



Addressing Social Determinants of Vision Health

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ABSTRACT

Social determinants of health encompass the quality of an individual's social and physical environment and its effect on health outcomes. Disparities in these social and environmental factors have a significant role in vision health disparities and inequity in eye care. In this review, we discuss how disparities in visual impairment and eye care utilization are affected by each of the five core domains of social determinants of health, namely economic stability (income, employment, and food security), education (education level and health literacy), health care access (insurance and medical costs), neighborhood environment (housing conditions, home ownership, pollution, and crime), and social context (race and racism). Moreover, we describe a framework by which ophthalmologists can take action to address social determinants of vision health. These

actionable strategies are guided by recommendations from the National Academies of Sciences, Engineering, and Medicine and have five complementary components to address social needs: awareness (screening for social needs), assistance (connecting patients with social care resources), adjustment (altering clinical care in recognition of social needs), alignment (understanding social assets and collaborating with community organizations), and advocacy (promoting policies to address social needs). Addressing social determinants of health is complex but achievable through collaborative strategies. Ophthalmologists have an important leadership role in addressing eye care disparities by taking action on underlying social determinants of vision health.

Keywords: Social determinants of health; Eye care delivery; Health disparities

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Key Summary Points

Social determinants of health encompass the environments in which people live, learn, play, and work.

Five domains of social determinants are economic stability, education, health care access, neighborhood environment, and social context.

All five domains are relevant to vision outcomes and access to eye care.

Ophthalmologists can take action on social determinants through awareness (screening for social needs), assistance (connecting patients with social care resources), adjustment (altering clinical care in recognition of social needs), alignment (understanding social assets and collaborating with community organizations), and advocacy (promoting policies to address social needs).

for ophthalmologists not only to assess social determinants of vision health but also to take action to address patients' social needs. Guided by recommendations from the National Academies of Sciences, Engineering, and Medicine, we outline actionable—and urgently needed—strategies to address social determinants of vision health.

This article is based on previously conducted studies and does not contain any studies with human participants or animals performed by any of the authors.

SOCIAL DETERMINANTS OF VISION HEALTH

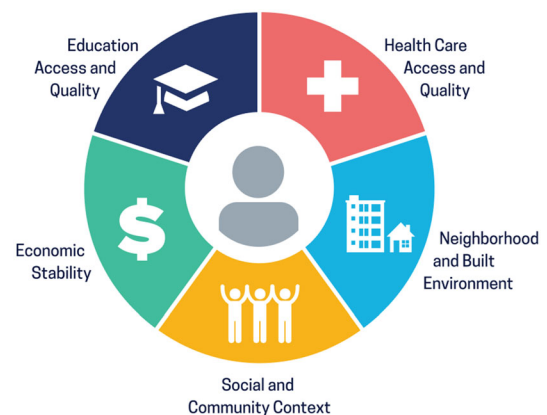
In Healthy People 2030, the US Department of Health and Human Services broadly groups social determinants of health into five domains: economic stability, education access and quality, health care access and quality, neighborhood and built environment, and social and community context (Fig. 1) [1]. Each of these

INTRODUCTION

In addition to treatment of eye diseases, effective eye care delivery depends on understanding and addressing patients' social needs. Social determinants of health are generally defined as the conditions in the environments where people are born, live, learn, work, and play [1], and it has become evident that these social factors affect health outcomes [2–4]. Vision health is no exemption [5–8]. For example, among patients with diabetes, glycemic control and disease duration account for only 11% of the risk of developing microvascular complications like diabetic retinopathy, suggesting that environmental factors likely play an important role in the disease course [9].

The purpose of this review is to describe how social determinants of health affect vision and to outline actionable strategies for ophthalmologists to address social needs. Social needs are strongly associated with visual impairment and access to eye care. We outline a framework

Social Determinants of Health



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Healthy People 2030

Fig. 1 Five domains of social determinants of health. Social determinants of health can be organized into five domains: economic stability, education access and quality, health care access and quality, neighborhood and built environment, and social and community context [1]

domains contains social factors that significantly affect vision care.

Economic Stability

The domain of economic stability encompasses several influential factors on health, including income, employment, and food stability [1]. Each of these social factors contributes to inequities in healthy vision.

