



Healthy People 2010 Focus Area Progress Review

Vision and Hearing

October 20, 2004

1:00 p.m. - 2:30 p.m.

Hubert H. Humphrey Building, Room 729-G

Vision Health

Goal: Promote the vision and hearing health of the Nation through prevention, early detection, treatment, and rehabilitation.

Objective Number	Objective Short Title
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Examinations and Prevention

28-1	Dilated eye examinations
28-2	Vision screening for children
28-3	Impairment due to refractive errors
28-4	Impairment in children and adolescents

Eye Diseases

28-5	Impairment due to diabetic retinopathy
28-6	Impairment due to glaucoma
28-7	Impairment due to cataract

Injury and Safety

28-8	Occupational eye injury
28-9	Protective eyewear

Vision Rehabilitation

28-10	Vision rehabilitation services and devices
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Healthy People 2010

Focus Area Progress Review

Vision Health Overview

Vision is an integral component and a defining element of one's quality of life. Vision impacts fundamental aspects of human development, including the ability to learn, communicate, and work. Good eye health has been shown to result in improved health overall and may reduce the risks of disease, injury, and disability. The need to promote and protect healthy vision encompasses the entire lifespan.

Age-related eye diseases are the leading causes of vision impairment and blindness in the United States.¹ With advancements in science and technology and improvements in environmental and social conditions, Americans are living longer than ever before. As the baby-boomer generation ages, the number of people at risk for developing age-related eye disease is increasing. The number of Americans ages 65 years and older is expected to double to 70 million people over the next 30 years.² While extending one's life expectancy is an overarching goal of Healthy People 2010, increasing the quality of those years is a core premise of the prevention framework for the Nation, as well.

A survey conducted on knowledge and attitudes about vision loss revealed that vision impairment is one of the most feared disabilities.³ The number of people in America who experience vision loss continues to increase, although it is believed that half of all blindness can be prevented. Blindness affects almost 1 million Americans ages 40 and older. People with visual impairments, including those who are blind, total nearly 3.4 million.¹ Blindness affects African Americans more frequently than Whites and persons of Hispanic origin. Hispanics/Latinos, however, have higher rates of visual impairment than any other race or ethnicity.

The prevalence of blindness and vision impairment increases rapidly in the later years, particularly after age 75. The prevalence rate for vision impairment and blindness is 2.85 percent. Twenty-two of the 50 states and the District of Columbia have rates above the national average. Iowa (3.73%) and North Dakota (3.74%) have the highest rates, whereas Alaska has the lowest rate (1.3%).⁴

Examinations and Prevention

Blindness and visual impairment from most eye diseases and disorders can be reduced with early detection and treatment. Most eye diseases, however, lack symptoms until vision is lost. Vision that has been lost cannot be restored. Therefore, early intervention through regular eye exams needs to be emphasized.

Annual comprehensive dilated eye examinations play a critical role in preventing and/or delaying eye disease for those at higher risk for blindness, such as those over age 65, people with diabetes, or African Americans over age 40.¹

Vision disorders are the fourth most prevalent class of disability in the United States and the most prevalent cause of handicapping conditions in childhood. Early detection increases the likelihood of effective treatment and prompts actions to decrease the negative impact of the disorders. However, fewer than 15 percent of all preschool children receive an eye examination, and fewer than 22

percent of preschool children receive any type of vision screening. The methods for vision screening vary tremendously and the effectiveness of the methods in appropriately identifying children has not been documented. Amblyopia (2–5%), strabismus (3–4%), and significant refractive error (15–20%) are the prevalent and significant vision disorders of preschool children.⁵

Millions of Americans have correctable visual impairment due to refractive errors. Prescription lenses—glasses and contact lenses—and corrective surgery are all standard treatments for refractive errors. Many Americans have uncorrected refractive errors because they do not realize that proper diagnosis and treatment could result in vision improvement. Eye examinations are essential for detecting refractive errors whenever they occur.

Eye conditions with onset in childhood have the potential to create visual impairment that lasts a lifetime. The potential for compromising or limiting daily activities and interfering with independent living is substantial. Childhood eye conditions can and do threaten the eye health of children and adolescents, and if undetected or untreated, can place a great burden on public health resources.

