Understanding and using VEHSS to access vision and eye health prevalence information

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NORC at the University of Chicago
The Vision and Eye Health Surveillance System
A national data system for vision and eye health

- CDC – NORC cooperative agreement

- Partner organizations
What is in VEHSS?

• Summary prevalence estimates of vision and eye health indicators
  • Percentage of persons in a dataset with a condition, divided by the population of people in the data source
• Indicators
  • The outcome measures selected or defined by the VEHSS team that are measured in each data source
• Data Sources
  • Surveys, claims databases and registries selected for analysis
• Composite Estimates
  • Model-based predictions of the total prevalence of conditions the VEHSS team creates by combining prevalence estimates from multiple datasets
What is not in VEHSS

- Person level or micro data
  - National survey micro-data files are available from the government agencies that administers each survey
  - Person-level administrative data (claims and registries) cannot be publicly released
- Highly detailed data, programmatic data, incidence, other outcomes
  - VEHSS is a public health surveillance system with limited scope and resources
VEHSS Indicator Topics

1. Visual function
   • Measured visual acuity, including best corrected, presenting, or uncorrected refractive error
   • Functional limitations
   • Other vision disorders

2. Eye health conditions
   • Eye diseases such as glaucoma, cataract, diabetic retinopathy, age related macular degeneration and others

3. Service utilization
   • Eye exams, imaging/tests
   • Medical procedures, surgeries and drugs
   • Glasses, contacts
   • Screenings
Data Sources Types

• National telephone surveys
  • National surveys ask questions about vision, eye health conditions and service utilization, like...
    • “Are you blind or do you have serious difficulty seeing even when wearing glasses?”
    • “Do you currently wear eyeglasses or contact lenses? Does [NAME] wear eyeglasses or contact lenses?”
    • “Have you EVER been told by a doctor or other health professional that you had Diabetic retinopathy?”
  • Nationally representative samples with variable recruitment methods, response rates, sample sizes
  • Unknown validity/accuracy of self-report measures
Data Sources Types

• Administrative claims databases
  • Claims contain diagnosis and procedure codes
    • Can identify detailed eye diseases and specific treatments
  • Claims databases are convenience samples
  • Claims are filed by healthcare providers for billing purposes, and may miss
    • Undiagnosed conditions
    • Untreated conditions
    • Conditions treated by other payers, or out of pocket
    • Any person who is not a member, customer or beneficiary of that insurer
    • All uninsured persons
Data Sources Types

• Electronic health records registries
  • EHR systems and registries have detailed records of diagnoses, procedures and best corrected acuity
  • VEHSS includes the IRIS Registry that includes >95% of US ophthalmology practices
    • IRIS Registry captures more detailed diagnosis history than claims:
      • Untreated conditions
      • Prior diagnoses
    • IRIS Registry will miss:
      • Undiagnosed conditions
      • Conditions or services provided by emergency depts, general practitioners and most optometrists
  • Denominator includes only patients with visits to an IRIS-participating ophthalmology practice
Data Sources Types

• Examination studies
  • Gold-standard eye examinations to measure vision and identify eye diseases
  • Examinations provided to as many people as possible within a defined population
    • Town, zip code, healthcare facility, mobile clinic
  • Studies may not be representative
    • Small, locally-derived samples
    • Most studies are now old, predating major changes in eye care
# Current Data Sources in VEHSS

<table>
<thead>
<tr>
<th>National surveys</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>ACS</td>
<td>American Community Survey (National, state, county)</td>
</tr>
<tr>
<td>BRFSS</td>
<td>Behavioral Risk Factors Surveillance System (National, state)</td>
</tr>
<tr>
<td>NHIS</td>
<td>National Health Interview Survey (National)</td>
</tr>
<tr>
<td>NHANES</td>
<td>National Health and Nutrition Examination Survey (National)</td>
</tr>
<tr>
<td>NSCH</td>
<td>National Survey of Children’s Health (National, state).</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Administrative claims</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Commercial Medical Insurance</td>
<td>MarketScan private commercial medical insurance (National, state; ~50% private insurance market coverage)</td>
</tr>
<tr>
<td>Medicaid</td>
<td>Medicaid MAX, TMSIS coming soon (National, state, county coming soon; 100% coverage)</td>
</tr>
<tr>
<td>Medicare</td>
<td>Medicare Fee-For-Service (National, state, county; 100% coverage)</td>
</tr>
<tr>
<td>Managed Vision Care</td>
<td>VSP Global managed vision plan insurance (National, state, ~60% vision insurance market coverage)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>EHR/Registry</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>IRIS Registry</td>
<td>IRIS Registry (National, state, county coming 2022; 95%+ ophthalmology practice coverage)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Examination Studies</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Published examination studies</td>
<td>Literature review of published studies, meta-analyses of selected studies for composite estimates</td>
</tr>
</tbody>
</table>
Composite Estimates

• No single indicator can answer general questions like “how many people in the US are blind?”

