NSCH Summary Data Report

For the Vision & Eye Health Surveillance System

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Overview

This Data Brief Report presents the analysis of the National Survey of Children's Health (NSCH) for the Vision and Eye Health Surveillance System (VEHSS). These results were used by the VEHSS team as a data source for the VEHSS Modeled Estimates of Visual Acuity Loss and Blindness, the capstone estimates of vision loss reported by VEHSS.

Additional and more recent data from the NSCH is available at https://www.childhealthdata.org/.

Dataset description

Purpose

The National Survey of Children's Health (NSCH), sponsored by the Maternal and Child Health Bureau of the Health Resources and Services Administration, examines the health and well-being of children 0-17 years of age, their families, their communities, and those with special health care needs. The NSCH was designed to produce nationally- and state-representative estimates. NSCH was selected for inclusion in the VEHSS system in order to capture demographic and state-level variation of visual health among children, a population that may be underrepresented in other data sources selected for inclusion in VEHSS.

Sample Design

The NSCH went under a redesign in 2015 for the 2016 Survey and has since been conducted by the U.S. Census Bureau. The redesign was a result of declining response rates coupled with the fact that fewer households have landline telephones. The underlying sampling frame went from using the State and Local Area Integrated Telephone Survey (SLAITS) sampling frame based on telephone numbers originally developed for the National Immunization Survey (NIS)[1] to household addresses. The 2016 and 2017 NSCH used an address-based sample covering the 50 states and the District of Columbia. Household addresses were randomly drawn from the Census Master Address File (MAF). The sample file was selected from the Census MAF and supplemented with an administrative records-based flag identifying households likely to include children. This child-presence indicator allowed the Census Bureau to oversample households that were more likely to have children. The 2016 sample was developed to select a roughly equal number of addresses within each state and the 2017 sample was developed to produce roughly equal number of responses by state. In households with both children with special health care needs (CSHCN) and non-CSHCN, there was an 80% oversample of CSHCNs. A 60% oversample of young children, ages 0-5, was applied in households with either all or no CSHCNs.

[1] Bramlett MD, B. S. (2017, August 8). Design and operation of the National Survey of Children's Health, 2011–2012. Hyattsville, Maryland: National Center for Health. Retrieved from National Center for Health Statistics: https://www.cdc.gov/nchs/slaits/index.htm

Data Collection Procedures

Under the new design the survey uses a two-phase multimode data collection design that combines the former NSCH and the National Survey of CSHCN (NS-CSHCN) into the NSCH. It now consists of two questionnaires: (1) a household screener to determine whether the household includes a child(ren) and to select the target child within the household, and (2) a topical questionnaire tailored to three age groups — 0-5 years, 6-11 years, and 12-17 years. The respondent is a parent or guardian who knew about the child's health and health care needs.

The process differed a little between the 2016 and 2017 surveys. In general all sampled addresses received an initial invitation letter with instructions to participate by web. After a certain point if a household did not complete their survey they were mailed a follow-up letter. This letter again included instructions for responding via web. Addresses with the lowest probability of completing a web survey received a paper screener with the second follow-up mailing (for 2017, paper screeners were sent with the initial mailing). All nonresponding addresses received paper screeners in the third and subsequent follow-up mailings. Those who responded via web completed both the screener and topical questionnaires in one instrument, while those who returned the paper screener via mail were sent a paper topical instrument to complete. The NSCH paper and web instruments were available in both English and Spanish. Data were collected from June 2016 through February 2017 and from August 2017 through February 2018 for the 2016 and 2017 Surveys, respectively.

Analysis Process and Suppression

We estimated the prevalence rate and sample size for each survey instrument selected for inclusion. We merged samples from the 2016 and 2017 rounds for analysis in order to maximize the available sample sizes at more detailed levels of stratification. We did not include data prior to 2016 because the different modes of data collection and the different sampling frame make the data not compatible.

For binary response questions included in the analysis, prevalence rate was defined as the number of persons who gave an affirmative response to the question divided by the total number of respondents who gave an affirmative or negative response and then multiplied by 100 for presentation in percentage format. For questions with a mark all that apply option, the data value is the proportion of respondents that selected that response option divided by the total number of respondents who either marked or did not mark that response option; and all responses may not sum to 100%. We estimated upper and lower confidence intervals and the relative standard error of the prevalence estimate using the Clopper-Pearson method with the smaller of the effective sample size and the sample size. The respondent sample size was reported for each response.

All estimates were calculated using SAS® PROC SURVEY FREQ procedure. Suppression was determined using the National Center for Health Statistics Data Presentation Standards for Proportions released in August 2017[2].

[2] Parker JD, Talih M, Malec DJ, et al. National Center for Health Statistics Data Presentation Standards for Proportions. National Center for Health Statistics. Vital Health Stat 2(175). 2017.

Vision-related Variables

Starting in 2016 the NSCH contains four questions related to VEHSS indicators and were included for analysis. These questions were fielded in both the 2016 and 2017 surveys. One question was categorized under the 'Visual Function' Topic and 'Difficulty Seeing with Glasses' Category. The other 3 questions were under the 'Service Utilization' Topic and covered 'Need', 'Screening', and 'Provider Type' categories. Two of the questions were sub-questions and were asked if the respondent responded Yes to the main question. **Table 1** presents these four questions and includes the VEHSS Topic and Category, the NSCH variable name, the year(s) survey data are available, the survey question, and the response options.

Table 1. Overview of eye health variables in the NSCH

NSCH eye health questions and response options					
VEHSS Indicator Topic	**VEHSS Indicator Category**	**NSCH Variable Name**	**Years Available**	**Question**	**Response Options**
Visual Function	Difficulty Seeing with Glasses	Blindness	2016, 2017	Does this child have any of the following? Blindness or problems with seeing, even when wearing glasses	1 Yes 2 No
Service Utilization	Need	K4Q27, K4Q28X03	2016, 2017	During the past 12 months, was there any time when this child needed health care but it was not received? By health care, we mean medical care as well as other kinds of care like dental care, vision care, and mental health services. If yes, which types of care were not received? Mark ALL that apply.	1 Medical Care 2 Dental Care 3 Vision Care 4 Hearing Care 5 Mental Health Services 6 Other, specify L Legitimate skip M Missing in error
Service Utilization	Screening	K4Q31_R	2016, 2017	Has this child ever (0-5 years)/ During the past 2 years (6-17 years) had his or her vision tested with pictures, shapes, or letters?	1 Yes 2 No
Service Utilization	Provider Type	K4Q32X01 K4Q32X02 K4Q32X03 K4Q32X04 K4Q32X05	2016, 2017	If yes, what kind of place or places did this child have his or her vision tested? Mark ALL that apply.	1 Eye doctor or eye specialist 2 Pediatrician or other general doctor's office 3 Clinic or health center 4 School 5 Other, specify: L Legitimate skip M Missing in error

The four questions included in the analysis come from Section A: This Child's Health (visual function question) and Section C: Health Care Services (service utilization questions) for both the 2016 and 2017 NSCH.

