

Improving Vision Care in America's High Risk, Underserved, and Vulnerable Populations: Understanding Barriers and Increasing Access to Eye Care Services through Community - Based Interventions and Evidence - Based Recommendations

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Abstract: *The number of individuals living with chronic vision impairment or blindness in the United States is continuously growing with at least six million Americans currently affected [28]. This paper addresses the concerning issue of limited access to vision care in underserved communities in the United States, identifies and explores the barriers that hinder accessibility to eye care services among this population, and seeks to promote vision care and enhance access to eye care services in those areas through community - based interventions and evidence - based recommendations. The paper also suggests ways to promote equity in vision care.*

Keywords: eye care access, the underserved, vision care barriers, eye care disparity, community - based interventions.

Abbreviations: CDC = Centers for Disease Control and Prevention; CHIP = Children's Health Insurance Program; HHS = Department of Health and Human Services; LEP = Limited English Proficiency; NEI = National Eye Institute; NGO = Non - Governmental Organization; NCHS = National Center for Health Statistics; SDOH = Social Determinants of Health; SES = Socioeconomic Status; WHO = World Health Organization; VHI = Vision Health Initiative.

1. Introduction

While access to eye care services is one of the things that the WHO is strongly advocating for, it is still not a reality in many countries of the world, [11] including the United States. Access to vision care is a significant public health issue that currently plagues the underserved in America as it disproportionately affects minority and low - income populations. The risk of eye disease and chronic vision impairment is increased in Americans of all ages who are poor, are unemployed, or have less than a high school education [35]. Access to eye care is critical, not just in maintaining optimal vision, but also in diagnosing and treating eye diseases promptly whenever they arise to prevent vision impairment. Given that vision is an important determinant of quality of life (QOL) [14] it is paramount that people everywhere should have access to vision care. However, despite the importance of vision care on people's quality of life, many continue to face barriers to access eye care [27]. This lack of accessibility to vision care, and these barriers are greatest in the underserved population [48].

The term 'underserved' refers to people living in communities with significant socioeconomic lack and health disparities. The Department of Health and Human Services regards a community as underserved when its residents face various vulnerabilities, have specific needs, belong to minority groups, or have experienced health disparities. This includes individuals such as refugees, persons with disabilities, those with limited English proficiency (LEP),

young adults and postsecondary graduating students without coverage options through parental, student, or employer plans, new mothers, and women with children, as well as Medicaid - eligible consumers who are eligible for Medicaid but not currently enrolled in coverage [49]. Americans of all age groups who are poor, unemployed, or have lower educational attainment face an elevated risk of developing eye diseases and experiencing chronic vision impairment. [35].

Disparities in eye health and the provision of vision care align with the broader landscape of health disparities, wherein racial and ethnic minority populations exhibit higher prevalence rates of chronic diseases compared to the white population [31]. These disparities can be attributed to social determinants of health, encompassing factors such as healthcare accessibility, healthcare utilization, health - related behaviors, nutrition, employment opportunities, discriminatory practices, income levels, physical and social environments, transportation access, and housing conditions [33]. The probability of an individual reporting a recent eye care visit within the past 12 months diminishes as their income level and educational attainment decrease [36]. Among rural low - income populations, eye health and vision problems are a significant concern [27] as individuals in this population are typically advanced in age, have higher rates of chronic illnesses, and possess lower socioeconomic status compared to urban populations [40]. These factors, operating independently, significantly contribute to the occurrence of eye health issues and vision problems. [40].

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Despite federal and state health care initiatives, millions of Americans do not have access to affordable medical and surgical eye care [24]. Researchers and clinicians have offered suggestions on ways to overcome these barriers and increase appropriate use of eye care [46]. To help remedy some of this challenge, the Centers for Disease Control and Prevention (CDC) developed the Vision Health Initiative (VHI), a coordinated national public health framework to prevent vision impairment and blindness especially within this population and a key aspect of the CDC's initiative involves addressing disparities in eye care to improve national eye health [47].

To address the barriers to vision care accessibility in the underserved, rigorous, measurable community - based interventions must be implemented. This requires a comprehensive approach involving various stakeholders, including policymakers, healthcare providers, and community organizations. These interventions aim to engage and empower the local community to promote positive change and enhance overall vision care outcomes. By addressing these challenges, it is possible to improve vision care outcomes for the underserved, thus reducing the burden of untreated vision problems and promoting their overall well - being.