• Integrating information from different indicators and data sources can produce more comprehensive estimates
  • Visual Acuity Loss released in May 2021
  • AMD, diabetic retinopathy and glaucoma in-progress
## Data Sources vs. Composite Estimates

<table>
<thead>
<tr>
<th>Data Sources (survey, claims, registry data)</th>
<th>Composite Estimates</th>
</tr>
</thead>
<tbody>
<tr>
<td>VEHSS summarizes prevalence information from 10 data sources, including on:</td>
<td>VEHSS creates composite estimates by combining information from multiple datasets from different types of data</td>
</tr>
<tr>
<td>• 200+ indicators</td>
<td>• The primary estimates available in VEHSS</td>
</tr>
<tr>
<td>• More granularity and detail</td>
<td>• Less detail</td>
</tr>
<tr>
<td>• More limitations and caveats to their interpretation</td>
<td>• Fewer caveats or limitations to their interpretation</td>
</tr>
</tbody>
</table>
Quick access to the Composite Estimates

Location Explorer: shows all data available for a state or national location

Data Explorer: shows all data available for any location

Indicator Documentation and Help pages

Data Documentation

Access the data portal for back-end data access, PUFs and APIs
Data Documentation Pages

- Data overview
- Analytic methods
- Indicators analyzed
- Limitations
- VEHSS Data access
- VEHSS Data Portal PUF access
- PDF reports

Access data explorer
Data portal
Additional documentation and reports

VEHSS - The Vision & Eye Health Surveillance System

Medicare Claims at a Glance

Data type: 100% Medicare Part B Fee for Service Claims
Sample: Convenience sample of Medicare beneficiaries, including nearly 89% of the US population aged 65 years and older, as well as 3.3% of the US population younger than 65, including persons disabled due to blindness

VEHSS Topics Included:
- Service Utilization
- Eye Health Conditions


Approximate Size: 30 million persons per year

The analysis of Medicare claims for the Vision and Eye Health Surveillance System (VEHSS) includes beneficiaries who were fully enrolled in Medicare Part B Fee for Service (FFS) for the duration of 2014, 2015, 2016, or 2017.

Medicare claims represent a convenience sample that includes approximately 30 million individuals annually. Data from patients enrolled in Medicare managed-care plans were not included, as these plans do not include individualized claims for services. In 2018, 2.2 million Americans were enrolled in Medicare advantage plans.

Medicare covers ophthalmologic services for nearly the entire US population aged 65 and older, for people younger than 65 who have received social security benefits as a result of disability for 24 months; for people who have end stage renal disease and receive dialysis or a kidney transplant; and for people who have amyotrophic lateral sclerosis (ALS). Like others with a disability, people with US defined blindness (a best corrected acuity of 20/200 or worse in the better-seeing eye) become eligible for Medicare after 24 months of social security enrollment. In 2015, approximately 42.5 million out of 47.8 million Americans aged 65 and older (88.9%) were enrolled in Medicare Part B (which covers outpatient services). - Because of this high coverage rate, those enrolled are roughly representative of the overall population aged 65 and older. In contrast, only 9 million out of 273.6 million Americans aged 0 to 64 (3.3%) were enrolled in Medicare, and because these...
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Indicator Documentation Pages

Overview
Datasets represented
Variables included

Disorders of Optic Nerve and Visual Pathways
Disorders of Refraction and Accommodation

Glaucome
VEHSS includes indicators for Glaucome from examination-based data including NHANES and published studies, self-reported diagnosis history from NHANES, treated cases from claims databases, and diagnosed cases from IRIS Registry.

Examination-based
Examination-based glaucoma indicates the respondent had graded probably or definite glaucoma in either eye based on retinal imaging.