The 2016 and 2017 surveys used the same question wording for all four questions. The two surveys were merged and new weights were created by dividing the original weights by 2 according to survey guidance[3].

[3] https://mchb.hrsa.gov/data/national-surveys/data-user?#

Outcome variables for all questions were coded such that bivariate responses were coded into Yes/Selected, No/Not Selected, and Missing (including Legitimate skip and Missing in error), although only the prevalence of Yes/Selected responses are reported below. The sample population for analysis (i.e., denominator) was also limited to those coded as Yes or No. Though K4Q27 was not analyzed, the frequencies to K4Q27 — During the past 12 months, was there any time when this child needed health care but it was not received? By health care, we mean medical care as well as other kinds of care like dental care, vision care, and mental health services. — were used to determine the sample who should have responded to K4Q28X03— If yes, which types of care were not received? —selected Vision Care.

Tables 2a, b, and c present the sample size for analysis by coded response option for the eight eye health variables. As demonstrated by the table, K4Q28X03 is one of the follow-up response options to those respondents who said Yes to K4Q27. K4Q23X01 – K4Q23X05 are the possible response options to a follow-up question to those respondents who said Yes to K4Q31_R.

Tables 2a-c. Frequency of coded response options for vison-related questions

Table 2a	
Sample Size	Variable
	Blindness
Yes	894
No	70,582
Missing	335

Table 2b			
Sample Size	Variable		
	K4Q27	K4Q28X03	
Yes	1,660	Yes	290
		No	1,349
		Missing	21
No	69,897	[redacted]	
Missing	254		

Table 2c							
Sample Size	Variable						
	K4Q31_R		K4Q32X01	K4Q32X02	K4Q32X03	K4Q32X04	K4Q32X05
Yes	51,929	Yes	30,648	20,542	1,727	11,792	522
		No	21,072	31,178	49,993	39,928	51,198
		Missing	209	209	209	209	209
No	19,657	[redacted]					
Missing	225						

Stratification Variables

We calculated the following demographic variables from the survey responses for use in stratifying vision-related prevalence rates: age, sex, race/ethnicity, and state. All participants had an age (variable: SC_AGE_YEARS) that ranged from 0-17 years. All participants had a sex (variable: SC_SEX) and was coded as Male or Female. The Hispanic and race variables (variables: SC_HISPANIC_R and SC_RACER, respectively) were combined to create one race/ethnicity variable where a Yes to Hispanic took priority over any other race option. The recoded Race variable was used to roll up the race categories with small

sizes. Race/ethnicity were coded into 4 categories: Hispanic, Non-Hispanic Black, Non-Hispanic White, and Non-Hispanic Other. All participants had race and ethnicity data. Data were available for all 50 states and DC (variable: FIPSST). Stratification variables and their frequencies are listed in **Table 3**.

Table 3. Stratification variable frequencies

Variables	Frequency
AGE	
0 -17 years	71,811
STATE	
50 States, D.C.	71,811
SEX	
Male	36,800
Female	35,011
RACE/ETHNICITY	
Hispanic	7,993
Non-Hispanic White	50,219
Non-Hispanic Black	4,236
Non-Hispanic Other	9,363

Stratification Levels Included in the Full Analysis

The full analysis includes additional stratifications beyond those included in this data brief report. NSCH only includes one VEHSS-defined age group. Based on the sample sizes and rates of suppression, we included 0, 1, and 2-level stratification at the national level, but only included 0-level and 1-level stratification at the state level. We found high rates of missing/suppression when attempting to analyze further levels of stratification. **Table 4** reports the stratification levels included in the data table, which equate to the variables available for selection in the data visualization application.

Table 4. Stratification factor combinations included in full results

	National	State
0-level	All participants	All participants
1-level	Race/ethnicity	Race/ethnicity
	Sex	Sex
2-level	Race/ethnicity*sex	

Validation

Internal Validation

Sample Size

The NSCH has the second largest sample of children among surveys included in the VEHSS system. The 2016 survey has 50,212 completed child-level interviews and the 2017 survey has 21,599 completed child-level interviews. The ACS, which is the largest survey included in the VEHSS system with a sample size over two million each of the data years, has over 650,000 children, ages 0-17 years in the ACS PUMS 2016 sample. The National Health Interview Survey has on average roughly 10,000 children 0-17 years of age each year and the National Health and Nutrition Examination Survey has less than 5,000 children ages 0-17 years in its sample size. As mentioned above, the sample was designed such that all 50 states and DC would have roughly 1,700 participants that would allow for reliable state-level estimates. The weighted sample is to be representative of the US non-institutionalized children ages 0-17 years.

