
Office Visits to Ophthalmologists and Other Physicians for Eye Care Among the U.S. Population, 1990

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Synopsis

Despite growth in the use of ophthalmologic care in the last decade, little is known about the use of eye care services and patterns of physician contact across population subgroups. As the U.S. population grows older, such information is crucial in planning strategies for treatment and prevention of eye disorders as well as in identifying potential problems in access and use of eye care.

Using the 1990 National Ambulatory Medical Care Survey data, a descriptive statistical analysis was employed to profile the possible variations in eye care-related office visits to ophthalmologists and other physicians across demographic groups.

In 1990, a total of 49.3 million visits that were related primarily to an ocular disorder were made to physicians' offices; 43.8 million (89 percent) of these were visits to ophthalmologists and 5.4 million (11 percent) to other physicians.

Use of ambulatory eye care varied across demographic subgroups. Those ages 65 or older had a substantially higher rate of eye care related outpatient visits per 1,000 persons per year compared with the rest of the population (743.6 per 1,000 versus 118.5 per 1,000, $P < 0.001$). Women had a higher rate than men (216.0 per 1,000 versus 177.0 per 1,000, 0.01; $P < 0.05$). Blacks had a substantially lower rate than whites (143.2 per 1,000 versus 194.6 per 1,000, 0.001; $P < 0.01$). Those who visited ophthalmologists' offices also differed from those who visited other physicians' offices in terms of their age, sex, race, health insurance status, and disease characteristics.

It is important to devote increased attention to the prevention of vision loss among the population groups that have a higher risk of developing eye diseases and that also may have underused or have less access to care. Results from this analysis, in combination with data on the prevalence of ocular disorders for different population groups, provide useful information to identify these high-risk groups.

ALTHOUGH PHYSICIANS' SERVICES account for only one-fifth of the personal health expenditures in the United States, the physician's office is where Americans most often seek health care (1). Because visual dysfunction is one of the most common health problems, ophthalmologists along with physicians in general and family practice, pediatrics, internal medicine, and obstetrics and gynecology are among the five most visited physicians (2). A number of studies on the use of eye care have focused on the growth of certain ophthalmologic surgical procedures, such as cataract extraction and intraocular lens implantation (3,4).

Less attention, however, has been devoted to the delivery of nonsurgical ophthalmologic care. The National Center for Health Statistics (NCHS) has reported previously the practice patterns of office-based ophthalmologists based on the 1985 National Ambulatory Medical Care Survey (NAMCS) (5). The NCHS analysis, however, did not capture eye care related visits to physicians other than ophthalmologists. Furthermore, despite the growth of ophthalmologic care in the last decade, little is known about the use of eye care services and patterns of physician contact across different demographic subgroups.

We previously have summarized overall population

ICD-9-CM Diagnosis Codes Related to Eye Diseases or Disorders

<i>Code</i>	<i>Diagnosis</i>
250.5	Diabetes with ophthalmic manifestations
360.0-379.9	Disorders of the eye and adnexa
743.0-743.9	Congenital anomalies of eye
802.7	Orbital floor (blowout) open
870.0-870.9	Open wound of ocular adnexa
871.0-871.9	Open wound of eyeball
918.0-918.9	Superficial injury of eye and adnexa
921.0-921.9	Contusion of eye and adnexa
930.0-930.9	Foreign body on external eye
940.0-940.9	Burn confined to eye and adnexa
950.0	Optic nerve injury
950.1	Injury to optic chiasm
950.9	Traumatic blindness, not otherwise specified
V43.0-V43.1	Organ or tissue replaced by other means (eye globe, lens)
V53.1	Fitting and adjusting of other devices (spectacles and contact lenses)
V72.0	Examination of eyes and vision

NOTE: In this study, all visits to an ophthalmologist's office were considered related to eye disorders, regardless of the actual diagnosis codes listed.

rates of eye care related visits to physicians (6). In this study, we describe the demographic characteristics of persons receiving eye care from ophthalmologists and other physicians and patterns of use of eye care services and physician contact among different population groups based on the 1990 NAMCS. As the U.S. population grows older and the demand for eye care intensifies, this information is crucial in planning strategies for the prevention of vision loss because of prevalent eye disorders and in identification of potential problems in uses of eye care services.

