

The role of community health centers in responding to disparities in visual health

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KEYWORDS

Community health centers;
Comprehensive eye and vision care;
Optometry;
Health disparities;
Access to health services;
Medically underserved

Abstract

BACKGROUND: Community health centers (CHCs) are nonprofit community-based providers of primary and preventive health care for medically underserved populations. At the same time, nationally, racial/ethnic minorities and low-income populations are disproportionately affected by poor access to comprehensive eye and vision care and are more likely to experience adverse outcomes.

OVERVIEW: This report describes the fundamentals of CHCs, including mission, their patients, the types of health care and enabling services that they provide, the quality and cost-effectiveness of their care, and how they are funded. This report also reviews the demographics of vision disparities among at-risk populations, the economic impact of undiagnosed and untreated vision problems, and the similarities between those at risk for vision problems and the patients targeted by CHCs.

CONCLUSIONS: Aimed at responding to disparities in access to health care services and health status outcomes, CHCs are optimally positioned to contribute to improved access to comprehensive eye and vision care as well as to the reduction of disparities in visual health status. There is need for extensive research in further defining and addressing disparities in access to optometric care in medically underserved populations and the potential role that CHCs can play in meeting those needs.

Optometry 2008;79:564-575

Community health centers (CHCs) are nonprofit, tax-exempt community-based and community-governed providers of primary and preventive health care for the nation's most vulnerable, including the uninsured and other medically underserved populations. CHCs also offer preventive dental care, mental health, substance abuse, pharmacy, and enabling

services aimed at responding to disparities in access to health care and disparities in health status. With a federal mandate to provide primary health care in low-income communities with a high prevalence of preventable diseases and health conditions, health centers provide high-quality care that exceeds the performance of more traditional providers.^{1,2}

Low-income and minority populations in particular tend to be at greater risk for undiagnosed and uncorrected eye and vision disorders and diseases than the general population.³⁻⁵ Such disparities are compounded by a number of factors, including inadequate or no health insurance, lack of access to eye care professionals, the high cost of treatments including corrective lenses, and lack of understanding of the importance of routine comprehensive eye and vision care, especially when asymptomatic.^{3,6}

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Although undiagnosed and untreated medical, mental health, and oral health problems are understood to be serious health threats to quality of life and health status, undetected and untreated eye and vision problems also have grave consequences. Unmet eye and vision care needs among millions of children, working poor, and elderly people can significantly impair learning, job performance, employment opportunities, and home safety. Undiagnosed medical eye conditions such as cataracts, glaucoma, and diabetic retinopathy can contribute to vision loss, visual impairment, blindness, loss of socialization, and depression. In the elderly, undiagnosed vision problems have been implicated as the primary cause of falls and injury within the home, which many times lead to more serious health consequences.⁷

CHCs are positioned optimally to reduce disparities in visual health status in medically underserved populations. This report examines the role health centers play as medical homes and care coordinators, as safety net providers, and as an essential health care setting for patients to have better access to comprehensive eye and vision care. Specifically, this report describes (1) patient and service characteristics of health centers, (2) health center financing, and (3) health center quality of services. This report also discusses remaining gaps in improving visual health outcomes, including disparities in vision care in underserved populations, access to comprehensive eye and vision care in underserved populations, and a review of literature showing the economic impact of undiagnosed and untreated vision disorders and diseases. Given the intent of this report to lay out the fundamentals of CHCs and their role in addressing health care disparities, this report does not cover policy approaches to integrating optometry services into CHCs. However, another report published in this issue presents a valuable case study on how one community achieved this.⁸

The CHC system of the United States provides the type of primary care services that are consistent with optometry's scope of practice. There is a need to study potential disparities in visual health among CHC patients and access issues relating to optometric care in CHCs. Studies should address the benefits of increasing access points to optometric services. Optometry, by virtue of its scope of practice, is in a position to close any identified gaps in access to comprehensive eye and vision care and to contribute to improved visual health outcomes at CHCs. If studies find a need for comprehensive eye and vision care, then optometry and CHCs should develop cost-effective and collaborative approaches to provide further access to these optometric services. Service partnerships between CHCs and optometry should be thoroughly evaluated.

The community health center program

The national network of community, migrant, homeless, and public housing health centers delivers primary and preventive care to poor and underserved communities across the country that face compounding access barriers. Born out

of the war on poverty and civil rights movements of the 1960s, CHCs respond to meet the needs of Americans suffering from poverty, a desperate lack of health care, and disparities in access to health services and health status. The Office of Economic Opportunity funded the first health centers in 1965—then known as neighborhood health centers—and over the years the program has been statutorily defined as part of the Public Health Service (PHS) Act. In 1975, neighborhood health centers were designated by Congress as “Community and Migrant Health Centers,” and, in 1996, the PHS Act was amended to bring together the different health center categories under Section 330 of the act. Specific health center categories include:

- CHCs, making up the majority of health center sites, serving medically underserved and low-income people and including care delivered through school-based sites
- Migrant health centers, serving migrant and seasonal agricultural workers and their families
- Homeless health centers, serving homeless adults, families, and children
- Public housing health centers, serving residents of public housing

CHCs are also known as Federally Qualified Health Centers (FQHCs). The 2 terms come from different sets of statutes, yet speak to the same health center program. The Omnibus Budget Reconciliation Acts of 1989 and 1990 established the term FQHC under Title 19 (Medicaid) and Title 18 (Medicare) of the Social Security Act. FQHCs are defined in these statutes to include health center organizations recognized by Section 330 of the PHS Act, including those that receive Section 330 grant funds, certain centers that subcontract with these 330 grantees, and centers that do not receive Section 330 grant funds, but, based on the recommendation of the Federal Health Resources and Services Administration (HRSA), are determined to meet the requirements of the Section 330 grant program. This last category of health centers, making up approximately 10% of all FQHCs, has been labeled *FQHC Look-Alikes*. The Bureau of Primary Health Care (BPHC) within the HRSA is responsible for the Health Centers Program and for recommending health centers to the federal Centers for Medicare & Medicaid Services (CMS) for designation as FQHCs.