2. Data

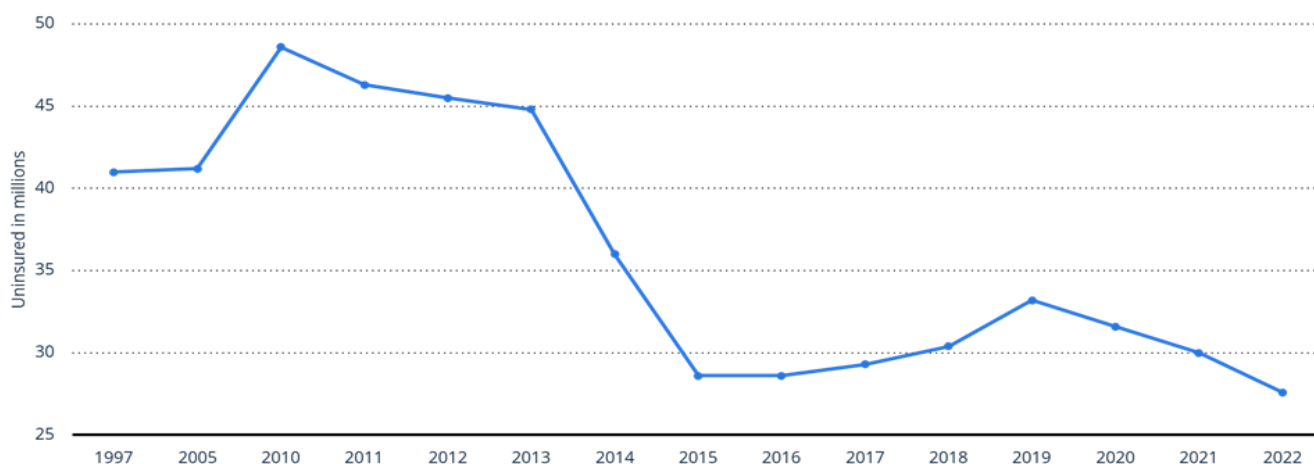


Figure 1: Number of people without health insurance in the United States from 1997 to 2021 (in millions)

Note: Individuals were categorized as uninsured if they lacked any form of private health insurance, such as Medicare, Medicaid, Children's Health Insurance Program (CHIP), state - sponsored or other government plans, or military plans.

Source (s): CDC; NCHS [51]

Table1: Showing Access to Eye Care Among United States High - Risk Population From the 2002 National Health Interview Survey.