Eye Diseases

While significant strides have been made in the prevention and treatment of eye disease, there is no cure for many of the diseases that cause vision loss. Diabetic retinopathy, glaucoma, and cataract are common eye diseases in Americans ages 40 and over and are leading causes of visual impairment. Among African Americans, the leading causes of blindness are cataract and glaucoma. Among Hispanics/Latinos, glaucoma is the most common cause of blindness. Vision loss due to eye disease is becoming a major public health problem. It is projected that as a result of eye disease, low vision and blindness will markedly increase by the year 2020.¹

Injury and Safety

Each day about 2,000 American workers receive some form of medical treatment because of eye injuries sustained at work. Each year, emergency rooms at United States hospitals treat about 300,000 eye injuries that occurred on the job, some resulting in lasting visual impairment.⁶ Research suggests that as much as 90 percent of documented injuries could have been prevented with the proper selection and use of eye and face protection.

Every year, toys and playground equipment cause more than 11,000 eye injuries. Nearly all of these injuries can be prevented with precaution or appropriate protective eyewear. Understanding potential dangers and having adult supervision are essential to preventing eye injuries in children.

Almost all eye injuries can be prevented. Many sports and recreation activities, including baseball, basketball, tennis, racquetball, and hockey, carry some risk of eye injury. Some injuries may go unnoticed because only one eye is involved. Activities at home, such as cooking and yard work, may also present eye injury risk.

Vision Rehabilitation

People with low vision often cannot perform many daily routine activities, such as reading the newspaper, preparing meals, or recognizing the faces of friends. The inability to see well affects functional capabilities and social interactions and can lead to a loss of independence. In many cases it may not be possible to improve patients' vision through medical treatments, but it may be possible to improve their quality of life.

Vision rehabilitation involves a continuum of care, beginning with medical and surgical intervention, and proceeding to the prescription of low vision devices and vision rehabilitation services. Vision rehabilitation refers to the provision of services for people with visual impairment. Services primarily encompass training, counseling, and support—from helping people continue everyday activities, to providing adaptive devices, to assisting with employment.⁷

A. Public Health Application and Outreach: Translating the Science into Services

Translating scientific advances into applicable activities is essential to minimizing vision loss, decreasing disparities, and achieving the Healthy Vision 2010 objectives. The science surrounding vision screening, eye disease, injury prevention and eye safety, and vision rehabilitation must be presented in ways that enable health care providers to incorporate these findings into everyday practice and better educate their patients in an effort to improve patient outcomes. State agencies and local communities must be able to take the knowledge gained from research to develop and implement eye health services and programs, activities, and health promotion campaigns.

The National Eye Institute (NEI) and its partners promote and conduct research; synthesize and disseminate scientific knowledge; and foster the adoption and implementation of evidence-based eye health programs, interventions, and policies among Federal, state, and local service agencies and professional organizations.

Objective 28:5

Reduce vision impairment due to diabetic retinopathy.

Diabetic retinopathy is a common complication of diabetes and a major cause of blindness. It affects the tiny blood vessels of the retina, the light-sensitive tissue at the back of the eye. A healthy retina is necessary for good vision. In those with diabetes, retinal blood vessels can break down, leak, or become blocked, affecting and impairing vision over time. This condition is called diabetic retinopathy. 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 usually affects both eyes.

All people with diabetes—both type 1 and type 2—are at risk for diabetic retinopathy. Between 40 to 45 percent of Americans diagnosed with diabetes have some stage of diabetic retinopathy. Diabetic retinopathy has no early warning signs.⁸ Because early diagnosis and timely treatment have been shown to prevent vision loss in more than 90 percent of patients, health care guidelines recommend an annual dilated eye examination for people with diabetes.⁹ To prevent progression of the disease, people with diabetes should control their blood sugar, blood pressure, and cholesterol levels.¹⁰