Income

Income level is associated with visual impairment, complexity of care, and lower eye care utilization. Among participants in the UK Biobank, a large, prospective study on environmental factors on health, low income was associated with visual impairment (odds ratio [OR] 1.58; 95% confidence interval [CI] 1.27–1.97) [10]. Similarly, a study of a British birth cohort from 1958 found that low socioeconomic status correlated with severe visual impairment or blindness (OR 2.55; 95% CI 1.36–4.79) [11]. In an analysis of the All of Us Research Program of the National Institutes of Health, Chan et al. [12] identified lower annual income as a risk factor for loss of an eye (OR 0.85; 95% CI 0.79–0.91), and Moxon et al. [13] found that areas with higher adult poverty levels were associated with complex rather than routine cataract surgery (OR 2.614; $p < 0.001$). Furthermore, among patients with uveitis, lower household income has been associated with higher rates of incident blindness (OR 1.50; 95% CI 1.02–1.98) [14]. The large cohort studies demonstrate the influence of income on vision loss, even after controlling for other potentially confounding factors.

Not only does lower income correlate with visual impairment but it is also associated with lower levels of eye care utilization. In the National Health Interview Survey (NHIS), persons with age-related eye disease were less likely to report visiting an eye care provider if they had a low (compared to high) income (62.7% vs 80.1%; $p < 0.001$) [15]. Similarly, among respondents to the Behavioral Risk Factor Surveillance System survey, those with an annual income greater than \$35,000 were more

likely to report yearly eye doctor visits than those who made less than that amount (62% vs 52%, $p < 0.001$) [16]. Disconcertingly, these reports suggest that those with lower economic means are not only at greater risk of visual impairment but are also less likely to access eye care.

Employment

Employment status also affects vision health. In the NHIS, respondents who were employed were at lower risk of self-reported visual difficulty than those who were looking for work or not working (OR 0.79; 95% CI 0.71–0.89) [17]. In the same vein, the UK Biobank study found that visual impairment was associated with being unable to work (OR 3.48, 95% CI 2.57–4.72) or being unemployed (OR 1.91; 95% CI 1.33–2.76) [10], and employment was protective against loss of an eye (OR 0.55; 95% CI 0.38–0.77) [12]. Among participants in the Los Angeles Latino Eye Study, unemployment was an independent risk factor for visual impairment (OR 3.5; 95% CI 1.4–8.9) [18].

Food Security

Lastly, economic stability includes food security. One in ten Americans experience food insecurity, in which access to nutritionally adequate food is uncertain or limited [19, 20]. Food insecurity has been associated with chronic diseases, such as diabetes and hypertension [21, 22]. In addition to systemic disease, food insecurity has also been associated with self-reported visual impairment in both the NHIS (OR 1.75; 95% CI 1.54–1.99) [17] and the National Health and Nutrition Examination Survey (NHANES) (OR 1.85; 95% CI 1.41–2.41) [23]. Not limited to self-report, measured visual impairment was greatest among those with lowest levels of food security (OR 2.71; 95% CI 1.75–4.20) [23]. Nutrition and basic sustenance have a foundational role in health and well-being. The chronic stress and poor diet associated with food insecurity likely have pervasive physiological effects that can lead to downstream systemic disease and vision loss.

Education Access and Quality

Education Level

People with higher levels of education are more likely to live healthier and longer lives, but educational opportunities are not equally accessible. Lower levels of education are associated with less eye care utilization and higher risk of visual impairment. Zhang et al. [15] report that interviewees with less than a high-school education were less likely than college graduates to report receiving an eye exam (62.9% vs 80.8%; $p < 0.001$), and Chou et al. [16] similarly found higher rates of self-reported yearly eye exams among respondents who finished high school compared to those who did not (62% vs 52%; $p < 0.001$). Lower levels of education have been associated with more visual impairment in the UK Biobank (OR 1.99; 95% CI 1.33–2.96) [10] and in the NHIS (OR 1.54; 95% CI 1.30–1.81) [17]. In the same vein, higher education was protective against loss of an eye in the All of Us cohort (OR 0.80; 95% CI 0.69–0.92) [12].

Health Literacy

Education also encompasses health literacy, or the ability to read, understand, and act on health information. Low levels of health literacy have been associated with lower levels of access to care [24] and greater number of hospital admissions [25]. Among patients with glaucoma, lower levels of health literacy are associated with a lower understanding about the disease [26, 27], poorer medication adherence [28], less successful eyedrop instillation [29], more advanced visual field loss [26], and worse vision-related quality of life [30]. Patient education must be communicated at a level that is assessable and understandable across a range of health literacy levels to ensure patient understanding of their conditions [31].

