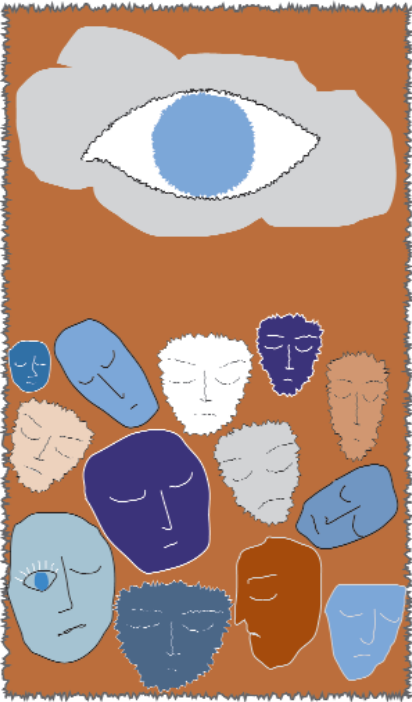


# Vision Problems in the U.S.

Prevalence of Adult Vision Impairment and Age-Related Eye Disease in America





Founded in 1908, PREVENT BLINDNESS AMERICA is the nation's leading volunteer eye health and safety organization dedicated to fighting blindness and saving sight. Focused on promoting a continuum of vision care, PREVENT BLINDNESS AMERICA touches the lives of millions of people each year through public and professional education, community and patient service programs and research.

These services are made possible through the generous support of the American public. Together with a network of affiliates, divisions and chapters, it is committed to eliminating preventable blindness in America.



The National Eye Institute (NEI), a component of the National Institutes of Health (NIH), supports and conducts research aimed at improving the prevention, treatment, and rehabilitation of diseases that affect the eye and vision. The NIH, a Federal government agency, is part of the U.S. Department of Health and Human Services. Research is conducted on the NIH campus in Bethesda, Maryland, and at universities, medical schools, hospitals, and other institutions throughout the United States and abroad.

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the 1990s, the number of people in the world who are illiterate has increased from 1.1 billion to 1.5 billion. The number of illiterate people in the world is expected to reach 2 billion by the year 2015 (UNESCO 2003).

There are many reasons for the increase in illiteracy. One of the main reasons is the rapid population growth in developing countries. Another reason is the lack of access to education, particularly in rural areas. A third reason is the high cost of education, which is often beyond the reach of many families. Finally, the quality of education is often poor, leading to high dropout rates and low levels of literacy.

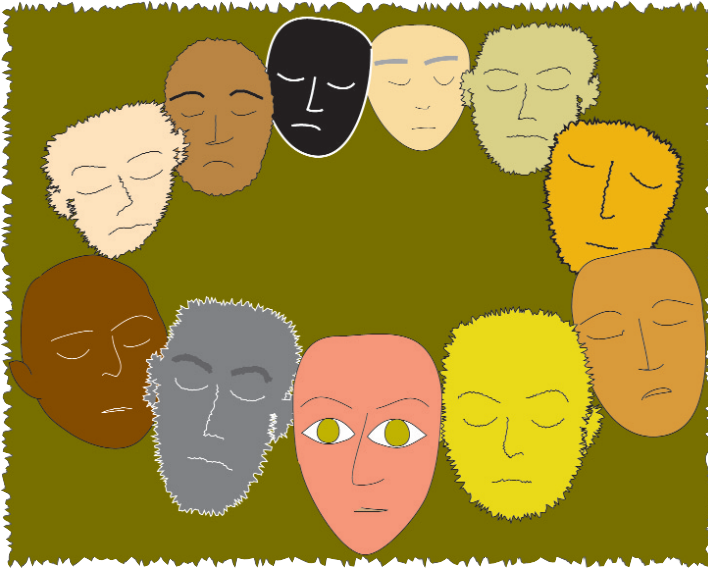
Illiteracy has a significant impact on the lives of individuals and communities. It limits access to information and services, reduces income, and increases vulnerability to exploitation. It also hinders social and economic development. Therefore, it is essential to take action to reduce illiteracy and improve the quality of education.

There are several strategies that can be used to reduce illiteracy. One of the most effective is to improve the quality of education, particularly in primary and secondary schools. This can be done by training teachers, improving teaching methods, and providing better learning materials. Another strategy is to provide adult literacy programs, which can help people learn to read and write at any age.

Community-based literacy programs are also an important part of the solution. These programs use local resources and people to provide literacy training. They are often more effective than traditional classroom-based programs because they are more relevant to the needs of the community and more accessible to people.

Finally, it is important to create an environment that values literacy and encourages people to learn. This can be done by promoting literacy in the media, in the workplace, and in the community. It is also important to provide incentives for people to learn, such as scholarships and job training opportunities.

Reducing illiteracy is a complex task that requires a multi-faceted approach. It is essential to improve the quality of education, provide adult literacy programs, and create an environment that values literacy. Only through these efforts can we hope to reduce the number of illiterate people in the world and improve the lives of all.



**Introduction** Vision impairment is one of the most feared disabilities. Although it is believed that half of all blindness can be prevented, the number of people in America who suffer vision loss continues to increase.

**The leading causes of vision impairment and blindness in the United States are primarily age-related eye diseases.** The number of Americans at risk for age-related eye diseases is increasing as the baby-boomer generation ages. These conditions, including age-related macular degeneration, cataract, diabetic retinopathy and glaucoma, affect more Americans than ever before. Disturbingly, the number of Americans with age-related eye disease and the vision impairment that results is expected to double within the next three decades. As of the year 2000 census, there were more than 119 million people in the United States in this age group. The table on the following pages provides an overview of the U.S. population age 40 and older by race and sex.

**Awareness of vision impairment and its causes is important to all of us.** We must be aware of our own personal risk of vision loss and take steps to preserve and protect our precious eyesight. Our communities must be informed so that they may prepare the treatment and rehabilitation services that will be needed. Most important, our nation's leaders must comprehend the scope of eye problems in our country so that adequate government resources can be devoted to research, treatment and prevention.

*Vision Problems in the U.S.*, now in its fourth edition, provides useful estimates of the prevalence of sight-threatening eye diseases in Americans age 40 and older. This report includes information on the prevalence of blindness and vision impairment, significant refractive error, and the four leading eye diseases affecting older Americans: age-related macular degeneration, cataract, diabetic retinopathy, and glaucoma.

## U.S. Census 2000 Population Age 40 and Older by Race and Sex

State	Total	Female	Male	White	Black	Hispanic	Other
<b>Total U.S.</b>	119,386,252	63,704,939	55,681,313	92,795,063	11,798,940	8,884,286	5,907,963
Alabama	1,940,751	1,052,469	888,282	1,481,032	411,498	15,975	32,246
Alaska	233,727	113,037	120,690	176,382	5,730	5,816	45,799
Arizona	2,114,232	1,110,773	1,003,459	1,654,026	48,149	295,103	116,954
Arkansas	1,178,108	631,726	546,382	999,797	138,752	15,826	23,733
California	13,211,984	6,964,840	6,247,144	8,005,612	791,710	2,575,874	1,838,788
Colorado	1,740,236	901,636	838,600	1,443,614	53,043	183,815	59,764
Connecticut	1,549,786	834,892	714,894	1,328,878	99,573	76,800	44,535
Delaware	340,191	182,128	158,063	273,092	50,837	7,191	9,071
District of Columbia	236,719	131,471	105,248	66,332	150,140	11,331	8,916
Florida	7,660,296	4,099,162	3,561,134	5,736,782	739,430	985,303	198,781
Georgia	3,181,496	1,704,689	1,476,807	2,279,261	745,103	70,523	86,609
Hawaii	533,783	276,777	257,006	140,317	4,264	20,397	368,805
Idaho	521,748	268,925	252,823	487,165	1,100	18,932	14,551
Illinois	5,154,384	2,769,464	2,384,920	3,977,226	647,503	328,127	201,528
Indiana	2,582,036	1,377,801	1,204,235	2,325,490	173,582	44,961	38,003
Iowa	1,313,721	700,185	613,536	1,265,289	16,951	14,930	16,551
Kansas	1,143,431	606,768	536,663	1,025,089	49,624	37,034	31,684
Kentucky	1,755,054	939,758	815,296	1,616,637	102,817	12,406	23,194
Louisiana	1,831,086	987,373	843,713	1,270,084	484,758	35,993	40,251
Maine	608,016	322,728	285,288	595,531	1,523	2,330	8,632
Maryland	2,276,083	1,225,782	1,050,301	1,578,607	532,315	55,768	109,393
Massachusetts	2,802,324	1,520,368	1,281,956	2,488,184	105,269	94,613	114,258
Michigan	4,261,002	2,264,530	1,996,472	3,586,932	491,207	72,510	110,353
Minnesota	2,076,523	1,088,919	987,604	1,953,980	39,415	24,030	59,098
Mississippi	1,164,390	632,457	531,933	803,746	335,434	9,910	15,300
Missouri	2,449,558	1,317,241	1,132,317	2,157,327	214,785	27,264	50,182
Montana	416,517	215,188	201,329	389,837	614	4,589	21,477
Nebraska	733,296	388,728	344,568	682,270	20,539	17,545	12,942
Nevada	834,229	420,350	413,879	645,254	45,222	81,758	61,995
New Hampshire	553,140	289,106	264,034	536,917	2,361	4,511	9,351
New Jersey	3,733,200	2,018,525	1,714,675	2,794,264	397,207	321,258	220,471
New Mexico	758,427	399,622	358,805	433,587	11,037	251,013	62,790
New York	8,197,490	4,469,271	3,728,219	5,769,361	1,031,985	855,345	540,799
North Carolina	3,409,590	1,837,162	1,572,428	2,647,699	620,878	53,880	87,133
North Dakota	284,355	148,573	135,782	272,229	628	1,451	10,047
Ohio	5,004,592	2,692,286	2,312,306	4,397,146	467,523	53,095	86,828
Oklahoma	1,490,431	795,928	694,503	1,227,118	83,495	34,544	145,274
Oregon	1,520,543	798,229	722,314	1,382,795	17,866	46,846	73,036
Pennsylvania	5,752,498	3,115,315	2,637,183	5,107,986	444,732	93,047	106,733
Rhode Island	468,200	255,062	213,138	420,041	12,721	19,246	16,192
South Carolina	1,719,131	927,597	791,534	1,249,805	424,902	17,982	26,442
South Dakota	326,961	171,244	155,717	306,427	904	2,129	17,501
Tennessee	2,472,678	1,330,265	1,142,413	2,094,587	314,485	22,916	40,690
Texas	7,915,214	4,173,081	3,742,133	5,117,834	792,280	1,719,211	285,889
Utah	719,281	372,516	346,765	651,863	4,037	37,318	26,063
Vermont	280,775	148,064	132,711	273,854	769	1,574	4,578
Virginia	3,013,080	1,606,110	1,406,970	2,308,583	503,483	71,883	129,131
Washington	2,495,837	1,300,500	1,195,337	2,160,195	58,602	81,057	195,983
West Virginia	874,610	467,509	407,101	837,043	23,301	4,001	10,265
Wisconsin	2,332,867	1,227,283	1,105,584	2,169,441	83,802	36,443	43,181
Wyoming	218,645	111,526	107,119	202,515	1,055	8,882	6,193

White Female	White Male	Black Female	Black Male	Hisp. Female	Hisp. Male	Other Female	Other Male	State
49,323,810	43,471,253	6,594,609	5,204,331	4,624,359	4,259,927	3,162,161	2,745,802	<b>Total U.S.</b>
792,299	688,733	234,632	176,866	7,652	8,323	17,886	14,360	Alabama
83,460	92,922	2,694	3,036	2,862	2,954	24,021	21,778	Alaska
871,860	782,166	23,509	24,640	150,954	144,149	64,450	52,504	Arizona
533,450	466,347	78,118	60,634	7,222	8,604	12,936	10,797	Arkansas
4,204,389	3,801,223	424,476	367,234	1,343,750	1,232,124	992,225	846,563	California
750,367	693,247	26,002	27,041	92,605	91,210	32,662	27,102	Colorado
714,537	614,341	56,065	43,508	41,217	35,583	23,073	21,462	Connecticut
145,534	127,558	28,290	22,547	3,494	3,697	4,810	4,261	Delaware
33,621	32,711	86,717	63,423	6,059	5,272	5,074	3,842	District of Columbia
3,053,396	2,683,386	406,774	332,656	531,367	453,936	107,625	91,156	Florida
1,206,805	1,072,456	420,549	324,554	31,357	39,166	45,978	40,631	Georgia
67,615	72,702	1,442	2,822	10,578	9,819	197,142	171,663	Hawaii
251,923	235,242	396	704	8,778	10,154	7,828	6,723	Idaho
2,132,701	1,844,525	368,966	278,537	161,173	166,954	106,624	94,904	Illinois
1,240,055	1,085,435	96,031	77,551	21,311	23,650	20,404	17,599	Indiana
675,767	589,522	8,502	8,449	7,035	7,895	8,881	7,670	Iowa
545,567	479,522	26,330	23,294	17,836	19,198	17,035	14,649	Kansas
864,789	751,848	56,753	46,064	5,678	6,728	12,538	10,656	Kentucky
674,317	595,767	272,902	211,856	18,960	17,033	21,194	19,057	Louisiana
316,241	279,290	577	946	1,212	1,118	4,698	3,934	Maine
837,104	741,503	300,204	232,111	29,814	25,954	58,660	50,733	Maryland
1,351,597	1,136,587	57,734	47,535	51,223	43,390	59,814	54,444	Massachusetts
1,896,811	1,690,121	274,447	216,760	35,620	36,890	57,652	52,701	Michigan
1,027,713	926,267	18,793	20,622	11,178	12,852	31,235	27,863	Minnesota
429,924	373,822	189,436	145,998	4,581	5,329	8,516	6,784	Mississippi
1,154,233	1,003,094	122,057	92,728	13,707	13,557	27,244	22,938	Missouri
201,060	188,777	214	400	2,378	2,211	11,536	9,941	Montana
362,441	319,829	10,983	9,556	8,165	9,380	7,139	5,803	Nebraska
322,975	322,279	22,904	22,318	39,832	41,926	34,639	27,356	Nevada
280,901	256,016	1,007	1,354	2,343	2,168	4,855	4,496	New Hampshire
1,508,365	1,285,899	225,567	171,640	170,245	151,013	114,348	106,123	New Jersey
228,474	205,113	5,252	5,785	131,322	119,691	34,574	28,216	New Mexico
3,114,937	2,654,424	602,258	429,727	473,072	382,273	279,004	261,795	New York
1,415,910	1,231,789	350,719	270,159	23,194	30,686	47,339	39,794	North Carolina
142,173	130,056	209	419	729	722	5,462	4,585	North Dakota
2,357,122	2,040,024	261,773	205,750	26,855	26,240	46,536	40,292	Ohio
655,564	571,554	45,079	38,416	16,378	18,166	78,907	66,367	Oklahoma
728,546	654,249	8,403	9,463	21,912	24,934	39,368	33,668	Oregon
2,758,443	2,349,543	253,221	191,511	47,371	45,676	56,280	50,453	Pennsylvania
229,286	190,755	6,553	6,168	10,580	8,666	8,643	7,549	Rhode Island
664,656	585,149	240,177	184,725	8,160	9,822	14,604	11,838	South Carolina
160,550	145,877	278	626	1,020	1,109	9,396	8,105	South Dakota
1,119,794	974,793	178,129	136,356	10,421	12,495	21,921	18,769	Tennessee
2,694,727	2,423,107	433,217	359,063	894,428	824,783	150,709	135,180	Texas
338,860	313,003	1,613	2,424	18,196	19,122	13,847	12,216	Utah
144,476	129,378	298	471	821	753	2,469	2,109	Vermont
1,220,195	1,088,388	277,845	225,638	37,418	34,465	70,652	58,479	Virginia
1,126,767	1,033,428	27,227	31,375	38,558	42,499	107,948	88,035	Washington
447,291	389,752	12,699	10,602	2,039	1,962	5,480	4,785	West Virginia
1,140,838	1,028,603	46,131	37,671	17,288	19,155	23,026	20,155	Wisconsin
103,384	99,131	457	598	4,411	4,471	3,274	2,919	Wyoming

## Vision Impairment & Blindness

The term "blindness" can have many connotations and is difficult to define precisely. To many people, blindness refers to the complete loss of vision with no remaining perception of light. However, this ultimate form of complete blindness is rare. Far more people have a permanent loss of some, but not all, of their eyesight. The severity of vision loss can vary widely and may result in equally varying degrees of functional impairment.

