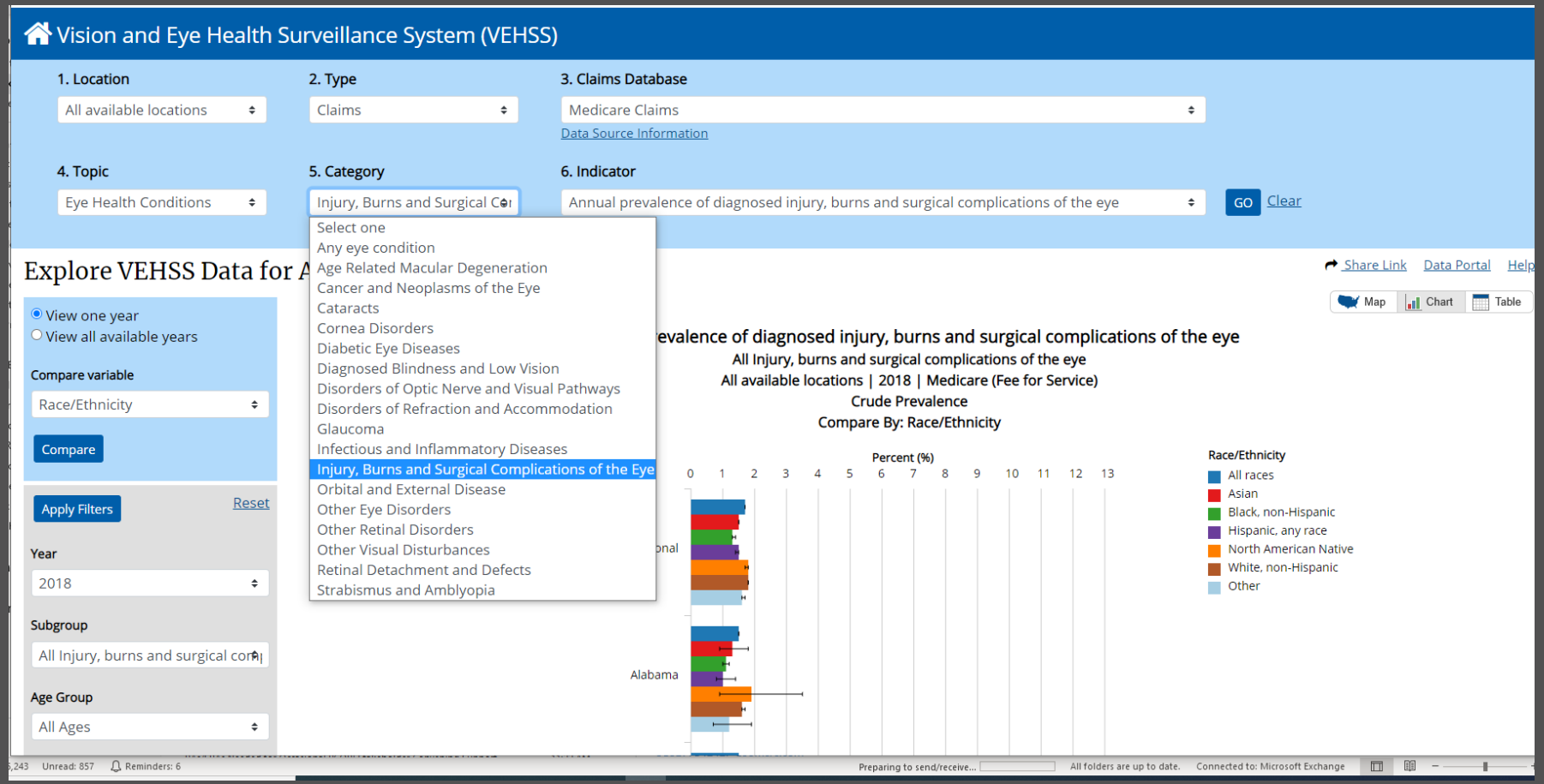
SURVEILLANCE CAN TELL US WHERE VISION PROBLEMS ARE MOST SEVERE

County level estimates of the prevalence of vision loss or blindness.



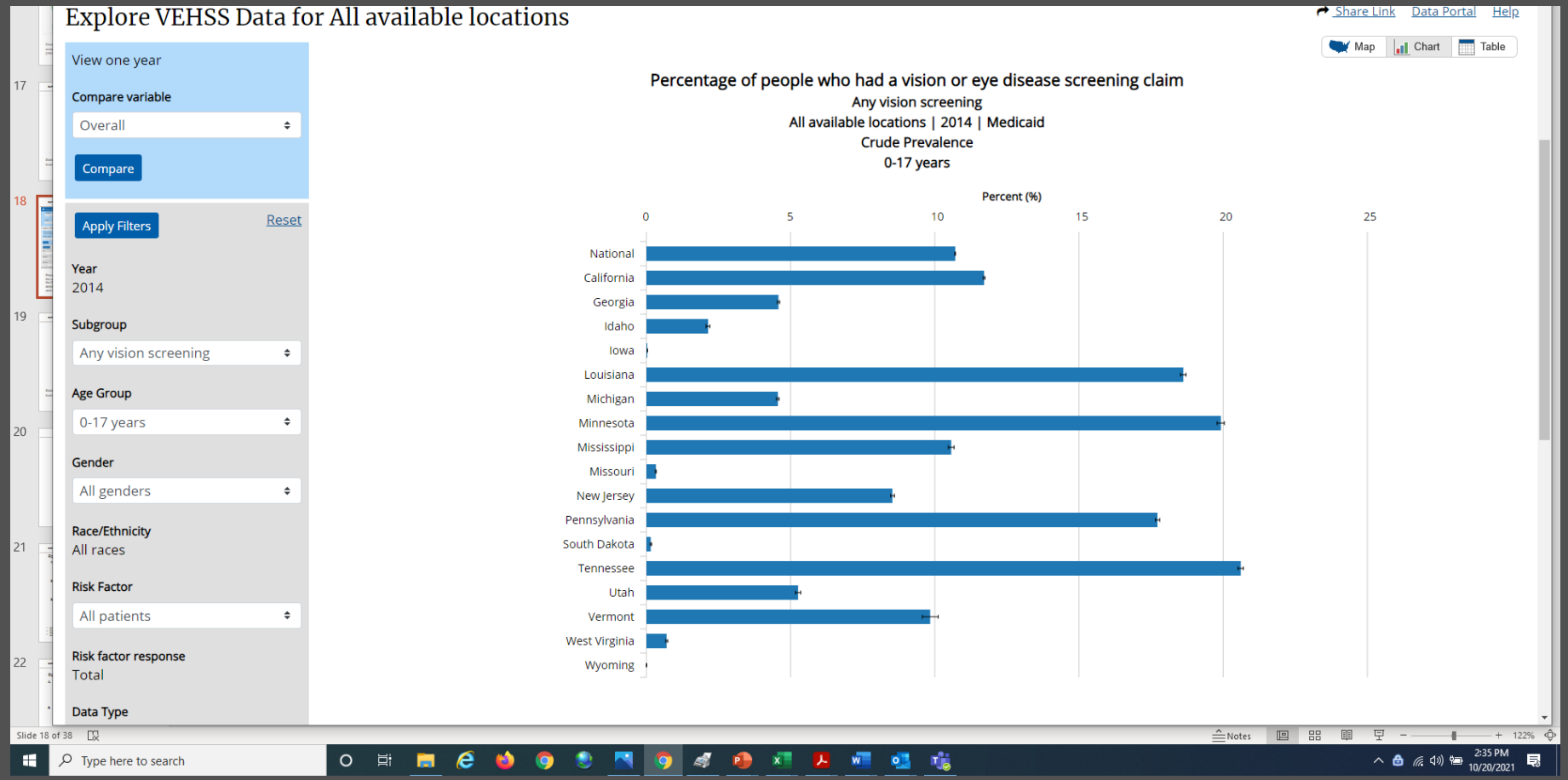
SURVEILLANCE CAN TELL US WHO IS MOST AFFECTED