Health Care Access and Quality

Insurance and Costs of Care

Lack of insurance is detrimental to health [32], and type of insurance coverage plays a significant role in vision outcomes and access to eye

care. Medicaid insurance, a government program generally available to low-income Americans, is associated with poorer outcomes and less access to care than private plans or Medicare. For example, Medicaid insurance is associated with higher levels of self-reported visual impairment (OR 1.44; 95% CI 1.23–1.67) [17] and with requiring complex cataract surgery (OR 2.058; 95% CI 1.832–2.312) [13]. When attempting to schedule an ophthalmology appointment, adults with Medicaid insurance have decreased odds of success compared to adults with private coverage (OR 0.41; 95% CI 0.28–0.59) [33], and Medicaid patients with glaucoma receive less testing than their commercially insured peers [34].

Independent of insurance type, medical costs fall disproportionately on those who have the greatest needs. For example, when surveyed about barriers to care, respondents with a history of blindness or visual impairment were twice as likely to cite medical costs than those without visual impairment (25% vs 12%) [35].

Neighborhood and Built Environment

The environments where people live have a critical role in their health and well-being, including vision outcomes and access to eye care. In a Swedish cohort, higher levels of neighborhood deprivation were associated with age-related eye diseases in both men (OR 1.28; 95% CI 1.25–1.32) and women (OR 1.52; 95% CI 1.47–1.57) [36]. In the UK Biobank, sheltered accommodation was associated with visual impairment (OR 3.73; 95% CI 2.03–6.84) [10]. Along the same lines, participants in the All of Us program had a higher risk of eye loss if they reported renting rather than owning their current housing (OR 3.16, 95% CI 1.93–5.40) [12].

Poorer living conditions also increase risk of hospitalization for eye disease. By linking social data from the Robert Wood Johnson Foundation County Health Rankings with codes from a Medicare inpatient dataset, French et al. [37] found that hospitalization for a primary ocular diagnosis was higher in areas with increased air pollution (OR 1.05; 95% CI 1.01–1.08), higher

rates of violent crime (OR 1.07; 95% CI 1.03–1.12), and more severe housing problems (OR 1.13; 95% CI 1.09–1.18).

There is evidence to suggest that living environment influences not only vision outcomes but also access to eye care. In a sample of Medicaid enrollees with diabetes in Washington, DC, poor housing conditions (such as overcrowding and poor heating) were associated with 30% lower odds of adherence to diabetic eye examinations (OR 0.70; 95% CI 0.53–0.94) [38].

Social and Community Context

People's interactions with family, friends, and coworkers can significantly affect their health, particularly in the context of race and racism. Black race is associated with visual impairment in the UK Biobank (OR 1.82, 95% CI 1.28–2.58) [10] and with loss of an eye (OR 2.39, 95% CI 1.39–4.09) in the All of Us program [12]. Among patients with glaucoma, Black race has been associated with fewer outpatient visits, less testing, and more emergency department encounters compared to White race, even after accounting for socioeconomic status. Specifically, in a study of Medicare beneficiaries, Halawa et al. [39] found race-related glaucoma disparities persisted between Black and White race within the same low socioeconomic status group in outpatient visits (relative risk [RR] 0.93; 95% CI 0.92–0.95), visual field testing (RR 0.96; 95% CI 0.94–0.98), optic nerve imaging (RR 0.81; 95% CI 0.78–0.83), and inpatient or emergency encounters (RR 2.57; 95% CI 1.55–4.26). Along the same lines, the Salisbury Eye Evaluation Study identified a sixfold higher rate of visual impairment from diabetic retinopathy among Black residents compared to their White peers [40]. The role of race and racism in health outcomes is complex but is pervasive in health, including vision care [41].

HOW OPHTHALMOLOGISTS CAN TAKE ACTION TO ADDRESS SOCIAL NEEDS

Social determinants of health clearly influence patient outcomes in eye care. Increased awareness of these structural and social environments is critical for ophthalmologists to deliver the best care for patients, as social determinants are closely intertwined with each patient's clinical course. To provide the best possible care, ophthalmologists need to take action to address social determinants of vision health.