"Legal blindness" represents an artificial distinction and has little value for rehabilitation, but it is significant in that it determines eligibility for certain disability benefits from the Federal Government. In the United States, it is typically defined as visual acuity with best correction in the better eye worse than or equal to 20/200 or a visual field extent of less than 20 degrees in diameter. These overly simple criteria for visual impairment are far from comprehensive in defining the visual function deficits that can cause difficulties for daily living tasks.

Vision impairment is defined as having 20/40 or worse vision in the better eye even with eyeglasses. People with the least degree of vision impairment may still face challenges in everyday life. For instance, people with vision worse than 20/40 cannot obtain an unrestricted driver's license in most states.

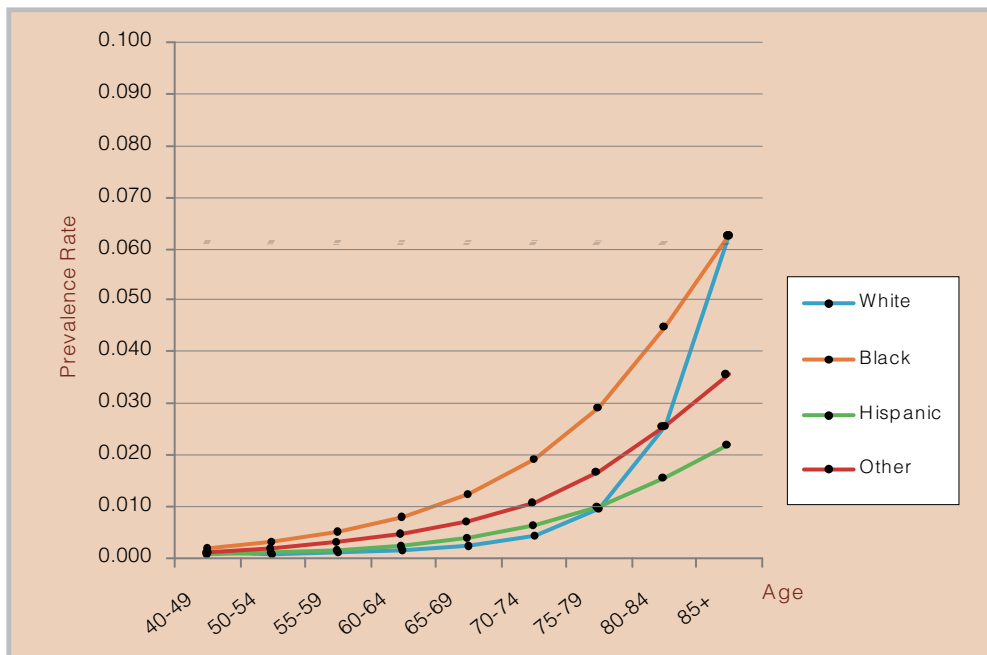
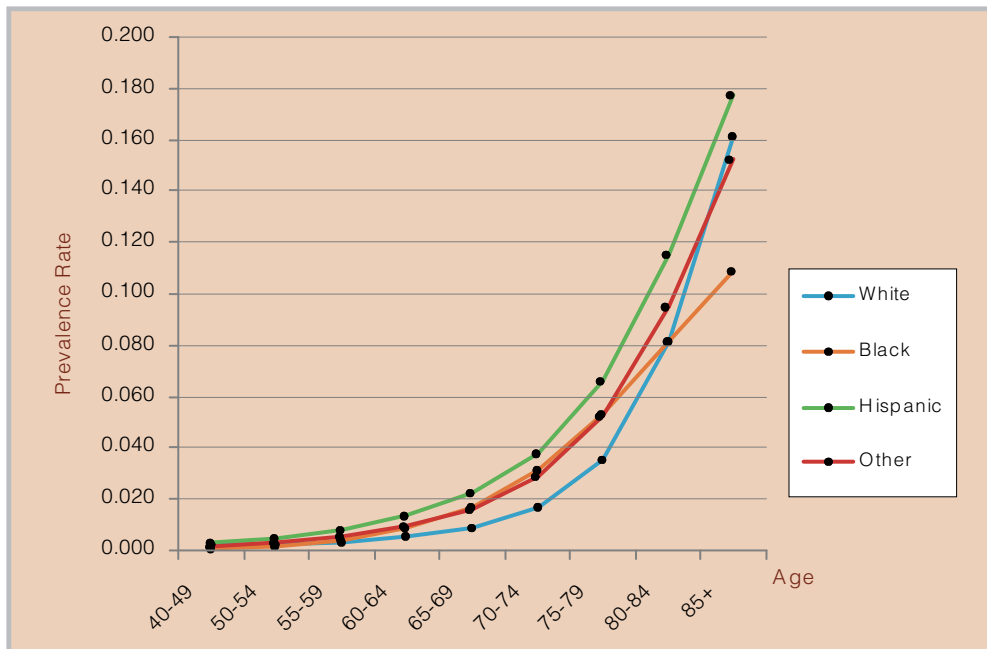
Almost everyone with blindness or vision impairment can benefit from vision rehabilitation that can help make the most of whatever vision remains.

Unfortunately, blindness and vision impairment represent a significant burden, not only to those affected by sight loss, but to our national economy as well. It is estimated that blindness and vision impairment cost the federal government more than \$4 billion annually in benefits and lost taxable income.

Blindness, as defined above, affects more than one million Americans age 40 and older (see table on pages 8 and 9). The visually impaired, including those who are blind, total more than 3.4 million older Americans (see table on pages 6 and 7). Blindness affects Blacks more frequently than Whites and Hispanics (see chart on page 5). Hispanics, however, have higher rates of visual impairment than other races. The prevalence of blindness and vision impairment increases rapidly in the later years, particularly after age 75.



### Estimated Specific Prevalence Rates for Visual Impairment and Blindness



## Estimated Number of Cases of Vision Impairment (including Blindness) in the U.S. Population Age 40 and Older by State, Race and Sex

State	Total	Female	Male	White	Black	Hispanic	Other
<b>Total U.S.</b>	3,406,280	2,253,866	1,152,413	2,861,479	265,277	170,462	109,063
Alabama	52,976	35,655	17,321	41,399	10,722	329	525
Alaska	3,046	1,749	1,297	2,194	69	62	721
Arizona	58,117	36,002	22,115	49,747	903	5,344	2,124
Arkansas	35,517	23,569	11,949	31,036	3,801	236	444
California	356,021	227,223	128,798	255,709	17,060	46,475	36,777
Colorado	40,841	26,536	14,306	35,609	904	3,419	908
Connecticut	49,635	33,760	15,876	45,686	1,995	1,231	722
Delaware	8,994	5,945	3,049	7,697	1,040	116	141
District of Columbia	7,095	4,696	2,399	2,237	4,453	202	204
Florida	261,745	164,021	97,724	216,060	15,591	26,785	3,309
Georgia	72,763	49,038	23,725	55,447	15,223	944	1,150
Hawaii	14,647	8,399	6,248	3,252	52	385	10,958
Idaho	14,242	8,967	5,276	13,707	16	263	255
Illinois	152,125	102,781	49,345	129,527	14,385	4,840	3,372
Indiana	73,203	49,466	23,738	67,840	3,984	750	630
Iowa	48,944	33,832	15,113	48,085	342	248	268
Kansas	39,216	26,712	12,504	36,937	1,140	639	500
Kentucky	47,021	31,766	15,255	43,835	2,512	239	435
Louisiana	47,731	31,683	16,048	34,867	11,308	821	735
Maine	18,308	12,436	5,872	18,094	25	46	143
Maryland	56,701	37,420	19,282	43,832	10,266	901	1,702
Massachusetts	90,426	62,632	27,795	84,726	2,125	1,474	2,101
Michigan	116,032	76,802	39,230	101,891	11,152	1,250	1,740
Minnesota	65,322	44,263	21,058	63,507	544	348	922
Mississippi	32,673	22,070	10,602	23,502	8,667	203	301
Missouri	76,074	51,777	24,297	69,608	5,063	518	884
Montana	12,062	7,772	4,291	11,617	12	81	352
Nebraska	25,623	17,448	8,175	24,733	419	265	206
Nevada	16,857	10,091	6,766	13,891	817	1,195	955
New Hampshire	14,697	9,905	4,791	14,457	34	69	137
New Jersey	109,141	72,877	36,264	91,702	8,602	5,594	3,242
New Mexico	19,864	12,334	7,530	12,513	247	5,890	1,214
New York	247,844	167,069	80,775	198,694	23,299	16,403	9,448
North Carolina	87,109	58,808	28,302	70,395	14,646	702	1,366
North Dakota	10,649	7,055	3,594	10,452	6	28	163
Ohio	142,655	96,213	46,442	129,032	11,157	971	1,495
Oklahoma	44,699	29,960	14,739	39,335	1,938	532	2,893
Oregon	44,704	28,907	15,796	42,471	348	652	1,233
Pennsylvania	185,205	125,628	59,577	170,524	11,237	1,582	1,862
Rhode Island	16,018	11,126	4,892	15,145	242	309	323
South Carolina	42,463	28,326	14,137	31,776	9,991	284	412
South Dakota	12,088	8,141	3,947	11,730	13	44	302
Tennessee	65,272	44,109	21,162	56,942	7,290	367	672
Texas	199,296	129,900	69,397	144,451	16,917	33,790	4,138
Utah	17,815	11,133	6,682	16,726	66	579	444
Vermont	7,896	5,329	2,568	7,777	12	37	71
Virginia	73,714	49,279	24,435	59,379	11,469	1,031	1,836
Washington	67,035	43,288	23,747	61,602	989	1,155	3,289
West Virginia	25,434	17,089	8,345	24,406	709	99	220
Wisconsin	73,168	49,294	23,875	70,449	1,448	558	713
Wyoming	5,557	3,590	1,968	5,251	22	179	106

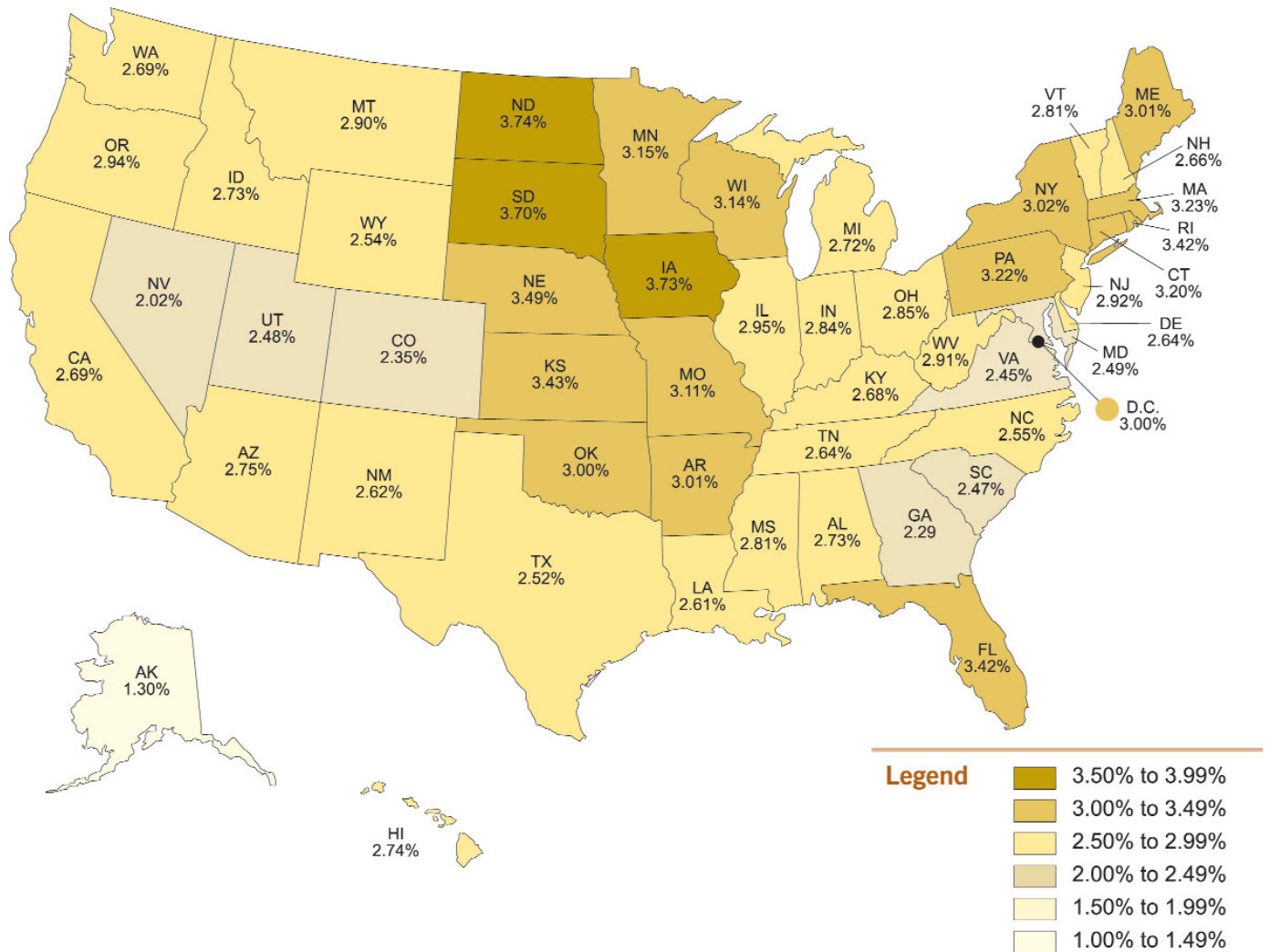
White Female	White Male	Black Female	Black Male	Hisp. Female	Hisp. Male	Other Female	Other Male	State
1,920,686	940,793	169,088	96,188	100,631	69,831	63,461	45,602	<b>Total U.S.</b>
28,155	13,244	6,991	3,732	187	141	322	203	Alabama
1,265	929	37	32	35	27	412	309	Alaska
31,164	18,582	521	380	3,070	2,274	1,247	878	Arizona
20,718	10,318	2,456	1,345	124	112	271	173	Arkansas
168,175	87,535	10,500	6,560	27,358	19,117	21,192	15,585	California
23,514	12,096	533	371	1,952	1,468	537	372	Colorado
31,342	14,344	1,274	722	731	502	414	309	Connecticut
5,152	2,546	649	391	65	51	80	61	Delaware
1,499	738	2,937	1,517	133	70	129	75	District of Columbia
136,037	80,022	9,707	5,885	16,358	10,427	1,919	1,389	Florida
37,849	17,599	10,011	5,212	511	432	668	482	Georgia
1,954	1,299	22	30	209	176	6,214	4,744	Hawaii
8,677	5,030	8	9	136	126	144	112	Idaho
89,033	40,495	9,107	5,279	2,656	2,184	1,985	1,388	Illinois
46,206	21,634	2,485	1,498	397	352	376	253	Indiana
33,335	14,750	208	135	135	113	154	115	Iowa
25,361	11,576	706	434	347	292	298	202	Kansas
29,749	14,085	1,613	898	137	102	265	170	Kentucky
23,599	11,267	7,146	4,162	508	313	430	305	Louisiana
12,315	5,779	12	13	26	20	83	60	Maine
29,389	14,443	6,494	3,772	555	346	981	720	Maryland
59,168	25,558	1,332	793	877	597	1,255	847	Massachusetts
68,185	33,707	6,918	4,234	684	567	1,016	724	Michigan
43,225	20,283	312	232	186	162	541	381	Minnesota
16,254	7,247	5,519	3,148	116	87	181	120	Mississippi
47,684	21,924	3,261	1,802	298	221	534	350	Missouri
7,510	4,107	7	6	45	37	211	141	Montana
16,931	7,802	263	156	136	129	118	87	Nebraska
8,426	5,465	464	353	652	543	549	406	Nevada
9,774	4,683	18	17	37	33	77	60	New Hampshire
62,150	29,553	5,487	3,116	3,363	2,231	1,878	1,365	New Jersey
8,074	4,439	143	104	3,402	2,488	715	499	New Mexico
135,808	62,887	15,407	7,892	10,361	6,042	5,494	3,954	New York
48,038	22,357	9,572	5,074	366	336	832	535	North Carolina
6,940	3,512	3	4	15	13	97	66	North Dakota
87,762	41,271	7,024	4,134	541	430	887	608	Ohio
26,656	12,679	1,220	719	287	246	1,797	1,096	Oklahoma
27,638	14,834	207	141	352	300	710	523	Oregon
116,340	54,184	7,303	3,934	896	686	1,089	773	Pennsylvania
10,599	4,546	147	96	189	120	193	130	Rhode Island
21,462	10,315	6,460	3,530	154	129	250	162	South Carolina
7,926	3,804	5	6	24	20	184	117	South Dakota
38,778	18,163	4,719	2,572	203	164	408	264	Tennessee
97,043	47,408	10,668	6,249	19,789	14,001	2,399	1,739	Texas
10,526	6,200	35	31	320	259	251	192	Utah
5,262	2,515	6	6	22	15	39	31	Vermont
40,333	19,045	7,238	4,231	620	412	1,089	746	Virginia
40,189	21,413	558	432	616	540	1,927	1,362	Washington
16,430	7,976	469	240	57	42	132	88	West Virginia
47,675	22,774	897	553	300	257	422	291	Wisconsin
3,419	1,832	12	10	99	80	60	45	Wyoming