State by state estimates of vision loss prevalence by race/ethnicity taken from the CDC's Vision and Eye Health Surveillance System



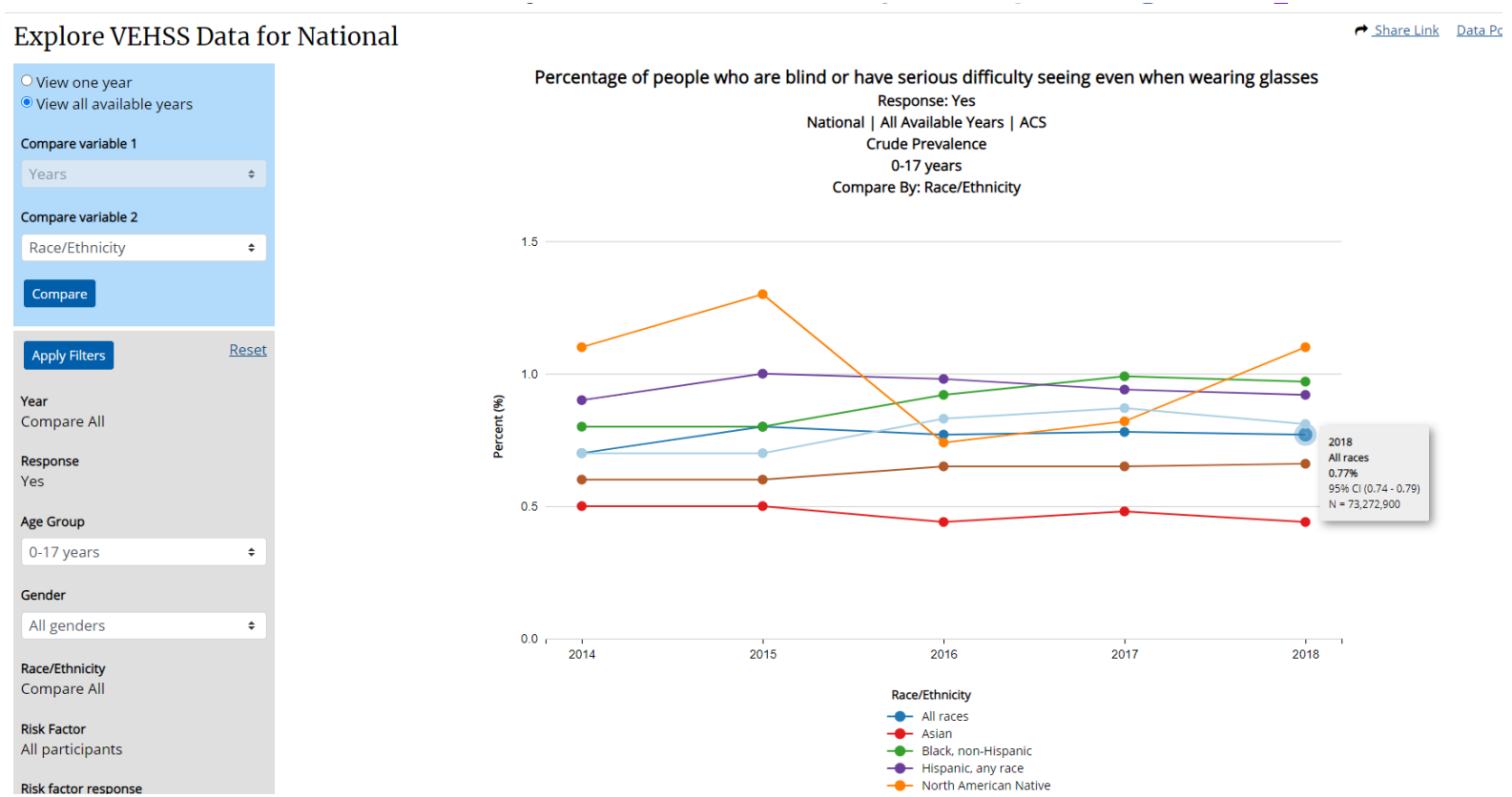
SURVEILLANCE CAN TELL US WHAT IS CAUSING PROBLEMS

Prevalence of medical claims for injuries, burns, and surgical complications of the eye in 2018 Medicare fee-for-service data by race/ethnicity and state taken from the CDC's Vision and Eye Health Surveillance System. VEHSS contains prevalence information on 17 categories of eye conditions for Medicare, Medicaid, and commercial insurance plans.



SURVEILLANCE CAN IDENTIFY DIFFERENCES IN PREVENTION PROGRAM USE

Percent of children in Medicaid with claims for vision screening by reporting state, taken from the CDC's Vision and Eye Health Surveillance System. Updated Medicaid data coming to VEHSS soon.



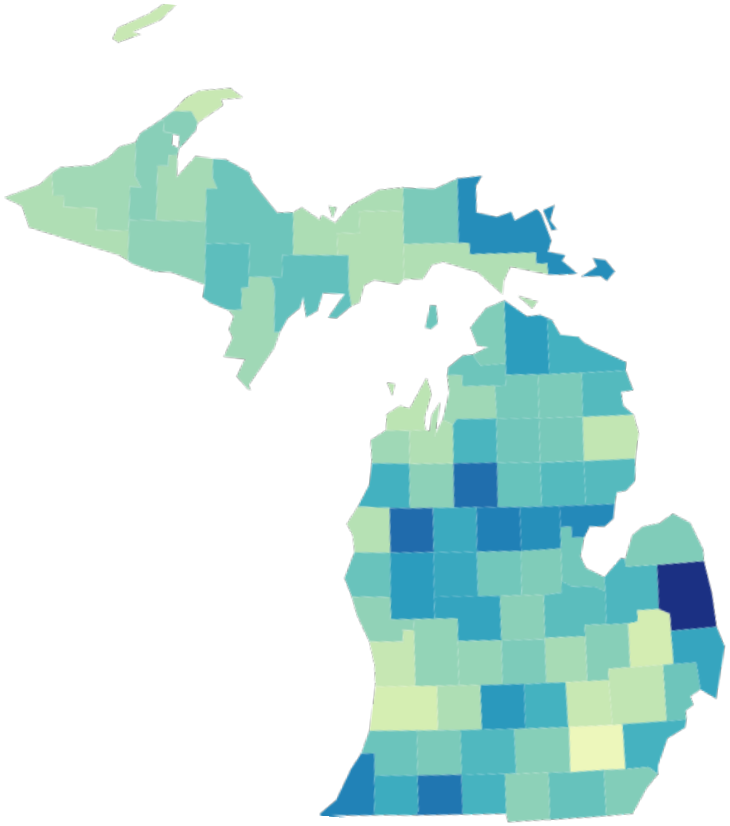
SURVEILLANCE CAN TRACK PROGRESS IN REDUCING DISPARITIES OVER TIME

Percent of children who report serious difficulty seeing even when wearing glasses from the American Community Survey, by race/ethnicity and year. Taken from the CDC's Vision and Eye Health Surveillance System.