The Centers for Disease Control and Prevention (CDC) estimate that there are 18.2 million Americans with diabetes, but that only 13 million have been diagnosed. Almost 800,000 new cases are diagnosed annually. Although the incidence of insulin-dependent diabetes mellitus (IDDM) in Whites is nearly twice the incidence in African Americans, the prevalence of non-insulin-dependent diabetes mellitus (NIDDM) is between 1.4 and 2.3 times higher in African Americans than in Whites. The prevalence of NIDDM is two to three times higher in Hispanics than in non-Hispanic Whites. Generally, NIDDM is more common in African Americans, Mexican Americans, Japanese Americans, and Native Americans than in non-Hispanic Whites.¹¹ The Los Angeles Latino Eye Study (LALES) found that participants who had diabetes for 15 years or more were more than three times as likely to have diabetic retinopathy, and more than 23 times as likely to have severe diabetic retinopathy, than those newly diagnosed. Latinos appear to have a higher rate of more severe vision-threatening diabetic retinopathy than Whites.¹²

Based on data from the 2002 National Health Interview Survey, men and women ages 18 years and older with diabetes had similar rates of diabetic retinopathy. Among men and women 25 years and older with diabetes, rates of diabetic retinopathy were highest for those with less than 12 years of education and lowest for those with 12 years of education. Among different racial/ethnic groups, the highest rate of diabetic retinopathy occurred in Whites.

Challenges

- Diabetic retinopathy is a common complication of diabetes and a leading cause of blindness.
- Diabetic retinopathy has no early warning signs.
- Between 40 to 45 percent of Americans diagnosed with diabetes have some stage of diabetic retinopathy.
- Future projections suggest that diabetic retinopathy will increase as a public health problem, both with the aging of the U.S. population and the increasing age-specific prevalence of diabetes.

Strategies and Opportunities

- During American Diabetes Month in November, the American Diabetes Association coordinates programs nationwide to increase awareness among people with diabetes of the importance of having annual comprehensive dilated eye exams. The American Diabetes Association produces educational materials and conducts a variety of activities, including co-sponsored vision screenings, to help people live well with diabetes.
- Healthy Vision Month is a national eye health observance sponsored by the National Eye Institute each May. Healthy Vision Month 2004 promoted the importance of receiving annual comprehensive dilated eye exams for people who have diabetes. Components of this program will be used beyond 2004 to educate people with diabetes about the importance of eye exams.

- The American Academy of Ophthalmology (AAO) has developed a brochure entitled, “Diabetic Retinopathy,” to educate patients about how diabetic retinopathy is diagnosed and treated, and when to schedule an exam.
- The American Association of Diabetes Educators has co-developed a presentation with the American Optometric Association. The presentation, “Understanding Diabetic Retinopathy,” is designed to educate health care providers about this condition.
- The American Optometric Association (AOA) provides a variety of educational materials for professionals. Two of these publications, “Care of the Patient with Diabetes Mellitus” and “Quick Reference Guide to Care of the Patient with Diabetes Mellitus,” are designed to help optometrists work with people who have diabetes.
- The CDC Division of Diabetes Translation provides a variety of resources about the impact of diabetes on Americans, including prevalence data for visual impairment among people who have diabetes.
- The Diabetes EyeCare Program of EyeCare America raises awareness about diabetic eye disease (including diabetic retinopathy), provides free diabetic eye disease educational materials, facilitates access to eye care, and promotes annual dilated eye exams for people with diabetes.
- The Juvenile Diabetes Research Foundation funds research leading to new clinical interventions and preventive strategies, and sponsors workshops to bring together major private and public institutions involved in the fight against diabetic retinopathy.
- The National Eye Health Education Program (NEHEP), coordinated by the National Eye Institute, has developed public and professional awareness activities related to diabetic eye disease that encourage annual dilated eye exams for everyone with diabetes.
- The National Eye Institute, Community Award Recipients—

West Virginia Health Right, Inc., Charleston, WV

This free comprehensive-care clinic educates people with diabetes about the importance of receiving an annual comprehensive dilated eye exam and about diabetes control. Volunteer ophthalmologists provide eye exams and treatment plans for patients diagnosed with diabetic retinopathy, glaucoma, and cataract.