## Estimated Number of Cases of Blindness in the U.S. Population Age 40 and Older by State, Race and Sex

State	Total	Female	Male	White	Black	Hispanic	Other
<b>Total U.S.</b>	1,046,920	712,171	334,748	883,698	111,877	23,170	28,175
Alabama	17,186	11,775	5,411	12,546	4,456	44	139
Alaska	887	516	371	653	32	9	193
Arizona	16,530	10,570	5,960	14,860	390	733	547
Arkansas	11,231	7,644	3,588	9,510	1,574	33	114
California	102,328	67,268	35,060	79,340	7,232	6,353	9,402
Colorado	12,145	8,157	3,989	11,039	395	467	244
Connecticut	15,544	10,906	4,639	14,327	856	170	190
Delaware	2,835	1,927	908	2,338	443	16	38
District of Columbia	2,608	1,729	880	719	1,812	28	50
Florida	76,799	49,395	27,404	65,772	6,631	3,526	870
Georgia	23,759	16,280	7,479	16,801	6,508	132	319
Hawaii	3,663	2,115	1,548	981	24	52	2,606
Idaho	4,313	2,799	1,515	4,202	7	37	66
Illinois	48,021	33,309	14,712	40,367	6,079	681	894
Indiana	22,920	15,914	7,007	20,978	1,674	104	165
Iowa	15,682	11,215	4,467	15,431	146	34	70
Kansas	12,502	8,788	3,714	11,802	479	88	133
Kentucky	14,624	10,138	4,486	13,432	1,048	32	112
Louisiana	15,669	10,560	5,109	10,614	4,756	110	189
Maine	5,709	4,013	1,696	5,654	11	6	37
Maryland	18,385	12,355	6,030	13,380	4,422	124	459
Massachusetts	28,325	20,241	8,084	26,675	908	204	538
Michigan	36,552	24,772	11,780	31,232	4,683	173	465
Minnesota	20,731	14,512	6,219	20,193	246	48	243
Mississippi	10,930	7,488	3,441	7,214	3,613	27	76
Missouri	24,185	16,917	7,268	21,762	2,122	70	230
Montana	3,701	2,465	1,236	3,592	5	11	93
Nebraska	8,186	5,757	2,429	7,915	180	37	55
Nevada	4,807	2,966	1,841	4,021	355	169	263
New Hampshire	4,564	3,185	1,379	4,502	15	10	37
New Jersey	33,529	22,954	10,574	28,228	3,650	772	879
New Mexico	5,005	3,233	1,772	3,810	104	785	306
New York	76,723	53,043	23,680	62,182	9,837	2,242	2,462
North Carolina	27,880	19,226	8,654	21,286	6,131	98	364
North Dakota	3,381	2,309	1,073	3,331	3	4	43
Ohio	44,702	30,922	13,780	39,521	4,658	133	390
Oklahoma	13,878	9,559	4,319	12,251	816	74	737
Oregon	13,734	9,159	4,575	13,170	149	91	324
Pennsylvania	57,620	40,143	17,477	52,258	4,660	218	485
Rhode Island	4,976	3,561	1,415	4,748	104	43	82
South Carolina	13,847	9,397	4,450	9,510	4,188	39	110
South Dakota	3,864	2,691	1,173	3,774	6	6	79
Tennessee	20,659	14,275	6,383	17,366	3,066	50	177
Texas	57,445	38,648	18,798	44,546	7,192	4,583	1,124
Utah	5,291	3,396	1,895	5,066	29	81	115
Vermont	2,464	1,716	748	2,435	5	5	19
Virginia	23,594	16,115	7,479	18,136	4,811	144	504
Washington	20,529	13,650	6,879	19,068	432	161	868
West Virginia	7,812	5,397	2,415	7,455	289	13	55
Wisconsin	22,977	15,973	7,004	22,079	633	78	187
Wyoming	1,688	1,130	558	1,627	9	24	28

White Female	White Male	Black Female	Black Male	Hisp. Female	Hisp. Male	Other Female	Other Male	State
612,301	271,397	70,335	41,541	13,459	9,711	16,076	12,099	<b>Total U.S.</b>
8,796	3,750	2,871	1,585	25	19	83	56	Alabama
387	267	17	15	5	4	108	85	Alaska
9,619	5,241	220	169	415	318	316	231	Arizona
6,553	2,957	1,006	568	17	16	68	47	Arkansas
53,862	25,479	4,384	2,848	3,682	2,671	5,341	4,061	California
7,526	3,513	227	168	262	205	142	103	Colorado
10,161	4,166	539	318	100	71	106	84	Connecticut
1,625	714	273	170	9	7	21	17	Delaware
498	221	1,183	630	18	10	31	19	District of Columbia
42,710	23,062	4,071	2,560	2,118	1,408	496	374	Florida
11,826	4,975	4,204	2,304	70	62	181	138	Georgia
613	368	10	14	28	24	1,464	1,142	Hawaii
2,739	1,463	3	4	19	18	37	30	Idaho
28,622	11,745	3,807	2,273	368	313	512	382	Illinois
14,731	6,247	1,032	641	54	49	96	69	Indiana
11,070	4,361	87	59	18	16	40	31	Iowa
8,372	3,430	292	187	47	41	77	56	Kansas
9,389	4,042	664	384	18	14	66	46	Kentucky
7,415	3,198	2,970	1,786	67	43	108	82	Louisiana
3,983	1,671	5	6	3	3	21	16	Maine
9,265	4,115	2,756	1,666	75	49	258	200	Maryland
19,250	7,425	560	348	120	84	311	227	Massachusetts
21,541	9,692	2,874	1,809	93	80	264	201	Michigan
14,211	5,983	137	109	25	23	139	104	Minnesota
5,152	2,061	2,276	1,337	15	12	45	31	Mississippi
15,391	6,370	1,350	772	40	31	135	95	Missouri
2,403	1,189	3	3	6	5	54	39	Montana
5,596	2,318	111	69	19	18	31	23	Nebraska
2,527	1,494	199	156	91	78	150	113	Nevada
3,152	1,350	8	8	5	5	20	17	New Hampshire
19,705	8,523	2,299	1,352	456	316	495	384	New Jersey
2,550	1,260	59	45	447	338	177	129	New Mexico
43,841	18,341	6,419	3,418	1,392	850	1,391	1,071	New York
15,013	6,273	3,947	2,184	50	48	216	149	North Carolina
2,280	1,051	1	2	2	2	25	18	North Dakota
27,722	11,799	2,901	1,757	73	60	226	164	Ohio
8,571	3,680	506	310	39	35	443	294	Oklahoma
8,841	4,329	86	63	48	43	183	141	Oregon
36,753	15,505	2,993	1,667	122	96	276	209	Pennsylvania
3,426	1,322	62	42	26	17	48	34	Rhode Island
6,641	2,869	2,670	1,518	21	18	65	45	South Carolina
2,639	1,135	2	3	3	3	46	32	South Dakota
12,186	5,179	1,957	1,109	27	23	104	73	Tennessee
30,900	13,646	4,467	2,725	2,645	1,938	635	489	Texas
3,273	1,793	15	14	44	37	64	51	Utah
1,701	734	3	3	3	2	10	8	Vermont
12,744	5,391	2,994	1,817	85	59	292	212	Virginia
12,827	6,242	237	195	85	77	502	366	Washington
5,169	2,286	188	101	7	6	32	23	West Virginia
15,438	6,641	386	248	41	36	108	79	Wisconsin
1,097	530	5	4	13	11	15	12	Wyoming

## Estimated Prevalence Rates of Vision Impairment & Blindness for Persons Age 40 and Older by State



The map above reflects estimated state-by-state prevalence rates of vision impairment, including blindness. The overall national rate is 2.85%. When this rate is applied to the total U.S. population age 40 and older of approximately 119 million, the result indicates that more than 3.4 million older Americans are blind or vision impaired. Twenty-two states and the District of Columbia have rates above the national average, while 28 states have rates below the average. Iowa and North Dakota have the highest rates at 3.73% and 3.74% respectively. Alaska has the lowest rate at 1.3%. The largest majority of states (39 states and DC) are within the 2.5% to 3.5% range. Differences between states are likely due to demographic differences in age, race and/or gender distribution.

State	Rate
Total U.S.	0.0285
Alabama	0.0273
Alaska	0.0130
Arizona	0.0275
Arkansas	0.0301
California	0.0269
Colorado	0.0235
Connecticut	0.0320
Delaware	0.0264
District of Columbia	0.0300
Florida	0.0342
Georgia	0.0229
Hawaii	0.0274
Idaho	0.0273
Illinois	0.0295
Indiana	0.0284
Iowa	0.0373
Kansas	0.0343
Kentucky	0.0268
Louisiana	0.0261
Maine	0.0301
Maryland	0.0249
Massachusetts	0.0323
Michigan	0.0272
Minnesota	0.0315
Mississippi	0.0281
Missouri	0.0311
Montana	0.0290
Nebraska	0.0349
Nevada	0.0202
New Hampshire	0.0266
New Jersey	0.0292
New Mexico	0.0262
New York	0.0302
North Carolina	0.0255
North Dakota	0.0374
Ohio	0.0285
Oklahoma	0.0300
Oregon	0.0294
Pennsylvania	0.0322
Rhode Island	0.0342
South Carolina	0.0247
South Dakota	0.0370
Tennessee	0.0264
Texas	0.0252
Utah	0.0248
Vermont	0.0281
Virginia	0.0245
Washington	0.0269
West Virginia	0.0291
Wisconsin	0.0314
Wyoming	0.0254

State	Rate
Alaska	0.0130
Nevada	0.0202
Georgia	0.0229
Colorado	0.0235
Virginia	0.0245
South Carolina	0.0247
Utah	0.0248
Maryland	0.0249
Texas	0.0252
Wyoming	0.0254
North Carolina	0.0255
Louisiana	0.0261
New Mexico	0.0262
Tennessee	0.0264
Delaware	0.0264
New Hampshire	0.0266
Kentucky	0.0268
Washington	0.0269
California	0.0269
Michigan	0.0272
Alabama	0.0273
Idaho	0.0273
Hawaii	0.0274
Arizona	0.0275
Mississippi	0.0281
Vermont	0.0281
Indiana	0.0284
Ohio	0.0285
Montana	0.0290
West Virginia	0.0291
New Jersey	0.0292
Oregon	0.0294
Illinois	0.0295
District of Columbia	0.0300
Oklahoma	0.0300
Maine	0.0301
Arkansas	0.0301
New York	0.0302
Missouri	0.0311
Wisconsin	0.0314
Minnesota	0.0315
Connecticut	0.0320
Pennsylvania	0.0322
Massachusetts	0.0323
Florida	0.0342
Rhode Island	0.0342
Kansas	0.0343
Nebraska	0.0349
South Dakota	0.0370
Iowa	0.0373
North Dakota	0.0374

## SECTION 2

**Refractive Error** Refractive errors are the most frequent eye problems in the United States. They are optical defects that result in light not being properly focused on the eye's retina.

Nearsightedness (myopia) and farsightedness (hyperopia) are the most common refractive errors. People with myopia see near objects clearly, while distant ones are blurred. People with hyperopia experience just the opposite – distant objects are clear while near ones are blurred.

Why refractive errors develop is uncertain. Most infants have some degree of hyperopia, but vision becomes more normal with age, usually leveling off by age 6. However, some children remain farsighted or become so later in life. While some children may be nearsighted early in life, most myopia occurs later during adolescence. Refractive error can continue to change over our lifetime.

Other common refractive errors include astigmatism (uneven focus) and presbyopia (age-related problem with near focus). Fortunately, almost all refractive errors can be corrected by eyeglasses or contact lenses. It is estimated that more than 150 million Americans use corrective eyewear to compensate for their refractive error. Americans are estimated to spend over \$15 billion each year on eyewear, supporting an optical industry in the U.S. worth more than \$30 billion.

Refractive surgery is now another alternative for correcting problems such as myopia, hyperopia and astigmatism. The number of people seeking refractive surgery is increasing. However, the surgical procedures are not without some risk and the long-term effects of many of these procedures are still unknown.

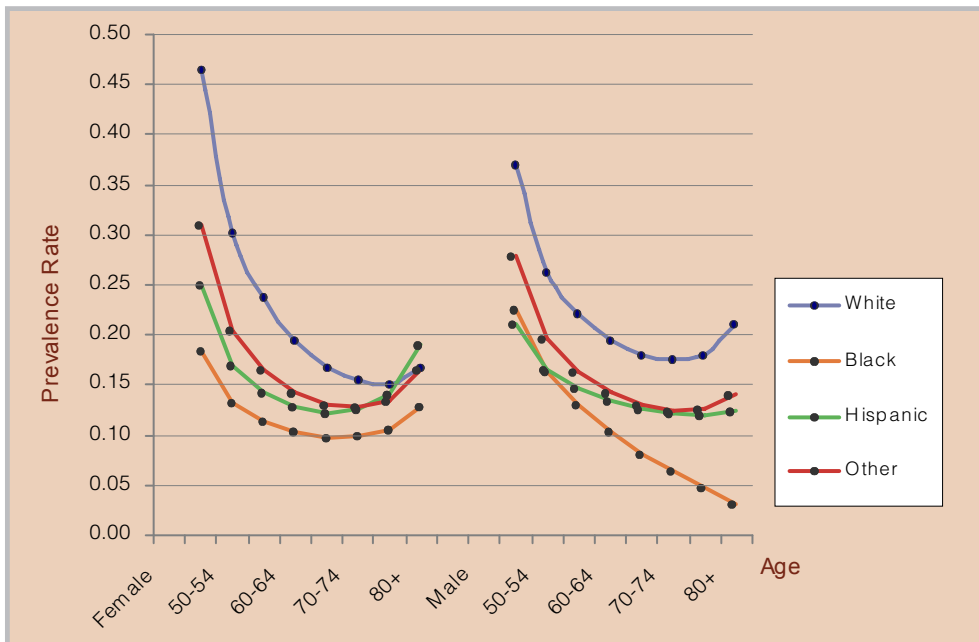
Uncorrected or under-corrected refractive error can result in significant vision impairment. The magnitude of refractive error is measured in units called diopters. For each diopter of refractive error, a person may be unable to read the next smaller line of an eye chart. For instance, a person with more than two diopters of hyperopia might find it difficult to read this text.

Cases of refractive error described in the following charts include myopia of 1.0 diopters or more. The threshold for clinically significant hyperopia is somewhat higher at 3.0 diopters or more.