Methods

We analyzed data from the 1990 NAMCS with a focus on visits for eye care. Source of the survey data was a national probability sample of nonfederally employed, office-based physicians who engage primarily in patient care (7). The survey measures patient visits to 13 physician specialties as well as information on patient demographic characteristics, reason for visit, expected source of payment, principal diagnosis, and treatment.

As of 1990, there were a total of 326,987 physicians (MD and DO) of all specialties (including 13,082 ophthalmologists) in the American Medical Association and American Osteopathic Association master files which constitute the universe of the 1990 NAMCS. Based on a multi-stage probability sampling technique, 3,063 physicians (of which 130 were ophthalmologists) were first selected from the master files. Among those selected, 794 physicians (of which 19 were ophthalmologists) were ineligible because they did not meet the inclusion criteria of primarily engaging in office-based patient care practice or not being employed by the Federal Government. Another 585 physicians (19 of whom were ophthalmologists) chose not to participate. A total of 1,684 physicians were recruited in the final physician sample (overall response rate, 74 percent); 92 of these were ophthalmologists (response rate of 83 percent).

The basic unit of analysis in the NAMCS is the outpatient visit, not the physician. Therefore, a random sample of patient visits is drawn from the annual practices of the sampled physicians. Each physician was first randomly assigned to 1 of the 52 weeks in the survey year; a systematic random sample of visits was then selected from the physician's practice during that week. The sampling rate of patient visits varied from 20 percent for a very large practice to 100 percent for a very small practice. This process resulted in a total of 43,469 sampled patient visits in the 1990 NAMCS; these represented a total of 704.6 million ambulatory visits to office-based physicians in the United States during the 12 months from January 1, 1990, through December 31, 1990 (7).

In our analysis, visits to ophthalmologists' offices or visits with principal diagnoses of any ocular problem were defined as eye care related visits. The diagnoses in the 1990 NAMCS were coded according to the "International Classification of Diseases, 9th Revision, Clinical Modification" ICD-9-CM (8). The ICD-9-CM codes used for this analysis are summarized in the box.

The total number of eye care related office visits was estimated following the NCHS estimation procedure (2,7). A weight variable provided by NCHS was applied in the estimation to adjust for probabilities of selection, for nonresponse, and for ratio adjustment. Annual visit rates for eye care services by age, sex, and race were computed using the 1989 U.S. population as a denominator (7). This population also served as the standard population in the calculation of adjusted rates using the direct method of standardization (9). To estimate the variance surrounding our calculated rates of service, relative standard error was

calculated according to NCHS methods (10), and standard error was estimated by multiplying the rate by its relative standard error. The Z-test was used in determining the significance of difference between the estimated rates (11).

Results

In 1990, approximately 49.3 million of 704.6 million (7 percent) of ambulatory visits to physicians' offices were to an ophthalmologist, or the patient had an eye related *primary* diagnosis. Of all these eye care related visits, 43.8 million (89 percent) were made to ophthalmologists' offices, the remaining 5.4 million (11 percent) were to other physicians such as family and general practitioners, internists, or pediatricians.

Overall, eye care related office visits increased 12 percent ($P < 0.0011$, compared with the 44.1 million office visits reported in the 1989 NAMCS (12). The 43.8 million visits to ophthalmologists sampled in the 1990 NAMCS represent a 42-percent increase over the 30.8 million visits to ophthalmologists in 1980 (12). Tables 1 and 2 show the distributions of all eye care related ambulatory visits by age and sex in the 1990 NAMCS. The distributions of visits by race are shown in table 3.