In recognition of the gap between understanding the role of social determinants in health and the ability to address these social needs in clinical settings, the National Academies of Sciences, Engineering, and Medicine recently published guidelines to integrate social care with health care delivery [42]. In this framework, addressing social factors begins with promoting awareness of social needs, followed by categorizing actions to address them at the level of the individual (adjustment and assistance) and the community (alignment and advocacy) (Table 1) [42, 43]. This framework for action has already been adapted for dermatologists [43], hepatologists [44], internists [45], family physicians [46], and pediatricians [47]. In the same way, this framework to take action on social factors provides guidance for ophthalmologists to address social determinants of vision health. Specifically, ophthalmologists can aim to address inequities in eye care through a strategy of awareness, assistance, adjustment, alignment, and advocacy.

Awareness

To address social needs, ophthalmologists first need to identify them. Promoting awareness seeks to identify social risks in patients and populations and to examine their associations with relevant health outcomes [42]. In the clinic setting, this increased awareness most often takes the form of social risk screening questionnaires. A variety of social screening tools have become available for clinic use, which differ in length and areas of focus [48].

Table 1 A framework for ophthalmologists to take action on social determinants of vision health

Activity	Definition	Example actions
Awareness	Activities that identify the social risks of patients and populations	Use a standardized screening tool to assess social needs Integrate social screening results into the electronic health record to facilitate referrals
Assistance	Activities that reduce social risk by providing assistance in connecting patients with social resources	Provide financial assistance to those who report challenges with medical costs Connect patients with community resources for needs like housing, food, and transportation Refer patients to a social worker or patient navigator who could act as a liaison between community resources and patient needs
Adjustment	Activities that focus on altering clinical care to accommodate identified social barriers	Offer evening and weekend services Utilize telemedicine in appropriate settings for those with transportation challenges Provide patient education materials that are written at an accessible level for those with low health literacy
Alignment	Activities taken by health care systems to understand existing social care assets in the community and to coordinate services to promote a shared goal to create positive health outcomes	Accept Medicaid insurance Partner with local organizations and clinics to offer vision screenings and to engage in community outreach
Advocacy	Activities in which health care organizations work with partner social care organizations to promote policies that facilitate the creation and implementation of resources to address health and social needs	Advocate for federal, state, and local policies that advance access to eye care Promote investment in research in health disparities and community-engaged research

Modified from *Integrating Social Care into the Delivery of Health Care* [42], and Williams et al. [43]

For example, standard tools have been developed by the American Academy of Family Physicians [49], Boston Medical Center [50], and the Centers for Medicare and Medicaid Services [51]. Screening tools can integrate into the clinic workflow upon patient registration, and the results can populate directly into the electronic health record (EHR) to facilitate referrals [50]. Importantly, patients report high levels of acceptability of social screening questionnaires in outpatient clinics [52], although

little work has been conducted outside of primary care.

Academic ophthalmology departments can build on resources from their university medical centers to implement similar screening programs. For example, at the University of Pittsburgh, patients in general internal medicine clinics routinely undergo social determinants screening using a questionnaire that integrates directly with our institution's EHR (Epic, Verona, WI). We have implemented changes to allow for the same screening tool to take place

for ophthalmology patients during their visits to eye clinic. Standard assessment is prerequisite to understanding the social needs of eye patients.

Assistance

Upon identifying social needs, health care systems should aim to address them by connecting patients with community resources. The level of assistance can range from providing a list of relevant community organizations to referring patients to a social worker or a patient navigator to take action on individual needs [53].

Referral to a patient navigator can effectively assist patients with identified social needs. Patient navigators first emerged in cancer care to improve outcomes in vulnerable populations by addressing individual barriers to treatment and follow-up [54]. Examples of interventions can include providing rides to appointments for those with transportation difficulties, offering financial assistance to those who express concerns about medical costs, and referring those with food insecurity to community food banks. Assistance from patient navigators has led to improved health outcomes in fields such as cardiology [55] and women's health [56]. In ophthalmology, a community-based study found that use of a patient navigator improved appointment follow-up rates after screening for glaucoma [57]. Similarly, a social worker intervention in eye clinic settings effectively addressed barriers for most patients and reduced patient distress [58, 59].

In light of this evidence, our ophthalmology department recently hired a full-time patient navigator as a resource for eye patients. Our patient navigator receives dozens of referrals a month and connects patients with local resources for a wide variety of needs, including arranging home safety assessments for the visually impaired, providing transportation, and connecting patients in need with disability benefits. Incorporating a patient navigator or social worker in the eye clinic may improve medication adherence and reduce loss to follow-up by addressing financial and logistical barriers to care [59]. Ultimately, these services

may improve vision outcomes by reducing social barriers and allowing patients to receive continued treatment.