Characteristic	Respondents Who Visited Eye Doctor in Past 12 mo, %			Respondents With Dilated Eye Examination in Past 12 mo, %			Respondents Who Cannot Afford Eyeglasses, %		
	CP	PM	95% CI	CP	PM	95% CI	CP	PM	95% CI
Age, y									
18-44	37.1	38.5	34.8-42.1	37.3	39.5	35.9-43.1	15.9	11.9	9.9-13.9
45-64	52.9	51.2	48.3-54.2	52.4	49.5	46.4-52.6	12.8	12.2	10.4-14.0
≥65	56.3	56.5	53.9-59.1	59.6	59.9	57.2-62.5	2.9	4.2	3.2-5.1
Sex									
Male	47.4	46.3	44.2-48.3	49.7	49.0	47.1-50.9	6.8	7.1	6.1-8.1
Female	55.5	55.4	53.6-57.3	56.6	55.4	53.7-57.2	9.3	10.8	9.7-11.9
Marital status									
Married	52.6	52.0	50.2-53.8	54.9	53.9	52.1-55.8	6.9	8.4	7.4-9.5
Not married	50.2	49.1	46.9-51.2	50.8	49.4	47.5-51.4	10.1	9.7	8.6-10.8
Race or ethnicity									
White	53.9	51.4	49.8-53.0	54.3	51.9	50.4-53.5	7.2	9.3	8.3-10.2
African American	47.4	50.8	46.3-55.2	51.5	52.9	49.0-56.8	13.2	9.6	7.6-11.7
Hispanic	39.3	48.6	43.8-53.4	48.2	54.7	50.3-59.1	11.1	6.7	5.1-8.2
Other	42.3	45.6	38.5-52.7	48.6	53.0	45.6-60.4	6.9	7.5	4.5-10.5
Education									
<High school	42.2	41.9	39.0-44.7	46.9	45.7	42.8-48.7	9.7	8.9	7.3-10.4
High school	51.3	48.7	46.1-51.3	54.3	52.1	49.5-54.7	7.0	7.8	6.4-9.2
>High school	57.1	56.6	54.6-58.5	56.2	55.6	53.6-57.5	8.2	9.7	8.5-10.9
Poverty income ratio									
<1	39.2	44.6	40.7-48.4	41.6	45.7	41.5-49.9	18.9	13.4	10.8-16.1
1 to <2	45.5	47.2	44.5-49.9	47.5	48.2	45.6-50.8	12.4	11.9	10.0-13.8
≥2	55.0	53.3	51.4-55.2	55.8	54.8	52.9-56.6	5.9	6.6	5.7-7.6
Health insurance									
Public only	49.1	52.4	49.5-55.3	52.8	54.7	51.7-57.7	8.3	9.3	7.5-11.0
Private only	50.5	48.0	45.1-51.0	50.9	50.7	47.9-53.5	7.6	6.3	5.2-7.5
Both	62.3	59.8	56.7-62.9	63.6	59.1	56.0-62.1	2.1	5.0	3.1-6.8
None	25.3	31.4	26.6-36.1	25.9	31.1	26.7-35.4	31.7	20.6	17.5-23.7
Diabetes									
Yes	60.0	64.4	61.6-67.2	62.9	66.9	64.1-69.6	8.8	10.4	8.4-12.4
No	49.3	47.1	45.5-48.8	50.7	48.1	46.6-49.7	7.9	8.6	7.7-9.4
Vision or eye problem									
Yes	54.8	56.8	55.2-58.4	54.8	57.0	55.4-58.5	10.5	10.1	9.1-11.1
No	45.6	38.6	36.3-40.9	50.4	42.3	40.1-44.5	3.6	5.2	3.9-6.5
Region									
Northeast	58.6	57.8	55.2-60.5	58.9	56.8	53.7-59.9	6.0	7.9	5.9-9.8
Midwest	53.6	52.3	49.5-55.1	52.6	51.4	49.0-53.9	7.7	9.1	7.6-10.5
South	48.0	47.9	45.5-50.3	50.7	50.7	48.4-53.1	9.9	9.6	8.5-10.8
West	49.7	48.6	45.6-51.5	54.0	52.1	49.3-54.9	7.2	8.2	6.6-9.7

Abbreviations: CI, confidence interval; CP, crude prevalence; PM, predictive margin.
 *People at high risk for serious vision loss include those with self-reported diabetes, those with self-reported vision or eye problems, and those aged 65 years and older. All of the variables were controlled for all others in the regression. P < .001 for the PM; the 95% CI is for the PM.
 Source: [42]

3. Discussion

Scientific research provides conclusive evidence that the timely detection and treatment of eye conditions can effectively prevent blindness and visual impairment [29]. This therefore makes it important for all persons to have access to affordable eye care services. However, in the United States, the demand for easily accessible eye care services is substantial and continues to grow [1] especially among high risk, underserved populations. The utilization of eye care services serves as an indicator of the effectiveness and coverage of healthcare services, serving as a measure of the overall performance of the vision health system [16] but despite this, the nation continues to experience inadequate access to eye care services, which is particularly concerning given that vision loss and blindness rank among the top 10 disabilities in the country [25] with over 3.4 million (equivalent to 3%) of Americans aged 40 and above experiencing either blindness or visual impairment, and millions more at risk of developing vision problems [26]; a risk that is particularly pronounced among vulnerable groups in the country, such as the economically disadvantaged, children, the elderly, and ethnic minorities [26].

Fig.1 [51] shows that although the share of Americans without health insurance saw a steady increase from 2015 to 2019, it declined from 2020 to 2022 [51]. This shows that millions of people (8.4% of the population) in the United States had no health insurance in 2022. The decrease in the uninsured population, despite the economic hardships caused by the pandemic in 2020, could potentially be attributed to factors such as the expansion of Medicaid in more states and an increase in the availability of private health insurance coverage. The data presented on **Table 1** [42] shows that, while individuals at high risk for significant vision loss, particularly the underserved population, demonstrated similar rates of receiving eye care services such as visits and examinations compared to the general population, substantial health disparities persisted within this group. These disparities acted as barriers, hindering their access to vision care services.