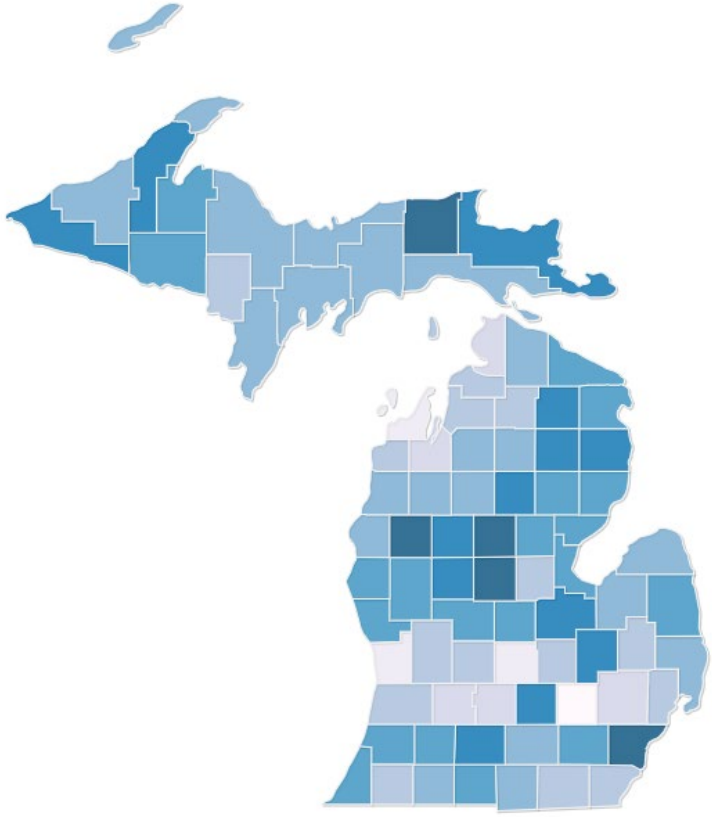
More Work is Needed

at the
University of
Chicago

Vision Loss or Blindness



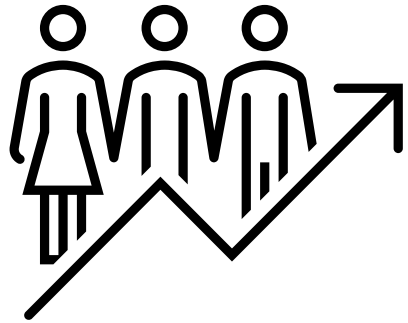
Poverty Rate

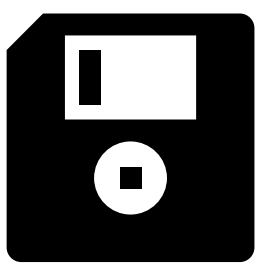


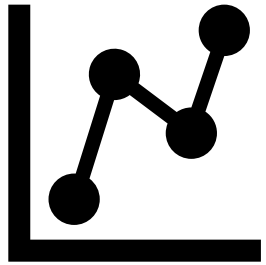
We know SDoH are connected to vision loss, but we need more research to understand how, and what to do about it.

COLLECTING VISION HEALTH PRIMARY DATA

- **The National Health and Examination Survey** last collected nationally representative, examination-based information on the prevalence of vision loss and blindness and other eye disorders in 2008.
- **No survey data sources** exist to track state and local trends in vision health prevention and treatment.
- **Limited representative data** to support the evaluation of vision outcomes over time.







Thank you.

David Rein
Program Area Director
Rein-david@norc.org

Research You Can Trust™

NORC at the University of Chicago

Vision Impairment and Blindness in the U.S.

New National, State, and County-level Prevalence Estimates

11.02.21 : Version 1.2

John Wittenborn
David B. Rein, Ph.D.

On Behalf of the Vision and Eye Health Surveillance System Study Group

NORC at the University of Chicago

Agenda

Paper: Prevalence of Visual Acuity Loss or Blindness in the US: A Bayesian Meta-analysis [1]

IHME Institute for Health Metrics and Evaluation

NORC at the University of Chicago

CDC Centers for Disease Control and Prevention

Abraham Flaxman,
Toshana Robalik,
Rohit Gulia

John Wittenborn,
David Rein

Bob Gerzoff,
Elizabeth Lundeen,
Jinan Saaddine

1 Flaxman, A. D., Wittenborn, J. S., Robalik, T., Gulia, R., Gerzoff, R. B., Lundeen, E. A., Saaddine, J. & D.B. Rein on behalf of the Vision and Eye Health Surveillance System Study Group. (2021). Prevalence of Visual Acuity Loss or Blindness in the US: A Bayesian Meta-analysis. *JAMA Ophthalmol.* doi:10.1001/jamaophthalmol.2021.0527

Background & Objective

NORC at the University of Chicago

The Vision And Eye Health Surveillance System

A national data system for vision and eye health

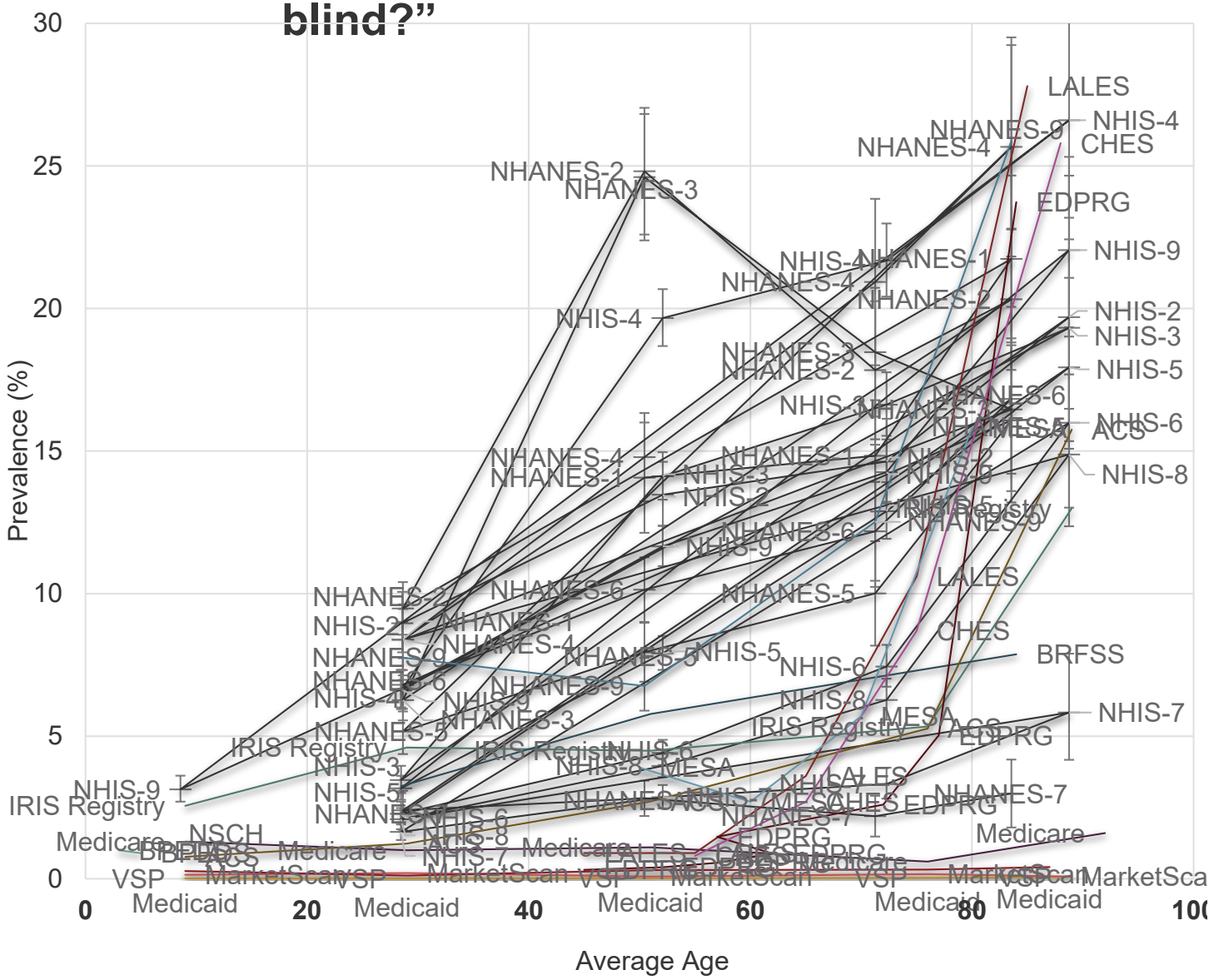
VEHSS summarizes indicators of vision, eye disease and eye care prevalence from many data sources

- National surveys
- Administrative claims and registries
- Examination-based studies

No single data source can provide a comprehensive estimate of prevalence at the national, state and local level

- Differences in population of measure, concept of measure, and data collection methods
- Limitations in scope and sample

No single estimate can answer "how many people in the US are blind?"