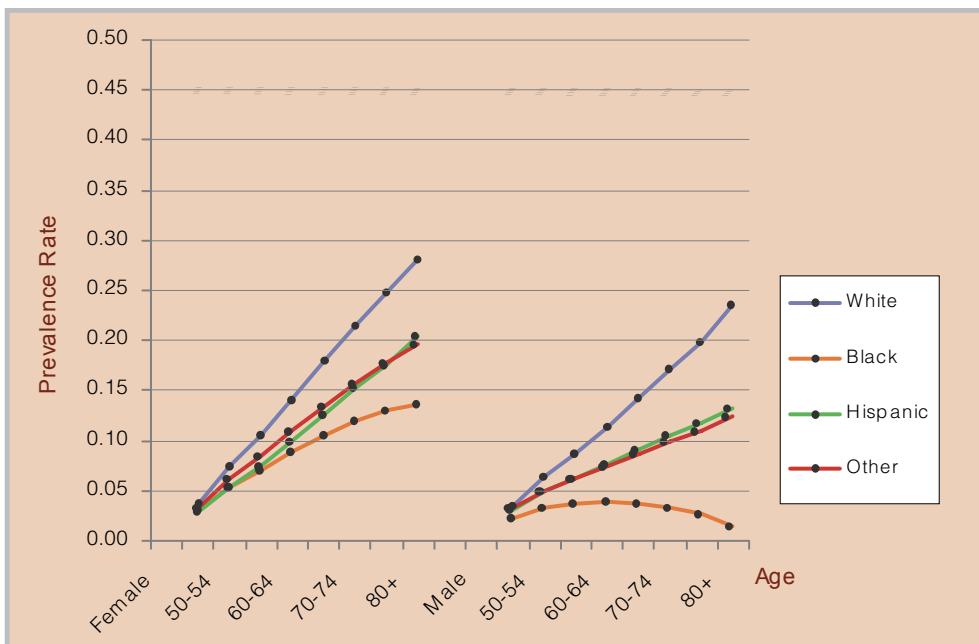


Myopia is a very common disorder affecting more than 30.5 million Americans age 40 and older. Prevalence is greater in women through age 60 when rates become more comparable between genders (see chart below). Myopia affects more Whites than other races, and is generally less frequent with age. Because of the higher threshold for significance, hyperopia is less common, affecting 12 million older Americans. Prevalence of hyperopia generally increases with age (see chart below). It is most frequent in Whites, but also affects Hispanics more often than Blacks.

### Estimated Specific Prevalence Rates for Myopia and Hyperopia



Myopia  
≥1.0 diopters



Hyperopia  
≥3.0 diopters

## Estimated Number of Cases of Myopia (-1.00 diopters or worse) in the U.S. Population Age 40 and Older by State, Race and Sex

State	Total	Female	Male	White	Black	Hispanic	Other
<b>Total U.S.</b>	30,529,637	16,737,458	13,792,179	25,810,362	1,776,919	1,648,865	1,293,491
Alabama	478,381	263,544	214,837	407,129	61,122	2,981	7,149
Alaska	67,927	35,062	32,865	55,527	965	1,143	10,292
Arizona	533,472	290,276	243,196	445,098	7,582	54,942	25,850
Arkansas	299,843	164,527	135,316	270,901	20,764	3,028	5,149
California	3,228,997	1,755,298	1,473,699	2,228,602	119,995	483,893	396,508
Colorado	480,114	260,649	219,465	424,037	8,423	34,087	13,567
Connecticut	409,762	226,979	182,783	370,169	15,033	14,542	10,018
Delaware	86,358	47,403	38,955	75,265	7,722	1,358	2,013
District of Columbia	43,700	23,740	19,960	18,482	21,167	2,130	1,920
Florida	1,820,420	992,696	827,724	1,490,003	112,343	173,888	44,187
Georgia	799,380	436,564	362,816	650,100	115,690	13,768	19,822
Hawaii	119,298	63,536	55,762	40,237	746	3,820	74,495
Idaho	145,170	78,347	66,822	138,124	187	3,643	3,216
Illinois	1,312,845	722,286	590,559	1,110,384	96,245	62,179	44,037
Indiana	697,663	383,728	313,935	654,731	25,969	8,478	8,485
Iowa	357,846	196,263	161,583	348,634	2,637	2,842	3,733
Kansas	307,951	168,643	139,308	286,278	7,589	6,988	7,096
Kentucky	477,530	264,164	213,366	454,636	15,516	2,314	5,063
Louisiana	443,202	242,325	200,877	355,299	72,600	6,479	8,824
Maine	169,892	93,743	76,149	167,254	251	439	1,948
Maryland	561,504	308,038	253,466	445,399	81,242	10,674	24,190
Massachusetts	754,466	421,582	332,884	694,754	16,125	18,086	25,501
Michigan	1,124,343	614,806	509,537	1,012,990	73,242	13,535	24,577
Minnesota	582,754	317,436	265,319	557,964	6,650	4,678	13,463
Mississippi	275,863	151,386	124,478	220,401	50,277	1,832	3,353
Missouri	647,257	357,247	290,010	599,029	32,105	5,090	11,033
Montana	115,545	62,395	53,150	109,781	101	859	4,804
Nebraska	199,550	109,189	90,360	190,118	3,171	3,356	2,904
Nevada	214,648	112,729	101,919	178,826	6,883	15,465	13,474
New Hampshire	158,854	86,803	72,051	155,470	384	872	2,128
New Jersey	940,122	520,180	419,942	771,763	58,918	59,690	49,750
New Mexico	180,143	98,974	81,169	119,461	1,684	45,141	13,858
New York	2,012,984	1,117,455	895,530	1,584,511	152,371	156,778	119,324
North Carolina	859,741	473,187	386,555	736,551	93,012	10,630	19,549
North Dakota	78,177	42,179	35,998	75,529	116	272	2,261
Ohio	1,329,444	734,770	594,674	1,231,209	69,168	9,873	19,193
Oklahoma	387,416	212,915	174,501	336,818	12,733	6,574	31,291
Oregon	416,198	227,611	188,587	388,063	2,816	9,072	16,247
Pennsylvania	1,503,617	832,240	671,377	1,397,464	65,181	17,482	23,490
Rhode Island	125,182	70,097	55,085	115,948	1,986	3,698	3,551
South Carolina	418,478	229,564	188,914	345,710	63,459	3,421	5,888
South Dakota	89,266	48,277	40,990	84,795	159	402	3,911
Tennessee	645,089	356,000	289,089	583,905	47,736	4,392	9,055
Texas	1,948,647	1,060,583	888,064	1,444,438	121,979	317,711	64,519
Utah	202,206	109,713	92,494	188,520	675	7,107	5,905
Vermont	79,798	43,950	35,848	78,349	128	291	1,029
Virginia	773,809	423,918	349,891	654,861	75,910	13,960	29,078
Washington	686,978	373,382	313,596	618,281	9,484	15,657	43,556
West Virginia	236,136	130,206	105,930	229,856	3,420	711	2,150
Wisconsin	640,236	347,964	292,272	610,454	13,092	6,973	9,717
Wyoming	61,433	32,911	28,522	58,258	166	1,640	1,369

White Female	White Male	Black Female	Black Male	Hisp. Female	Hisp. Male	Other Female	Other Male	State
14,187,803	11,622,560	940,549	836,370	897,549	751,317	711,558	581,932	<b>Total U.S.</b>
224,666	182,463	33,298	27,824	1,497	1,484	4,083	3,066	Alabama
28,476	27,051	418	547	595	548	5,572	4,720	Alaska
242,753	202,345	3,423	4,159	29,465	25,477	14,636	11,215	Arizona
149,016	121,885	11,174	9,590	1,455	1,574	2,882	2,267	Arkansas
1,210,440	1,018,162	60,632	59,362	264,420	219,473	219,806	176,702	California
231,198	192,838	3,792	4,631	18,034	16,053	7,625	5,942	Colorado
205,465	164,703	7,986	7,047	8,174	6,368	5,353	4,665	Connecticut
41,528	33,737	4,086	3,637	693	665	1,096	916	Delaware
9,672	8,810	11,776	9,391	1,172	958	1,119	801	District of Columbia
811,751	678,251	58,495	53,848	97,813	76,075	24,637	19,550	Florida
357,924	292,176	61,354	54,336	6,450	7,318	10,836	8,986	Georgia
20,475	19,762	225	521	2,093	1,726	40,742	33,753	Hawaii
74,706	63,418	61	126	1,793	1,850	1,787	1,428	Idaho
613,968	496,416	52,268	43,977	32,098	30,081	23,952	20,085	Illinois
361,134	293,596	13,670	12,299	4,237	4,241	4,687	3,798	Indiana
191,562	157,072	1,227	1,411	1,410	1,432	2,065	1,668	Iowa
157,402	128,876	3,776	3,813	3,532	3,456	3,933	3,163	Kansas
252,153	202,484	8,107	7,408	1,104	1,210	2,800	2,263	Kentucky
195,118	160,182	38,878	33,721	3,539	2,941	4,791	4,034	Louisiana
92,321	74,933	87	165	240	199	1,096	852	Maine
245,320	200,079	43,336	37,906	5,945	4,729	13,437	10,753	Maryland
389,323	305,430	8,292	7,833	10,257	7,830	13,709	11,792	Massachusetts
555,628	457,362	38,988	34,253	7,008	6,526	13,181	11,396	Michigan
304,939	253,026	2,876	3,774	2,307	2,371	7,314	6,148	Minnesota
121,464	98,937	27,126	23,150	878	955	1,917	1,436	Mississippi
331,051	267,978	17,355	14,750	2,688	2,403	6,153	4,880	Missouri
59,233	50,547	31	70	470	389	2,661	2,144	Montana
104,299	85,819	1,592	1,579	1,653	1,703	1,645	1,259	Nebraska
93,817	85,009	3,260	3,623	7,909	7,557	7,743	5,731	Nevada
85,033	70,437	149	236	477	395	1,145	983	New Hampshire
428,773	342,990	31,774	27,145	33,051	26,639	26,582	23,168	New Jersey
65,591	53,870	744	940	24,786	20,355	7,853	6,005	New Mexico
879,940	704,570	84,341	68,030	90,061	66,717	63,112	56,212	New York
407,607	328,943	49,832	43,180	4,846	5,784	10,901	8,648	North Carolina
40,739	34,789	34	81	144	128	1,262	999	North Dakota
682,003	549,206	36,940	32,229	5,252	4,621	10,575	8,618	Ohio
185,738	151,080	6,485	6,248	3,281	3,293	17,411	13,880	Oklahoma
212,870	175,193	1,216	1,601	4,478	4,594	9,048	7,200	Oregon
774,759	622,705	35,371	29,810	9,365	8,118	12,745	10,745	Pennsylvania
65,069	50,879	948	1,038	2,134	1,564	1,947	1,604	Rhode Island
190,507	155,202	34,094	29,365	1,626	1,795	3,336	2,552	South Carolina
45,880	38,915	42	116	203	199	2,152	1,759	South Dakota
323,239	260,667	25,639	22,098	2,096	2,297	5,026	4,028	Tennessee
789,978	654,460	62,741	59,238	172,802	144,909	35,061	29,458	Texas
102,595	85,925	240	435	3,646	3,461	3,232	2,673	Utah
43,165	35,185	45	83	160	131	580	449	Vermont
360,215	294,645	39,702	36,208	7,592	6,368	16,409	12,670	Virginia
336,786	281,495	4,037	5,446	7,885	7,773	24,674	18,882	Washington
126,882	102,974	1,762	1,658	377	334	1,185	965	West Virginia
332,395	278,059	6,757	6,336	3,497	3,476	5,315	4,402	Wisconsin
31,235	27,023	65	100	863	777	748	622	Wyoming

## Estimated Number of Cases of Hyperopia (3.00 diopters or worse) in the U.S. Population Age 40 and Older by State, Race and Sex

State	Total	Female	Male	White	Black	Hispanic	Other
<b>Total U.S.</b>	11,958,486	7,316,349	4,642,138	10,393,571	596,572	564,190	404,154
Alabama	190,641	119,562	71,079	165,964	21,537	1,003	2,137
Alaska	17,695	9,563	8,132	14,203	231	297	2,965
Arizona	222,810	131,860	90,950	194,272	2,213	18,399	7,927
Arkansas	125,164	76,826	48,338	115,432	7,200	889	1,642
California	1,225,044	739,856	485,188	896,858	39,081	158,923	130,183
Colorado	161,848	95,527	66,321	144,090	2,415	11,506	3,836
Connecticut	163,440	100,672	62,769	151,037	4,984	4,548	2,871
Delaware	34,257	20,959	13,298	30,744	2,500	421	591
Dist. of Columbia	16,990	11,650	5,340	7,176	8,472	698	644
Florida	851,477	515,981	335,496	728,505	36,536	73,314	13,122
Georgia	283,163	175,847	107,317	237,690	36,374	3,760	5,339
Hawaii	45,416	27,346	18,069	14,111	155	1,265	29,883
Idaho	54,228	31,579	22,649	52,178	43	1,037	971
Illinois	512,907	318,155	194,751	447,293	33,180	18,909	13,525
Indiana	268,134	164,357	103,777	254,197	8,786	2,661	2,490
Iowa	149,775	91,628	58,147	147,039	803	870	1,064
Kansas	122,989	75,007	47,982	116,263	2,452	2,220	2,054
Kentucky	182,586	111,827	70,759	174,993	5,230	762	1,601
Louisiana	169,039	106,027	63,013	139,183	24,650	2,488	2,719
Maine	66,164	39,900	26,264	65,398	62	145	560
Maryland	207,551	128,746	78,805	171,025	26,071	3,279	7,176
Massachusetts	300,149	186,328	113,821	281,830	5,165	5,499	7,654
Michigan	426,354	260,338	166,016	389,883	24,876	4,415	7,181
Minnesota	218,076	130,956	87,120	211,387	1,636	1,308	3,745
Mississippi	109,535	69,512	40,024	90,627	17,226	625	1,057
Missouri	259,346	159,692	99,654	243,204	11,046	1,704	3,392
Montana	44,110	25,761	18,350	42,395	26	282	1,408
Nebraska	80,408	48,849	31,558	77,579	993	995	840
Nevada	79,952	45,467	34,485	68,886	2,147	4,723	4,197
New Hampshire	56,514	33,604	22,910	55,581	99	251	583
New Jersey	375,547	233,300	142,247	321,167	20,393	19,981	14,006
New Mexico	70,656	41,994	28,663	48,482	530	17,363	4,281
New York	813,579	508,909	304,670	667,378	54,278	55,790	36,132
North Carolina	331,003	205,839	125,163	290,591	31,949	2,795	5,667
North Dakota	32,211	19,256	12,956	31,443	22	89	658
Ohio	520,602	321,517	199,085	487,349	24,164	3,305	5,784
Oklahoma	156,380	95,609	60,771	139,969	4,142	1,985	10,285
Oregon	159,925	95,157	64,768	151,719	822	2,552	4,832
Pennsylvania	633,898	394,186	239,712	597,522	23,640	5,604	7,132
Rhode Island	51,836	32,356	19,481	48,980	604	1,126	1,127
South Carolina	161,801	100,936	60,865	137,222	21,820	1,034	1,726
South Dakota	36,781	22,042	14,739	35,455	33	131	1,162
Tennessee	248,795	153,699	95,096	228,944	15,872	1,302	2,678
Texas	720,358	436,201	284,157	553,278	38,720	110,292	18,068
Utah	71,678	41,941	29,737	67,663	167	2,159	1,689
Vermont	29,318	17,550	11,768	28,893	31	104	291
Virginia	281,835	173,153	108,682	244,223	25,366	4,006	8,240
Washington	248,534	147,267	101,267	228,445	2,565	4,455	13,069
West Virginia	96,766	59,053	37,713	94,472	1,264	284	745
Wisconsin	249,296	150,325	98,971	240,457	3,953	2,070	2,815
Wyoming	21,922	12,677	9,245	20,896	48	568	410