Federally Qualified Health Centers and FQHC Look-Alikes are eligible to receive enhanced reimbursement from Medicare and Medicaid and to participate in the 340B Program for reduced-priced drugs. However, only FQHCs that actually receive Section 330 grant funds have access to medical malpractice insurance through the Federal Tort Claims Act. FQHC Look-Alikes do not receive such coverage.

Program requirements

All FQHCs must meet the following requirements:

- Be **located in high-need areas** identified by the federal government as having elevated poverty and

higher-than-average infant mortality and where few physicians practice

- Be **open to all residents**, regardless of insurance status, and provide free or reduced-cost care based on ability to pay (i.e., a sliding fee scale)
- **Offer important “enabling services” that facilitate care utilization**, such as interpretation/translation, outreach, case management, transportation, and health education
- **Customize their services** to meet the specific health care and cultural needs of their patients
- **Provide primary health care services**; federal statute requires that basic health services at a minimum include primary care; diagnostic laboratory and radiology services; preventive services (including prenatal and perinatal services); cancer and other disease screening, well-child services; immunizations against vaccine-preventable diseases; screening for elevated blood lead levels, communicable diseases and cholesterol; vision, ear and dental screening for children; family planning services and preventive dental services; emergency medical and dental services; and pharmaceutical services as appropriate to a particular health center.⁹ **These services are delivered either on-site or through contractual relationships.**
- **Have an ongoing quality improvement program** to ensure continuous performance improvement in both clinical services and management
- Be run by a **patient-majority governing board**

This last requirement is unique among all health care providers. No less than 51% of members of a health center’s governing board must be active patients. As a group, a health center’s board must represent the individuals being served by the center in terms of demographic factors such as race, ethnicity, and gender. These consumer-majority boards provide oversight to health center operations and are ultimately responsible for determining the extent other health services (such as medical, mental, dental, and optometry) are needed and can be provided either on-site or through a referral mechanism.⁹ Governing boards ensure that health centers are firmly grounded in their local community, giving patients an active say in the determinants of their care. See [Table 1](#) for more information on CHCs.

Under existing policy, optometry is not explicitly defined as a mandated service, but certain types of vision services, such as pediatric vision screenings, are included. Under the Section 330 statute, CHCs may provide “additional health services” that are not required services but that help meet the needs of their patients, such as diabetes management programs. Interestingly, a 1996 Institute of Medicine (IOM) report¹⁰ noted the role optometry plays in primary care and the important contributions of “first-contact” health professionals, specifically dentistry, optometry, and pharmacy, to the provider team that cares for patients. The report stated that these 3 services should be considered part of the overall team that provides care to patients and further named CHCs

Table 1 CHC resources online

The National Association of Community Health Centers (NACHC) http://www.nachc.com
The American Optometric Association Community Health Center Web page http://www.aoa.org/x6493.xml
Bureau of Primary Health Care, Health Resources and Services Administration http://www.bphc.hrsa.gov/
NACHC’s So You Want to Start a Community Health Center Guide http://iweb.nachc.com/downloads/products/05_start_chc.pdf
NACHC Background on Program Requirements and Common Features http://www.nachc.com/client/documents/Background_Paper_on_CHC_Model_FINAL.pdf .
State Primary Care Association Directory http://www.nachc.com/nachc-pca-listing.cfm
Online CHC Locator http://ask.hrsa.gov/pc

as places in which interactions between disciplines should be both encouraged and facilitated.

CHCs have made impressive strides in addressing health disparities in racial and ethnic minorities and the poor. CHCs acknowledged the need for further partnering to bring transdisciplinary approaches to care management.¹¹ In an editorial by Lopez and Donohue-Henry,¹² it is specifically noted that improved health outcomes at CHCs cannot be achieved without other ancillary and supportive services.¹² When these services are offered, they tend to be delivered on site or through a referral arrangement with a partner provider.

Fundamentals of community health centers

Health center services

Health centers provide primary care services either directly or through contracts or formal referral arrangements. Delivery of additional services beyond primary care depends on a governing board’s determination of services needed as well as available financing. For example, services such as optometry may be added, either on site or through a contractual or formal referral mechanism, if a governing board views optometric services as needed to augment other services, or if a determination is made by the board that a community need for optometric services is warranted.

All federally funded health centers report data annually to the Bureau of Primary Health Care (BPHC). Known as the Uniform Data System (UDS), these data reflect their patient population, service delivery, and other factors. According to CY2006 UDS, the most recent year available at the time this report was written, 93% of the 1,002 federally funded health centers nationwide provided vision screening on-site. The remaining federally funded health centers reported referral of patients to vision service

providers. During the same year, 30% of federally funded health centers provided dilated eye examinations for patients with diabetes, whereas the rest reported providing dilated eye examination through referrals. The UDS also reported that 19% of health centers indicate provision of optometry services on-site while the remaining centers reported providing optometry services through referral arrangements. These statistics and the definition of these services are seen in Table 2.