1.ACS: "Is this person blind or does he/she have serious difficulty seeing even when wearing glasses?"
2.BPEDS: Baltimore Pediatric Eye Disease Study BCVA
3.BRFSS: "Are you blind or do you have serious difficulty seeing, even when wearing glasses?"
4.CHES: Chines American Eye Study, BCVA
5.EDPRG: Eye Disease Prevalence Research Group, BCVA
6.IRIS: IRIS Registry, BCVA
7.LALES: Los Angeles Latino Eye Study, BCVA
8.MarketScan: MarketScan commercial claims, diagnosed vision loss
9.Medicaid: Medicaid MAX claims, diagnosed vision loss
10.Medicare: Medicare FFS Part B claims, diagnosed vision loss
11.MESA: Multi-Ethnic Study of Atherosclerosis, BCVA
12.NHANES-1: "At the present time, would you say your eyesight, with glasses or contact lenses if you wear them, is excellent, good, fair, poor, or very poor?"
13.NHANES-2: "How much difficulty do you have reading ordinary print in newspapers?"
14.NHANES-3: "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?"
15.NHANES-4: "How much difficulty do you have going down steps, stairs, or curbs in dim light or at night?"
16.NHANES-5: "How much difficulty do you have noticing objects off to the side while you are walking?"
17.NHANES-6: "How much difficulty do you have finding something on a crowded shelf?"
18.NHANES-7: "How much difficulty do you have driving during the daytime in familiar places?"
19.NHANES-8: Presenting visual acuity-Blind
20.NHANES-9: Presenting visual acuity-Visual Impairment
21.NHIS-1: "Are you blind or unable to see at all?"
22.NHIS-2: "Do you have difficulty seeing, even when wearing glasses?"
23.NHIS-3: "Even when wearing glasses or contacts lenses, because of your eyesight, how difficult is it for you 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?"
24.NHIS-4: "Even when wearing glasses or contacts lenses, because of your eyesight, how difficult is it for you to read ordinary print in newspapers?"
25.NHIS-5: "Even when wearing glasses or contacts lenses, because of your eyesight, how difficult is it for you to go down steps, stairs, or curbs in dim light or at night?"
26.NHIS-6: "Even when wearing glasses or contacts lenses, because of your eyesight, how difficult is it for you to find something on a crowded shelf?"
27.NHIS-7: "Even when wearing glasses or contacts lenses, because of your eyesight, how difficult is it for you to drive during daytime in familiar places?"
28.NHIS-8: "Even when wearing glasses or contacts lenses, because of your eyesight, how difficult is it for you to notice objects off to the side while you are walking along?"
29.NHIS-9: "Do you have any trouble seeing, even when wearing glasses or contact lenses?"
30.NSCH: "Does child have blindness or problems with seeing, even when wearing glasses?"
31.VSP: Vision Service Plan claims, diagnosed vision loss

Opportunity to develop composite prevalence estimates

Using statistical modeling methods, we can combine information from different data sources to create composite estimates

- Leverage the strengths, minimize limitations of individual data sources
- Include measures for different population groups
- Capture variation by demographic group, geography, risk factors and social determinants of health (SDoH)

VEHSS creates opportunities for new estimate

- New data sources and methods
- VEHSS platform for data dissemination

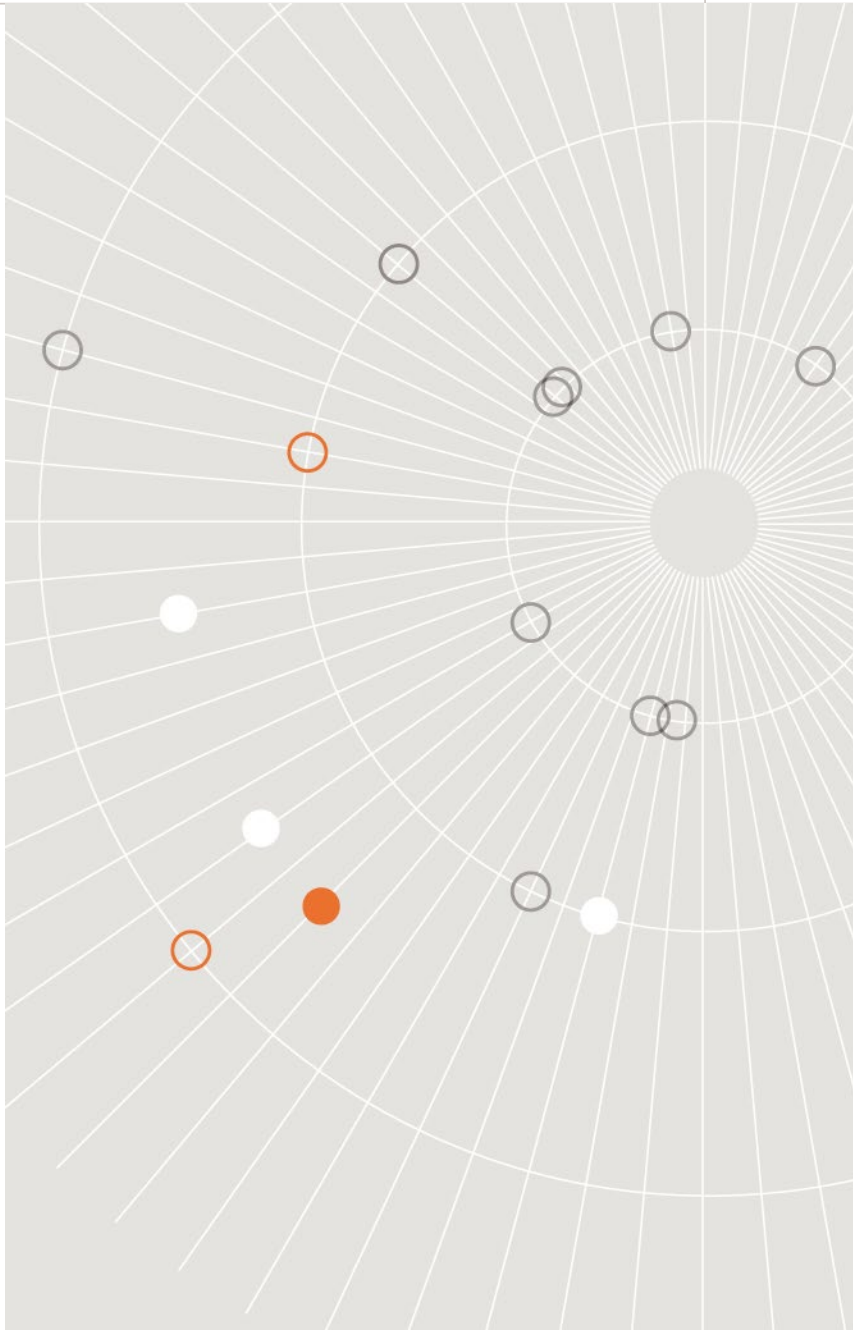
Previously published prevalence estimates derived from a single data source:

Data source used	Strengths	Limitations
Meta-analyses of population-based examination study estimates	• Gold-standard eye examinations measuring best-corrected visual acuity	• Excluded populations (<40, nursing homes, prisons, and military), • Costly and infrequent (data published from 8 to 36 years ago), • Small samples collected in a few localized populations, including international data
Self-report survey estimates	• Large national, state and county representative samples • Detailed demographics, risk factors, SDoH • Collected annually	• Unknown validity of self-reported vision and blindness
NHANES vision examination survey estimates	• Nationally representative sample • Nearly gold-standard examination	• Excluded populations (<12, nursing homes, prisons, and military) • Last collected in 2008 • Limited sample, top-coded age at 80 or 85

Objective: Produce new estimates of visual acuity loss and blindness by age, sex, race/ethnicity, US state and county.