White Female	White Male	Black Female	Black Male	Hisp. Female	Hisp. Male	Other Female	Other Male	State
6,285,544	4,108,027	446,037	150,535	333,967	230,223	250,801	153,353	<b>Total U.S.</b>
101,206	64,758	16,437	5,100	562	442	1,358	780	Alabama
7,461	6,742	146	85	161	136	1,796	1,169	Alaska
114,676	79,596	1,512	701	10,659	7,740	5,013	2,914	Arizona
69,852	45,581	5,473	1,727	465	424	1,036	606	Arkansas
536,137	360,721	28,457	10,624	93,795	65,128	81,468	48,715	California
84,894	59,196	1,646	769	6,583	4,924	2,404	1,432	Colorado
92,519	58,518	3,713	1,271	2,717	1,831	1,723	1,148	Connecticut
18,521	12,223	1,844	656	233	189	361	230	Delaware
4,186	2,990	6,605	1,867	436	262	423	221	Dist. of Columbia
435,485	293,020	26,911	9,626	45,432	27,882	8,153	4,968	Florida
143,548	94,143	27,114	9,260	1,934	1,825	3,251	2,088	Georgia
7,681	6,430	79	76	729	537	18,858	11,026	Hawaii
30,422	21,756	23	19	536	501	597	373	Idaho
274,365	172,928	25,038	8,142	10,443	8,467	8,309	5,216	Illinois
154,843	99,354	6,537	2,249	1,433	1,228	1,544	946	Indiana
89,942	57,097	562	241	471	399	654	410	Iowa
70,718	45,545	1,791	662	1,229	991	1,270	784	Kansas
106,492	68,502	3,911	1,318	415	348	1,010	591	Kentucky
84,320	54,863	18,524	6,126	1,521	967	1,662	1,057	Louisiana
39,431	25,967	36	26	85	60	349	211	Maine
103,053	67,972	19,313	6,757	1,987	1,292	4,393	2,784	Maryland
174,537	107,292	3,799	1,367	3,303	2,196	4,689	2,965	Massachusetts
234,950	154,933	18,580	6,296	2,448	1,967	4,360	2,821	Michigan
126,905	84,482	1,075	561	689	620	2,288	1,457	Minnesota
55,435	35,191	13,053	4,173	347	278	676	381	Mississippi
148,221	94,983	8,364	2,682	977	726	2,130	1,263	Missouri
24,714	17,681	15	11	161	120	871	537	Montana
47,079	30,501	718	275	523	472	529	311	Nebraska
38,715	30,171	1,493	654	2,596	2,128	2,664	1,533	Nevada
33,053	22,528	60	38	145	107	347	237	New Hampshire
197,599	123,568	15,346	5,048	11,931	8,050	8,423	5,582	New Jersey
28,618	19,864	364	166	10,306	7,057	2,706	1,575	New Mexico
410,470	256,908	41,668	12,610	34,920	20,870	21,850	14,282	New York
176,774	113,818	24,117	7,831	1,390	1,405	3,558	2,109	North Carolina
18,783	12,661	10	11	50	39	412	245	North Dakota
297,862	189,487	18,184	5,980	1,884	1,421	3,587	2,197	Ohio
84,971	54,998	3,043	1,098	1,069	915	6,525	3,760	Oklahoma
90,265	61,453	553	270	1,353	1,199	2,986	1,846	Oregon
368,559	228,962	18,064	5,576	3,201	2,403	4,362	2,771	Pennsylvania
30,537	18,443	429	175	686	440	704	423	Rhode Island
82,845	54,377	16,451	5,369	546	487	1,094	631	South Carolina
21,228	14,227	16	17	73	58	725	437	South Dakota
139,374	89,569	11,966	3,906	693	609	1,666	1,011	Tennessee
331,500	221,778	28,472	10,248	65,271	45,021	10,957	7,111	Texas
39,615	28,047	100	66	1,192	968	1,033	656	Utah
17,295	11,598	18	13	61	42	176	115	Vermont
146,800	97,423	18,857	6,509	2,358	1,647	5,137	3,102	Virginia
134,953	93,492	1,684	881	2,372	2,083	8,258	4,811	Washington
57,459	37,013	962	303	169	116	464	282	West Virginia
144,599	95,858	2,872	1,081	1,110	961	1,744	1,071	Wisconsin
12,077	8,819	31	17	319	249	249	161	Wyoming

## Age-Related Macular Degeneration

Age-related macular degeneration (AMD) is a condition that primarily affects the part of the retina responsible for sharp central vision. There are two forms:

- 1 Dry AMD (non-exudative)** is the most common form of the disease. Early AMD involves the presence of drusen, fatty deposits under the light-sensing cells in the retina. Late cases of dry AMD may also involve atrophy of the supportive layer under the light-sensing cells in the retina that helps keep those cells healthy. Vision loss in early dry AMD is usually moderate and only slowly progressive. Atrophy in late cases of dry AMD can result in more significant vision loss.
- 2 Wet AMD (exudative)** is less common, but is more threatening to vision. It's called wet AMD because of the growth of tiny new blood vessels (neovascularization) under the retina that leak fluid or break open. This distorts vision and causes scar tissue to form. All cases of the wet form are considered late AMD.

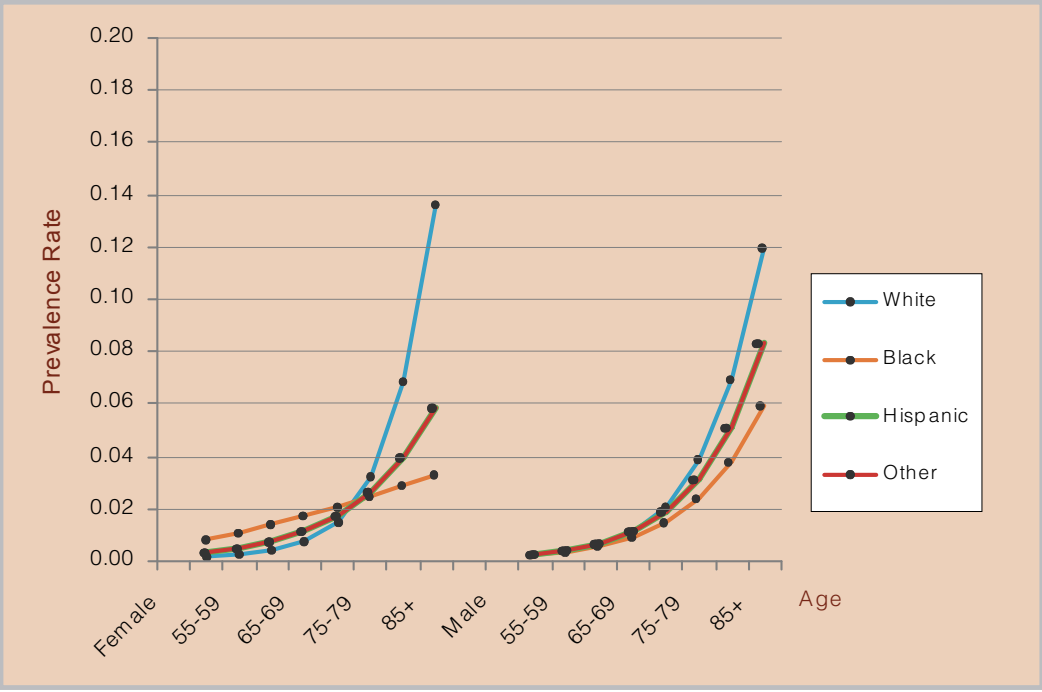
The exact cause of AMD is unknown, but risk factors for the disease include age (rarely affecting those under age 50), White race and cigarette smoking. Research also suggests that long-term diets low in certain antioxidant nutrients may increase the risk of AMD. Because AMD often damages central vision, it is likely the most common cause of legal blindness and vision impairment in older Americans.

Unfortunately, there is no generally-accepted treatment for dry AMD. Laser therapies to destroy leaking blood vessels can help reduce the risk of advancing vision loss in many cases of wet AMD. Research has recently shown that certain doses of zinc, vitamins A and C, and beta-carotene can help control the advance of late AMD, but appear to have no effect in preventing the disease in otherwise healthy individuals.

Only cases of late AMD involving geographic atrophy or neovascularization are included in the prevalence estimates on page 19. Over 1.6 million Americans age 50 and older have late AMD. Age-specific prevalence rates are initially comparable between races, but advance more significantly for Whites after age 75 (see chart on page 19). In Blacks, the disease is more prevalent in women until about age 75 as well.

Because data are lacking for Hispanics and other races, the rates shown below for these populations are an arithmetic average of the rates for Whites and Blacks.

**Estimated Specific Prevalence Rates for AMD**



## Estimated Number of Cases of Age-Related Macular Degeneration in the U.S. Population Age 50 and Older by State, Race and Sex

State	Total	Female	Male	White	Black	Hispanic	Other
<b>Total U.S.</b>	1,651,335	1,046,572	604,764	1,457,167	94,171	58,387	41,611
Alabama	25,476	16,432	9,044	21,547	3,618	111	200
Alaska	1,436	770	667	1,115	26	20	275
Arizona	29,352	17,196	12,156	26,381	326	1,838	807
Arkansas	17,465	11,032	6,433	15,972	1,245	80	168
California	165,476	101,579	63,898	129,406	6,112	15,842	14,116
Colorado	19,729	12,208	7,521	17,874	335	1,173	346
Connecticut	24,314	15,830	8,484	22,871	751	419	273
Delaware	4,491	2,820	1,671	4,019	378	39	54
District of Columbia	2,731	1,816	914	1,083	1,505	68	75
Florida	128,552	76,992	51,560	112,419	5,622	9,248	1,262
Georgia	34,847	22,629	12,218	28,704	5,396	309	439
Hawaii	5,997	3,199	2,798	1,693	18	133	4,153
Idaho	7,174	4,295	2,879	6,983	6	88	98
Illinois	73,428	47,864	25,564	65,237	5,241	1,653	1,296
Indiana	36,354	23,454	12,900	34,452	1,408	257	238
Iowa	23,841	15,714	8,127	23,535	121	84	101
Kansas	18,912	12,334	6,578	18,109	395	218	189
Kentucky	23,582	15,134	8,448	22,484	853	80	165
Louisiana	22,581	14,503	8,079	18,042	3,979	282	278
Maine	9,178	5,887	3,290	9,100	9	15	54
Maryland	27,370	17,496	9,874	22,571	3,840	302	657
Massachusetts	44,363	29,322	15,041	42,297	781	498	786
Michigan	57,268	36,348	20,921	52,192	3,982	431	664
Minnesota	31,852	20,580	11,272	31,190	202	115	345
Mississippi	15,194	9,911	5,284	12,094	2,919	68	113
Missouri	37,271	24,219	13,052	34,979	1,780	177	335
Montana	6,052	3,688	2,363	5,886	4	28	133
Nebraska	12,422	8,089	4,333	12,104	150	90	79
Nevada	8,731	4,889	3,842	7,627	315	410	379
New Hampshire	7,357	4,675	2,681	7,268	13	24	52
New Jersey	53,189	34,239	18,950	46,842	3,186	1,923	1,238
New Mexico	9,064	5,333	3,731	6,482	85	2,041	456
New York	117,638	76,460	41,179	99,840	8,561	5,648	3,589
North Carolina	42,588	27,466	15,122	36,745	5,096	228	518
North Dakota	5,185	3,295	1,890	5,111	2	9	62
Ohio	71,113	45,812	25,301	66,273	3,938	335	567
Oklahoma	21,821	13,928	7,894	19,884	666	180	1,092
Oregon	22,238	13,710	8,528	21,430	121	216	471
Pennsylvania	92,869	60,202	32,667	87,701	3,920	541	707
Rhode Island	7,920	5,256	2,664	7,606	88	104	122
South Carolina	20,552	13,142	7,410	16,804	3,496	96	157
South Dakota	5,852	3,755	2,098	5,720	4	15	113
Tennessee	32,267	20,807	11,460	29,367	2,523	122	254
Texas	92,697	58,030	34,667	73,552	5,960	11,607	1,577
Utah	8,970	5,335	3,636	8,584	23	196	168
Vermont	3,926	2,509	1,416	3,882	4	12	27
Virginia	35,657	22,825	12,832	30,581	4,027	342	707
Washington	33,058	20,374	12,685	31,057	356	385	1,260
West Virginia	12,952	8,239	4,713	12,608	226	34	83
Wisconsin	36,218	23,271	12,947	35,209	552	188	269
Wyoming	2,765	1,681	1,084	2,656	7	62	40



White Female	White Male	Black Female	Black Male	Hisp. Female	Hisp. Male	Other Female	Other Male	State
926,188	530,979	64,439	29,732	32,969	25,417	22,975	18,635	<b>Total U.S.</b>
13,800	7,747	2,455	1,163	60	51	117	83	Alabama
591	524	17	9	11	9	151	124	Alaska
15,524	10,858	209	117	1,014	825	450	357	Arizona
10,070	5,902	824	421	41	39	97	71	Arkansas
80,842	48,564	4,086	2,026	8,954	6,888	7,697	6,420	California
11,148	6,726	223	112	639	534	197	149	Colorado
14,912	7,958	528	223	241	178	149	124	Connecticut
2,512	1,508	258	120	21	18	30	25	Delaware
693	390	1,036	469	43	24	44	31	District of Columbia
67,193	45,226	3,807	1,816	5,292	3,956	700	562	Florida
18,425	10,279	3,791	1,605	165	144	248	191	Georgia
945	748	9	9	68	64	2,176	1,977	Hawaii
4,195	2,788	3	3	44	44	52	45	Idaho
42,642	22,595	3,607	1,634	885	768	729	566	Illinois
22,242	12,210	946	462	131	126	136	102	Indiana
15,535	8,000	80	41	44	40	55	46	Iowa
11,851	6,259	261	134	114	104	108	81	Kansas
14,418	8,066	577	277	44	36	96	70	Kentucky
11,499	6,543	2,684	1,294	166	116	154	124	Louisiana
5,844	3,255	5	4	8	7	30	24	Maine
14,276	8,294	2,675	1,165	181	121	363	294	Maryland
28,055	14,242	536	245	288	210	443	344	Massachusetts
33,073	19,118	2,676	1,306	226	205	372	292	Michigan
20,193	10,996	133	69	59	55	194	152	Minnesota
7,878	4,216	1,932	987	37	31	64	49	Mississippi
22,707	12,272	1,222	558	97	80	193	143	Missouri
3,596	2,291	2	2	15	13	76	57	Montana
7,900	4,204	101	48	45	45	44	35	Nebraska
4,251	3,376	206	108	219	191	212	167	Nevada
4,628	2,640	8	5	12	12	28	24	New Hampshire
30,211	16,631	2,220	966	1,116	807	692	547	New Jersey
3,919	2,563	53	32	1,108	933	253	203	New Mexico
64,922	34,918	6,114	2,448	3,440	2,207	1,984	1,605	New York
23,516	13,229	3,530	1,566	117	111	303	215	North Carolina
3,253	1,858	1	1	5	5	35	27	North Dakota
42,648	23,626	2,666	1,272	179	157	320	247	Ohio
12,750	7,134	443	223	94	86	641	451	Oklahoma
13,259	8,171	78	43	114	102	258	213	Oregon
56,808	30,893	2,708	1,213	294	247	392	315	Pennsylvania
5,067	2,539	59	29	61	42	68	53	Rhode Island
10,598	6,206	2,402	1,094	50	45	92	65	South Carolina
3,679	2,041	2	2	8	7	66	48	South Dakota
18,868	10,499	1,726	797	65	57	147	107	Tennessee
46,625	26,927	4,033	1,927	6,491	5,116	881	696	Texas
5,126	3,458	13	9	105	91	90	77	Utah
2,486	1,396	2	2	7	5	14	13	Vermont
19,491	11,090	2,726	1,300	202	140	406	301	Virginia
19,241	11,815	226	130	199	186	708	553	Washington
8,021	4,587	152	74	19	16	47	36	West Virginia
22,637	12,572	384	168	98	90	153	116	Wisconsin
1,623	1,033	4	3	32	30	22	18	Wyoming

## Cataract

Cataract is a clouding of the eye's naturally clear lens. Most cataracts appear with advancing age. The exact cause of cataract is unclear, but it may be the result of a lifetime of exposure to ultraviolet radiation contained in sunlight, or may be related to other lifestyle factors such as cigarette smoking, diet, and alcohol consumption.

Cataract can also occur at any age as a result of other causes such as eye injury, exposure to toxic substances or radiation, or as a result of other diseases such as diabetes.

Congenital cataracts may even be present at birth due to genetic defects or developmental problems. Cataracts in infants may also result from exposure to diseases such as rubella during pregnancy.

According to the World Health Organization, cataract is the leading cause of blindness in the world. In the United States, cataract is sometimes considered a conquered disease because treatment is widely available that can eliminate vision loss due to the disease. However, cataract still accounts for a significant amount of vision impairment in the U.S., particularly in older people who may have difficulty accessing appropriate eye care due to cost, availability, or other barriers.

Treatment of cataract involves removal of the clouded natural lens. The lens is usually replaced with an artificial intraocular lens (IOL) implant. Cataract removal is now one of the most commonly performed surgical procedures with more than a million such surgeries performed each year.