Validating Responses

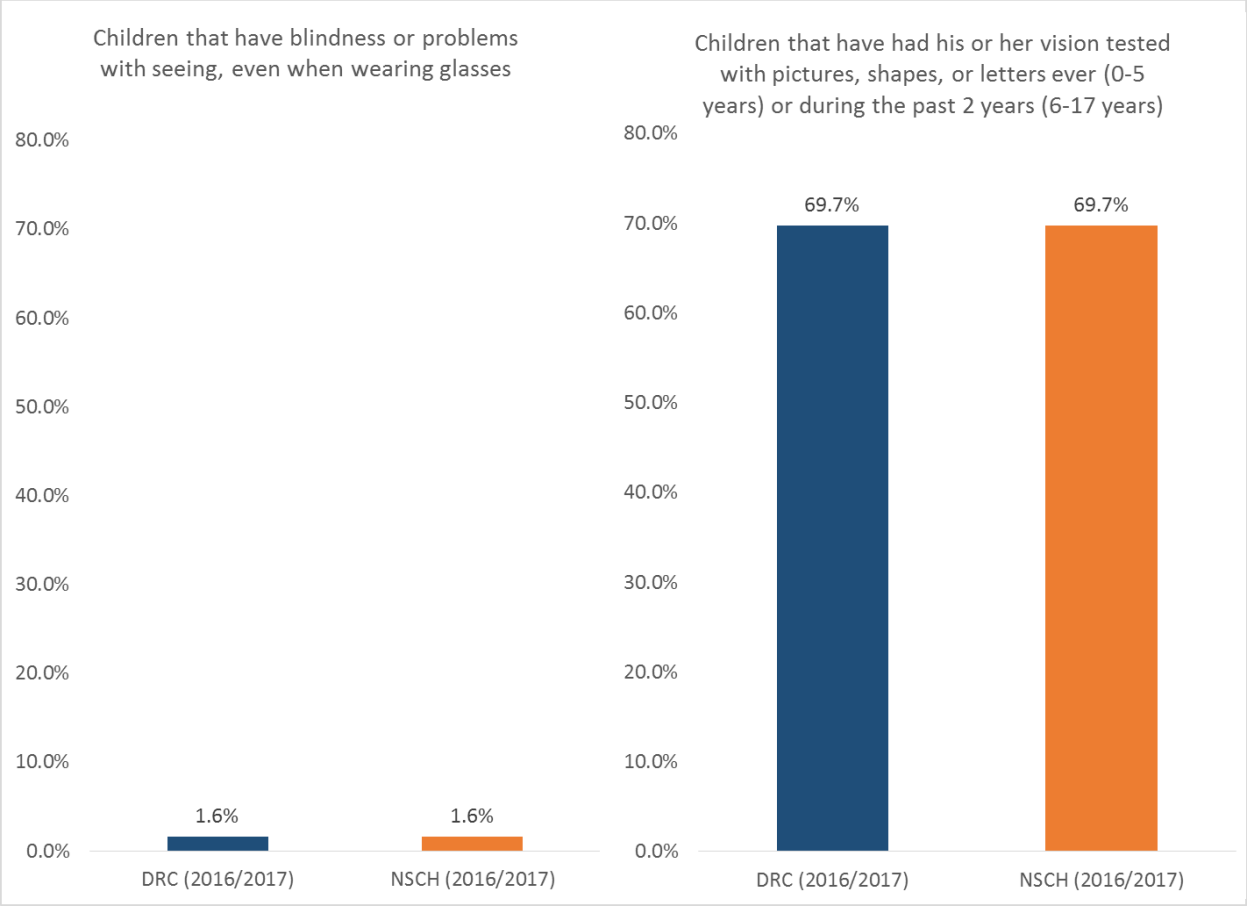
There were no other survey questions that could be used to check the internal consistency responses.

External Validation

Comparison to other NSCH Reporting

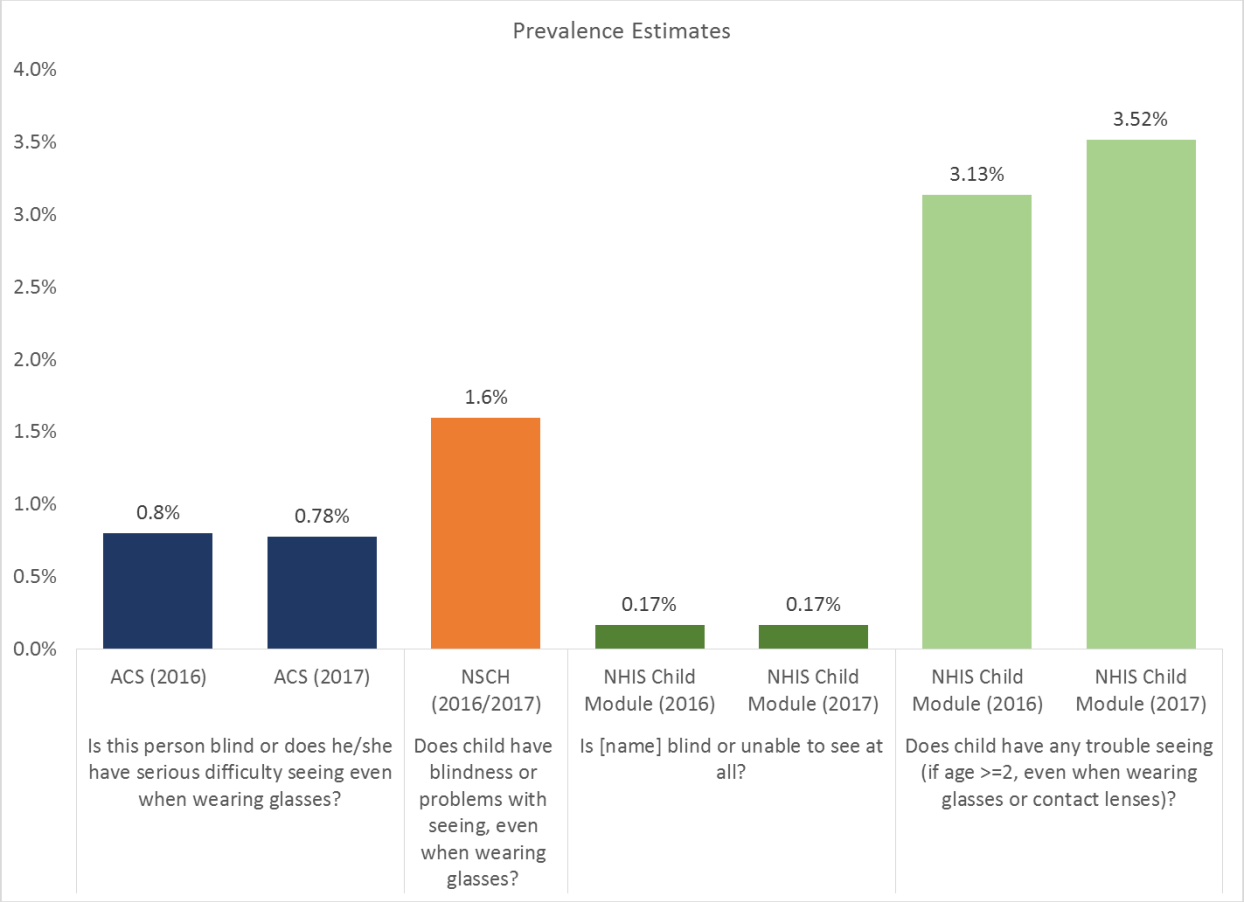
The Data Resource Center for Child & Adolescent Health (DRC) provides access to public data on children's health and health-related services for children, youth, and families in the United States including results of the NSCH. The DRC reports responses only to NSCH questions Blindness and K4Q31_R (vision tested). The DRC presents estimates for 2016 only, 2017 only, and 2016 and 2017 combined. Figure 1 below compares the DRC's estimates with VEHSS for the 2016 and 2017 combined data.