Address limitations in existing estimates

- Update population-based examination meta-analyses
  - use latest available examination data, including NHANES
- Use empirical self-report measurements to
  - estimate state and county variation and
  - provide additional information for under-represented groups (children and the oldest old)

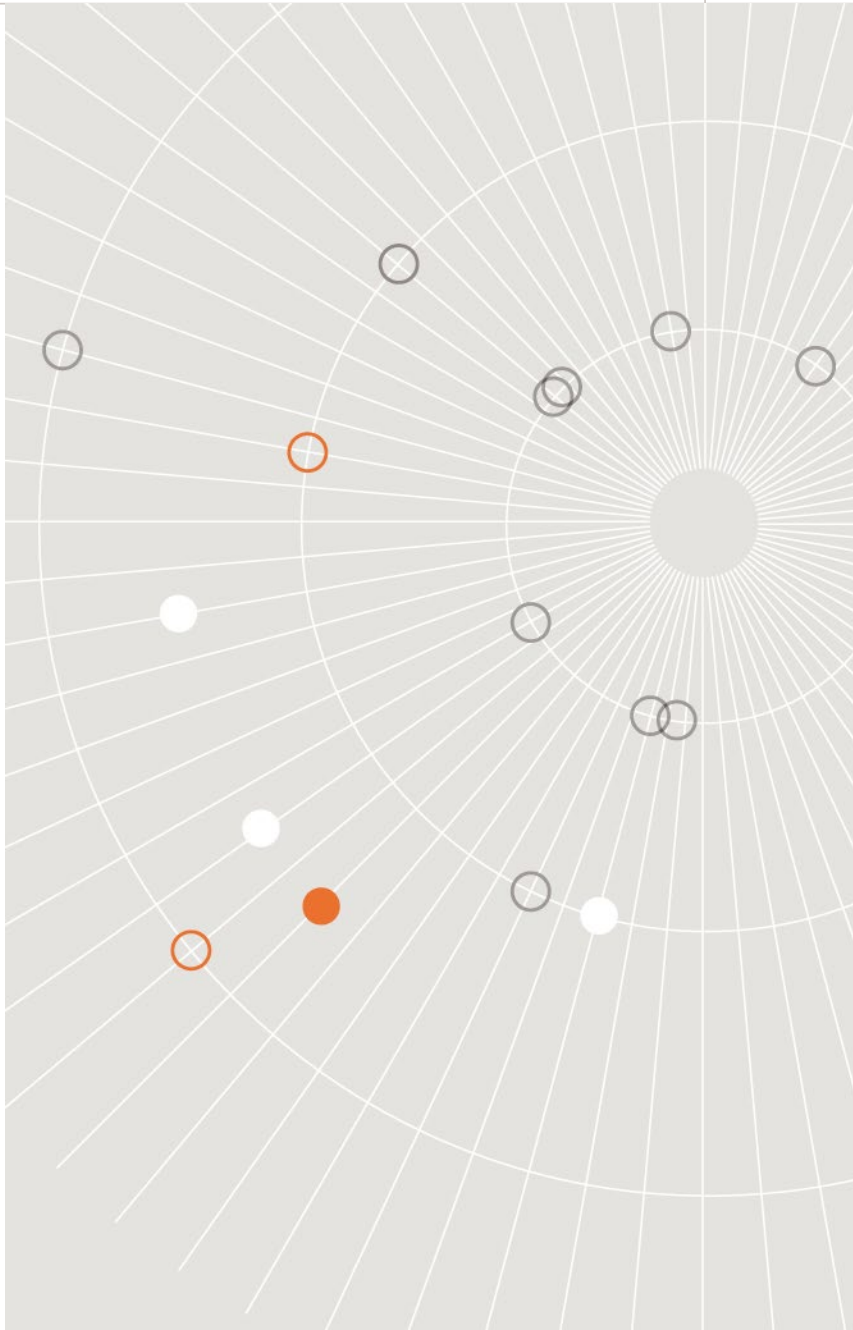


Data & Methodology

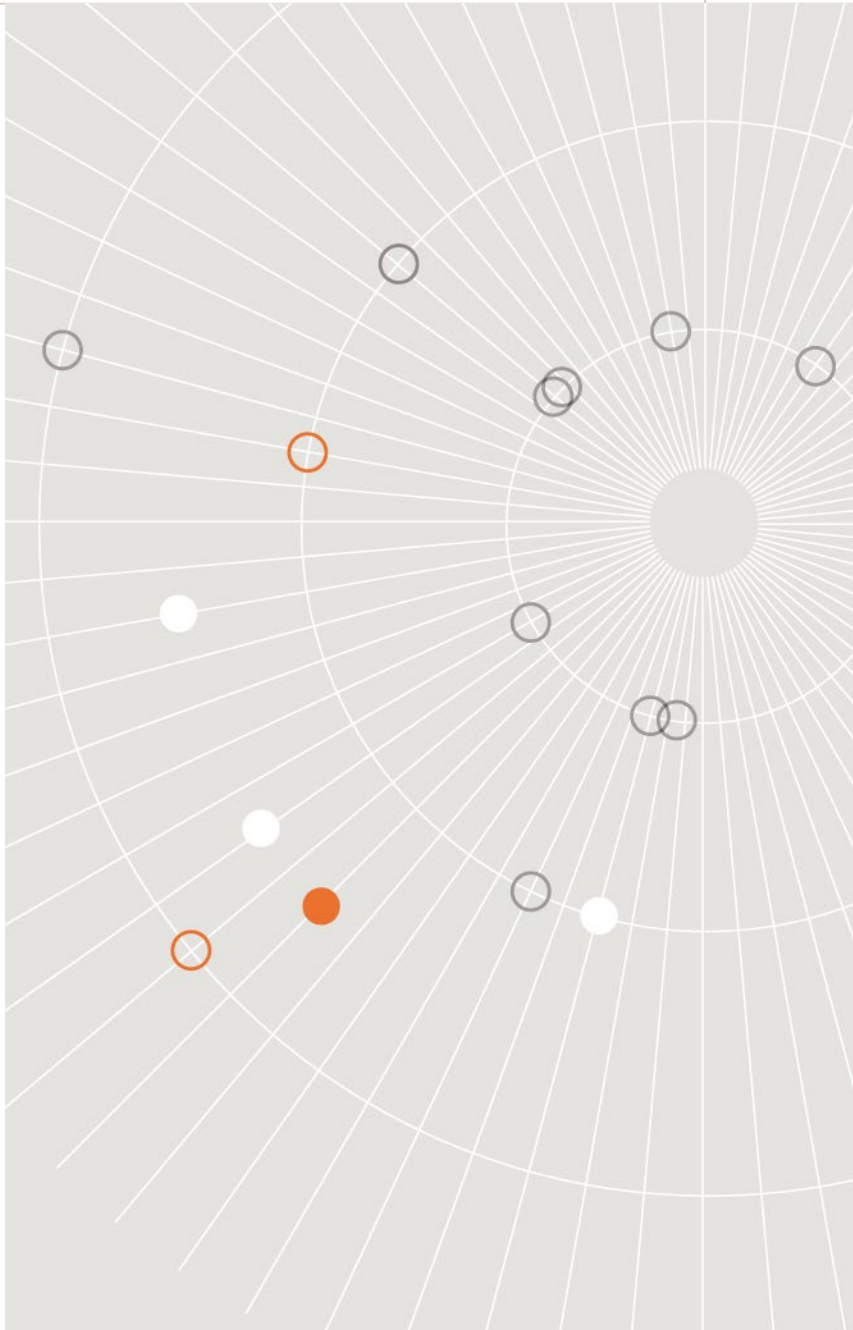
NORC at the University of Chicago

Data Sources

- Examination studies
  - Published population-based examination studies:
    - Baltimore Pediatric Eye Disease Study (BPEDS), 2003-2007
    - The Chinese American Eye Study (CHES), 2010-2013
    - Eye Disease Prevalence Research Group (EDPRG), 1985-1998
    - Los Angeles Latino Eye Study (LALES), 2000-2003
    - Multi-Ethnic Study of Atherosclerosis Cohort, 2000-2004
  - National Health and Nutrition Examination Survey (NHANES), vision examination module, 1999-2008
- Self-report surveys
  - National Survey of Children's Health (NSCH), 2016
  - American Community Survey (ACS), 2017