Charles B. Wang Community Health Center, New York, NY

This educational program of the center educates Chinese Americans who have diabetes about diabetic retinopathy and the importance of early detection and treatment. The program features educational workshops, a media campaign, and collaboration with Asian community organizations.

Glaucoma damages the optic nerve, the network of fibers that carries visual information from the eye to the brain. Peripheral (side) vision is usually the first to be harmed by glaucoma. Over time, more nerve cells in the eye are damaged, and the field of vision is diminished. A person with glaucoma in its advanced stages sees only objects in the center of the visual field. However, vision loss may be subtle and may increase slowly. Many people do not notice this vision loss as it is happening or progressing. Of the estimated 2.2 million Americans who have glaucoma, half are unaware of the presence of the disease.¹³ Glaucoma is detected through a comprehensive dilated eye exam; however, there is no cure for glaucoma, and vision lost from the disease cannot be restored.

Glaucoma prevalence is clearly related to age and race. The Los Angeles Latino Eye Study found that the overall prevalence of open-angle glaucoma among Latinos was nearly 5 percent. This rate increased with age from about 8 percent for those in their sixties to 15 percent for those in their seventies. This prevalence rate is higher than the rate reported for Whites and similar to that for African Americans. Nearly 4 percent of Latinos had ocular hypertension, a risk factor for glaucoma. Latinos with a predominantly Mexican ancestry in Los Angeles have rates of open-angle glaucoma comparable to those of African Americans, and significantly higher than those seen in non-Hispanic Whites.¹⁴ Glaucoma is the leading cause of blindness in African Americans. African Americans experience almost three times the age-adjusted prevalence of glaucoma than Whites. The Baltimore Eye Study and the Barbados Eye Study confirm a substantially higher prevalence of primary open-angle glaucoma in Caribbean Blacks and African Americans than in Whites.^{15,16}

Based on data from the 2002 National Health Interview Survey, women ages 45 years and older have a higher rate of visual impairment due to glaucoma than men. Among different education levels, adults ages 45 and older with less than 12 years of education have a rate of visual impairment due to glaucoma nearly twice that of those with 12 or more years of education. Among different racial/ethnic groups, African American adults ages 45 years and older were three times more likely to have vision impairment due to glaucoma as compared with White and Hispanic/Latino adults. Persons with diabetes were nearly three times as likely to report visual impairment due to glaucoma as persons without diabetes.

Challenges

- Open-angle glaucoma is the most common form of the disease. At first, it has no symptoms, causes no pain, and does not affect vision.
- There is no cure for glaucoma. Vision lost from the disease cannot be restored.
- Glaucoma affects more than 2.2 million Americans ages 40 and older.
- Glaucoma is the leading cause of blindness in African Americans.

Strategies and Opportunities

- Chi Eta Phi Sorority, in collaboration with national health organizations and government agencies, provides public education and screening programs for glaucoma, targeting those in high-risk groups.
- The Glaucoma EyeCare Program, conducted by EyeCare America, promotes early detection and treatment of glaucoma. The program raises awareness of glaucoma risk factors (family history, race, age), provides free glaucoma educational materials, and facilitates access to glaucoma eye examinations.
- The National Eye Health Education Program, coordinated by the National Eye Institute, has developed the Glaucoma Public Education Program to educate people at risk for glaucoma and their families, friends, and caregivers about the importance of comprehensive dilated eye exams to detect this disease before vision is lost. As a part of this program, the NEI has developed a variety of materials to educate people about glaucoma, including “Glaucoma: What You Should Know” and “Don’t Lose Sight of Glaucoma.”
- The American Academy of Ophthalmology has developed a glaucoma brochure to educate patients about this disease. Health care professionals can order copies of the brochure to distribute to their patients by visiting the AAO Website at www.aao.org or by calling 415-561-8525.
- The American Optometric Association has developed a variety of educational materials for people at risk for glaucoma and their families, friends, and caregivers. These materials include “Answers to Your Questions About Glaucoma” and “What Black Americans Should Know About Eye Health.” Sample brochures are available at no cost through the AOA Website at www.aoa.org or by calling 314-991-4100.
- The Glaucoma Foundation provides a variety of resources for people who have glaucoma, including a toll-free hotline (1-800-GLAUCOMA) answered by representatives trained to provide factual answers to commonly asked questions, referrals to optometrists and ophthalmologists, and free literature designed to help the patient understand how to manage the disease. The Foundation also recently developed the *Young and Under Pressure* program, an e-mail-based support group for young patients seeking support from others sharing their age range and eye problems.
- The Glaucoma Research Foundation provides a variety of resources for people with glaucoma and their families, including a quarterly newsletter, an interactive feature on the Foundation’s Website that connects people who have glaucoma over the Internet, a telephone-based support service, and an e-mail-based peer support network.
- The Lions Clubs International provides financial assistance for those who need a comprehensive eye exam and/or necessary medication to control glaucoma.
- The National Eye Institute coordinates public and professional awareness activities related to glaucoma through the National Eye Health Education Program. These activities include