Figure 1. Prevalence of vision problems and testing, DRC and VEHSS estimates of NSCH



The ACS asks one vision health question — Is this person blind or does he/she have serious difficulty seeing even when wearing glasses?— and is very similar to the NSCH Blindness question. The NHIS-child module also includes a question on blindness — Are you blind or unable to see at all? — but is a follow-up question to those who answer yes to "Do you have any trouble seeing, even when wearing glasses or contact lenses?". The NSCH result falls almost exactly at the mid-point between the ACS responses and the NHIS responses among children, as shown in **Figure 2**. This result provides support that NSCH estimates are within the range of other surveys which field a similarly worded instrument for children.

Figure 2. Prevalence of blindness, NSCH, ACS, NHIS



Limitations

The vision health-related questions in the NSCH have not been used by researchers in previously published papers. This is probably largely due to new vision health questions replacing the older ones in 2016. There was one abstract[4] at the Association for Research in Vision and Ophthalmology (ARVO) Annual Meeting that presented findings from the 2016 NSCH vision question on screening. Prior to 2018, the DRC and a paper[5] looking at the relationship between ADHD and children ages 4-17 years with vision problems were the only sources found that used the NSCH vision health questions. The question wording for blindness – "Does this child have any of the following? Blindness or problems with seeing, even when wearing glasses" – is nearly identical to the wording used in the ACS and BRFSS, though BRFSS does not include children.

[4] Sandra S Block, Kira Baldonado; Results from 2016 National Survey of Children's Health (NSCH). Invest. Ophthalmol. Vis. Sci. 2018;59 (9):163.

[5] DeCarlo DK, Swanson M, McGwin G, Visscher K, Owsley C. ADHD and Vision Problems in the National Survey of Children's Health. Optometry and vision science : official publication of the American Academy of Optometry. 2016;93(5):459-465. doi:10.1097/OPX.0000000000000823.

The NSCH provides national- and state-level estimates of visual function, as reported by a parent or guardian. The level of detail of results is limited by sample size. At the state level, we were only able to identify prevalence estimates at a single level of stratification. We currently plan to include full stratification at the national level. Unlike other data sets included in VEHSS, NSCH only includes one VEHSS-defined age group, which means that full stratification of results is at the 2nd level (race*sex).

Diabetes was the only VEHSS-defined risk factor included in the survey. However, due to the relatively small number of children with diabetes, diabetes was not included in the analysis for NSCH as nearly all values were suppressed in the analysis of previous years of NSCH.

Summary Outcome measures

Table 5. National estimates of the prevalence rate of children with blindness or difficulty with seeing, even when wearing glasses (Blindness)

Stratification factor	Prevalence Rate	Sample Size
All respondents	1.6 (1.3-1.8)	71,476
Race/Ethnicity		
Hispanic	2.3 (1.7-3.2)	7,936
Non-Hispanic Black	2.0 (1.2-3.3)	4,208
Non-Hispanic White	1.2 (1.0-1.5)	50,005
Non-Hispanic Other	0.9 (0.5-1.4)	9,327
Sex		
Male	1.5 (1.3-1.9)	36,629
Female	1.6 (1.2-2.1)	34,847
Race/Ethnicity		
Hispanic		
Male	2.0 (1.4-2.8)	4,073
Female	2.7 (1.5-4.4)	3,863
Non-Hispanic Black		
Male	1.4 (0.9-2.1)	2,178
Female	2.8 (1.2-5.4)	2,030
Non-Hispanic White		
Male	1.5 (1.0-2.0)	25,752
Female	0.9 (0.8-1.2)	24,253
Non-Hispanic Other		
Male	1.1 (0.5-2.1)	4,626
Female	0.7 (0.3-1.2)	4,701

Table 6. State estimates of the prevalence rate of children with blindness or difficulty seeing, even when wearing glasses (Blindness)

State	Prevalence Rate	Sample Size		State	Prevalence Rate	Sample Size
United States	1.6 (1.3-1.9)	71,476		**Montana**	1.3 (0.7-2.3)	1,459
Alabama	3.3 (1.8-5.6)	1,250		**Nebraska**	2.3 (0.9-4.7)	1,489
Alaska	1.8 (0.8-3.3)	1,247		**Nevada**	3.3 (1.7-5.8)	1,219
Arizona	1.6 (0.8-2.9)	1,316		**New Hampshire**	1.2 (0.4-2.7)	1,414
Arkansas	1.8 (1.0-2.9)	1,166		**New Jersey**	2.0 (0.7-4.4)	1,513
California	0.5 (0.1-1.5)	1,386		**New Mexico**	2.3 (1.0-4.3)	1,188
Colorado	1.1 (0.6-2.0)	1,525		**New York**	1.5 (0.7-2.8)	1,375
Connecticut	1.2 (0.3-3.0)	1,552		**North Carolina**	1.7 (0.7-3.2)	1,336
Delaware	1.4 (0.7-2.6)	1,333		**North Dakota**	1.9 (0.8-3.8)	1,478
Florida	1.9 (1.0-3.4)	1,309		**Ohio**	0.8 (0.3-1.7)	1,435
Georgia	1.5 (0.5-3.2)	1,213		**Oklahoma**	1.9 (1.0-3.3)	1,177
Hawaii	0.8 (0.3-1.6)	1,544		**Oregon**	1.7 (0.9-3.1)	1,510
Idaho	1.9 (0.7-4.1)	1,469		**Pennsylvania**	0.5 (0.2-1.1)	1,519
Illinois	1.0 (0.4-2.1)	1,549		**Rhode Island**	1.9 (0.7-4.2)	1,299
Indiana	1.8 (0.7-3.8)	1,366		**South Carolina**	2.3 (1.0-4.4)	1,295
Iowa	1.0 (0.5-1.7)	1,545		**South Dakota**	1.3 (0.5-2.7)	1,571
Kansas	1.7 (0.9-2.9)	1,427		**Tennessee**	1.6 (0.7-3.3)	1,280
Kentucky	2.8 (1.4-5.0)	1,267		**Texas**	3.2 (1.5-6.0)	1,185
Louisiana	2.9 (1.7-4.7)	1,097		**Utah**	1.4 (0.8-2.3)	1,586
Maine	1.5 (0.7-2.8)	1,424		**Vermont**	1.3 (0.4-3.3)	1,545
Maryland	1.0 (0.4-1.9)	1,545		**Virginia**	0.8 (0.3-1.5)	1,574
Massachusetts	0.8 (0.3-1.6)	1,591		**Washington**	1.8 (0.9-3.0)	1,568
Michigan	0.9 (0.3-2.0)	1,545		**West Virginia**	2.5 (1.3-4.3)	1,167
Minnesota	0.8 (0.4-1.4)	1,776		**Wisconsin**	1.6 (0.6-3.2)	1,679
Mississippi	2.8 (1.7-4.5)	1,064		**Wyoming**	2.6 (1.4-4.4)	1,243
Missouri	0.9 (0.4-1.6)	1,432		**District of Columbia**	1.1 (0.3-2.7)	1,434