Table 2 does not show the differences in how these services are delivered between urban and rural CHC organizations. There is no difference between urban and rural centers in the delivery of vision screening on-site, but 9% of rural grantees provide optometry services on-site compared with 29% of urban grantees, whereas 21% of rural grantees provide dilated eye examination services on-site for diabetic patients versus 38% of urban grantees. These notable differences may speak to a lack of eye care professionals in rural areas but also to community decisions to partner with off-site eye care professionals.

Some of the difficulties in interpreting Table 2 include the definition of vision screening. Although most agree that vision screenings are an important way to triage the need for a comprehensive eye examination by an eye care professional,^{13,14} the information in Table 2 does not specify the battery of tests involved in vision screenings at CHCs. Additionally, guidelines have been developed that recommend comprehensive eye and vision care for certain populations at high risk for ocular and vision problems despite access to vision screening services. These guidelines

include (1) people with diabetes who have not had an eye examination through dilated pupils in the previous year, (2) African-Americans older than 40 who have not had an eye examination through dilated pupils in the previous 2 years, and (3) anyone older than 50 who has not had an eye examination through dilated pupils in the previous 2 years.¹⁵ The literature also recommends that children should be screened for visual problems before entering school.¹⁶

Table 2 includes a column for dilated eye examinations. To our knowledge, there is no elucidation of how the dilated examinations were performed and by whom. For example, these numbers could include dilation with fundus photography; dilation and examination by a nonophthalmic health care provider; dilation with examination using a direct or monocular ophthalmoscope, or examination and interpretation by an optometrist or ophthalmologist in a setting that does not have on-site equipment for comprehensive eye and vision care services (thereby accounting for the larger percentage of on-site dilated examinations versus on-site optometric services).

Although Table 2 is useful from a general perspective, there are other limitations that this information brings into question, such as in interpretation of the extent of optometry services delivered at CHCs. Another issue that arises is the need to further study referral patterns for comprehensive eye and vision care, including rates of kept appointments by insurance status, accuracy and documentation of results from referrals, and cost comparisons of grantees paying for referrals versus having in-house optometry services.

Table 2 Summary of vision services as reported by the Bureau of Primary Health Care at community health centers, 2006

Services	On-site	By referral & grantee pays	By referral & grantee does not pay
Vision screening*	93%	9%	46%
Optometry†	19%	13%	85%
Dilated eye exam for diabetics‡	29%	16%	76%

Notes: "On-site" includes services rendered by employees, contracted providers, volunteers, and others who render services in the health center's name. Referrals indicate that services are provided through formal and contractual referral arrangements. Health centers may deliver care through more than one method.

* "Diagnostic services to identify potential vision problems."

† "Services provided by a medical professional licensed or certified to diagnose, treat and manage diseases and disorders of the visual system, the eye and associated structures as well as diagnosis of related systemic conditions."

‡ "An examination in which the pupils are dilated in order to check for diabetic eye disease."

Source: 2006 Uniform Data System, Bureau of Primary Health Care, Health Resources and Services Administration, DHHS. All federally funded health centers report this data annually.

Health center patients

In 2008, health centers will care for 18 million underserved and vulnerable patients, which represents nearly 71 million total visits. The majority of health center patients have low income, are uninsured or publicly insured, and are members of racial/ethnic minority groups. In fact, health center patients represent 1 in 5 of the nation's low-income, uninsured population; 1 in 8 Medicaid beneficiaries; nearly 1 in 3 individuals in poverty; 1 in 4 low-income minorities; and 1 in 9 rural Americans. In 2008, more than 1,200 health center organizations provide care through more than 6,600 delivery sites in every state and U.S. territory. The number of health centers and the number of patients are nearly evenly split between urban and rural areas.

Ninety-two percent of CHC patients have low income, with most actually below the federal poverty level (see Figure 1), compared to 12.3% of the total U.S. population.¹⁷ Although roughly a third of the U.S. population are members of racial and ethnic minority groups,¹⁸ roughly two thirds of CHC patients are, in fact, members of racial and ethnic minority groups, as shown in Figure 2. Nearly a third (29%) of health center patients prefers to be served in languages other than English. At the same time,

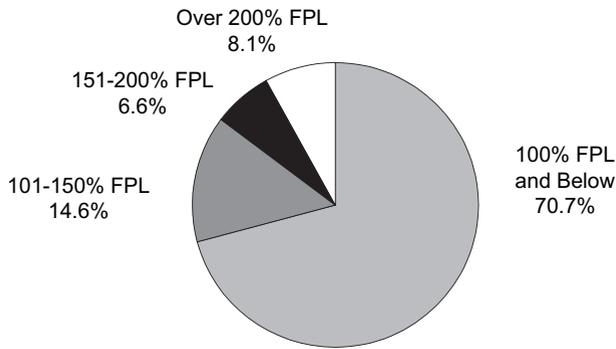


Figure 1 Health center patients by income level as a percent of the federal poverty level, 2006.

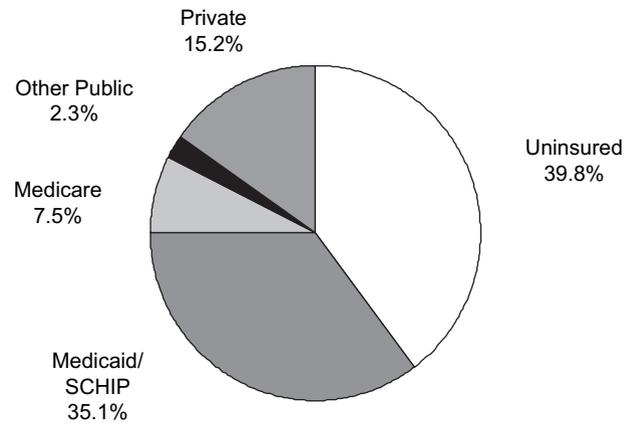


Figure 3 Health center patients by insurance status, 2006.