Vision Care Disparities

In healthcare generally, disparities exist and have been linked to elevated poverty rates, limited availability to education, and reduced availability of healthcare services [15]. The presence of health disparities in the nation, however, can also be observed along racial and gender lines within communities where a limited representation of healthcare providers and policymakers identifies with traditionally underserved and marginalized population groups [8]. In vision care within the United States, the existence of disparities specifically concerning racial and ethnic disparities, is well established [7]. However, despite being widely acknowledged, these disparities persist across various regions of the country [10]. Within the realm of eye care, the disparities manifest in a notably intricate manner, exhibiting a disproportionate impact on specific communities [2]. The affected populations are often the socially disadvantaged, and the multiple levels of discrimination that these people often experience mean that their characteristics and attributes deviate from the norm observed within the broader population [6]. For instance,

research indicates that non - dominant ethnic groups, particularly Latin Americans and recent immigrants, exhibit lower rates of utilizing eye care services compared to the general population. [18]. Disparities in access to vision care can be attributed to three significant factors: per capita income, healthcare coverage, and geographic location and estimates suggests that approximately 89% of individuals affected by visual impairment reside in low - income and middle - income countries, highlighting that this is not only a concern within the United States but also a pressing global health issue [4]. Resolving these disparities requires collaborative efforts involving partners from various sectors, operating at multiple levels such as state, local, and community. These efforts should address the diverse circumstances that shape people's lives, spanning behavioral, psychosocial, socioeconomic, cultural, and political dimensions of the population [5].

Barriers to Vision Care

There is limited data available regarding barriers which impede access to vision health services, especially among high - risk minority populations [7]. Previous studies have shown that self - reported barriers include cost, transportation, waiting time, and provider - patient communication [40]. However, most barriers are believed to be driven by socio - economic factors within communities inhabited by the underserved. Socio - economic status affects eye care accessibility, and studies have shown it to be an important determinant of visual impairment [34]. Lower socio - economic status was shown to be related to a lower level of eye health (Rius et al.2014; Lou et al.2017; Wang et al.2017) [3]. Some of the barriers to eye care accessibility in underserved communities includes:

- **Financial constraint and limited eye care insurance:** Eye care in the United States can be expensive, and often, it is covered through both private and public insurance plans. The problem is that most people living in underserved communities are either underinsured or uninsured, and this makes vision care difficult to access. Approximately 44 million Americans lack adequate, basic health insurance, and even more lack insurance coverage for and access to routine eye care [24]. Many of these individuals are not indigent; they either do not have access to care or are unable to bear the financial burden imposed by existing health care programs. Rising health care costs are leaving an increasing percentage of the population without access to adequate, affordable medical care [24]. Individuals with low levels of income and education, and the self - employed, seniors, immigrants, and nonwhites had less coverage [21].
- **Medical mistrust:** In healthcare generally, medical mistrust exists, particularly among marginalized and minority groups. The inequities and health disparities experienced by these groups in certain communities have made skeptical towards the healthcare system and healthcare providers. This skepticism which often stems from historical and contemporary experiences of discrimination, mistreatment, institutional biases, and systemic inequalities is a huge barrier that significantly impact healthcare - seeking behaviors, treatment adherence, and overall health outcomes. For instance, studies show that the barriers to care faced by Non - Hispanic Black individuals are primarily related to their

experiences of mistreatment within healthcare settings as there exists a perceived discrimination and medical mistrust [22].