- Statistical method
  - Bayesian multiple-regression model
- Approach
  - Use population-based studies and NHANES vision examination data to “set the level” of vision loss (≤20/40) and blindness (≤20/200) based on BCVA
    - NHANES selected as the overall reference point
  - Use self-reported blindness or difficulty seeing (even when wearing glasses) to estimate relative variation by:
    - State and county
    - Groups not included in examination data:
      - Children younger than 12
      - Persons in long term care and prisons
      - The oldest old
  - Census population estimates used to fit to 2017 US population by state and county
- Intuition
  - Goal is to predict the outcomes of an NHANES-style vision examination survey conducted on a much, much larger and more recent sample



VEHSS Composite Estimates of the Prevalence of Vision Loss or Blindness

NORC at the University of Chicago

Prevalence of Visual Impairment or Blindness (≤20/40)

7.08 mil

(95% UI, 6.32 -7.89)

2.17%

(95% UI, 1.94% - 2.42%)

Among populations excluded from earlier estimates:

Ages 0 to 39

1.62 mil

(95% UI, 1.32 – 1.92)

Group Quarters

358,000

(95% UI, 263k – 472k)

Prevalence of Blindness (≤20/40)

1.08 mil

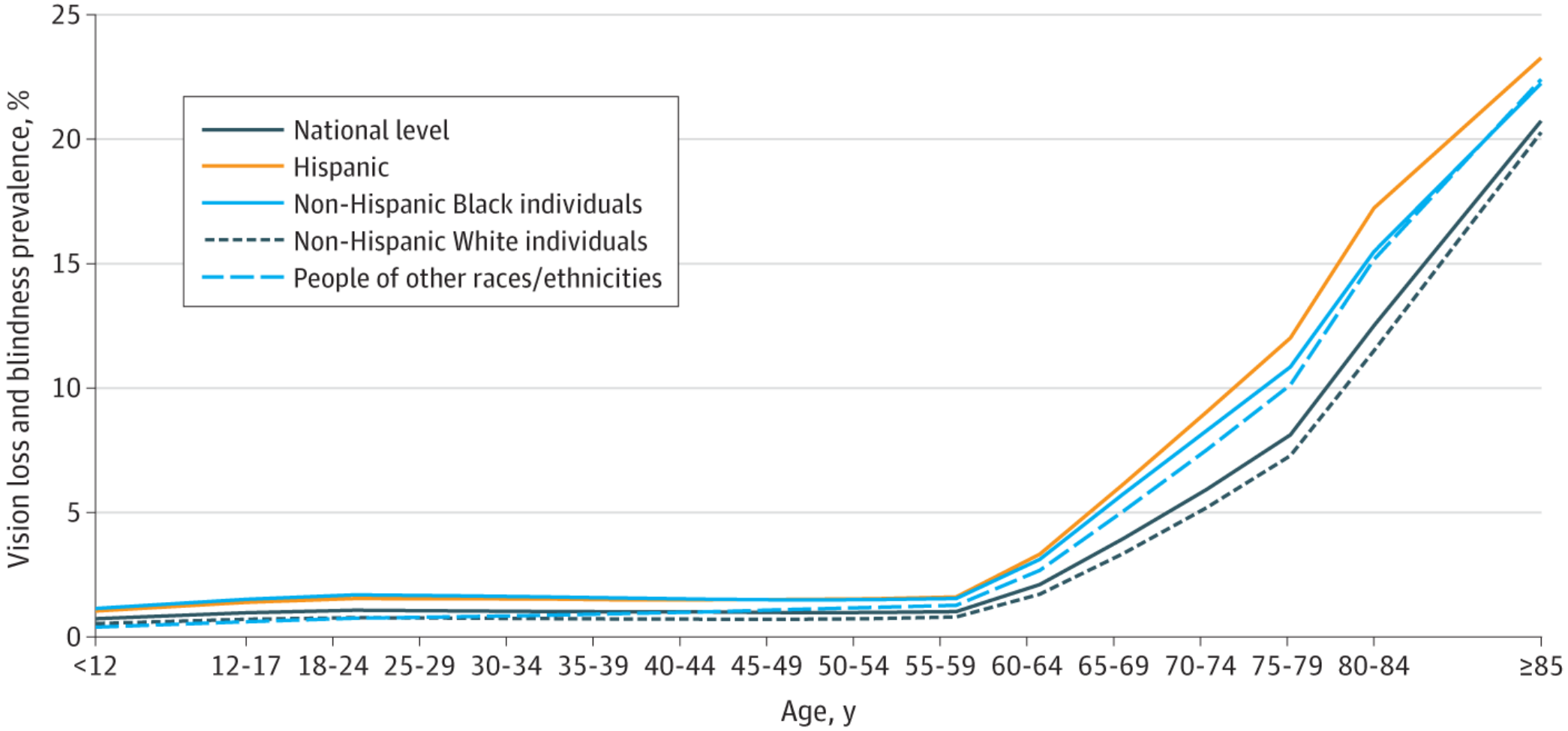
(95% UI, 0.82 – 1.30)

Prevalence Rate was Higher for Women than Men:

w. 2.52%

m. 1.82%

Prevalence rates increased with age and varied by race/ethnicity (although uncertainty intervals by race/eth overlapped)