40% of patients are uninsured, and 35% have Medicaid (*see Figure 3*), compared with national rates of 15.8% and 12.9%, respectively.¹⁹ Although 15% of patients are privately insured, the fact that private insurance covers so little of their costs implies that they are predominately underinsured.¹⁰ Speaking to the fact that health centers provide care throughout the lifecycle, patients range in age (*see Figure 4*). Finally, CHCs also serve more than 900,000 migrant and seasonal farm workers and more than 900,000 homeless individuals.

Health center financing

As safety net providers, health centers have scarce resources. Health centers' revenue mix closely matches that of their payer mix. As displayed in *Figure 5*, the largest source of revenue is Medicaid, a proportion that closely matches that of patients with Medicaid. This contrasts sharply with private insurance, which provides only 7% of health center revenue yet covers 15.2% of health center patients. The second largest source of single revenue stems from federal health center grants. At 20% of total health center revenue, this amount has not kept up with the rising number of uninsured patients and costs of care. The number of uninsured patients has increased 55% since 2000. When

accounting for average cost of a self-pay patient and federal health center grant revenue per uninsured, federal grants have covered less than 60% of uninsured patient costs over the last several years and have declined annually since 2001. As of 2006, federal grants covered only half of the uninsured cost of care (*see Figure 6*). Operating margins are also low at health centers, hovering around 0.2% nationally. Health centers rely heavily on Medicaid as a source of third-party revenue. In comparison with private insurers and even federal funding, Medicaid comes closer to paying its costs. On the other hand, private insurers tend to be the least reliable payers and shift their costs to Medicaid and federal funding (*see Figure 7*).^{19,20} As a result, health centers are financially limited in their ability to expand staffing and services.

CHCs as medical homes and care coordinators

All patients, regardless of income, insurance status, or race/ethnicity, benefit from a patient-centered, culturally appropriate, continuous, and usual source of care. Such places, usually referred to as a medical home, embody not just a physical place for primary and preventive care, but also a

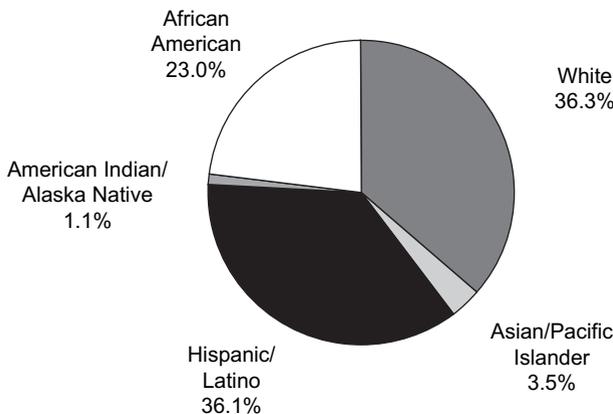


Figure 2 Health center patients by race/ethnicity, 2006.

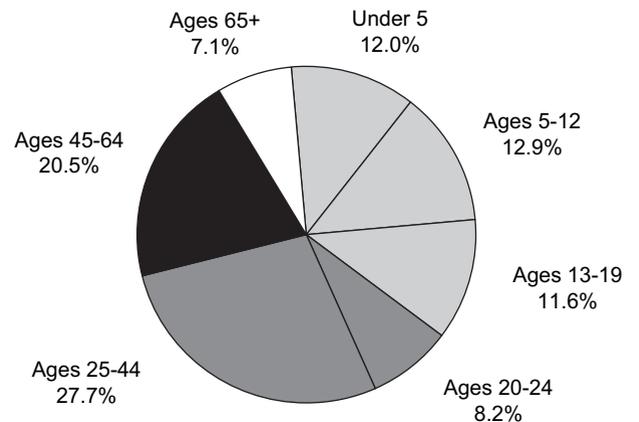


Figure 4 Health center patients by age, 2006.

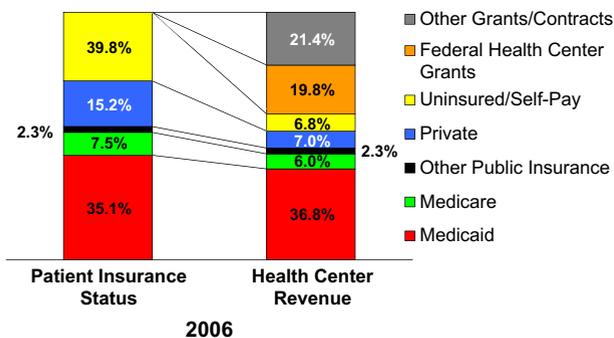


Figure 5 Health center patient insurance status and revenue by source, 2006.