- **Language:** Effective communication is crucial for accessing vision care services. When patients and eye care providers do not share the same language, it can hinder the accurate communication of symptoms and concerns, which may discourage individuals from seeking necessary care. Moreover, language barriers impede the understanding of vital vision - related information, including instructions, treatment options, and preventive measures. This lack of comprehension can lead to adverse vision health outcomes and discourage future care - seeking behavior.
- **Poor education and eye care awareness:** The less educated often reports more barriers, this highlights the need to address fiscal concerns and eye - health education [25]. Many individuals in underserved areas may not fully understand the importance of regular eye exams and maintaining good eye health given the low level of literacy and education found in these communities. This lack of awareness often prevents them from seeking early intervention and treatment for vision problems.
- **Transportation:** Amidst many barriers to eye care, clinic accessibility, specifically lack of transportation and distance to eye care provider, has been identified as a significant barrier in the current and previous studies [48]. Transportation to eye care facilities is an important barrier faced by individuals in underserved areas. Due to the lack of reliable public transportation systems in underserved areas, it is often difficult for residents to travel to distant eye care facilities. This transportation barrier further limits their access to vision care services.
- **Poverty:** Studies have found high rates of eye - care underutilization among minority groups with lower income disproportionately affected [25]. The level of poverty found in underserved communities affects all persons within them including children, and they do not escape the impact of poverty on vision and eye health. A child living below the federal poverty line has nearly twice the risk of being visually impaired when compared to a child living at 200% of the federal poverty line or higher [32].
- **Expensive nature of eye care:** Vision care can be expensive, especially for individuals without health insurance or those living on low incomes. Eye exams, glasses, contact lenses, and specialized treatments for eye conditions can place a financial burden on underserved populations, making it difficult for them to afford necessary care.
- **Lack of available eye care services:** Most of the communities have limited availability to eye care professionals such as optometrists and ophthalmologists, and this scarcity makes it difficult for residents to receive regular eye exams, diagnosis of eye conditions, and access to proper treatment [48]. This often leads to vision impairments (VI). Vision impairment costs the nation so much in revenue today, and as the population ages and demographics shift, studies suggests that the numbers could get to over \$717 billion a year by 2050 unless existing infrastructure and resources are expanded to

address vision health [30] particularly among the underserved.

- **Physical environment:** Certain communities and environments predispose people to difficulties in accessing eye care. Functional disability has been shown to be higher among rural than urban older adults [12].
- **Housing and homelessness:** Individuals who are currently homeless exhibit elevated prevalence of vision impairment, encompassing a notable portion of unaddressed refractive errors, ocular diseases, and diminished rates of ocular examinations [37, 38, 39].

Community - based Interventions

Interventions aimed towards improving eye care accessibility and outcomes within the underserved communities includes:

- **Community - based eye care programs:** These have the potential for improving access to care among low - income and rural populations [43, 44]. Salowe et al [45] found that when ophthalmologists at the University of Pennsylvania Health System interfaced with leaders in the surrounding community and generated tailored outreach initiatives, barriers to eye care services decreased. The authors also advised that ophthalmology departments close to these communities were good targets to start facilitating these relationships. For example, Wills Eye Hospital and Thomas Jefferson University support an annual Give Kids Sight Day, which offers free vision screening, free eyeglasses, and follow - up care to children aged 19 years and younger.
- **Community mobile eye care clinics:** It is important to enhancing linkages between clinical and community program, and services by public health practitioners and social service providers [20]. This can address gaps in access to eye care.
- **Inclusion of minority communities in vision care:** Health systems are often implicitly structured to meet the needs and preferences of members of the dominant group in any given population, which makes these systems more challenging for people with diverse backgrounds to navigate [17]. Minority communities should be considered and included in vision care programs.
- **Recruiting more eye care professionals to work in these communities:** Simply put, the eye care industry is overstretched, and the number of eye care professionals, Ophthalmologists and Optometrists alike, just cannot handle the national demand on eye care. This demand is way more present in the underserved communities than anywhere else, and efforts should be made to avail these communities with more professionals.
- **Addressing language as a barrier:** This requires implementing strategies such as providing language interpretation services for minority groups and immigrants, utilizing multilingual eye care staff, offering translated vision care materials, and promoting cultural competence among eye care providers. By so doing, eye care facilities within the communities can improve communication, enhance patient satisfaction, and ultimately provide more equitable and accessible eye care.
- **Federally funded community health centers:** Despite disparities in health status that exist regionally and nationally among at - risk populations, such disparities

do not exist among community health center patients, even after controlling for sociodemographic factors. These centers may be uniquely poised to address disparities in eye and vision care across diverse populations.