Table 7. National estimates of rates of children who needed vision care in the past 12 months but did not receive it (K4Q27)

Stratification factor	Prevalence Rate	Sample Size
All respondents	24.5 (19.4-30.1)	1,639
Race/Ethnicity		
Hispanic	26.2 (16.8-37.5)	266
Non-Hispanic Black	31.3 (18.2-47.1)	160
Non-Hispanic White	20.2 (14.9-26.3)	994
Non-Hispanic Other	16.2 (8.0-27.9)	219
Sex		
Male	25.4 (18.6-33.1)	861
Female	23.6 (16.6-31.7)	778
Race/Ethnicity		
Hispanic		
Male	22.1 (11.3-36.8)	134
Female	†	132
Non-Hispanic Black		
Male	†	†
Female	†	†
Non-Hispanic White		
Male	18.3 (10.8-28.0)	528
Female	22.6 (16.0-30.3)	466
Non-Hispanic Other		
Male	†	116
Female	†	†

† Suppressed according to NCHS guidelines (Parker JD, Talih M, Malec DJ, et al. National Center for Health Statistics Data Presentation Standards for Proportions. National Center for Health Statistics. Vital Health Stat 2(175). 2017.)

Table 8. National estimates of rates of children having his or her vision tested with pictures, shapes, or letters ever (0-5 years) or during the past 2 years (6-17 years) (K4Q31_R)

Stratification factor	Prevalence Rate	Sample Size
All respondents	69.7 (68.8-70.5)	71,586
Race/Ethnicity		
Hispanic	69.7 (67.2-72.0)	7,963
Non-Hispanic Black	71.9 (69.3-74.4)	4,202
Non-Hispanic White	69.8 (67.0-70.7)	50,087
Non-Hispanic Other	66.4 (64.1-68.6)	9,334
Sex		
Male	69.0 (67.9-70.2)	36,671
Female	70.3 (69.1-71.5)	34,915
Race/Ethnicity		
Hispanic		
Male	69.5 (66.1-72.8)	4,085
Female	69.8 (66.3-73.1)	3,878
Non-Hispanic Black		
Male	71.2 (67.6-74.6)	2,171
Female	72.7 (68.8-76.3)	2,031
Non-Hispanic White		
Male	69.3 (68.1-70.4)	25,789
Female	70.5 (69.2-71.7)	24,298
Non-Hispanic Other		
Male	64.3 (60.9-67.6)	4,626
Female	68.5 (65.3-71.5)	4,708

Table 9. State estimates of the rate of children having his or her vision tested with pictures, shapes, or letters ever (0-5 years) or during the past 2 years (6-17 years) (K4Q31_R)

State	Prevalence Rate	Sample Size		State	Prevalence Rate	Sample Size
United States	69.7 (68.9-70.5)	71,586		**Montana**	68.5 (64.7-72.1)	1,462
Alabama	71.1 (67.2-74.7)	1,250		**Nebraska**	67.7 (63.7-71.5)	1,497
Alaska	71.4 (67.8-74.9)	1,249		**Nevada**	60.6 (56.4-64.8)	1,220
Arizona	65.4 (61.3-69.3)	1,320		**New Hampshire**	71.0 (67.4-74.3)	1,417
Arkansas	66.7 (62.5-70.8)	1,171		**New Jersey**	73.9 (69.9-77.6)	1,513
California	68.8 (64.7-72.8)	1,385		**New Mexico**	67.3 (62.8-71.5)	1,189
Colorado	69.2 (65.4-72.9)	1,529		**New York**	73.7 (70.1-77.1)	1,387
Connecticut	75.3 (71.5-78.8)	1,557		**North Carolina**	73.9 (69.7-77.8)	1,339
Delaware	74.1 (70.3-77.6)	1,330		**North Dakota**	66.5 (62.6-70.2)	1,474
Florida	67.5 (63.3-71.5)	1,317		**Ohio**	69.7 (65.8-73.4)	1,440
Georgia	71.4 (67.5-75.2)	1,207		**Oklahoma**	65.8 (61.6-69.7)	1,176
Hawaii	67.9 (64.4-71.3)	1,545		**Oregon**	67.6 (63.8-71.3)	1,511
Idaho	60.4 (56.6-64.0)	1,471		**Pennsylvania**	71.5 (67.7-75.1)	1,523
Illinois	66.9 (62.9-70.6)	1,548		**Rhode Island**	74.8 (71.0-78.3)	1,302
Indiana	67.4 (63.6-71.1)	1,366		**South Carolina**	65.9 (61.8-69.9)	1,292
Iowa	70.1 (66.3-73.6)	1,548		**South Dakota**	64.4 (60.7-68.0)	1,572
Kansas	69.4 (65.3-73.3)	1,431		**Tennessee**	70.9 (66.9-74.6)	1,285
Kentucky	65.8 (61.5-69.8)	1,266		**Texas**	69.2 (65.0-73.3)	1,193
Louisiana	69.5 (65.4-73.3)	1,099		**Utah**	66.9 (63.4-70.3)	1,589
Maine	68.1 (64.3-71.7)	1,428		**Vermont**	69.2 (65.5-72.6)	1,549
Maryland	69.3 (65.5-73.0)	1,545		**Virginia**	72.9 (69.3-76.3)	1,574
Massachusetts	73.9 (70.6-77.0)	1,597		**Washington**	68.7 (64.9-72.3)	1,569
Michigan	73.2 (69.6-76.6)	1,549		**West Virginia**	69.4 (65.4-73.3)	1,165
Minnesota	73.5 (69.9-76.8)	1,780		**Wisconsin**	70.2 (66.7-73.6)	1,677
Mississippi	67.0 (62.9-70.9)	1,066		**Wyoming**	76.2 (72.8-79.3)	1,243
Missouri	67.9 (64.1-71.6)	1,437		**District of Columbia**	66.9 (62.7-70.9)	1,437

Table 10. National estimates of rates of children having his or her vision tested at various locations among those who had their vision tested with pictures, shapes, or letters ever (0-5 years) or during the past 2 years (6-17 years) (K4Q32X01, K4Q32X02, K4Q32X03, K4Q32X04, K4Q32X05)