Adjustment

Another action at the individual patient level is adjustment of clinical care to accommodate identified social barriers. Clinic adjustments can include broadening hours to include evenings and weekends, offering telemedicine visits, and offering written materials that are accessible at low levels of health literacy.

A common barrier to care for working-age adults is inability to get time off work, which is a commonly cited reason for missing follow-up visits for diabetic retinopathy [60, 61]. Other research has found that expanded clinic hours in primary care leads to fewer emergency department visits [62]. Along the same lines, expanded eye clinic access could similarly promote office-based, routine care and reduce emergency visits. In clinical practice, knowledge that a patient faces challenges to clinic attendance may allow ophthalmologists to adjust to recommending clinical procedures with less follow-up burden, such as panretinal photocoagulation over intravitreal injections for proliferative diabetic retinopathy [63] or glaucoma drainage device implantation over trabeculectomy for medically uncontrolled glaucoma [64].

Another method to improve access to eye care providers is to offer telemedicine visits, which had been rapidly adopted in ophthalmology during the onset of the coronavirus disease 2019 (COVID-19) pandemic [65, 66]. At our department, we found that a wide range of visits for acute and chronic concerns have been managed by video visit [67]. Moreover, when surveyed after their encounter, patients rated their video visit experience highly—an average of 4.3 out of 5 on a Likert scale—and 78% of patients reported that they would participate in a video visit in our department again [67]. Although outpatient clinic volumes have largely been restored to pre-pandemic levels, we continue to offer video visits for select routine postoperative encounters and to review results

of diagnostic testing, such as electrophysiology or intracranial imaging.

Finally, patient education should be adjusted to accommodate a range of health literacy levels. Patient education should be supplemented with written materials when appropriate, which should be written at accessible readings levels with appropriate graphics, active voice, and white space [31]. Commercial patient pamphlets from sources such as the American Academy of Ophthalmology can empower patients with more understanding about their eyes as a supplement to their physician encounter [68].

Alignment

A community-level action, alignment involves understanding existing resources and coordinating services with the shared goal to promote vision care. Specifically, ophthalmologists can improve access to care by accepting Medicaid insurance and engaging in community outreach. By accepting Medicaid insurance, ophthalmologists would significantly improve access to care for this insured population that has poorer vision health and eye care utilization [33].

In the community, partnerships with free clinics, community events, and federally qualified health centers would improve access to eye care by providing free services directly to the community. For example, our department has led a vision outreach initiative since 2006 that brings eye care directly to free clinic sites. Termed the Guerrilla Eye Service, this mobile program provides refractions, dispenses eyeglasses, and conducts comprehensive, dilated examinations on nights and weekends at partnering primary care clinics [69]. In a retrospective evaluation of the program, we found that over half of Guerrilla Eye Service patients had refractive error and a third of patients with diabetes had retinopathy. Encouragingly, three-quarters of those who were recommended to have further evaluation at the university eye clinic successfully followed up for care [69]. Similar programs have been described in Detroit, MI [70] and Rochester, NY [71],

indicating the influence that academic ophthalmology departments can have on their local communities. Aligning these efforts with other organizations that emphasize eye screening, such as Vision to Learn [72] and the Mission of Mercy [73], has further expanded the reach of our collective efforts to promote eye care delivery in our community.

Advocacy

Finally, ophthalmologists need to advocate for the policies and resources that would help patients meet their health goals and social needs. Advocacy with political organizations at the federal, state, and local levels could involve promoting expanded health care coverage, defending surgical scope of practice, or advancing local housing initiatives.

Not least, it is also important to advocate for investment in research to identify health disparities and to measure outcomes related to social determinants of health. For example, funding for community-engaged research could help align researchers and community organizations to decrease vision health disparities [74]. In fact, community-engaged research is critical to engage stakeholders and tailor vision programs to community needs [75].

CONCLUSION

Social determinants of health affect an individual's risk of visual impairment and access to eye care. As we treat patients for eye disease, we cannot ignore the environments in which they live. Ophthalmologists can play an important role to address underlying social factors that affect vision health through collaborative strategies that can lead to substantive change.

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Compliance with Ethical Guidelines. This article is based on previously conducted studies and does not contain any studies with human participants or animals performed by any of the authors.

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Data Availability. Data sharing is not applicable to this article as no datasets were generated or analyzed during the current study.

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