the development of materials designed to teach at-risk populations about glaucoma and the importance of regular eye exams.

- The Glaucoma Public Education Program: Medicare Benefit, developed by the NEI, is designed to increase awareness among African Americans ages 50 and older about the risk factors of glaucoma; the importance of healthy vision; and for those who are eligible, the Medicare benefit. Products developed include five radio public service announcements and a vision benefit card. Outreach activities and promotion of the products are concentrated during January, which is Glaucoma Awareness Month, and February, which is Black History Month.
- The National Eye Institute, Community Award Recipient:

Louisiana Eye Health Educational Institute, Port Allen, LA

The institute targets older Louisiana residents to decrease the rate of comprehensive dilated eye exam disparity among African Americans with diabetes. The institute offers “Faith in Wellness” eye health fairs at faith-based venues.

Objective 28:10	Increase vision rehabilitation.
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Vision rehabilitation refers to the provision of services for people with visual impairment. Services primarily encompass training, counseling, and support—from helping people continue everyday activities, to providing adaptive devices, to assisting with employment.⁷ While vision rehabilitation cannot restore lost sight, it can maximize any existing sight or, for people with no vision, it can equip them with techniques to maintain an independent lifestyle. Adaptive devices are generally included in vision rehabilitation services. These devices—from low-technology large-text books to high-technology computer programs that help the eye detect contrasts—help people make the most of their remaining vision.

Professionals from a variety of disciplines provide rehabilitation services. Disciplines may include ophthalmology, optometry, occupational therapy, mobility training, rehabilitation teaching, elderly care, and social work. These professionals may work together on a multidisciplinary team in numerous settings, including ophthalmology and optometry offices, rehabilitation centers and hospitals, university-based clinics, schools, state or private agencies, veterans administration programs, charitable agencies, and independent living centers.¹⁷

Based on data from the 2002 National Health Interview Survey, persons with visual impairments and 13 or more years of education were less likely to use vision rehabilitation services than persons with less education. Whites were more likely to use rehabilitation services.

Visual and adaptive devices include both prescribed and nonprescribed devices that help people with low vision enhance their remaining vision. Eye care professionals trained in low vision typically prescribe these devices. The appropriate selection of a low vision device or assistive technology and training in their application are crucial for ensuring proper use, and are included as part of the rehabilitation plan.¹⁸

Based on data from the 2002 National Health Interview Survey, men and women with visual impairments were equally likely to use visual and adaptive devices. Similarly, persons with visual impairments ages 18 years and older and any level of education were equally likely to use visual or adaptive devices. For the available race and ethnicity data, Whites with visual impairments were most likely to use visual or adaptive devices, and Hispanics/Latinos with visual impairments were least likely to use devices.

Challenges

- The number of Americans older than 40 years with visual impairments is about 3.4 million, including nearly 1 million people who are blind.
- Blindness affects African Americans more frequently than Whites and Hispanics/Latinos, and Hispanics/Latinos have higher rates of visual impairment than other races.
- People are unaware of available vision rehabilitation services.