Surgery is not truly a cure for cataract, however, and its success in controlling vision loss comes with a price. It is estimated that the federal government spends more than \$3.4 billion each year treating cataract through the Medicare program.

Ongoing research into the normal healthy functioning of the eye's lens may help us better understand the causes of cataract and how they might be prevented. Even partial achievement of this goal might save hundreds of millions of dollars in the annual costs of treating cataract.

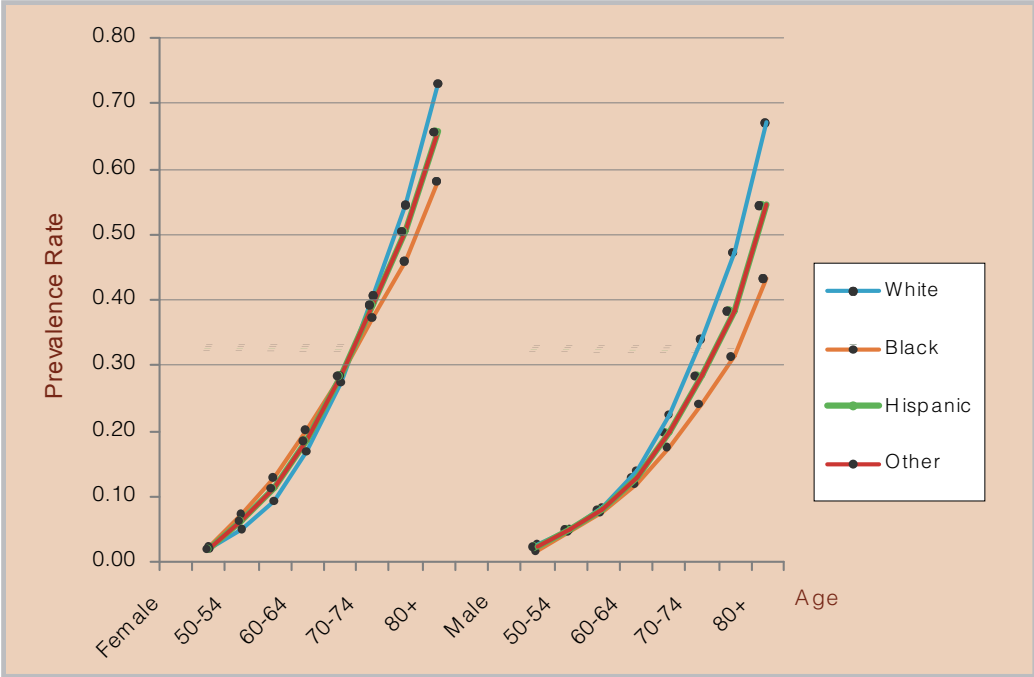
Because of the variety of opacifications possible, cases of cataract can be defined by a number of classification schemes. The cases included in the

prevalence statistics below include cortical cataract affecting 25% or more of the lens, posterior sub-capsular cataract 1mm or larger, and nuclear cataract greater than or equal to the next-to-the-highest grade in the grading system used (generally NII or NIII in the LOCS II grading system).

Cataract affects nearly 20.5 million Americans age 40 and older (see table on pages 24 and 25), or about one in every six people in this age range. By age 80, more than half of all Americans have cataract.

Cataract is slightly more common in women than in men (see chart below). It also affects Whites somewhat more frequently than other races, particularly with increasing age.

**Estimated Specific Prevalence Rates for Cataract**



## Estimated Number of Cases of Cataract in the U.S. Population Age 40 and Older by State, Race and Sex

State	Total	Female	Male	White	Black	Hispanic	Other
<b>Total U.S.</b>	20,476,040	12,724,479	7,751,561	17,179,612	1,524,064	1,041,740	730,624
Alabama	332,285	211,671	120,613	268,736	58,013	1,870	3,666
Alaska	24,206	13,267	10,939	18,233	461	438	5,075
Arizona	378,937	225,001	153,936	326,008	5,341	33,436	14,152
Arkansas	215,348	133,838	81,511	191,135	19,758	1,488	2,968
California	2,123,862	1,304,123	819,739	1,493,465	98,912	287,647	243,837
Colorado	255,305	153,595	101,710	222,248	5,611	20,960	6,485
Connecticut	279,993	175,406	104,587	255,091	12,168	7,813	4,921
Delaware	58,105	35,861	22,244	50,213	6,173	723	997
District of Columbia	38,335	26,010	12,324	11,648	24,213	1,244	1,229
Florida	1,556,783	944,190	612,594	1,290,243	91,422	152,408	22,710
Georgia	471,888	299,585	172,303	369,150	88,230	5,994	8,514
Hawaii	88,491	53,260	35,231	21,693	319	2,321	64,158
Idaho	87,565	51,459	36,106	84,078	96	1,676	1,716
Illinois	886,516	559,888	326,628	746,576	84,637	31,742	23,560
Indiana	444,934	277,777	167,157	413,182	22,793	4,670	4,288
Iowa	257,490	160,596	96,894	252,177	1,991	1,516	1,806
Kansas	210,726	130,941	79,786	196,924	6,366	3,952	3,484
Kentucky	297,531	185,628	111,903	279,431	13,815	1,385	2,901
Louisiana	298,068	189,244	108,825	224,585	63,765	4,868	4,850
Maine	108,153	66,368	41,785	106,780	146	266	961
Maryland	356,447	223,875	132,572	276,104	62,483	5,675	12,185
Massachusetts	509,781	322,585	187,197	473,981	12,661	9,348	13,791
Michigan	717,119	444,436	272,683	632,906	64,128	7,866	12,219
Minnesota	359,978	220,370	139,607	348,109	3,435	2,144	6,290
Mississippi	196,886	126,643	70,243	147,561	46,238	1,159	1,928
Missouri	441,397	276,341	165,057	403,535	28,737	3,130	5,996
Montana	72,177	42,668	29,509	69,182	64	508	2,423
Nebraska	137,005	84,755	52,250	131,453	2,446	1,683	1,423
Nevada	127,046	72,660	54,386	106,748	5,164	7,931	7,203
New Hampshire	89,486	54,228	35,258	87,895	216	413	962
New Jersey	652,565	411,972	240,594	542,198	51,458	35,642	23,268
New Mexico	122,548	73,884	48,664	79,086	1,391	34,326	7,744
New York	1,433,753	912,904	520,849	1,128,716	138,188	102,999	63,850
North Carolina	562,051	355,657	206,394	465,158	82,893	4,389	9,611
North Dakota	55,593	33,738	21,855	54,256	40	163	1,134
Ohio	879,217	551,493	327,723	799,314	63,783	6,012	10,108
Oklahoma	265,301	164,741	100,560	232,159	10,718	3,374	19,049
Oregon	263,574	158,567	105,008	248,973	2,012	4,137	8,452
Pennsylvania	1,103,711	697,058	406,653	1,017,850	63,477	9,859	12,525
Rhode Island	89,624	57,041	32,583	84,117	1,471	1,940	2,096
South Carolina	279,286	176,734	102,552	218,109	56,515	1,766	2,896
South Dakota	63,360	38,580	24,781	61,008	71	242	2,040
Tennessee	413,541	260,348	153,193	365,966	40,754	2,214	4,608
Texas	1,223,128	757,056	466,072	891,175	96,721	205,501	29,730
Utah	114,200	67,320	46,880	107,173	385	3,693	2,949
Vermont	46,830	28,565	18,266	46,073	69	202	487
Virginia	470,160	293,945	176,215	384,532	65,488	6,605	13,535
Washington	403,514	242,396	161,118	367,441	5,938	7,273	22,862
West Virginia	160,207	99,489	60,718	154,580	3,646	574	1,407
Wisconsin	417,351	256,362	160,989	399,882	9,118	3,492	4,859
Wyoming	34,680	20,360	14,320	32,777	123	1,065	716

White Female	White Male	Black Female	Black Male	Hisp. Female	Hisp. Male	Other Female	Other Male	State
10,546,767	6,632,845	1,066,158	457,906	654,274	387,466	457,280	273,344	<b>Total U.S.</b>
166,951	101,785	41,225	16,788	1,125	745	2,370	1,295	Alabama
9,608	8,625	280	181	260	178	3,120	1,955	Alaska
192,036	133,972	3,446	1,894	20,546	12,889	8,973	5,180	Arizona
117,156	73,979	13,937	5,822	846	642	1,900	1,068	Arkansas
903,913	589,553	67,208	31,705	180,366	107,281	152,637	91,200	California
133,052	89,195	3,660	1,952	12,758	8,202	4,125	2,360	Colorado
158,898	96,193	8,535	3,634	4,971	2,843	3,003	1,918	Connecticut
30,571	19,642	4,245	1,928	431	291	614	383	Delaware
6,951	4,696	17,394	6,819	848	396	817	413	District of Columbia
768,959	521,284	62,863	28,559	98,141	54,267	14,226	8,484	Florida
228,053	141,097	62,790	25,440	3,437	2,557	5,305	3,209	Georgia
11,875	9,818	156	163	1,392	929	39,838	24,321	Hawaii
49,419	34,659	51	45	936	740	1,053	663	Idaho
467,030	279,547	59,290	25,348	18,819	12,924	14,750	8,810	Illinois
256,674	156,508	15,704	7,089	2,684	1,986	2,714	1,574	Indiana
157,269	94,908	1,321	671	886	630	1,120	686	Iowa
122,053	74,872	4,347	2,018	2,349	1,604	2,192	1,292	Kansas
173,273	106,158	9,663	4,151	824	561	1,868	1,033	Kentucky
138,557	86,028	44,521	19,244	3,158	1,711	3,008	1,842	Louisiana
65,519	41,261	80	66	164	102	605	356	Maine
169,123	106,981	43,532	18,951	3,698	1,977	7,521	4,664	Maryland
299,213	174,768	8,775	3,886	5,971	3,377	8,626	5,165	Massachusetts
387,987	244,919	44,229	19,899	4,637	3,229	7,583	4,636	Michigan
213,019	135,090	2,202	1,233	1,228	916	3,922	2,368	Minnesota
92,270	55,292	32,430	13,807	702	457	1,241	687	Mississippi
250,319	153,216	20,280	8,456	1,913	1,217	3,828	2,168	Missouri
40,804	28,378	36	28	303	205	1,525	898	Montana
81,228	50,225	1,673	772	953	730	901	523	Nebraska
60,090	46,658	3,325	1,839	4,688	3,243	4,556	2,647	Nevada
53,268	34,626	125	91	255	158	580	382	New Hampshire
338,788	203,410	36,141	15,317	22,683	12,959	14,360	8,908	New Jersey
46,874	32,213	892	499	21,217	13,109	4,901	2,843	New Mexico
705,222	423,494	99,791	38,397	68,510	34,490	39,381	24,469	New York
288,160	176,998	58,864	24,029	2,441	1,948	6,192	3,419	North Carolina
32,899	21,357	20	20	96	67	723	411	North Dakota
497,160	302,154	44,334	19,448	3,619	2,393	6,379	3,729	Ohio
143,085	89,074	7,377	3,342	1,959	1,415	12,320	6,729	Oklahoma
149,617	99,357	1,299	713	2,395	1,743	5,257	3,195	Oregon
638,181	379,669	45,107	18,370	5,991	3,868	7,779	4,747	Pennsylvania
53,465	30,652	989	482	1,258	682	1,329	767	Rhode Island
133,930	84,178	39,907	16,608	1,021	745	1,876	1,020	South Carolina
37,101	23,906	36	35	144	98	1,298	741	South Dakota
227,278	138,688	28,828	11,925	1,303	910	2,938	1,670	Tennessee
543,140	348,035	66,913	29,808	128,617	76,885	18,386	11,344	Texas
63,088	44,085	227	158	2,190	1,503	1,815	1,134	Utah
28,108	17,965	38	32	126	76	294	193	Vermont
235,744	148,788	45,404	20,084	4,227	2,378	8,570	4,964	Virginia
219,929	147,512	3,726	2,211	4,181	3,092	14,560	8,302	Washington
95,643	58,937	2,600	1,046	359	215	887	520	West Virginia
245,000	154,882	6,265	2,853	2,019	1,474	3,078	1,781	Wisconsin
19,218	13,559	74	48	632	433	436	279	Wyoming

## Diabetic Retinopathy

Diabetic retinopathy is a common complication of diabetes. It affects the tiny blood vessels of the retina. Retinal blood vessels can break down, leak, or become blocked—affecting and impairing vision over time. In some people with diabetic retinopathy, serious damage to the eye can occur when abnormal new blood vessels grow on the surface of the retina.

Diabetic retinopathy can affect almost anyone with diabetes. The U.S. Centers for Disease Control and Prevention (CDC) estimate that 10.3 million Americans have diagnosed diabetes, while an additional 5.4 million have diabetes that has not been diagnosed.

In general, the longer someone has diabetes, the greater the risk of developing diabetic retinopathy. Eventually, almost everyone with juvenile-onset diabetes will develop some signs of diabetic retinopathy. Those who acquire diabetes later in life are also at risk of diabetic retinopathy, although they are somewhat less likely to develop advanced diabetic retinopathy.

Diabetes also increases the risk of other eye diseases such as cataract and glaucoma. Because of its dangers to good vision, people with diabetes are urged to seek annual dilated eye exams.

Research suggests that the risk of diabetic retinopathy can be reduced through careful control of blood sugar. People with diabetes are also encouraged to control their blood pressure.

Laser treatment, called photocoagulation, has been shown to reduce the risk of sight loss in advanced cases of diabetic retinopathy. Focal photocoagulation can be used to destroy leaking blood vessels. Scatter photocoagulation, where a large number of spots are destroyed by the laser, is used to control the growth of abnormal blood vessels. In some cases vitrectomy, a surgical procedure to remove clouded fluid and gel from inside the eye, can help.

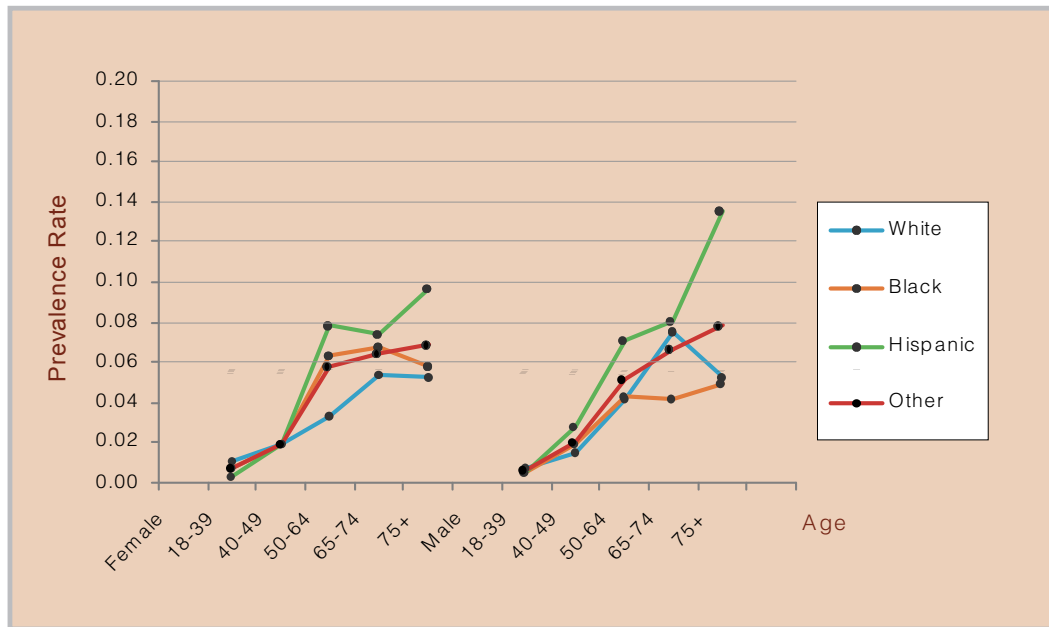
The prevalence estimates for cases of diabetic retinopathy on pages 28 and 29 include those with mild or worse retinopathy (grade 14 or higher based on fundus photographs), including definite non-proliferative retinopathy (e.g., microaneurysms, blot hemorrhages), macular edema, or proliferative changes.