Stratification factor	Prevalence Rate	Sample Size
All respondents		
Eye Doctor or Eye Specialist	55.1 (54.1-56.2)	51,720
Pediatrician or Other General Doctor's Office	43.8 (42.8-44.9)	51,720
Clinic or Health Center	5.1 (4.5-5.7)	51,720
School	22.2 (21.4-23.0)	51,720
Other	0.8 (0.7-0.9)	51,720
Race/Ethnicity		
Hispanic		
Eye Doctor or Eye Specialist	54.4 (51.4-57.4)	5,730
Pediatrician or Other General Doctor's Office	43.1 (40.1-46.2)	5,730
Clinic or Health Center	8.5 (6.8-10.5)	5,730
School	19.9 (17.6-22.4)	5,730
Other	0.5 (0.3-0.8)	5,730
Non-Hispanic Black		
Eye Doctor or Eye Specialist	56.1 (52.9-59.3)	3,171
Pediatrician or Other General Doctor's Office	41.9 (38.7-45.0)	3,171
Clinic or Health Center	8.2 (6.4-10.3)	3,171
School	17.1 (14.9-19.5)	3,171
Other	1.0 (0.6-1.6)	3,171
Non-Hispanic White		
Eye Doctor or Eye Specialist	55.0 (54.0-56.0)	36,215
Pediatrician or Other General Doctor's Office	44.4 (43.4-45.4)	36,215
Clinic or Health Center	2.6 (2.2-3.0)	36,215
School	24.8 (24.0-25.7)	36,215
Other	0.8 (0.7-1.0)	36,215
Non-Hispanic Other		
Eye Doctor or Eye Specialist	56.0 (53.4-58.5)	6,604
Pediatrician or Other General Doctor's Office	45.5 (42.9-48.1)	6,604
Clinic or Health Center	5.4 (4.2-6.9)	6,604
School	20.8 (18.8-23.0)	6,604
Other	1.0 (0.6-1.5)	6,604
Sex		
Male		
Eye Doctor or Eye Specialist	51.3 (49.9-52.8)	26,189
Pediatrician or Other General Doctor's Office	46.2 (44.8-47.7)	26,189
Clinic or Health Center	5.7 (4.9-6.6)	26,189
School	22.7 (21.5-23.9)	26,189
Other	0.9 (0.7-1.1)	26,189

Stratification factor	Prevalence Rate	Sample Size
Female		
Eye Doctor or Eye Specialist	59.0 (57.5-60.5)	25,531
Pediatrician or Other General Doctor's Office	41.4 (40.0-42.9)	25,531
Clinic or Health Center	4.5 (3.7-5.3)	25,531
School	21.7 (20.5-22.9)	25,531
Other	0.7 (0.5-0.9)	25,531

Table 11. State estimates of rates of children having his or her vision tested at an eye doctor or specialist among those who had their vision tested with pictures, shapes, or letters ever (0-5 years) or during the past 2 years (6-17 years) (K4Q32X01)

State	Prevalence Rate	Sample Size		State	Prevalence Rate	Sample Size
United States	55.1 (54.1-56.2)	51,720		**Montana**	58.0 (53.3-62.6)	1,021
Alabama	55.3 (50.6-60.0)	901		**Nebraska**	67.3 (62.7-71.7)	1,045
Alaska	57.2 (52.4-61.9)	890		**Nevada**	66.1 (60.9-71.0)	812
Arizona	53.9 (48.8-59.0)	919		**New Hampshire**	52.1 (48.1-56.1)	1,069
Arkansas	59.9 (54.0-65.5)	794		**New Jersey**	54.3 (49.7-58.8)	1,203
California	49.7 (44.8-54.5)	1,015		**New Mexico**	58.6 (53.1-63.9)	838
Colorado	50.2 (45.8-54.7)	1,138		**New York**	50.0 (45.3-54.7)	1,059
Connecticut	52.9 (48.8-57.0)	1,255		**North Carolina**	51.4 (46.3-56.4)	1,035
Delaware	55.6 (51.0-60.2)	1,003		**North Dakota**	67.6 (63.0-72.0)	1,024
Florida	51.7 (46.7-56.7)	944		**Ohio**	61.4 (56.8-65.9)	1,050
Georgia	48.8 (43.9-53.7)	883		**Oklahoma**	65.7 (60.8-70.3)	818
Hawaii	40.3 (36.3-44.4)	1,077		**Oregon**	49.7 (44.7-54.7)	1,043
Idaho	67.1 (62.5-71.4)	919		**Pennsylvania**	54.1 (49.6-58.5)	1,170
Illinois	77.9 (74.0-81.4)	1,081		**Rhode Island**	48.1 (43.5-52.7)	1,009
Indiana	68.5 (64.0-72.8)	975		**South Carolina**	51.7 (46.8-56.6)	890
Iowa	65.7 (61.6-69.6)	1,145		**South Dakota**	73.0 (68.7-77.1)	1,054
Kansas	63.2 (58.6-67.7)	1,081		**Tennessee**	58.1 (53.4-62.7)	963
Kentucky	81.2 (77.1-84.7)	898		**Texas**	51.6 (46.0-57.0)	863
Louisiana	59.8 (54.6-64.9)	762		**Utah**	46.2 (41.9-50.5)	1,078
Maine	52.6 (48.2-57.1)	1,012		**Vermont**	40.8 (36.8-45.0)	1,130
Maryland	53.9 (49.4-58.3)	1,122		**Virginia**	49.8 (45.4-54.3)	1,180
Massachusetts	51.3 (46.7-55.8)	1,193		**Washington**	52.3 (47.7-56.8)	1,136
Michigan	56.1 (51.5-60.7)	1,168		**West Virginia**	66.2 (61.6-70.6)	857
Minnesota	49.5 (45.1-53.8)	1,328		**Wisconsin**	54.6 (50.3-58.8)	1,225
Mississippi	63.9 (58.6-68.9)	721		**Wyoming**	67.6 (63.1-71.9)	945
Missouri	59.8 (55.3-64.2)	1,057		**District of Columbia**	41.0 (35.5-46.6)	922

Table 12. State estimates of rates of children having his or her vision tested at a pediatrician or general doctor's office among those who had their vision tested with pictures, shapes, or letters ever (0-5 years) or during the past 2 years (6-17 years) (K4Q32X02)