Strategies and Opportunities

- The Council of Citizens with Low Vision International (CCLVI) provides services and outreach programs for people with low vision, including a toll-free hotline, consumer magazine, and annual conference.
- Lighthouse International is conducting a national awareness campaign that provides free booklets, bookmarks, and promotional posters to public libraries, low vision specialists, support groups throughout the United States, and people and organizations in the aging network. More than 343,000 booklets (“Vision Loss is Not a Normal Part of Aging” and “Family and Friends Can Make a Difference”) have been disseminated. The material focuses on normal changes in vision as people age; common age-related eye disorders, including diabetic retinopathy, glaucoma, cataract and macular degeneration; the benefits of vision rehabilitation for people with vision loss; and information on how to access rehabilitation services.
- The National Association for Visually Handicapped lends devices to people in need, teaches computer courses, provides optical aids, and offers support to senior groups.
- The National Eye Institute and Lighthouse International have developed the *See for Yourself: Vision and Older Adults* program to help public health professionals and other people who work with older adults teach effective ways to live with low vision and promote awareness about low vision rehabilitation services.
- The American Academy of Ophthalmology has developed a variety of low vision materials for eye care professionals, including an educational brochure ophthalmologists can distribute to patients.
- The American Optometric Association provides a variety of educational resources for eye care professionals and patients with low vision. These resources include a patient brochure and guidelines for health professionals who work with patients who have low vision.

- The Glaucoma Foundation provides a toll-free hotline (1-800-GLAUCOMA) for people with glaucoma. Since many glaucoma patients calling the hotline have experienced some visual loss, the Foundation routinely provides referrals to low vision organizations and suggests the consideration of low vision devices to improve the callers' life experience. The Glaucoma Foundation newsletter also provides information on new resources and services available for these individuals.
- Lions Clubs International is recognized worldwide for its service to the blind and visually impaired. The Lions extend their commitment to sight conservation through countless efforts, including their international *SightFirst* program.
- The National Eye Institute, Community Award Recipients:

Greater Boston Aid to the Blind, Boston, MA

Vision Boston, a collaborative project targeting low-income and minority older adults, provides workshops for consumers and health care providers, telephone followup, and referrals. The menu of resources includes low vision exams, books and magazines on tape, and vision rehabilitation services.

Health S.E.T., Denver, CO

The *Senior Vision Connection* program aims to increase delivery of vision rehabilitation services and adaptive aids to older adults with visual impairment. The program features direct services such as home assessments, support groups, counseling, in-service training, presentations, and media relations.

B. Reducing Eye Health Disparities

The National Eye Health Education Program, coordinated by the National Eye Institute in partnership with public and private organizations concerned with eye health education, collaborates on the development of eye health education programs targeted to a variety of high-risk audiences. The programs can be implemented through the members/chapters/affiliates of the NEHEP Partnership. NEHEP convenes work groups and conducts focus groups and key informant interviews to ensure the sensitivity of NEHEP education programs in addressing the needs and acknowledging the perspectives of select populations. NEHEP is strengthening the capacity of select communities by expanding the number of Partnership organizations involved in planning and implementing educational and outreach activities.

Some eye diseases and conditions have a greater prevalence in minority populations and result in increased blindness or visual impairment compared to other populations. These conditions include glaucoma, diabetic retinopathy, cataract, and refractive errors. A recent study of the causes and prevalence of visual impairment suggested that glaucoma and cataract account for more than 60 percent of the blindness in African American adults in this country.

By conducting basic and clinical research into these diseases and ensuring that NEI-supported clinical trials have appropriate inclusion of minority populations, the NEI and the vision research community are trying to improve treatment for those who have a disproportionate share of the

disease burden. The NEI is committed to advancing the understanding of disease development and progression that contributes to health disparities.

To understand the impact of eye disease and visual impairment on the health of the Nation, data are needed on the number and characteristics of people with various eye conditions, the effects of these conditions on quality of life, and the economic burden of these conditions. This information will serve to increase public awareness of the personal and societal costs of visual impairment, and will be useful to those who are interested in allocating adequate resources to Americans most in need of eye health services.