Because diabetes includes a form with juvenile onset, the information below reflects the prevalence of diabetic retinopathy in Americans age 18 and older. Approximately 209 million Americans are in this age group.

Diabetic retinopathy affects over 5.3 million Americans age 18 and older, or just over 2.5% of this population. Prior to age 40, diabetic retinopathy affects Whites more frequently than other races. In later decades, Hispanics are the most commonly affected by the disease.

Due to a lack of information about diabetic retinopathy in other races, the prevalence estimates for "other" races are the arithmetic average of those for Whites, Blacks and Hispanics.

### Estimated Specific Prevalence Rates for Diabetic Retinopathy



## Estimated Number of Cases of Diabetic Retinopathy in the U.S. Population Age 18 and Older by State, Race and Sex

State	Total	Female	Male	White	Black	Hispanic	Other
<b>Total U.S.</b>	5,353,233	2,840,501	2,512,732	3,960,514	551,337	544,794	296,588
Alabama	85,752	47,097	38,655	63,826	19,320	1,024	1,582
Alaska	9,484	4,627	4,857	6,703	250	315	2,216
Arizona	98,592	49,929	48,663	72,358	2,182	18,102	5,950
Arkansas	52,278	27,796	24,483	43,606	6,511	975	1,187
California	621,758	323,146	298,612	337,391	36,415	155,535	92,417
Colorado	75,836	38,700	37,137	59,234	2,370	11,269	2,963
Connecticut	67,367	35,958	31,408	55,846	4,719	4,567	2,235
Delaware	15,057	8,046	7,011	11,799	2,357	446	454
District of Columbia	11,508	6,974	4,534	3,132	7,186	697	492
Florida	363,561	190,336	173,225	255,242	34,452	64,144	9,723
Georgia	139,731	76,304	63,427	96,411	34,649	4,430	4,241
Hawaii	26,613	13,889	12,724	5,782	209	1,232	19,390
Idaho	22,636	11,406	11,230	20,744	50	1,114	727
Illinois	229,887	123,625	106,263	169,511	30,504	19,679	10,194
Indiana	112,112	59,511	52,600	99,295	8,122	2,761	1,934
Iowa	57,231	30,025	27,206	54,641	798	922	870
Kansas	50,065	26,266	23,800	43,887	2,305	2,278	1,596
Kentucky	75,960	40,308	35,652	69,186	4,789	795	1,190
Louisiana	81,421	45,096	36,325	54,416	22,733	2,258	2,013
Maine	25,670	13,331	12,338	25,038	70	139	423
Maryland	99,193	54,536	44,657	66,041	24,487	3,285	5,380
Massachusetts	122,919	66,007	56,912	106,420	4,940	5,605	5,953
Michigan	184,589	98,331	86,258	151,572	22,977	4,425	5,615
Minnesota	88,647	46,042	42,605	82,332	1,807	1,456	3,052
Mississippi	52,087	29,007	23,080	34,875	15,820	619	773
Missouri	107,188	57,338	49,851	92,862	10,107	1,682	2,538
Montana	17,614	8,883	8,732	16,263	28	272	1,051
Nebraska	32,033	16,730	15,303	29,342	956	1,060	676
Nevada	37,458	18,416	19,042	27,374	2,083	4,927	3,073
New Hampshire	23,004	11,863	11,140	22,177	108	259	459
New Jersey	167,197	90,122	77,075	118,386	18,835	19,330	10,646
New Mexico	37,557	19,116	18,441	18,171	500	15,725	3,160
New York	376,779	205,868	170,911	248,183	49,288	52,394	26,914
North Carolina	150,591	81,623	68,968	113,726	29,040	3,470	4,355
North Dakota	12,407	6,372	6,035	11,771	31	92	513
Ohio	216,861	116,477	100,384	187,381	21,836	3,236	4,408
Oklahoma	66,302	34,960	31,341	52,921	3,904	2,093	7,384
Oregon	65,294	33,510	31,785	58,017	800	2,838	3,639
Pennsylvania	251,832	135,427	116,405	219,739	21,042	5,583	5,468
Rhode Island	20,678	11,118	9,560	18,112	590	1,136	839
South Carolina	76,027	41,692	34,336	53,750	19,818	1,146	1,313
South Dakota	14,311	7,380	6,931	13,244	43	131	893
Tennessee	107,677	57,903	49,775	89,585	14,637	1,439	2,017
Texas	372,237	194,171	178,065	216,232	36,561	105,493	13,950
Utah	32,884	16,902	15,983	29,062	183	2,285	1,355
Vermont	11,719	6,062	5,658	11,364	34	96	224
Virginia	131,032	70,480	60,552	97,182	23,257	4,232	6,361
Washington	107,081	55,057	52,025	89,951	2,597	4,809	9,724
West Virginia	37,736	19,780	17,956	35,871	1,081	255	528
Wisconsin	100,551	52,353	48,198	92,222	3,907	2,198	2,224
Wyoming	9,230	4,606	4,624	8,337	49	539	305



White Female	White Male	Black Female	Black Male	Hisp. Female	Hisp. Male	Other Female	Other Male	State
2,058,980	1,901,534	349,664	201,673	269,544	275,249	162,312	134,276	<b>Total U.S.</b>
33,284	30,542	12,466	6,854	457	567	890	693	Alabama
3,157	3,546	134	116	147	169	1,190	1,026	Alaska
36,613	35,745	1,233	949	8,751	9,351	3,331	2,618	Arizona
22,574	21,032	4,150	2,361	412	562	660	528	Arkansas
173,168	164,223	22,331	14,085	76,804	78,730	50,842	41,574	California
30,338	28,896	1,349	1,021	5,369	5,900	1,644	1,319	Colorado
29,424	26,422	3,015	1,704	2,329	2,238	1,191	1,044	Connecticut
6,114	5,685	1,481	876	203	243	248	206	Delaware
1,608	1,525	4,720	2,466	360	338	287	205	District of Columbia
130,199	125,043	21,542	12,910	33,226	30,918	5,368	4,354	Florida
50,135	46,276	22,082	12,567	1,778	2,652	2,309	1,932	Georgia
2,680	3,102	87	123	595	637	10,527	8,862	Hawaii
10,507	10,237	22	28	481	632	396	331	Idaho
89,373	80,138	19,631	10,873	9,090	10,590	5,531	4,663	Illinois
52,139	47,156	5,099	3,023	1,217	1,544	1,057	878	Indiana
28,685	25,956	461	336	405	517	474	396	Iowa
22,961	20,926	1,398	906	1,034	1,244	873	723	Kansas
36,311	32,875	2,999	1,790	340	455	658	532	Kentucky
28,363	26,054	14,497	8,236	1,155	1,103	1,081	932	Louisiana
12,995	12,044	32	38	68	71	237	186	Maine
34,322	31,719	15,606	8,880	1,666	1,620	2,941	2,439	Maryland
56,823	49,597	3,091	1,849	2,875	2,730	3,218	2,735	Massachusetts
78,734	72,838	14,539	8,438	2,039	2,386	3,019	2,596	Michigan
42,741	39,591	1,013	795	626	830	1,663	1,389	Minnesota
18,192	16,683	10,104	5,716	274	345	437	336	Mississippi
48,638	44,223	6,500	3,606	795	887	1,404	1,134	Missouri
8,162	8,101	12	16	132	140	577	474	Montana
15,313	14,029	583	372	457	603	377	298	Nebraska
13,188	14,187	1,223	860	2,260	2,667	1,745	1,328	Nevada
11,439	10,738	55	53	126	133	243	216	New Hampshire
62,513	55,873	12,109	6,726	9,801	9,529	5,699	4,947	New Jersey
9,204	8,967	279	221	7,863	7,862	1,770	1,390	New Mexico
131,003	117,181	32,501	16,787	27,979	24,415	14,385	12,529	New York
59,303	54,423	18,579	10,461	1,320	2,149	2,421	1,935	North Carolina
6,031	5,740	12	18	43	49	285	228	North Dakota
98,625	88,756	13,888	7,947	1,546	1,690	2,418	1,991	Ohio
27,524	25,397	2,398	1,506	931	1,162	4,107	3,277	Oklahoma
29,849	28,168	442	358	1,223	1,615	1,996	1,643	Oregon
116,194	103,544	13,582	7,460	2,692	2,891	2,959	2,510	Pennsylvania
9,717	8,395	352	238	588	549	461	378	Rhode Island
27,791	25,959	12,686	7,132	475	671	740	573	South Carolina
6,813	6,432	16	26	59	72	493	401	South Dakota
46,830	42,754	9,366	5,271	599	840	1,107	910	Tennessee
111,546	104,686	22,762	13,799	52,335	53,158	7,528	6,422	Texas
15,038	14,024	88	95	1,041	1,244	735	619	Utah
5,876	5,488	16	18	48	49	122	102	Vermont
50,293	46,889	14,583	8,673	2,062	2,170	3,542	2,819	Virginia
46,057	43,893	1,413	1,184	2,127	2,682	5,459	4,265	Washington
18,696	17,175	671	410	126	129	287	242	West Virginia
47,732	44,489	2,437	1,470	967	1,232	1,217	1,007	Wisconsin
4,165	4,172	25	24	252	287	165	140	Wyoming

**Glaucoma** Glaucoma is a disease that causes a gradual degeneration of cells that make up the optic nerve which carries visual information from the eye to the brain. As the nerve cells die, vision is slowly lost, usually beginning in the periphery. Often, the loss of vision is unnoticeable until a significant amount of nerve damage has occurred. For this reason, as many as half of all people with glaucoma may be unaware of their disease.

The exact cause of primary open-angle glaucoma, the most common form of the disease, is uncertain. Other forms of glaucoma (such as angle-closure, secondary and congenital glaucoma) occur in relation to specific physical causes.

Elevated fluid pressure within the eye (intraocular pressure) seems related in some way to all cases of glaucoma. The majority of cases of glaucoma exhibit intraocular pressure outside normal limits at some time. However, even those cases with apparently normal pressure seem to benefit from treatment aimed at lowering pressure.

Most cases of glaucoma can be controlled and vision loss slowed or halted by treatment. Medications, laser treatments and surgery can be used to lower intraocular pressure. However, any vision lost to glaucoma cannot be restored.

Unfortunately, glaucoma cannot be prevented. Factors that increase the risk of glaucoma include age, race, diabetes, eye trauma, and long-term use of steroid medications.

Glaucoma is traditionally defined by a triad of signs, including the presence of at least two of the following: elevated intraocular pressure, optic disc cupping, and visual field loss. However, case definitions used in the various epidemiologic studies of the disease have differed on specific criteria. Only cases of primary open-angle glaucoma that had clear signs of optic nerve head damage and/or reproducible visual field loss (definite open angle glaucoma) are included in the prevalence estimates.

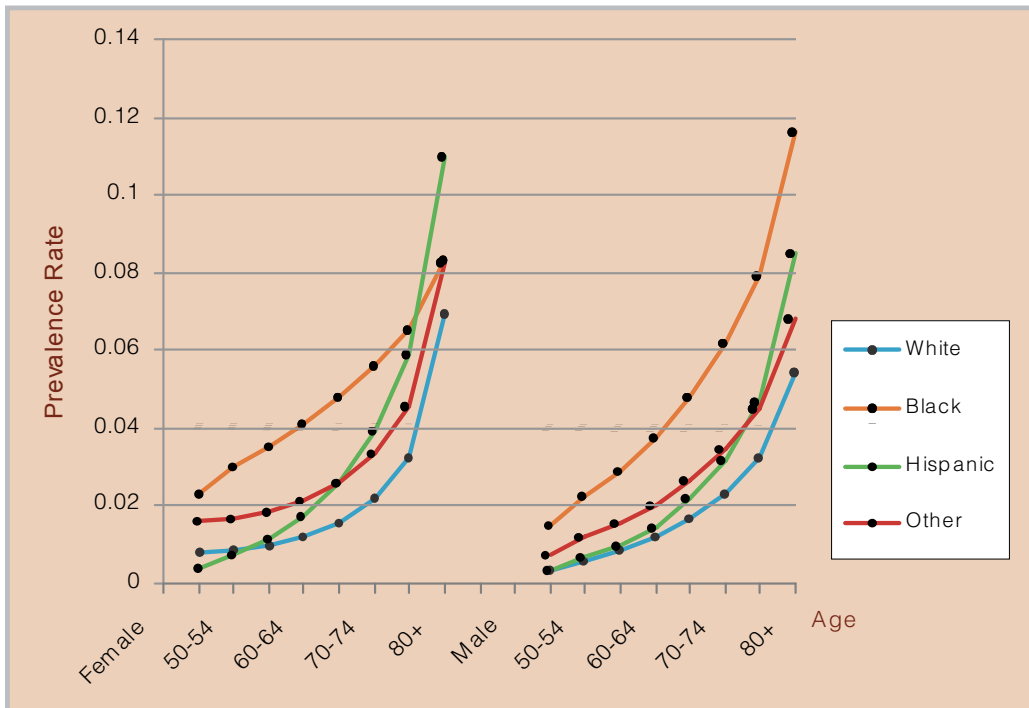
The table on pages 32 and 33 lists state-by-state prevalence estimates for glaucoma by race and sex. Glaucoma affects more than 2.2 million Americans age 40 and older, or about 1.9% of this population. Glaucoma prevalence is

clearly related to age and race (see chart below). In general, glaucoma is more common in Blacks, Hispanics and with increasing age.

In the 65-69 age group, the prevalence rate for White females is about 1.6%, while in Black females, the rate is three times higher at 4.8%. For those age 80 and older, glaucoma affects more than 10% of Black men and Hispanic women.

Glaucoma appears to be more common initially in women, but by age 65, prevalence becomes more comparable between the sexes.

### Estimated Specific Prevalence Rates for Open-Angle Glaucoma

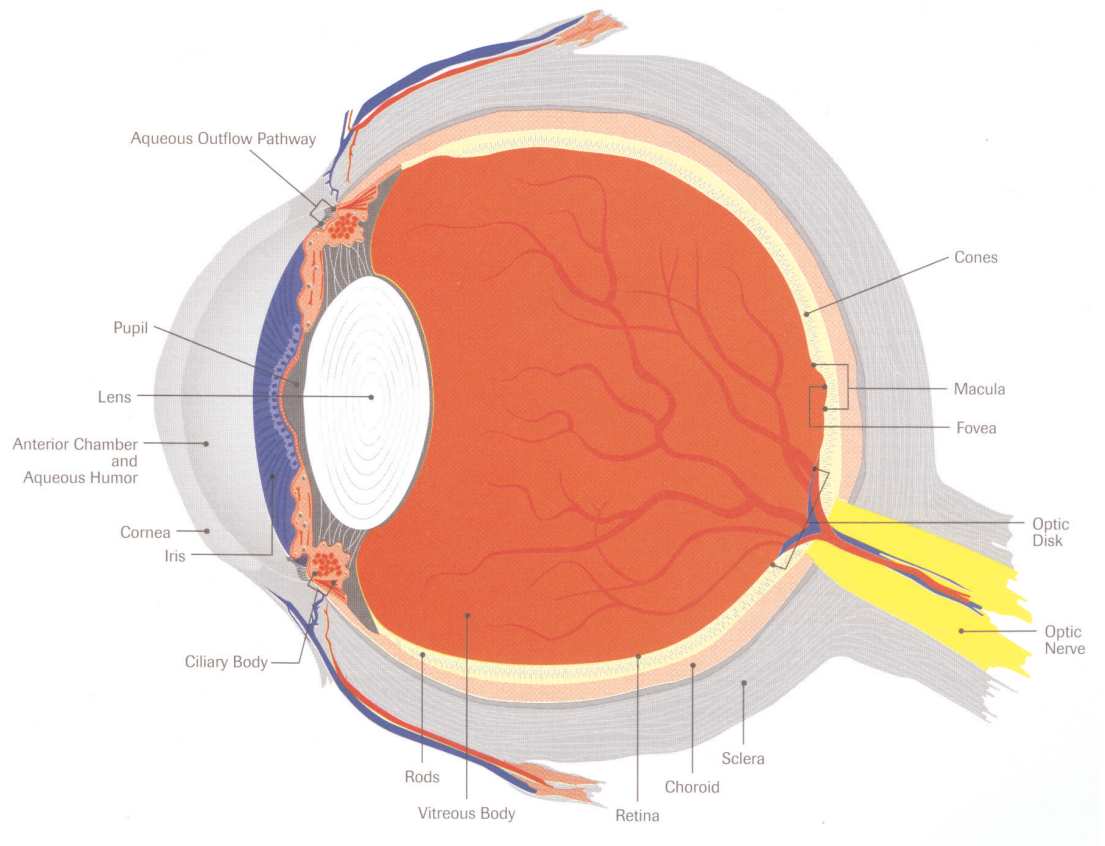


## Estimated Number of Cases of Definite Primary Open Angle Glaucoma in the U.S. Population Age 40 and Older by State, Race and Sex