State	Prevalence Rate	Sample Size		State	Prevalence Rate	Sample Size
United States	43.9 (42.8-44.9)	51,720		**Montana**	34.7 (30.3-39.2)	1,021
Alabama	32.9 (28.5-37.4)	901		**Nebraska**	29.3 (25.2-33.6)	1,045
Alaska	38.8 (34.3-43.5)	890		**Nevada**	34.3 (29.4-39.4)	812
Arizona	39.8 (34.8-44.9)	919		**New Hampshire**	53.7 (49.6-57.7)	1,069
Arkansas	20.2 (15.6-25.4)	794		**New Jersey**	55.2 (50.7-59.7)	1,203
California	54.0 (49.2-58.7)	1,015		**New Mexico**	38.2 (32.9-43.6)	838
Colorado	42.4 (38.0-46.8)	1,138		**New York**	54.6 (49.9-59.3)	1,059
Connecticut	51.6 (47.5-55.8)	1,255		**North Carolina**	53.1 (48.0-58.2)	1,035
Delaware	50.1 (45.5-54.8)	1,003		**North Dakota**	21.7 (18.0-25.9)	1,024
Florida	50.0 (45.0-55.0)	944		**Ohio**	39.0 (34.6-43.6)	1,050
Georgia	50.8 (45.8-55.6)	883		**Oklahoma**	18.7 (15.3-22.5)	818
Hawaii	63.7 (59.7-67.6)	1,077		**Oregon**	41.2 (36.4-46.2)	1,043
Idaho	26.5 (22.8-30.5)	919		**Pennsylvania**	43.0 (38.7-47.4)	1,170
Illinois	21.3 (17.9-24.9)	1,081		**Rhode Island**	56.6 (52.0-61.2)	1,009
Indiana	27.6 (23.5-31.9)	975		**South Carolina**	45.4 (40.5-50.3)	890
Iowa	27.8 (24.2-31.7)	1,145		**South Dakota**	15.8 (12.5-19.6)	1,054
Kansas	30.7 (26.3-35.3)	1,081		**Tennessee**	42.3 (37.7-47.0)	963
Kentucky	21.0 (17.3-25.2)	898		**Texas**	44.3 (38.9-49.9)	863
Louisiana	41.1 (35.8-46.5)	762		**Utah**	48.6 (44.3-52.9)	1,078
Maine	47.3 (42.9-51.8)	1,012		**Vermont**	55.3 (50.9-59.5)	1,130
Maryland	46.9 (42.5-51.4)	1,122		**Virginia**	53.4 (48.9-57.8)	1,180
Massachusetts	49.1 (44.5-53.6)	1,193		**Washington**	43.4 (38.9-47.9)	1,136
Michigan	42.3 (37.7-46.9)	1,168		**West Virginia**	38.3 (33.9-42.8)	857
Minnesota	41.3 (37.1-45.6)	1,328		**Wisconsin**	41.3 (37.1-45.5)	1,225
Mississippi	24.0 (19.8-28.5)	721		**Wyoming**	21.4 (17.5-25.8)	945
Missouri	34.0 (29.8-38.3)	1,057		**District of Columbia**	56.3 (50.5-61.9)	922

Table 13. State estimates of rates of children having his or her vision tested at a clinic or health center among those who had their vision tested with pictures, shapes, or letters ever (0-5 years) or during the past 2 years (6-17 years) (K4Q32X03)

State	Prevalence Rate	Sample Size		State	Prevalence Rate	Sample Size
United States	5.1 (4.5-5.7)	51,720		**Montana**	5.4 (3.3-8.3)	1,021
Alabama	3.8 (1.9-6.6)	901		**Nebraska**	4.6 (3.0-6.8)	1,045
Alaska	7.8 (5.4-10.8)	890		**Nevada**	2.0 (1.0-3.5)	812
Arizona	3.7 (2.0-6.1)	919		**New Hampshire**	3.0 (1.5-5.1)	1,069
Arkansas	4.8 (2.6-8.1)	794		**New Jersey**	2.1 (1.0-3.8)	1,203
California	9.0 (6.0-12.8)	1,015		**New Mexico**	5.6 (3.2-8.9)	838
Colorado	6.6 (4.0-10.2)	1,138		**New York**	6.5 (3.8-10.2)	1,059
Connecticut	4.7 (2.6-7.8)	1,255		**North Carolina**	6.3 (3.5-10.3)	1,035
Delaware	3.7 (2.1-6.1)	1,003		**North Dakota**	7.3 (4.9-10.4)	1,024
Florida	4.8 (2.8-7.6)	944		**Ohio**	2.6 (1.0-5.4)	1,050
Georgia	4.9 (2.9-7.7)	883		**Oklahoma**	4.5 (2.3-7.8)	818
Hawaii	4.5 (3.0-6.4)	1,077		**Oregon**	5.8 (3.8-8.4)	1,043
Idaho	3.0 (1.7-4.8)	919		**Pennsylvania**	4.4 (2.3-7.7)	1,170
Illinois	2.6 (1.2-4.9)	1,081		**Rhode Island**	3.7 (1.9-6.3)	1,009
Indiana	1.3 (0.6-2.6)	975		**South Carolina**	4.1 (2.4-6.5)	890
Iowa	3.2 (2.1-4.6)	1,145		**South Dakota**	3.4 (2.1-5.2)	1,054
Kansas	4.0 (2.3-6.6)	1,081		**Tennessee**	4.1 (2.1-7.3)	963
Kentucky	4.0 (2.3-6.3)	898		**Texas**	4.7 (2.7-7.5)	863
Louisiana	3.9 (2.0-6.8)	762		**Utah**	2.9 (1.8-4.5)	1,078
Maine	0.6 (0.2-1.5)	1,012		**Vermont**	2.3 (0.8-5.1)	1,130
Maryland	3.3 (1.7-5.7)	1,122		**Virginia**	2.4 (1.3-4.1)	1,180
Massachusetts	4.9 (2.5-8.6)	1,193		**Washington**	6.6 (4.3-9.7)	1,136
Michigan	3.6 (2.1-5.8)	1,168		**West Virginia**	3.3 (2.1-5.0)	857
Minnesota	11.1 (8.1-14.8)	1,328		**Wisconsin**	7.7 (4.9-11.4)	1,225
Mississippi	6.4 (3.6-10.3)	721		**Wyoming**	5.5 (3.8-7.6)	945
Missouri	5.0 (2.9-8.1)	1,057		**District of Columbia**	11.9 (8.1-16.8)	922

Table 14. State estimates of rates of children having his or her vision tested at school among those who had their vision tested with pictures, shapes, or letters ever (0-5 years) or during the past 2 years (6-17 years) (K4Q32X04)