As table 1 indicates, of all 49.3 million eye care related visits to physicians, 23.5 million were made by patients ages 65 and older. In fact, as suggested in both tables 1 and 2, the aging process plays an important role in patients' demand for eye care. Persons ages 65 and older had a nearly seven-fold higher annual rate of eye care related office visits, after adjusting for the sex distribution, than those younger than 65 (743.6 per 1,000 versus 118.5 $P < 0.001$). The difference in eye care related office visits between the elderly and the rest of the population is also substantially larger for office visits to other physicians. Overall, persons ages 65 and older were twice as likely to visit a physician as those younger than 65 (4,926 versus 2,542, sex-adjusted annual rate of visit per 1,000 persons $P < 0.001$).

In addition to age, there are differences according to sex and race in the use of outpatient care for ocular conditions. Women account for 60 percent of total office visits. Although this is in part attributable to their increased longevity, there is a higher rate of outpatient ambulatory visits per 1,000 population among women than men (216.0 versus 177.0, 0.01 P value < 0.05 , table 2), even after adjusting for age. The higher rate of ambulatory office visits among women is consistent across all physician specialties. The rate of visits by men was approximately two-

Table 1. Distribution and annual rate of outpatient ambulatory visits for all eye care related diagnoses by patient's age and sex, United States, 1990

Age and sex	Visits		Visits per 1,000	Standard error
	Number	Percent		
Total	49,265,529	100	200.2	26.8
Younger than 65 ..	25,736,038	52.5	118.5	15.9
Females	14,194,295	28.8	130.3	17.5
Males	11,541,743	23.4	106.1	14.2
65 and older	23,529,491	47.8	743.6	99.7
Females	15,408,407	31.3	839.7	12.6
Males	8,121,084	16.5	642.7	86.2

¹Sex-adjusted rate.

SOURCE: The National Ambulatory Medical Care Survey, 1990.

Table 2. Distribution and annual rate of outpatient ambulatory visits for all eye care related diagnoses by patient's sex and age, United States, 1990

Age and sex	Visits		Visits per 1,000	Standard error
	Number	Percent		
Females	29,602,702	60.1	216.0	29.0
Younger than 5 ..	897,703	1.8	98.1	13.2
5-14	1,206,703	2.5	70.4	9.4
15-24	1,045,414	2.1	57.8	7.7
25-44	4,380,470	8.9	108.4	14.5
45-64	6,663,978	13.5	275.6	37.0
65-74	6,988,051	14.2	692.8	92.9
75-84	6,558,749	13.3	1,080.5	144.9
85 and older	1,861,607	3.8	849.3	113.9
Males	19,662,827	39.9	177.0	15.7
Younger than 5 ..	995,450	2.0	103.7	13.9
5-14	1,349,997	2.7	75.0	10.1
15-24	1,299,379	2.6	69.7	9.3
25-44	3,125,308	6.3	77.7	10.4
45-64	4,771,609	9.7	213.8	28.7
65-74	3,906,092	7.9	482.5	64.7
75-84	3,389,604	6.9	918.3	123.1
85 and older	825,388	1.7	972.2	130.3

¹Age-adjusted rate.

SOURCE: The National Ambulatory Medical Care Survey, 1990.

thirds the rate of visits by women (2.3 per year versus 3.3 per year).

Table 3 shows the racial variation in eye care related outpatient visits. Black persons had a substantially lower age-adjusted rate of eye care related outpatient visits than white persons (143.2 per 1,000 versus 194.6, 0.01 $P < 0.05$). In both the elderly and nonelderly groups, black persons had a lower rate of eye care related visits than whites (107.2 per 1,000 versus 128.5 for those younger than age 65 and 667.9 per 1,000 versus 830.3 for those ages 65 and older).