Examination Surveys

<table>
<thead>
<tr>
<th>Dataset</th>
<th>Description</th>
<th>Variable name(s)</th>
<th>Years available</th>
<th>Years analyzed</th>
<th>Response options</th>
</tr>
</thead>
<tbody>
<tr>
<td>NHANES</td>
<td>Percentage of people with glaucoma, based on examination</td>
<td>DPASCST2 - Exam status; DPXGGLAU - Glaucome, right eye; DPXGGLAU - Glaucome, left eye</td>
<td>2005, 2008</td>
<td>2005, 2008</td>
<td>2 - Probable 3 - Definite</td>
</tr>
</tbody>
</table>

Published Examination Studies

<table>
<thead>
<tr>
<th>Study</th>
<th>Years</th>
<th>Location</th>
<th>Citation</th>
</tr>
</thead>
</table>
**VEHSS - The Vision & Eye Health Surveillance System**

1. **Selector Box:** Complete all 6 dropdowns and click GO

2. **Compare Box:** Compare 1-2 stratification factors and click Compare

3. **Filter Box:** Filter data to selected groups and click Apply Filters

4. **Results Panel**

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**Explore VEHSS Data for Georgia**

<table>
<thead>
<tr>
<th>Compare variable 1</th>
<th>Compare variable 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Race/Ethnicity</td>
<td>Gender</td>
</tr>
</tbody>
</table>

**Graph:** Proportion of patients who had an eye exam in selected year

- **By any provider type**
  - Georgia | 2017 | Medicare Fee for Service
  - Crude Prevalence
  - Diabetes: Yes
  - Compare By: Race/Ethnicity & Gender

**Table:**

<table>
<thead>
<tr>
<th>Gender</th>
<th>All genders</th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>All races</td>
<td>50.37</td>
<td>47.71</td>
<td>52.78</td>
</tr>
</tbody>
</table>
1. Selector Box

Selecting All available locations defaults to state level map

Selecting National or any state defaults to chart+table with compare box

Click Data Source Information to open documentation page for selected data source

Click Category Definition to open documentation page for selected indicator category
2. Compare Box:
Not available in map views
Select all years of data for trend line analyses

3. Filter Box:
Filters get reset when Compare changes

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4. Results Panel

- Export formatted PDF report, or CSV table
- Share Link, Data Portal and Help pages
- Switch view from Map, Chart or Table (if available)
- Click a state to zoom, or explore all data for location
- Click Legend Settings to change gradient scales
- Zoom or reset map

Proportion of patients who had an eye exam in selected year by any provider type
All available locations | 2017 | Medicare (Fee for Service) Crude Prevalence
65-84 years | Female | Hispanic, any race | Diabetes:Yes

National: 53.21%
95% CI (53.02 - 53.40) N = 263,400

Data Source: Medicare Claims

Legend:
- 48.78 - 50.47
- 50.48 - 54.28
- 54.27 - 57.26
- 57.27 - 73.68
- Data suppressed
- Data unavailable

Quantile
New for 2021:

• Composite estimates of the prevalence of visual acuity loss
• County-level mapping:
  • ACS
  • Medicare
  • Composite estimates of vision loss
  • Medicaid coming soon
County map option is shown if user selects a state and a data source that has county-level results.

Map view selected.

State totals in header.

Click on a county for detail.
Explore VEHSS Data for North Carolina

Prevalence of Vision Loss, by major age groups

Any vision loss
North Carolina | 2017 | Prevalence Estimates
Prevalence Estimates
65-84 years | Female

Compare By: Race/Ethnicity

Race/Ethnicity
- All races
- Black, non-Hispanic
- Hispanic, any race
- White, non-Hispanic
- Other

Compare box available in Chart and Table views

Chart view selected
Data Portal

Select a data file
Data Portal: Selected Data

Click View Data
Data Portal: Filter

Click Filter

Select a variable, enter a value

Add more filters
**Data Portal: Export**

After you filter, Click Export

Select a file type

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**VEHSS - The Vision & Eye Health Surveillance System**
Data Portal: Visualize a scatterplot

Select a chart type

Select what to show

You must add filters (previous filters are cleared)
Data Portal: Visualize a map

Select Map

Select to measure Data_Value Avg by States or Counties

Filter until 1 row per state or county

Customize colors, legend etc