State	Total	Female	Male	White	Black	Hispanic	Other
<b>Total U.S.</b>	2,227,485	1,417,504	809,981	1,566,362	409,643	131,654	119,826
Alabama	40,012	25,414	14,597	24,165	14,973	244	629
Alaska	2,969	1,749	1,219	1,881	160	55	873
Arizona	36,573	22,416	14,157	28,471	1,550	4,191	2,360
Arkansas	22,925	14,527	8,398	17,155	5,094	189	487
California	238,657	149,449	89,208	136,639	27,072	36,306	38,640
Colorado	26,604	16,750	9,854	21,163	1,660	2,651	1,130
Connecticut	28,754	18,739	10,015	23,558	3,357	986	853
Delaware	6,473	4,063	2,410	4,493	1,716	92	172
District of Columbia	7,324	4,556	2,768	1,120	5,848	159	197
Florida	160,023	99,343	60,680	111,520	25,146	19,481	3,877
Georgia	61,197	38,906	22,292	34,163	24,708	770	1,557
Hawaii	11,648	6,973	4,676	2,019	114	295	9,220
Idaho	8,286	5,146	3,140	7,752	31	214	289
Illinois	99,233	63,885	35,349	68,682	22,646	3,961	3,945
Indiana	45,396	29,266	16,131	37,977	6,091	590	738
Iowa	24,543	16,205	8,338	23,473	559	194	317
Kansas	21,216	13,811	7,405	18,394	1,717	499	606
Kentucky	29,898	19,270	10,627	25,602	3,641	180	474
Louisiana	38,848	24,394	14,454	20,370	17,050	617	810
Maine	10,132	6,577	3,554	9,884	46	34	167
Maryland	45,748	28,859	16,889	25,285	17,649	719	2,095
Massachusetts	50,900	33,613	17,286	43,896	3,521	1,184	2,299
Michigan	78,257	49,598	28,659	57,952	17,217	986	2,102
Minnesota	35,431	23,001	12,430	32,910	1,128	277	1,116
Mississippi	25,940	16,366	9,574	13,352	12,119	151	318
Missouri	46,076	29,840	16,236	37,084	7,592	398	1,002
Montana	6,887	4,318	2,569	6,387	19	64	417
Nebraska	13,418	8,760	4,659	12,274	684	213	248
Nevada	13,108	7,710	5,398	9,445	1,481	984	1,198
New Hampshire	8,581	5,522	3,059	8,285	70	54	173
New Jersey	71,402	45,929	25,473	49,049	13,806	4,453	4,093
New Mexico	13,185	8,157	5,028	7,145	379	4,368	1,293
New York	162,942	105,723	57,218	103,057	36,337	12,875	10,673
North Carolina	66,184	42,092	24,092	42,082	21,867	570	1,664
North Dakota	5,272	3,404	1,868	5,041	16	21	194
Ohio	91,884	59,072	32,813	72,711	16,706	756	1,712
Oklahoma	27,522	17,637	9,885	21,147	2,895	426	3,053
Oregon	25,540	16,169	9,372	23,002	576	530	1,433
Pennsylvania	110,788	71,919	38,870	91,220	16,210	1,247	2,111
Rhode Island	8,706	5,776	2,930	7,706	415	246	338
South Carolina	35,297	22,176	13,121	19,590	14,977	225	505
South Dakota	6,079	3,940	2,139	5,677	24	32	346
Tennessee	45,393	29,103	16,290	33,371	10,943	287	792
Texas	140,088	88,076	52,012	82,085	26,750	25,964	5,289
Utah	10,997	6,829	4,168	9,904	120	465	508
Vermont	4,473	2,896	1,577	4,337	23	27	87
Virginia	56,296	35,496	20,800	35,520	17,538	840	2,399
Washington	40,915	25,780	15,135	34,333	1,802	931	3,848
West Virginia	15,089	9,716	5,373	13,903	891	73	222
Wisconsin	41,013	26,495	14,518	37,062	2,673	445	834
Wyoming	3,362	2,093	1,269	3,070	35	136	122

White Female	White Male	Black Female	Black Male	Hisp. Female	Hisp. Male	Other Female	Other Male	State
1,014,097	552,265	248,085	161,557	81,089	50,564	74,232	45,595	<b>Total U.S.</b>
15,685	8,480	9,180	5,793	145	99	405	224	Alabama
1,097	784	85	75	32	23	535	338	Alaska
17,557	10,915	847	703	2,519	1,672	1,493	867	Arizona
11,031	6,124	3,084	2,010	104	85	308	179	Arkansas
87,483	49,157	15,822	11,250	22,298	14,008	23,846	14,794	California
13,531	7,632	921	739	1,581	1,070	718	412	Colorado
15,552	8,005	2,054	1,303	611	375	521	332	Connecticut
2,873	1,620	1,030	686	54	38	106	66	Delaware
719	401	3,602	2,246	106	53	130	68	District of Columbia
69,489	42,031	14,994	10,152	12,435	7,045	2,426	1,451	Florida
22,184	11,978	15,319	9,389	429	341	973	583	Georgia
1,185	834	46	68	172	123	5,569	3,651	Hawaii
4,838	2,913	14	18	116	98	178	111	Idaho
45,347	23,335	13,826	8,820	2,276	1,685	2,436	1,509	Illinois
24,843	13,134	3,628	2,463	330	260	465	273	Indiana
15,582	7,891	314	245	111	83	198	119	Iowa
12,143	6,251	999	717	287	212	381	225	Kansas
16,677	8,926	2,187	1,453	106	74	300	174	Kentucky
13,184	7,186	10,316	6,734	395	222	499	311	Louisiana
6,431	3,454	20	25	21	14	106	62	Maine
16,320	8,965	10,786	6,863	458	261	1,294	801	Maryland
29,338	14,558	2,113	1,408	737	447	1,426	873	Massachusetts
37,434	20,517	10,304	6,913	567	420	1,294	808	Michigan
21,529	11,381	620	508	155	122	697	418	Minnesota
8,743	4,609	7,330	4,789	90	61	204	114	Mississippi
24,321	12,763	4,647	2,945	239	159	633	369	Missouri
4,010	2,377	8	11	37	27	262	155	Montana
8,083	4,190	403	281	116	97	157	91	Nebraska
5,573	3,872	821	660	563	421	753	445	Nevada
5,351	2,933	34	36	31	23	106	68	New Hampshire
32,197	16,852	8,446	5,360	2,774	1,679	2,512	1,581	New Jersey
4,477	2,668	202	177	2,659	1,710	820	474	New Mexico
67,929	35,128	22,888	13,449	8,404	4,471	6,502	4,170	New York
27,305	14,778	13,418	8,449	307	262	1,062	602	North Carolina
3,262	1,779	6	9	12	9	123	71	North Dakota
47,522	25,189	10,034	6,672	444	312	1,072	640	Ohio
13,750	7,397	1,708	1,187	241	186	1,938	1,115	Oklahoma
14,670	8,332	310	266	298	232	891	542	Oregon
59,941	31,279	9,936	6,275	740	507	1,302	809	Pennsylvania
5,170	2,536	238	177	156	90	211	127	Rhode Island
12,572	7,018	9,153	5,825	127	98	325	180	South Carolina
3,693	1,984	10	15	19	13	219	127	South Dakota
21,724	11,647	6,713	4,231	165	122	501	291	Tennessee
52,887	29,199	15,994	10,756	15,922	10,042	3,274	2,015	Texas
6,189	3,715	57	63	268	197	314	194	Utah
2,815	1,521	10	12	16	10	54	33	Vermont
22,961	12,559	10,491	7,047	523	317	1,522	877	Virginia
21,869	12,464	954	848	520	411	2,436	1,412	Washington
8,999	4,904	534	357	45	28	137	85	West Virginia
24,109	12,952	1,611	1,062	250	194	524	310	Wisconsin
1,922	1,148	17	18	79	57	75	47	Wyoming

# Glossary



**accommodation:** ability of the lens to adjust its shape for vision at various distances in order to produce a clear image on the retina

**anterior chamber:** space in front portion of the eye between the cornea and the iris and lens, which is filled with aqueous humor

**aqueous humor:** clear, watery fluid that fills the anterior chamber and the posterior chamber in the front part of the eye and provides nutrients to structures in the anterior chamber

**aqueous outflow pathway:** the main exit route of aqueous humor from the eye, including the trabecular meshwork and Schlemm's canal

**astigmatism:** irregular curvature of the cornea or lens resulting in a distorted image because light rays are not focused on a single point on the retina

**binocular vision:** coordinated use of the two eyes to see a single fused three-dimensional image

**blindspot:** in testing the visual field, this is the blind area corresponding to the optic disk where the optic nerve fibers exit the eye and where there are no light-sensitive cells

**central visual field:** the area of objects in space seen without moving the head or eyes; corresponds to an area within 30° of the fixation point (fovea)

**choroid:** the middle layer of the eye containing blood vessels that furnish nourishment to the other parts of the eye, especially the retina

**ciliary body:** a ring of tissue between the iris and the choroid consisting of muscles and blood vessels that changes the shape of the lens and manufactures aqueous humor

**color vision deficiency (color blindness):** inability to recognize certain colors, primarily red or green, but rarely blue

**cones:** cone-shaped light-sensitive cells in the retina particularly in the macula area; cone function predominates in daylight with a small pupil allowing one to make out details and shapes, especially colors

**congenital:** present at birth

**conjunctiva:** delicate tissue that lines the inside of the eyelids and covers the front part of the eye except the cornea

**cornea:** the clear curved structure that comprises the front of the eye, a refractive surface through which light enters

**degeneration:** tissue changes that make it less able to carry out its function

**depth perception:** the blending of slightly dissimilar images from the two eyes for the perception of three-dimensional depth

**diopter:** metric unit used to denote the refractive error of the eye or lens

**distance vision:** ability to distinctly perceive objects at a distance, usually tested at 20 feet

**farsightedness:** also called hyperopia; a refractive error in which the focal point for light rays is behind the retina; distant objects are seen more clearly than near objects

**focus:** the point at which light rays meet after passing through the cornea and lens; in normal eyes this point is on the fovea of the retina

**hereditary:** appearing in, or characteristic of, successive generations; individual differences in human beings passed from parent to offspring

**incidence:** number of new cases of a particular problem or disease that occurs within a period of time

**iris:** colored circular membrane that is in front of the lens and controls the size of the opening at its center (pupil), thereby regulating the amount of light entering the eye

**laser:** surgical tool using an intense beam of light energy to close rips, make holes, destroy new vessels (photocoagulation), or to open channels as in the treatment of glaucoma

**legal blindness:** visual acuity that does not exceed 20/200 in the better eye with correcting lens; field of vision no greater than 20 degrees in its widest angle (visual acuity of 20/200 means that a person can see at a distance of 20 feet what one with "normal" sight can see at 200 feet)

**low-vision aids:** powerful optical devices useful to persons with vision impairments that are not successfully corrected by the usual prescription lenses

**macula:** a rod-free area at the center of the retina that surrounds the fovea and is responsible for best central vision

**myopia:** see nearsightedness

**nearsightedness:** also called myopia; a refractive error of the eye where the image of a distant object is formed in front of the retina and cannot be seen distinctly; near objects are seen more clearly than distant objects

**near vision:** the ability to perceive objects distinctly at normal reading distance (usually about 14 inches from the eye)

**night blindness:** condition in which sight is good by day but deficient at night and in any faint light

**optic disk:** head of optic nerve; formed by the meeting of all retinal nerve fibers in the retina

**optic nerve:** special nerve of sight beginning in the retina as the optic disk, which carries messages from the retina to the brain, resulting in visual images

**peripheral vision:** the ability to perceive the presence or motion of objects outside the direct line of vision

**presbyopia:** decreased elasticity of the lens due to advancing age which moves the near point of vision farther from the eye, making it difficult to focus on near objects

**prevalence:** total number of cases of a problem or disease in the population at a given time

**pupil:** the opening in the center of the iris that appears as a black dot and through which light enters the eye

**refraction:** measurement of the focusing characteristics of the eye to determine refractive error and the need for prescription glasses

**retina:** innermost layer of the eye containing light-sensitive nerve cells and fibers connecting with the brain through the optic nerve and nourished by a network of blood vessels; receives image and sends it to the brain

**rods:** light-sensitive cells in the retina that work best in darkness or dim illuminations

**sclera:** the white part of the eye; a tough covering that along with the cornea forms the external protective layer of the eye

**severe visual impairment:** inability to read ordinary newspaper print, even with the aid of glasses, and impairment indicating no useful vision in either eye; includes those who are legally blind

**20/20 vision:** the ability to correctly perceive an object or letter of a designated size from a distance of 20 feet; normal visual acuity

**visual acuity:** measurement of the ability of the eye to perceive the shape of objects in the direct line of vision and to distinguish detail; generally determined by finding the smallest symbol on an eye chart that can be recognized at a given distance

**visually impaired:** persons who have some difficulty seeing with one or two eyes even when wearing glasses

**vitreous body:** transparent colorless mass of soft, gelatinous material filling the globe of the eye between the lens and the retina

# Methods and Sources

In 2001, a consensus meeting was convened by the National Eye Institute at which many of the world's leading ophthalmic epidemiologists created standard case definitions for the eye conditions included in this report. Data was obtained from a review of the major epidemiological studies with the cooperation of their authors (see Table of Sources below).

The number of individuals with each disease and the total number at risk were provided in five year age increments by race and sex for the adult population from each of the studies. These age, race and sex-specific prevalence rates were then combined using a meta-analysis technique for reducing the overall variance of the pooled rate. Appropriate logistic regression models were fit to the age, race and sex-specific pooled prevalence rates. These models were applied to the state level U.S. Census 2000 populations for each year of age to arrive at the number of individuals with disease by race and sex for each state. The state level prevalence rates were then derived by dividing the number of individuals with disease in each state by the total population in each state. To estimate the prevalence of disease in the "other" race category, the age and sex-specific rates for Whites, Blacks, and Hispanics were averaged, and then logistic regression models were developed based on these averages.

While the methods used in this report are similar to those used in previous editions of *Vision Problems in the U.S.*, there are minor differences. Changes in statistical techniques and significantly broader source data have resulted in the most accurate estimates PREVENT BLINDNESS AMERICA has ever produced. For these reasons, however, direct comparisons between current and previous estimates are inappropriate.

Obtaining an actual count of the number of cases of eye disease in America would be virtually impossible. While these estimates do not represent exact measurements, they provide the best available information on the scope of the most serious threats to good vision for American adults in the 21st century.

**Table of Sources**

Study	Location	Eye Condition					
		B/VI	R/E	AMD	Cataract	D/R	Glaucoma
Baltimore Eye Survey	Baltimore, MD	B W	B W	B W			B W
Barbados Eye Study	Barbados, West Indies			B	B	B	
Beaver Dam Eye Study	Beaver Dam, WI	W	W	W	W	W	W
Blue Mountains Eye Study	Blue Mountains, Australia	W		W	W	W	W
Kongwa Eye Survey	Kongwa, Tanzania						B
Proyecto Ver	Tucson, AZ	H	H			H	H
Rotterdam Study	Rotterdam, Netherlands	W	W	W			W
Salisbury Eye Evaluation Project	Salisbury, MD	B W		B W	B W		
San Antonio Heart Study	San Antonio, TX					H W	
San Luis Valley Diabetes Study	San Luis Valley, CO					H W	
Visual Impairment Project	Melbourne, Australia	W		W	W	W	W
Wisconsin Epidemiologic Study of Diabetic Retinopathy	Madison, WI					W	

Primary prevalence rate source for: B = Blacks, W = Whites, H = Hispanics  
 B/VI = blindness and vision impairment, R/E = refractive errors, AMD = age-related macular degeneration,  
 D/R = diabetic retinopathy



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