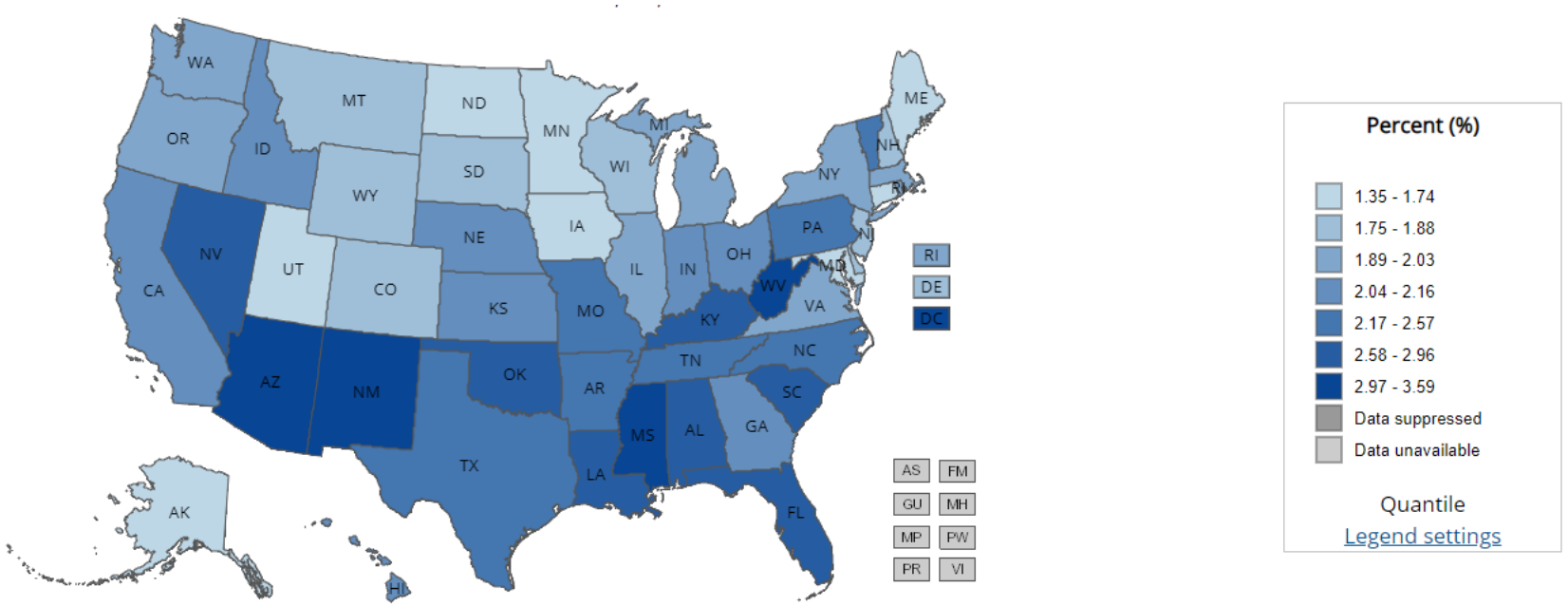


Highest Prevalence

- WV: 3.6%
- MS: 3.3%
- DC: 3.2%
- NM: 3.0%
- AZ: 3.0%

Lowest Prevalence

- ME: 1.4%
- UT: 1.4%
- IA: 1.5%
- ND: 1.6%
- AK: 1.7%

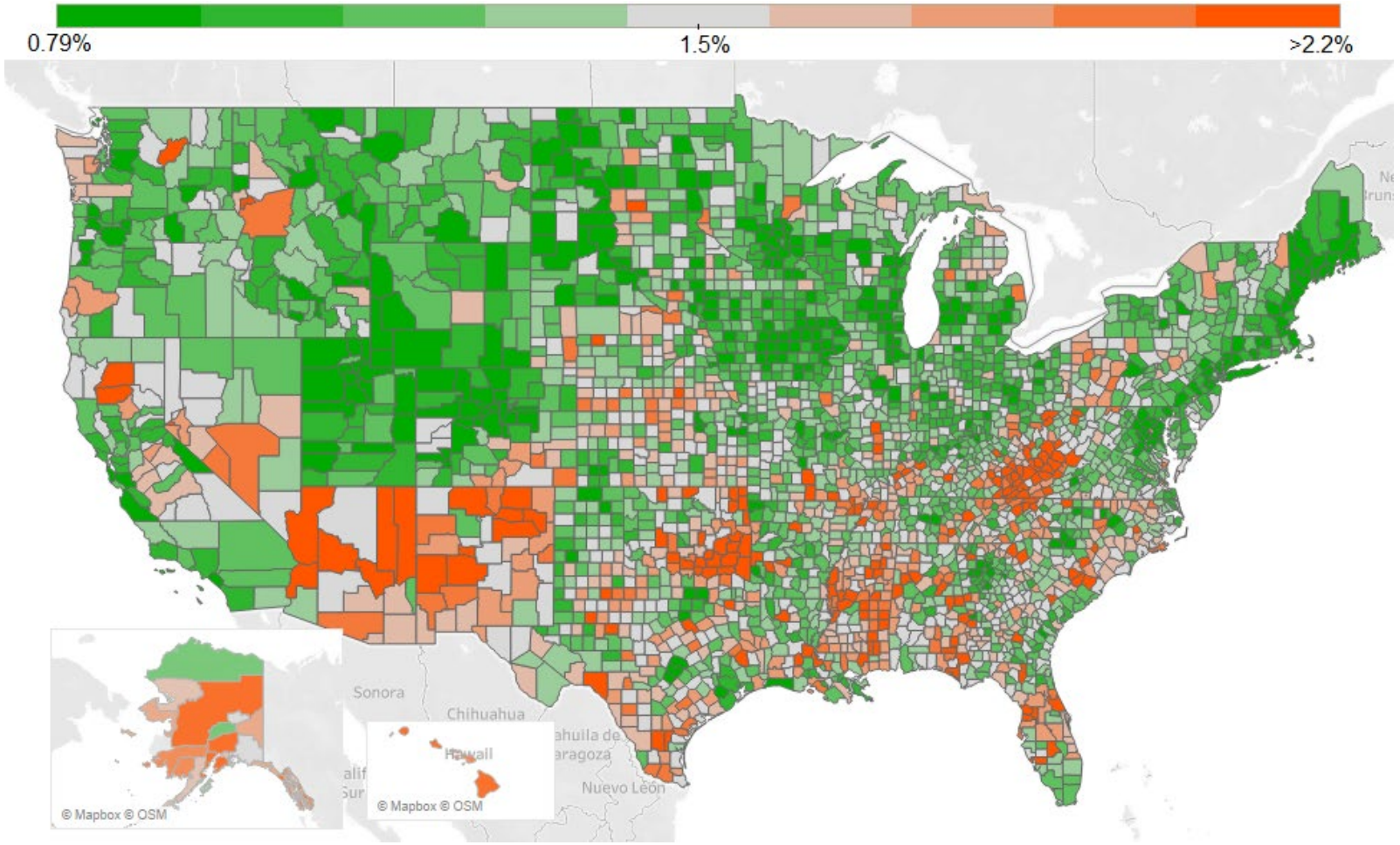


Highest Prevalence

- Kalawao, HI: 9.96%*
- Clay County, KY: 7.52%
- Logan County, WV: 7.11%
- McDowell County, WV: 7.06%
- Washington County, MS: 6.71%

Lowest Prevalence

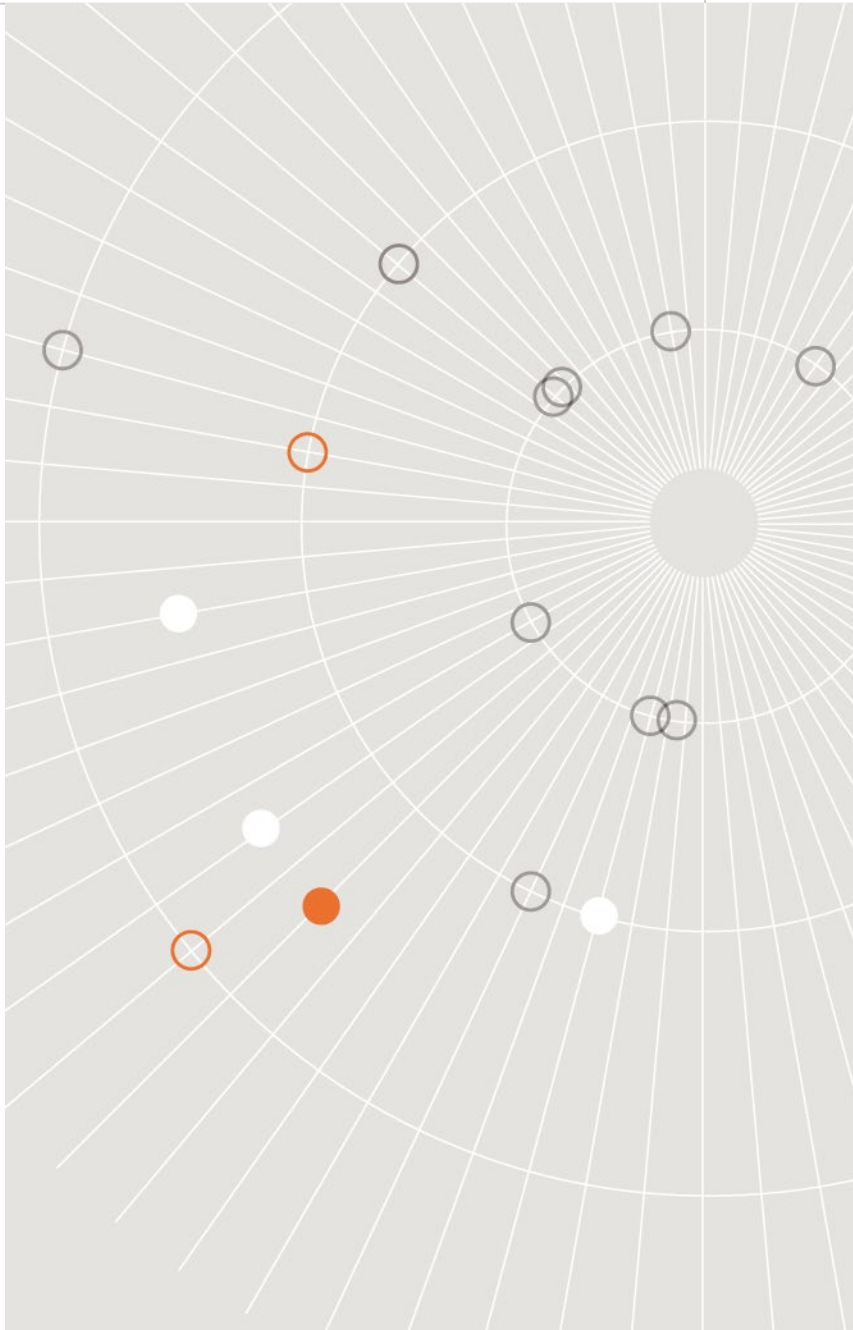
- Sioux County, ND: 0.09%
- Douglas County, CO: 0.1%
- North Slope Borough, AK: 0.11%
- Todd County, SD: 0.11%
- Loudoun County, VA: 0.11%



* Smallest county in the US, <100 residents!