This pattern of lower rates for ambulatory eye care visits among blacks, however, is consistent with that for all outpatient visits to all physician specialties. Our analysis of the 1990 NAMCS data indicates that

Table 3. Distribution and age-adjusted annual rate of outpatient ambulatory visits for all eye care related diagnoses by patient's race, United States, 1990

Race and age	Observed visits		Visits ¹		Visits per 1,000 ¹	Standard error
	Number	Percent	Number	Percent		
White	2,834	88.3	42,145,311	85.6	² 194.6	26.1
Younger than 65 years	1,455	45.3	21,344,873	43.3	128.5	17.2
65 years and older	1,379	43.0	20,800,438	42.2	830.3	111.3
Black	228	7.1	3,595,633	7.3	² 143.2	19.2
Younger than 65 years	134	4.2	2,134,278	4.3	107.2	107.2
65 years and older	94	2.9	1,461,355	3.0	667.9	89.6
Asian Americans and Pacific Islanders	46	1.4	1,150,354	2.3	133.0	17.8
Unknown	102	3.2	2,374,231	4.8	NA	

¹Projected number and rate following procedure of the National Center for Health Statistics.

²Age-adjusted rate. The rate for Asian American and Pacific Islanders is the

unadjusted crude rate because the age distribution for this group is not readily available.

SOURCE: The National Ambulatory Medical Care Survey, 1990.

Table 4. Characteristics of patients making ambulatory eye care visits by physician's specialties, United States, 1990

Characteristics	Percent of visits to—		P value
	Ophthalmologists	Other physicians	
New diagnosis or patient	25.9	79.6	< 0.001
Ages 65 and older	52.2	11.5	< 0.001
Female	60.5	56.4	0.115
Black, other race	8.0	22.7	< 0.001
Fee-for-service insurance ¹	39.9	28.3	< 0.001
Member of HMO	6.9	20.3	< 0.001

¹This group includes patients who have Blue Cross, Blue Shield or other commercial health insurance.

SOURCE: The National Ambulatory Medical Care Survey, 1990.

blacks not only seek eye care from ophthalmologists and other physicians less often; in general, they also do not visit physicians as frequently as whites. Although the white population has an age-adjusted average of 2.8 outpatient ambulatory visits for all causes per person per year, the black population had an age-adjusted average of only 2.2 visits during 1990.

Although 89 percent of eye care related outpatient visits in 1990 were to ophthalmologists, physicians from other specialties can and do provide ophthalmologic care. Tables 4 and 5 depict the variations in the use of eye care services provided by the two groups. These data indicate that ophthalmologists and other physicians tend to face different types of clinical complaints from the patients in their respective practices.

As shown in table 4, although only 25 percent of visits to ophthalmologists lead to a new diagnosis of ocular disorder or were visits by new patients, almost 80 percent of visits for eye care to other physicians led to new ocular diagnoses or were made by new

patients. Patients who visit ophthalmologists are older than those who are seen by other physicians. Although 52 percent of the visits to ophthalmologists were by persons ages 65 and older, only 12 percent of the eye care related visits to other physicians were by the elderly ($P < 0.001$). In addition, a higher percentage of visits (61 percent), though not statistically significant, was made by women to ophthalmologists, compared with visits to other physicians (56 percent).

Blacks, Asian-Americans and Pacific Islanders, and American Indians made a significantly larger proportion of eye care related visits to other physicians rather than to ophthalmologists (23 percent versus 8 percent; $P < 0.001$). This observation suggests that these minorities in general are more likely to seek eye care from primary care physicians than do whites.

People who see ophthalmologists have health insurance that differs from those who see other physicians for their ocular problems. Seven percent of patients who visited ophthalmologists were members of health maintenance organizations (HMO), and 40 percent had a fee-for-service insurance plan. Among those who visited other physicians for their eye care, 20 percent were HMO members and 28 percent had fee-for-service plans. The differences were statistically significant ($P < 0.001$).