Challenges

- Diabetes is more common in some U.S. minority populations, especially African Americans, American Indians, Alaska Natives, and Hispanics/Latinos. High prevalence rates of diabetic retinopathy have been found in these populations.^{19,20}
- The rate of diabetes in the Mexican-American community ages 40 years and older was 20 percent, rising from 10 percent in those ages 40–49, to 32 percent in those ages 70–79. This high prevalence of diabetes among Hispanics of Mexican origin, generally 2 to 2 1/2 times higher compared to non-Hispanic Whites, is similar to that reported by other studies.²¹
- The rate of diabetic retinopathy in those with diabetes was 48 percent, a number similar to that of non-Hispanic Whites. Prior to the survey, there had been conflicting reports about the rate of diabetic retinopathy in Mexican-Americans with diabetes. In this survey, it is estimated that one-third of Mexican-Americans with diabetic retinopathy could have delayed or prevented eye complications with early detection and control of their diabetes. The rate of diabetic retinopathy increased with higher blood sugar levels and longer duration of diabetes.²¹
- The Los Angeles Latino Eye Study found that nearly half of all participants with diabetes, almost a quarter of the study population, had some signs of diabetic retinopathy. A longer duration of diabetes was associated with a higher risk of retinopathy. In addition, more than 10 percent of participants with diabetes had macular edema (fluid buildup in the back of the eye), of whom 60 percent had cases severe enough to require laser treatment. Latinos had a higher rate of more severe vision-threatening diabetic retinopathy than Whites.¹²
- African Americans develop glaucoma more often than other ethnic groups, and are likely to develop the disease at a younger age.^{13,22} Latinos with a predominantly Mexican ancestry in Los Angeles have rates of open-angle glaucoma, comparable to those of African Americans, and significantly higher than those seen in non-Hispanic Whites.¹⁴
- Hispanics/Latinos have higher rates of visual impairment and blindness than members of other ethnic groups. Prevalence rates of visual impairment in Latinos are higher than those reported in Whites and comparable to those reported in Blacks.²³
- Myopia occurs in approximately 25 percent of the population of the United States.²⁴ Myopia progression results from excessive growth of the eye, primarily by enlargement of the vitreous chamber. Excessive elongation of the eye is a major risk factor for retinal

detachment. A clinical study of myopia in first and second generation Hispanic, White, Asian, and Black immigrant students in this country demonstrated that Asian immigrants have a significantly higher prevalence of myopia.²⁴ Increased prevalence of myopia among Alaskan Eskimos and some American Indian tribes has also been reported.^{25,26}

Strategies and Opportunities

- The NEI supported the Ophthalmic Complications Prevention Trial, which evaluated the efficacy of an inexpensive educational intervention to promote annual ophthalmic screening among low-income African American women with diabetes.
- Results from the Los Angeles Latino Study reveal that Latinos with a predominantly Mexican ancestry in Los Angeles have rates of open-angle glaucoma, comparable to those of African Americans, and significantly higher than those seen in non-Hispanic Whites.¹⁴
- The NEI and the National Center on Minority Health and Health Disparities funded the Ocular Hypertension Treatment Study (OHTS), which was designed to determine the potential benefit of treatment with ocular hypotensive medications in preventing or delaying damage to the eye from glaucoma.²⁷ The high percentage of African Americans participating in the study will ensure adequate evaluation of the effectiveness of topical medication in treating African Americans with glaucoma.
- Recent findings from the NEI-supported Advanced Glaucoma Intervention Study suggest that African American and White patients with advanced glaucoma respond differently to two surgical treatments for the disease. Although both groups benefit from treatment, scientists found that African Americans with advanced glaucoma benefit more from a regimen that begins with laser surgery, while Whites benefit more from one that begins with an operation called a trabeculectomy.²⁸
- The National Eye Institute collaborated with the National Urban League (NUL), a national organization servicing the social and educational needs of the African American population, to support NUL's "Lift Every Voice" National Diabetes Education Program.