Primary Limitations

- Missing data in NHANES
  - Approximately 12% of NHANES observations had missing autorefractor data
  - Accounting for missing data increased mean prevalence rate from 1.7% to 2.2%
- Older data
  - Newer waves of NHANES examination data would be very valuable
- Self-reported measurements used to estimate variation
  - Major assumption is self-reports are strongly correlated with evaluated visual impairment
  - Forthcoming research supports this assumption, but self-reports are imperfect



Conclusions & Extensions

NORC at the University of Chicago

Conclusions

- We estimated that 7.08 million people were living with vision impairment or blindness in the United States in 2017;
  - 1.08 million with U.S. defined blindness (20/200 or worse)
- Compared to earlier estimates, 68% higher overall vision impairment or blindness
  - Some, but not all the increase is from newly-included populations
  - Prevalence of blindness is similar to earlier studies – increase is from visual impairment (20/40 – >20/200)
- Substantial and meaningful variation at the state and county level independent of demographic differences
  - Allocating national prevalence to states or counties base on demographics would miss major disparities
- Potential extensions:
  - Incorporate risk factors and SDoH
  - Incorporate new data. Greatest benefit would be from new NHANES vision examination collection.

Visit the Vision and Eye Health Surveillance System (VEHSS) Google: VEHSS CDC

Want to Learn How to Use VEHSS?

Workshop: Public Health and Research Applications of the CDC's Vision and Eye Health Surveillance System (VEHSS)

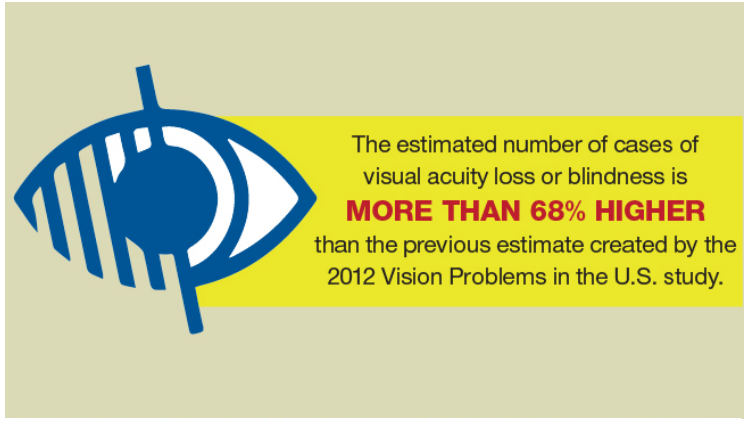
Date/time: Thursday, November 4 - 1:00-2:15pm Eastern

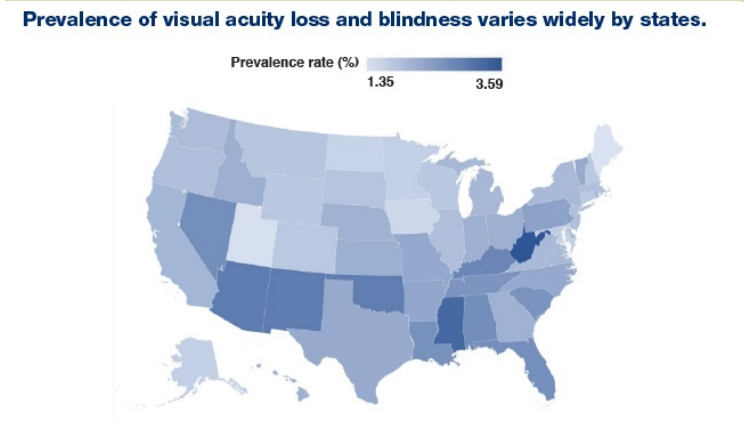
Length: 75 (60 minutes presentation and 15 minutes of Q&A)

Goals:
The goal of this webinar is to share information about how to use the CDC's Vision and Eye Health Surveillance System (VEHSS) and how the data can be leveraged for use in public health research and programs.

Objectives:

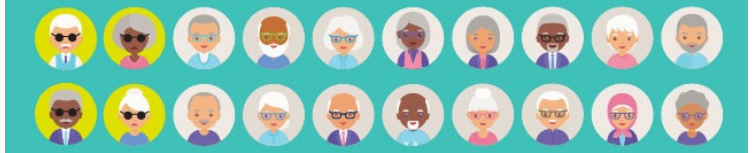
- **Learn what VEHSS is and the data it contains**
- **Learn how to use the VEHSS website to run custom data queries and download data**
- **Learn how to query data to develop research hypotheses, identify disparities, and inform public health planning and policy**



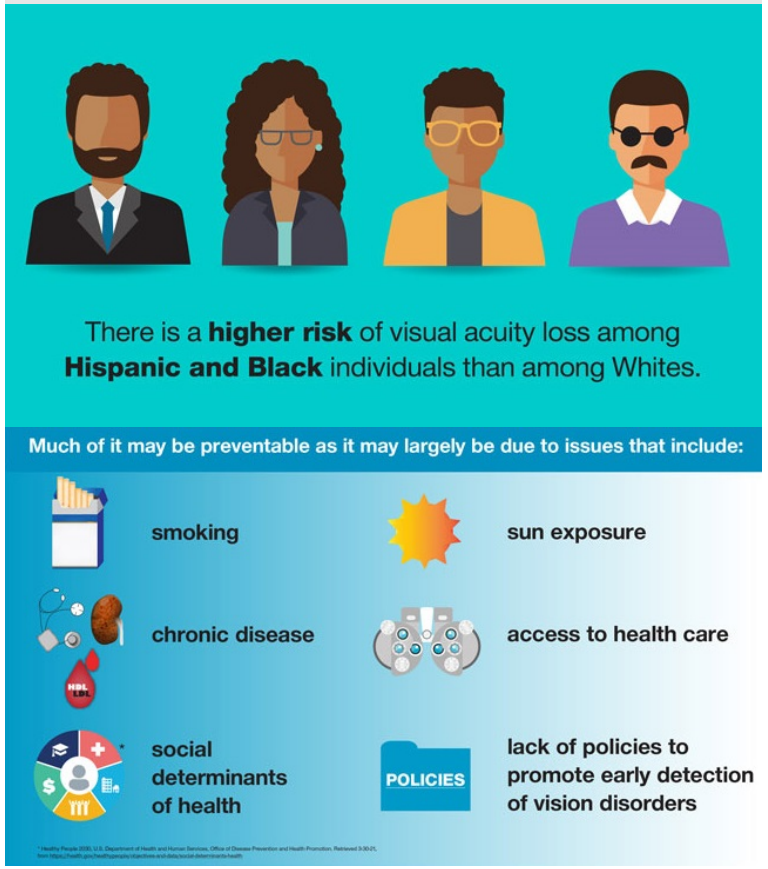


Materials for your next presentation.

https://preventblindness.org/prevalence-visual-acuity-loss-blindness-us



20% of all individuals age **85 and older** in the U.S. experience **permanent vision loss**.



Thank you.

Research You Can Trust™

NORC at the University of Chicago

Resources

- Vision and Eye Health Surveillance System: https://www.cdc.gov/visionhealth/vehss/index.html
- Prevent Blindness Vision Integration Library – **NEW!** https://cvph.preventblindness.org/vision-integration-library/
- Article: “Prevalence of Visual Acuity Loss or Blindness in the U.S.” https://preventblindness.org/prevalence-visual-acuity-loss-blindness-us/
- Integrating Vision Programs https://cvph.preventblindness.org/integrating-vision-programs/

Prevent Blindness
Our Vision Is Vision.

THANK YOU!