Ophthalmologists are likely to face a different mix of ocular disorders than other physicians in their daily practices (table 5). Cataract and cataract related surgery, disorders of refraction, and glaucoma are the three most frequent primary diagnoses rendered by ophthalmologists, accounting for 59 percent of their total office visits. In contrast, disorders of conjunctiva alone account for 53 percent of total eye care related office visits to other physicians. Superficial injury of eye or foreign body (11 percent) and inflammation of

Table 5. Principal diagnoses among all ambulatory eye care visits by physician specialties, United States, 1990

Rank	Ophthalmologists' diagnoses (ICD-9 DM Code)	Percent	Other physicians' diagnoses (ICD-9 DM code)	Percent
1	Cataract and cataract surgery (366; 379; 31; V43.1) (372) ..	25.6	Disorders of conjunctiva (372).....	52.8
2	Disorders of refraction (367; V53)	16.8	Superficial injury, foreign body (918; 930).....	10.5
3	Glaucoma (365)	16.3	Inflammation of eyelids (373).....	8.3
4	Retinal detachments, disorders (361, 362)	5.1	Cataract (366).....	5.8
5	Disorders of conjunctiva (372).....	4.0	Diabetes with ophthalmic manifestation (250.5)	2.9
6	Inflammation of eyelids (373).....	2.6	Keratitis (370)	1.8
7	Disorders of cornea (371).....	2.4	Other disorders of eye (379).....	1.5
8	Other disorders of eye (379).....	2.4	Glaucoma (365).....	1.4
9	Diabetes with ophthalmic manifestation (250.5).....	2.0	Disorders of lacrimal system (375)	1.4
10	Superficial injury, foreign body (918, 930).....	1.9	Strabismus (378)	1.3
	All other diagnoses.....	20.9	All other diagnoses.....	11.6
	Number of visits (in millions).....	43.8	Number of visits (in millions).....	5.4

SOURCE: The National Ambulatory Medical Care Survey, 1990.

eyelids (8 percent) were the next most frequent eye care related diagnoses rendered by physicians in nonophthalmology specialties. We estimate that 98 percent of office visits that led to a primary diagnosis of cataract, glaucoma, or macular degeneration in the 1990 NAMCS were made to ophthalmologists (data not shown).

Discussion

The objective of this study is to profile the use of ambulatory health care services for eye related problems by the U.S. population. We found significant variations in use and physician contact patterns across different population groups. The most important findings in our study are that women and whites are more likely to visit physicians' offices for eye care than are men and blacks in a given year.

Women have a 22-percent higher age-adjusted rate of eye care related office visits per 1,000 persons than men. One possible explanation for this difference is that women may be at a higher risk of developing some ocular disorders than men. The Framingham eye study reported a higher prevalence of senile cataract among women than men (14 percent versus 10 percent of all eyes screened) (13). The 1990 National Health Interview Survey yielded a rate of self-reported cataract among women ages 65 and older that was almost twice that of men of the same age (194 per 1,000 versus 98) (1). We also noted, in our previous analysis of Medicare claim data, that women were more likely to undergo cataract surgery than men (14).

Except for cataracts, however, there is no conclusive evidence that ocular disorders are more prevalent among women. Thus it is rather unlikely that the greater use of eye care related physician services

among women is driven by the underlying prevalence of eye disorders. Another plausible hypothesis for the higher rate of ambulatory eye care visits among women may be that it reflects different thresholds for use of health care between women and men. In fact, the higher rate of using medical services among women has been documented in the literature (15). As mentioned previously, women in general make more visits to physicians' offices than men (age-adjusted average of 3.3 versus 2.3 visits per person annually). A significant, though smaller, difference in eye care related visits between the sexes exists even when we exclude visits to obstetricians and gynecologists (data not shown).