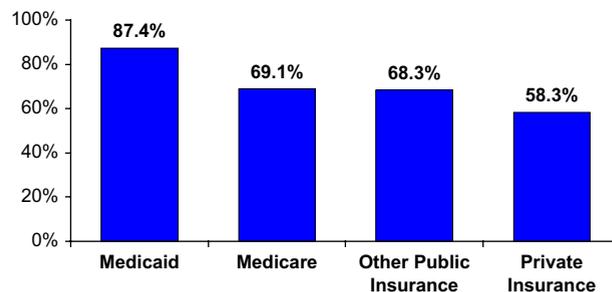


Figure 7 Percent of charges collected from third-party payers, 2006.

personal relationship and a complete process of care. Medical homes focus on the whole person, not just one specific health care need. Accordingly, they are led by a care management team of medical professionals, which is defined by each CHC according to its provider mix, that coordinate and integrate a patient’s care across multiple medical, behavioral, social, and other services and providers. Medical homes also help patients understand their conditions and coach them on changing their behaviors to improve their overall health. Moreover, medical homes require that the providers are committed to continuous quality improvement.²¹

A wealth of literature shows that having a medical home offers improved health outcomes and lowers health care costs independent of other factors. For example, accessible primary care is associated with reduced heart disease and cancer mortality disparities related to sociodemographic measures and lifestyle factors, whereas other medical services are not.²²⁻²⁶ When people have a regular source of health care, they better manage chronic illness, receive more cancer screenings, and even have fewer lawsuits against emergency rooms.²⁷ In an extensive review of relevant literature, Starfield and Shi²⁸ found that having a medical home is a greater predictor of receiving care than having insurance alone, and that having a medical home is generally associated with better utilization and outcomes, including needs recognition, earlier and more accurate diagnoses, reduced emergency room use, fewer hospitalizations, lower costs, better prevention, fewer unmet needs, and increased patient satisfaction.

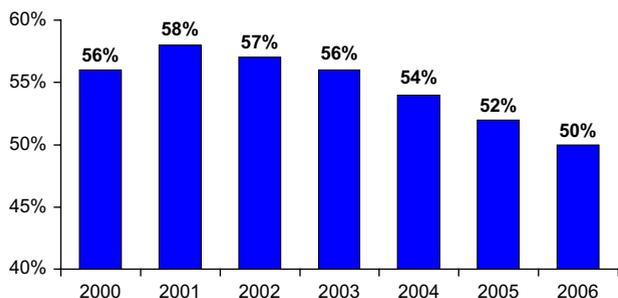


Figure 6 Federal health center grants as a percent of uninsured patient costs, 2006.

The expansion of medical homes can, even more dramatically, facilitate effective use of health care, improve health outcomes, minimize health disparities, and lower overall costs of care.²⁹⁻³¹ Low-income, minority, and uninsured populations would especially benefit from the expansion of medical homes because their health is more likely to be compromised, and they run the greatest risk of using costly hospital-based care for avoidable conditions.³²

Despite these benefits, numerous and often compounding barriers to care keep millions from accessing primary care, much less medical homes. Maldistribution of primary care providers means that 56 million people across every state do not have access to a primary care physician given shortages of such physicians in their local communities. These individuals come from the ranks of both the insured and uninsured. On top of this, dwindling numbers and increasing rates of practicing primary care physicians will cause this number to rise.³³ Furthermore, others face additional barriers to care, such as cost or insurance, language, and transportation. Clearly, insurance alone cannot guarantee access to primary care. In fact, people who have a usual source of care but no health insurance actually receive more primary and preventive care than those who have insurance but no usual source of care. Not surprisingly, those who have both fare best.³⁴

CHCs meet and go beyond the concept of a medical home. Approximately 84% of patients report being able to identify a particular health center physician as their own compared with 38% of adults and 36% of children nationally. Health center surveys also show 99% of health patients are satisfied or very satisfied with the quality of care they receive at health centers compared with satisfaction rates of 67% to 87% reported in other national surveys of physician visits.³⁵

One of the major contributing factors to the high rate of satisfaction of health centers as a medical home is the ease in which patients are able to access quality services. Only 24% indicate that their wait to see a provider was too long compared with other settings in which 53% of Medicaid and privately insured patients felt their wait was too long. Health centers generally customize and tailor their services to meet the specific needs of their patients and communities, including language services. Approximately 95% of patients report that their doctor speaks the same language as they do.³⁵

Finally, as a medical home model, health centers provide care using a mix of not only medical and health care professionals but also health educators, insurance enrollment workers, case managers, and others to ensure access to necessary specialty, diagnostic, and hospital care and to coordinate and integrate social services to improve effectiveness of the care they receive. As a result, health center Medicaid patients are significantly less likely to use the emergency department or be hospitalized for ambulatory care-sensitive (i.e., avoidable) conditions and therefore their care is less expensive than that of Medicaid patients treated elsewhere.³⁶⁻⁴⁰ These features common to all health centers help overcome barriers to care and make the care provided much more effective.

Health center quality and cost-effectiveness

Health centers provide high-quality care comparable to, or better than, other providers⁴¹ and meet or exceed quality performance results in the private sector even without adjusting for their greater mix of at-risk patient populations.¹ In particular, health centers nationwide meet or exceed nationally accepted practice standards for treatment of chronic conditions^{42,43} largely because of adoption of innovative and community-based chronic disease management programs that have been shown to improve both the processes of care and patient outcomes.^{2,44,45}

CHCs' abilities and capacities to improve access and quality for disenfranchised populations have resulted in reduced racial and ethnic health disparities.⁴⁶⁻⁴⁸ Despite disparities in health status that exist nationally, such disparities do not exist among health center patients, even after controlling for sociodemographic factors. The absence of disparities may be related to health centers' culturally sensitive practices and community involvement—features that other primary care settings often lack.⁴⁹ For example, Shi et al.⁵⁰ found that health center prenatal care patients have lower rates of low birth weight (LBW) than women nationally, regardless of race/ethnicity and even despite the fact that health center patients are low income. If the LBW black-white disparity seen at health centers could be achieved nationally, there would be 17,100 fewer LBW black infants annually.⁵⁰ Both the IOM and the U.S. Government Accountability Office have recognized health centers as effective models for reducing health disparities and for screening, diagnosing, and managing chronic conditions such as diabetes, cardiovascular disease, asthma, depression, cancer, and human immunodeficiency virus.^{48,51,52}