State	Prevalence Rate	Sample Size		State	Prevalence Rate	Sample Size
United States	22.2 (21.4-23.0)	51,720		**Montana**	29.7 (25.4-34.3)	1,021
Alabama	30.3 (26.1-34.7)	901		**Nebraska**	23.9 (20.1-28.1)	1,045
Alaska	21.1 (17.4-25.2)	890		**Nevada**	19.9 (15.9-24.3)	812
Arizona	30.5 (25.8-35.4)	919		**New Hampshire**	19.1 (16.1-22.4)	1,069
Arkansas	32.6 (27.5-38.0)	794		**New Jersey**	17.9 (15.0-21.2)	1,203
California	17.7 (14.1-21.8)	1,015		**New Mexico**	20.9 (16.6-25.8)	838
Colorado	30.5 (26.5-34.7)	1,138		**New York**	18.3 (15.0-21.9)	1,059
Connecticut	18.7 (15.7-21.9)	1,255		**North Carolina**	15.7 (12.0-20.0)	1,035
Delaware	20.7 (17.2-24.6)	1,003		**North Dakota**	27.3 (23.1-31.8)	1,024
Florida	23.0 (19.0-27.5)	944		**Ohio**	25.8 (22.0-29.9)	1,050
Georgia	11.9 (9.0-15.3)	883		**Oklahoma**	31.7 (27.3-36.4)	818
Hawaii	10.6 (8.2-13.4)	1,077		**Oregon**	27.0 (22.7-31.8)	1,043
Idaho	23.3 (19.4-27.7)	919		**Pennsylvania**	30.9 (27.2-34.8)	1,170
Illinois	19.1 (16.0-22.5)	1,081		**Rhode Island**	21.6 (17.9-25.7)	1,009
Indiana	22.4 (18.9-26.3)	975		**South Carolina**	20.5 (16.7-24.8)	890
Iowa	25.8 (22.2-29.6)	1,145		**South Dakota**	26.7 (22.6-31.1)	1,054
Kansas	35.3 (31.0-39.8)	1,081		**Tennessee**	24.8 (20.9-29.1)	963
Kentucky	13.2 (10.2-16.6)	898		**Texas**	21.1 (16.9-25.7)	863
Louisiana	23.3 (19.1-28.0)	762		**Utah**	29.4 (25.7-33.4)	1,078
Maine	24.1 (20.6-27.9)	1,012		**Vermont**	28.8 (25.0-32.9)	1,130
Maryland	18.1 (14.8-21.7)	1,122		**Virginia**	20.4 (16.3-25.0)	1,180
Massachusetts	22.0 (18.4-25.8)	1,193		**Washington**	23.1 (19.4-27.0)	1,136
Michigan	28.6 (24.6-32.7)	1,168		**West Virginia**	17.1 (13.6-21.0)	857
Minnesota	29.9 (26.2-33.9)	1,328		**Wisconsin**	23.1 (19.7-26.8)	1,225
Mississippi	22.5 (18.3-27.2)	721		**Wyoming**	31.1 (26.9-35.6)	945
Missouri	29.5 (25.5-33.9)	1,057		**District of Columbia**	10.0 (7.3-13.2)	922

Table 15. State estimates of rates of children having his or her vision tested at some other location among those who had their vision tested with pictures, shapes, or letters ever (0-5 years) or during the past 2 years (6-17 years) (K4Q32X05)

State	Prevalence Rate	Sample Size		State	Prevalence Rate	Sample Size
United States	0.8 (0.6-0.9)	51,720		**Montana**	1.1 (0.4-2.5)	1,021
Alabama	1.2 (0.4-2.5)	901		**Nebraska**	0.6 (0.2-1.7)	1,045
Alaska	0.9 (0.4-1.8)	890		**Nevada**	0.6 (0.2-1.4)	812
Arizona	1.3 (0.3-3.4)	919		**New Hampshire**	0.9 (0.3-2.0)	1,069
Arkansas	0.9 (0.3-2.0)	794		**New Jersey**	1.1 (0.3-2.5)	1,203
California	0.4 (0.1-1.0)	1,015		**New Mexico**	0.5 (0.1-1.4)	838
Colorado	1.0 (0.4-2.0)	1,138		**New York**	0.8 (0.3-1.8)	1,059
Connecticut	0.3 (0.1-1.1)	1,255		**North Carolina**	0.9 (0.3-2.3)	1,035
Delaware	1.3 (0.5-2.8)	1,003		**North Dakota**	1.4 (0.7-2.5)	1,024
Florida	0.8 (0.3-1.8)	944		**Ohio**	1.0 (0.3-2.4)	1,050
Georgia	1.3 (0.5-2.7)	883		**Oklahoma**	0.6 (0.2-1.6)	818
Hawaii	0.9 (0.4-1.9)	1,077		**Oregon**	1.1 (0.4-2.6)	1,043
Idaho	1.1 (0.4-2.3)	919		**Pennsylvania**	0.6 (0.2-1.4)	1,170
Illinois	0.5 (0.2-1.2)	1,081		**Rhode Island**	0.3 (0.1-0.9)	1,009
Indiana	1.1 (0.4-2.2)	975		**South Carolina**	1.6 (0.7-2.9)	890
Iowa	1.3 (0.6-2.4)	1,145		**South Dakota**	2.1 (0.6-5.0)	1,054
Kansas	1.1 (0.5-2.0)	1,081		**Tennessee**	0.5 (0.2-1.2)	963
Kentucky	0.6 (0.2-1.4)	898		**Texas**	0.4 (0.1-1.2)	863
Louisiana	0.9 (0.2-2.6)	762		**Utah**	0.7 (0.2-1.6)	1,078
Maine	1.7 (0.7-3.4)	1,012		**Vermont**	0.4 (0.1-1.3)	1,130
Maryland	0.7 (0.2-1.9)	1,122		**Virginia**	0.7 (0.3-1.5)	1,180
Massachusetts	0.8 (0.0-3.5)	1,193		**Washington**	0.6 (0.1-1.5)	1,136
Michigan	0.7 (0.2-1.5)	1,168		**West Virginia**	0.8 (0.3-1.7)	857
Minnesota	0.6 (0.2-1.2)	1,328		**Wisconsin**	0.6 (0.2-1.3)	1,225
Mississippi	0.0 (0.0-0.0)	721		**Wyoming**	3.7 (2.4-5.5)	945
Missouri	1.6 (0.7-3.1)	1,057		**District of Columbia**	0.8 (0.2-2.1)	922