In findings of epidemiologic studies black persons had a four times higher prevalence of glaucoma and a twofold excess prevalence of blindness and visual impairments compared with whites (16,17). This observation portends an expected higher use rate for ophthalmologic procedures and physician visits. Our analysis, however, found that blacks had a 26-percent lower rate of eye care related office visits than did whites of the same age. This disparity is of great concern because one recent study of surgical procedures among Medicare beneficiaries had already suggested that even with Medicare coverage, black patients with glaucoma are under-treated in comparison with white Medicare beneficiaries (18).

Our analysis also suggests that blacks, compared with their white counterparts, are less likely to visit both ophthalmologists and other medical specialists. We have defined primary care physicians as those in family practice, internal medicine, obstetrics and gynecology, and pediatrics; physicians in other specialties and subspecialties are viewed as specialists. Of all 597.3 million office visits by the white population, 38 percent were to specialists, while only

31 percent of the 62.3 million office visits by blacks were to specialists ($P < 0.001$). The white population had an age-adjusted average of 1.1 visits per person annually while blacks made an age-adjusted 0.7 visits per person annually to the specialists.

One plausible explanation of the disparity in use of services between blacks and whites for eye care, as well as overall ambulatory outpatient care, is that blacks have less financial means and less access to health insurance coverage. Even among Medicare beneficiaries, the ability to meet copayments or the availability of supplemental insurance (the so-called medicgap insurance) may affect a patient's care-seeking behavior.

NAMCS 1990 includes only private clinics or offices, free-standing clinics, partnerships or groups, neighborhood health care centers, and HMOs. Hospital emergency and outpatient departments and government operated clinics are excluded from the survey. The exclusion of these facilities does impose certain limitations on the 1990 NAMCS data set.

Estimates from the 1989 National Health Interview Survey indicate that only 67 percent of all ambulatory medical care occurs in physicians' offices, and another 17 percent occurs in non-hospital-based clinics and HMOs (19). These data indicate that at least 16 percent of all outpatient ambulatory medical care visits are overlooked by the NAMCS. We do not have any information as to how many eye care related outpatient visits actually occur in hospital settings. Presumably, the 49.3 million visits observed in our data represent 84 percent of the total outpatient ambulatory visits for eye care in 1990.

Further, because NAMCS excludes facilities such as hospital outpatient and emergency departments, the number of visits by black patients may be underestimated due to selection bias. Such bias might arise if blacks are more likely to seek care in hospital emergency and outpatient departments than whites, as has been documented in the literature (20,21). It is not clear, however, to what extent those findings hold true for eye care.

It should also be noted that, although optometrists also provide eye care services, the NAMCS surveys only physicians and excludes this professional group.

One immediate implication of such limitations of the NAMCS data set is that the racial variations in the use of outpatient eye care reported in our analysis may not be as robust if the inclusion criteria of NAMCS indeed leads to a systematic selection bias against the ambulatory visits made by blacks. NCHS, recognizing the limitations of omitting hospital-based outpatient care from the NAMCS data base, designed and conducted a new National Hospital Ambulatory

Medical Care Survey (NHAMCS) in 1992 to capture the outpatient care in the hospital outpatient and emergency departments. Further analysis of the existence and the extent of possible selection bias in the current NAMCS data base can be conducted once the NHAMCS data are made available.

Keeping the limitations of NAMCS data in mind, one still can contemplate the implications of possible racial variations in the use of outpatient eye care provided by ophthalmologists and other physicians. Although complete and reliable prevalence data on blindness and visual impairment are not available, a recent population-based study by Tielsch and co-workers (16) has indicated that the prevalence of blindness and severe visual impairment among blacks is twice that of whites. Other earlier studies based on the Model Reporting Area statistics (22) and the health and nutrition examination survey data (23) also indicated that blacks had significantly higher rates of blindness and visual impairment than whites in almost all age groups. Since vision loss frequently can be avoided by early detection and proper treatment, under-use of eye care among the black population is especially disturbing. Although access to health care among the disadvantaged is a complex issue, it is clear that more attention needs to be devoted toward the prevention of vision loss among the population groups that have a higher risk of developing eye diseases as well as less access to care.

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