Additionally, health centers generate substantial savings to the health care system as a result of improved access and quality and provide much-needed economic benefits to the low-income communities they serve. A recent national study done in collaboration with the Robert Graham Center, the National Association of Community Health Centers (NACHC), and Capital Link found that people who use

health centers as their usual source of care have 41% lower total health care expenditures than people who get most of their care elsewhere. This translates into an annual cost saving of \$9.9 billion to \$17.6 billion to the health system. At the same time, health centers produced more than \$12.6 billion annually in economic benefits and helped to sustain more than 140,000 jobs, helping by their presence to attract or retain other local businesses (including other health care providers), sustaining a sense of "community," giving residents a feeling of pride and fostering community revitalization.⁵³

National review of disparities in access to vision care and visual health outcomes

This section provides an overview of disparities in eye care and ocular health outcomes among vulnerable populations. There are demographic similarities between the populations served at CHCs (as previously described) and the populations most at risk for vision problems. To date, no national needs assessment for the inclusion of comprehensive eye and vision services at CHCs has been conducted; however, the similarities in demographic profiles between current CHC users and those most at risk for poor visual health outcomes nationally suggest that such a study would be worthwhile to investigate potential disparities in access and visual health outcomes that exist in CHC patients. Although health centers have a record of success in eliminating barriers to primary care and improving health outcomes while minimizing disparities, millions of people may benefit from receiving optometric care at CHCs. The sections that follow highlight areas that a needs-assessment study should investigate.

Disparities in access to eye and vision care

Improving the visual health of the public is a challenge for a variety of reasons, with access to comprehensive eye and vision care heading the list. Recent studies have found that populations at high risk for vision disorders and diseases are least likely to seek preventive eye care at the recommended frequency.^{3,54} Why these groups demonstrate such a difference in health practices and visual outcome is a question complicated by many factors. Age, gender, ethnicity, education, income, insurance status, ability to speak English, place of residence, and having a reliable source of transportation are but a few of the barriers to care that many individuals face.

Baker et al.⁵⁴ investigated the utilization of preventive eye care and the specific factors that influenced individuals to seek care at the recommended frequency among a uniformly socioeconomically disadvantaged, minority, urban population. The investigators used the Behavioral Model for Vulnerable Populations theoretical model of health care access and utilization to determine frequency of examinations. They found that only 64% of respondents had

received an eye examination in the previous 2 years. After comparison of all the factors investigated, the authors concluded that within this high-risk population, affordability, having a continuous and regular source of medical care, and receiving physician advice to seek eye care were the most significant factors associated with receiving eye examinations at the recommended frequency.

Lack of access to affordable eyeglasses is also a significant unmet need in the United States. A recent study found that 14 million people in the United States age 12 and older suffer from vision impairment. Of these, 11 million could have a significant vision improvement just by wearing corrective lenses.⁵⁵ For many low-income individuals, the cost of eyeglasses may be prohibitive. Zhang et al.³ found that 1 in 12 high-risk individuals could not afford eyeglasses when needed. In this study, individuals that had a diagnosed vision problem or diabetes were even less able to afford eyeglasses. Thus, those individuals who most needed eyeglasses were the least likely to be able to afford them.

National data on conditions causing vision impairment

In the United States, vision impairment is the number one disability in children and one of the top 10 disabilities among adults 18 years and older.⁵⁶ As such, vision impairment poses a serious public health risk.

It is well documented that being black or Hispanic increases the risk of being visually impaired, as does being of lower socioeconomic status. What is even more alarming is the higher prevalence of certain blinding eye diseases in blacks and patients of Hispanic descent. According to benchmark 2002 data derived from the National Institutes of Health,⁵⁷ blacks have a prevalence rate for visual impairment caused by glaucoma of 3.8%. This compares with 1.09% in whites. Similarly, the prevalence of visual impairment caused by diabetic retinopathy in patients of Hispanic descent was found to be 7.3% compared with whites at 4.7%.⁵⁸

Thus, the social and economic costs caused by visual impairment need to be addressed, particularly in racial and ethnic minorities, the uninsured, and the poor. As racial and ethnic disparities data come into common usage in analyzing quality issues in health care,⁵⁹ the development of national disparities data relating to eye problems, such as glaucoma and diabetic retinopathy, may serve a purpose in planning optometry services at health centers.

Prevalence of uncorrected refractive error

The prevalence of visual impairment caused by uncorrected refractive error in all age groups is staggering. Recent results obtained from the National Health and Nutrition Examination Survey (NHANES) included a sampling of 13,265 participants who visited a mobile examination center from 1999 to 2002. Extrapolating the results of

that survey, of the estimated 14 million people over the age of 12 in the United States with visual impairment, 11 million could have visual acuity corrected to a level of 20/40 or better with proper refractive correction.⁵⁵ These results help to bolster the premise that the most common cause of visual impairment in the United States today is uncorrected refractive error.