- **Community vision health education:** Patient education, including providing culturally appropriate materials and conveying the importance of eye care, has been shown to improve health literacy knowledge gaps and increase care use. Raising awareness about the importance of regular eye exams and promoting eye health within underserved communities can encourage individuals to seek care promptly. Educational campaigns, community workshops, and school - based programs can help disseminate information effectively. A study found that the less educated reported more barriers, highlighting the need to address fiscal concerns and eye - health education [25].

Evidence - Based Recommendations

There is a scarcity of evidence concerning interventions targeting individual determinants of health, barriers and effects of inter sectoral action on health equity [9]. Below are some recommendations to improve eye care accessibility most of which have been applied and evaluated:

- **Teleophthalmology:** Since the COVID - 19 pandemic, there has been an expansion of telehealth services within ophthalmology, and this expansion of tele health ophthalmic services and screening tools to disproportionately impacted patients have improved the detection of eye conditions such as glaucoma, cataract, etcetera. Eye care professionals are now embracing telemedicine whenever possible to remotely assess new signs and symptoms, triage patients, and screen and educate patients. This mode of connecting with patients may relieve some hurdles to eye care services utilization especially among the underserved where there is demand for eye care professionals as tele ophthalmology allows the eye specialists to monitor and educate patients about chronic conditions and reinforce medication adherence in real time without necessarily being present physically. Tele health initiatives benefited patients from racial and/or ethnic minority groups by reducing disparities in access to eye care experienced during the COVID - 19 pandemic [23].
- **Expanded Insurance Coverage:** Medicare and Medicaid expansion policies have been significantly associated with an increase in dilated eye examination rates within the first 2 years of implementation [44]. This suggests that an expanded insurance coverage may go a long way in increasing affordability of vision care.
- **School - based health centers and vision screenings:** Partnerships among schools, teachers, and nurses in the setting of school - based health centers have enhanced glasses use, family education, and follow - up care [43].
- **Free Vision Care Programs:** Vision care initiatives that offer low - cost or no - cost eye examinations, eyeglasses, and contact lenses can help relieve the financial burden faced by disadvantaged communities. In a study conducted by Sanspre et al. [43], a vision health program implemented in Alabama's rural Black Belt region in 2008 demonstrated positive outcomes. The program, which operated within familiar local health

departments, served a total of 2, 699 individuals of various age groups. It encompassed assessments of visual acuity, biomicroscopy, and digital retinal examinations. The findings revealed that 39% of the participants had a visual acuity of 20/40 or worse, however, 56% of the participants were given prescription eye glasses. Programs such as this go a long way to help improve the vision outcome in the underserved, especially if they are provided with no financial implications on the part of the participants.

- **Building collaborations:** Fostering collaborations between healthcare organizations, community clinics, and non - profit organizations can pool resources and expertise to provide comprehensive vision care services. Partnerships with optical companies can also help supply affordable eyewear to underserved areas. Collecting data on the prevalence and impact of vision problems in underserved areas.
- **School - based health centers and vision screenings:** Partnerships among schools, teachers, and nurses in the setting of school - based health centers have enhanced glasses use, family education, and follow - up care.
- **State - sponsored health insurance for children:** After enrolling in North Carolina's State Children Health Insurance Program, the percentage of 987 children with unresolved requirements for prescriptions and eyeglasses dropped significantly from 20% to a mere 2% [52].
- **Eye Care Research:** Research that advances the understanding and improvement of eye health and eye diseases in minority racial/ethnic groups in the United States mandates a basic understanding of the construct of race in the context of science. Such research should be embarked upon in a quest to understand the causes of and to define the mechanisms leading to interventions to reduce eye health disparities is a parallel mandate [13]. Through eye care research, both the national and local public health officials could benefit and have a granular understanding of the associations of local socioeconomic and demographic characteristics with Visual impairment and receipt of vision care [19].

4. Conclusion

It is crucial to recognize and address the barriers that impede access to eye care services among underserved populations. By dedicating increased efforts and resources more can be done towards resolving the disparities in eye care accessibility and in preventing visual impairment within these communities. Along with the CDC's Vision Health Initiative (VHI) framework, the implementation of community - based interventions presents a promising approach towards improved access to eye care services and better eye health outcomes in ensuring equitable eye care for all individuals, regardless of their socioeconomic background or geographical location.

Conflict of Interest

The author declares no conflicts of interest with respect to the research, authorship, and/or publication of this paper.

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