C. Early Detection, Treatment, and Rehabilitation of Eye Diseases and Disorders

Eye disease, a major public health problem in the United States, causes significant suffering, disability, loss of productivity, and diminished quality of life for millions of people. The National Eye Institute is addressing this public health problem through programs of biomedical research, disease prevention, and health promotion. NEHEP plays a critical role in increasing awareness among health care professionals and the public of scientifically based health information that can be applied to preserving sight and preventing blindness. The focus of NEHEP is on public and professional education programs that encourage early detection and timely treatment of glaucoma and diabetic eye disease, and the appropriate treatment for low vision.

Challenges

- It is estimated that less than 15 percent of children ages 5 and under receive an eye examination.
- Most eye diseases lack symptoms until vision is lost.
- Many work-related eye injuries result in lasting visual impairment.
- People with low vision often cannot perform many daily life activities.

Strategies and Opportunities

- The National Association of Vision Professionals develops and promotes educational programs for the public with a primary focus on prevention, detection, and followup of vision services for preschool and school-aged children and adults of all ages.
- The National Council of Aging and the American Optometric Association cosponsor *Rites of Sight*, a video-centered program designed to help people inform older adults of common age-related changes in the eyes and vision, and the early signs of more serious eye conditions.
- Unite For Sight offers online eye health courses, including an Eye Safety Module. The module includes information about eye injuries, common causes of eye injuries, and recommendations for preventing injuries. The module concludes with an interactive quiz.
- The National Association for Visually Handicapped provides a wide array of visual aids, large-print materials, emotional support, educational outreach, and referral services.
- The American Foundation for the Blind has national programs in aging, education, employment, specialized services, access, and technology, as well as a national program on braille and low vision literacy.

D. Research Needs and Opportunities for Eye Diseases and Disorders

In recognition of its special responsibility to address the eye health needs of the Nation, the NEI and its National Advisory Eye Council offer this vision and commitment for the future:

The National Eye Institute will continue to protect and improve the visual health of the Nation through the support and performance of the highest quality laboratory and clinical research aimed at increasing our understanding of the eye and visual system in health and disease and developing the most appropriate and effective means of prevention, treatment, and rehabilitation, and through the timely dissemination of research findings and information that will promote visual health.

This vision statement is the logical extension of the mission of the NEI to “conduct and support research, training, health information dissemination, and other programs with respect to blinding

eye diseases, visual disorders, mechanisms of visual function, preservation of sight, and the special health problems and requirements of the blind.” Inherent in this mission is the investigation of normal tissue and normal visual processes, so that a more complete understanding may be gained of the abnormal processes that lead to diseases of the eye and disorders of vision. These investigations are conducted in hundreds of extramural laboratories and clinics throughout the United States and in the intramural facilities of the NEI in Bethesda, Maryland.

Also inherent in the mission of the NEI is the application of the knowledge gained through research to benefit those who suffer from diseases of the eye or disorders of vision. This translational research is a critical component of NEI research programs, and it is defined as the application of fundamental scientific discoveries and novel technologies to the development and testing of solutions for clinically relevant problems, and thus may be relevant to the prevention, treatment, or diagnosis of eye diseases.

Challenges/Opportunities

- Understand the pathogenesis of diabetic retinopathy and other vascular diseases of the retina, and develop strategies for primary prevention and improved treatment.
- Study the interacting roles of the environment and genetics in risk factors for retinal disease.
- Study vascular endothelial growth factor (VEGF), which has become a leading candidate for the long-sought agent responsible for neovascularization in retinal diseases.
- Elucidate the prevalence, pathophysiology, natural history, and history of intervention results of optic neuropathies such as glaucoma over the full course of these diseases and within ethnic subgroups.
- Evaluate the effectiveness of existing rehabilitation strategies and programs and assess their impact on task performance, psychosocial and psychological factors, and quality of life parameters in people with visual impairment.
- Develop an understanding of visual and nonvisual requirements for performing everyday tasks.
- Develop a knowledge base of design requirements for architectural structures, open spaces, and parks, and the devices necessary to help people with visual impairments to get around and perform everyday tasks.
- Focus additional resources on the development of training programs and assistive devices for the rehabilitation of people with visual impairments.

A more complete description of the goals, challenges, and opportunities in vision research can be found in “National Plan for Eye and Vision Research” on the NEI Website at www.nei.nih.gov/strategicplanning.

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