Current data from Prevent Blindness America and the National Eye Institute indicate that 30.5 million Americans 40 and older are myopic and 12 million are hyperopic.⁵⁷ The type and amount of refractive error are influenced by age and ethnicity. The most obvious aging change is the development of presbyopia, which affects all individuals by the fourth or fifth decade of life. In the United States, the prevalence of myopia is highest in whites and generally decreases with age, whereas clinically significant hyperopia is most frequent in whites and Hispanics and generally increases with age.⁵⁷ Until recently, there were very limited data on refractive error in the Hispanic population, although more data are emerging. Munoz et al.⁶⁰ investigated the prevalence of refractive error in Mexican-Americans and found that this population had significantly more refractive error than whites and about equal to that found in African-Americans.

How optometric services provided by CHCs could contribute to improved visual health outcomes

Childhood vision problems

Vision disorders are the most common disabling condition in childhood.⁵⁶ Fortunately, childhood vision problems have received significant public attention in recent years, resulting in some increased awareness of the importance of comprehensive vision examinations in children, beginning in preschool, among public health officials, parents, and teachers.

The types of vision problems encountered in children differ with age. Infants may have clinically significant refractive error, strabismus, or, rarely, more serious life-threatening conditions such as retinoblastoma. Preschoolers typically present with refractive error, strabismus/amblyopia, or accommodative/binocular dysfunction. Early detection of these conditions allows for more effective treatment and increases the likelihood of improved vision, improved visual efficiency, and better ability to read and learn. Unfortunately, fewer than 15% of preschool children receive an eye examination, and fewer than 22% receive any type of vision screening.⁶¹ School-age children and adolescents are more likely to have vision impairment from uncorrected refractive errors than younger children and may have accommodative or binocular disorders that could affect learning.⁶² Not surprisingly, uncorrected vision problems correlate to learning difficulties, poor school performance, and social problems.⁶³

However, even with what is known about children's vision, there is still conflicting data regarding the prevalence of visual problems in children. The Vision in Preschoolers Study⁶¹ found amblyopia in 2% to 5% of children studied, strabismus in 3% to 4%, and significant refractive error in 15% to 20% of the preschoolers studied. In school-age children, estimates range as high as 25% that may have some type of vision problem. Most recently, Vitale et al.⁵⁵ found that 11.6% of study participants age 12 to 19 had some form of vision impairment, mostly caused by uncorrected refractive error.

Not surprisingly, race and socioeconomic status influence visual impairment in children, similar to adults. Kleinstein et al.⁶⁴ found that the type of refractive error among children varies widely among ethnic groups with Hispanic, black, and Asian children having higher degrees of refractive error than white children. Kemper et al.⁶⁵ found that children from low-income families are less likely to have corrective eyewear.

Referring to the section titled "Health Center Patients," the national CHC patient profile is composed of significant numbers of children who would otherwise lack access in general and may benefit from increased access to comprehensive eye and vision care.

Adult vision problems

Currently more than 3.4 million Americans are older than 40 and blind or visually impaired. According to data from Prevent Blindness America and the National Eye Institute,⁵⁷ the 4 leading causes of blindness in the United States are age-related macular degeneration (AMD), glaucoma, cataract, and diabetic retinopathy. Currently, 1.6 million Americans older than age 50 suffer from late-stage dry macular degeneration, 2.2 million older than age 40 have glaucoma, 20.5 million older than 40 have cataracts, and 5.3 million older than 18 have some form of diabetic retinopathy. These represent only the diagnosed cases of each vision problem.

Blindness affects blacks and Hispanics at least 2 times more often than whites of the same age, primarily because of primary open-angle glaucoma (POAG) and diabetic retinopathy.^{56,66,67} In addition to the 2.2 million people with an actual diagnosis of glaucoma, estimates suggest that another 3 to 6 million Americans are suspected to have glaucoma, ocular hypertension, or elevated intraocular pressure, placing them at risk for the development of POAG.⁶⁸ The Baltimore Eye Survey^{69,70} found that glaucoma may affect blacks nearly 6 times more frequently than whites and is the number one blinding disease in this population. More recently, the Ocular Hypertension Treatment Study⁶⁸ (OHTS) showed that blacks convert from glaucoma suspects to POAG 3 times more often than whites.

Two studies, Proyecto VER⁶⁰ and the Los Angeles Latino Eye Study (LALES),⁶⁶ investigated the prevalence of

multiple ocular conditions within a primarily Mexican-American population. The Proyecto study found that the prevalence of POAG was between that found in blacks and whites in the 40 to 49 age group. However, the prevalence of POAG in this Mexican-American population increased more quickly with older age than in other ethnic groups. Glaucoma was the leading cause of bilateral blindness in all age groups. The LALES investigators found a prevalence of 4.74% for POAG and 3.56% for ocular hypertension, which is nearly the same as found in blacks. LALES also found a much higher prevalence in older individuals than in other ethnic groups.⁶⁶

The Centers for Disease Control and Prevention (CDC)⁵⁶ estimates that 10.3 million Americans have diagnosed diabetes, whereas as many as 5.4 million cases remain undiagnosed. Diabetic retinopathy affects 5.3 million Americans age 18 and older and is the leading cause of blindness in people age 20 to 74. Current information indicates that diabetic retinopathy is more common in whites younger than 40, with Hispanics more affected at older ages. The LALES data showed more detailed information about diabetic retinopathy in the Hispanic population. The investigators found that 6% of diagnosed diabetics were visually impaired, 23% of newly diagnosed diabetics presented with retinopathy, and long-term diabetics (>5 years with diagnosis) were 23 times more likely to have severe retinopathy. These data could indicate that Hispanics suffer from more severe retinopathy at younger ages than any other ethnic group in the United States.⁶⁶

Cataract affects 20.5 million Americans older than 40, and late-stage AMD affects 1.6 million older than 50. Both conditions affect all races at younger ages with whites becoming more affected in later years. In the LALES study, 10% of participants had early macular degeneration, and that increased to 30% in the 80 and older age group, which is 2 times greater than the prevalence in blacks.⁵⁷ Taken together, these studies support the notion that low-income individuals, blacks, and Hispanics may benefit from regular optometric services.

Potential cost savings in addressing vision care disparities in CHC patients

National estimates on the costs of undiagnosed and untreated vision disorders and impairment indicate that improved access to comprehensive eye and vision care could lead to substantial health care savings. Further provision of these services within CHCs could help realize these cost savings.

Rein et al.⁷¹ estimated costs among adults older than 40 with visual disorders and visual impairment, including blindness, refractive error, cataracts, age-related macular degeneration, diabetic retinopathy, and primary open-angle glaucoma, to be \$35.4 billion. This includes \$16.2 billion in direct medical costs, \$11.1 billion in other direct costs, and \$8 billion in lost productivity. Combining these costs with

the additional cost to caregivers, the total financial impact of major adult eye disorders, visual impairment, and blindness on the U.S. economy is \$51.4 billion, which exceeds the total combined profits of the 2 top 2007 Fortune 500 companies Wal-Mart and Exxon Mobil.

Rein et al.⁷¹ also found that refractive error accounted for the biggest share of direct medical costs primarily among those that were 40 to 64 years. Cataract, not surprisingly, accounted for the biggest share among patients 65 years and older. The combined costs of age-related macular degeneration and cataracts were substantially higher in this older age group than the cost of diabetic retinopathy, glaucoma, and refractive error in the younger age group.

Frick et al.⁷² looked at the costs and economic impact of visual impairment and blindness in the United States. The authors used the National Health Interview Survey data and analyzed the cohort of 77,511 individuals over the age of 40 between 1996 and 2002 who reported being blind or visually impaired. In addition to reporting their visual status, the survey also found that these individuals were less likely to report favorable general health outcomes and were more likely to have public health insurance. They found that the total excess costs represented an average of \$1,400 per year for each of the 3.7 million visually impaired or blind individuals estimated today (\$2,000 excess per blind person; \$1,400 excess per visually impaired person).

Although the rates of visual impairment and blindness are relatively low, the investigators were able to project the total annual economic impact in excess of medical expenses and informal care received by these individuals for the home care component of total medical costs. Their results showed that the aggregate annual economic impact of blindness and visual impairment totaled \$5.5 billion (home care component only).

Although these studies do not specifically cite CHCs or patients served by CHCs, all providers of care, including CHCs, must prepare for the aging of the population and learn how to manage vision problems that cause vision impairment and other conditions that are directly linked to aging along with their associated economic consequences.

Conclusion

The national network of CHCs aims to reduce disparities in access to health care and improve health outcomes by providing an array of health care and enabling services to the nation's poor and underserved. CHCs will serve 18 million predominately low-income, uninsured and publicly insured, and racial/ethnic minority individuals, providing comprehensive care and serving as effective medical homes to some of the nation's most medically needy. Such medical homes and care coordinators have been shown to prevent illness, improve outcomes in chronic illnesses, and reduce the need for avoidable, costlier care such as an emergency department visits or hospitalizations. Health centers have a

proven record of removing barriers to care, improving health outcomes while reducing health disparities, and generating substantial savings to the health care system.

Access to comprehensive eye and vision care continues to be limited for certain segments of the population. Thus, there exists the probability of underdiagnosis and undertreatment of vision disorders and diseases in populations without access to comprehensive eye and vision care.

Policy issues pertaining to if or how optometry will be integrated into the health services offered within the community health center system of the United States are beyond the scope of this report. As stated, governing boards determine which additional health and enabling services would best meet the needs of their communities; however, budgetary constraints can limit service expansion efforts.

How health centers will ultimately assure access to comprehensive eye and vision care and how CHCs integrate full scope optometric services into its programs is yet to be determined. The information and background in this report nevertheless lay the foundation for optometry and optometrists to play a role in improving the visual health of CHC patients. Policy issues aside, one example of how optometry could effectively collaborate with CHCs is by partnering with academic programs in optometry across the country.⁷³

To date, no national needs assessment for the inclusion of optometric services at CHCs has been conducted. Although evidence shows that disparities relating to vision care for underserved populations do exist, there are no data documenting the prevalence of refractive error, ocular disorders, and diseases in patients served by CHCs, thereby linking these 2 facts. Thus, research is needed to ascertain the relationships between the demographics of health center users, their visual health status, and the potential cost savings to the United States government and health care industry by providing comprehensive eye and vision care on-site at health centers. When conducted, the needs assessment should determine the extent to which health center patients are already able to access referral providers of vision care, especially the uninsured who have greater difficulty accessing specialty services offered off site compared with patients with public or private insurance.⁷⁴ This is especially likely in cases in which the health center does not pay for the service provided off-site.

Finally, a detailed report of the status of the nation's visual health should be developed to document the current relationship between vision and overall health status and social well-being. Recommendations for how to improve access to comprehensive eye and vision care for underserved residents of the United States should also be addressed.

CHCs are optimally positioned to contribute to the reduction of disparities in access to eye and vision care and in visual health outcomes in populations served. We believe further research is needed as a next step to study whether

there is additional need to bring optometry to more CHC patients nationally.

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