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Manhattan Vision Screening and Follow-Up Study in Vulnerable Populations: 1-Month Feasibility Results

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Abstract

Purpose/Aim: In the United States, high rates of vision impairment and eye disease disproportionately impact those who lack access to eye care, specifically vulnerable populations. The objective of our study was to test instruments, implement protocols, and collect preliminary data for a larger 5-year study, which aims to improve detection of eye diseases and follow-up eye care in vulnerable populations using community health workers (CHW) and patient navigators. In

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Helsinki declaration of interest statement
The study was approved by the Columbia University Institutional Review Board and was conducted in accordance with the Declaration of Helsinki (CUIMC IRB #AAAR9162). Written informed consent was obtained from all participants. The study is registered with ClinicalTrials.gov (NCT04271709).

the study, trained CHWs conducted vision screening and patient navigators scheduled on-site eye exams and arranged appointments for those referred to ophthalmology to improve adherence to follow-up eye care.

Materials and Methods: Eligible individuals age 40-and-older were recruited from the Riverstone Senior Center in Upper Manhattan, New York City. Participants underwent on-site vision screening (visual acuity with correction, intraocular pressure measurements, and fundus photography). Individuals who failed the vision screening were scheduled with an on-site optometrist for an eye exam; those with ocular pathologies were referred to an ophthalmologist. Participants were also administered the National Eye Institute Visual Function Questionnaire-8 (NEI-VFQ-8) and Stopping Elderly Accidents, Deaths, and Injuries (STEADI) test by community health workers.

Results: Participants (n = 42) were predominantly older adults, with a mean age of 70.0 ± 9.8, female (61.9%), and Hispanic (78.6%). Most individuals (78.6%, n = 33) failed vision screening. Of those who failed, 84.8% (n = 28) attended the on-site eye exam with the optometrist. Ocular diagnoses: refractive error 13/28 (46.4%), glaucoma/glaucoma suspect 9/28 (32.1%), cataract 7/28 (25.0%), retina abnormalities 6/28 (21.4%); 13 people required eyeglasses.

Conclusion: This study demonstrates the feasibility of using CHWs and patient navigators for reducing barriers to vision screening and optometrist-based eye exams in vulnerable populations, ultimately improving early detection of eye disease and linking individuals to additional eye care appointments. The full five-year study aims to further examine these outcomes.

Keywords

Glaucoma detection; community-based; access to eye care; vulnerable populations; vision screening

Introduction

Visual disability, though often preventable, is one of the top 10 disabilities among adults in the United States and affects quality of life, chronic health conditions, and the economy.[1] Despite widespread prevalence and implications, lack of receiving adequate eye care disproportionately affects populations who are socioeconomically disadvantaged, uninsured, and have lower education levels.[2] These populations at greater risk of poor health status and healthcare access are considered vulnerable and experience significant disparities in life expectancy, access to and use of healthcare services, morbidity, and mortality.[2] Higher rates of vision impairment are seen in these vulnerable populations, especially older individuals with chronic comorbidities.[3,4] Therefore, it is crucial to improve utilization of high-quality eye care services in order to reduce vision-related disparities.

Community health workers (CHW) are knowledgeable frontline health personnel who typically come from the communities they serve and bridge cultural and linguistic barriers, expand access to care, and improve health outcomes.[5,6] In the present study, trained CHWs served as members of the vision screening team and assisted with the completion of health assessment measures (e.g. visual acuity, vision-related quality of life, and falls risk). Patient navigators are a subset of CHWs and have been proposed to address known barriers to the utilization and delivery of high-quality health care among underserved populations.[7] Utilizing patient navigators in ophthalmology is beneficial because they can guide medically underserved, vulnerable individuals through the healthcare system and address barriers to eye care. These barriers include low insurance coverage, financial issues, lack of transportation, limited family support to accompany patients to eye care service, and health illiteracy.[8] Ineffective navigation of the healthcare system leads to poor outcomes because of delayed care, failure to receive proper treatment, or care being received in the emergency room.[9] In the present study, patient navigators provided enhanced support with all aspects of follow-up eye care including scheduling on-site eye exams and arranging appointments for those referred to ophthalmology.

To improve access to and utilization of eye care services, the U.S. Centers for Disease Control and Prevention (CDC) Vision Health Initiative supports research to study innovative strategies to better engage populations most at risk, most vulnerable, and least likely to have access to eye care to detect and manage glaucoma and other eye diseases in community-based settings. The Manhattan Vision Screening and Follow-Up Study in Vulnerable Populations, funded by the CDC, was designed to investigate whether community-based vision screenings can improve glaucoma and other eye disease detection among vulnerable populations (sightstudies.org). This paper describes the methodology and results of the feasibility study, where we collected preliminary data, tested instruments and protocols, and revised materials for the larger 5-year study. This feasibility study was designed to test different clinical assessment tools but also to investigate whether CHWs were effective frontline workers in this capacity.

Materials and methods

Target population

gThis New York City feasibility study (NYC-SIGHT) targeted Upper Manhattan residents living in the Washington Heights neighborhood because of the high number of potential at-risk, vulnerable adults and seniors, living at or below the Federal poverty measure. Columbia University Harkness Eye Institute is located in Washington Heights, which facilitated effective recruitment and a scalable vision screening model. The Riverstone Senior Center was chosen by our government partner, the New York City Department for the Aging (DFTA), because of the close proximity to the Harkness Eye Institute and its location within a New York City Housing Authority (NYCHA) development. Their mission is to provide support services that help adults and seniors remain healthy, active, and living at home. Special attention is paid to helping those with minimal supports: people who are frail, isolated, and/or low income. Many of the NYCHA developments planned for the larger study also have senior centers on premises, which are owned and operated by DFTA and were selected because they mirror other Manhattan locations.

Study population

Individuals were eligible to participate in the feasibility study if they were: 1) members of the NYC Department for the Aging Riverstone Senior Center in Washington Heights, 2) willing to consent to the feasibility study, and 3) age 40 or above. During February 2020, 43 participants enrolled and 42 underwent vision screening at the Riverstone Senior Center. Follow-up eye exams were conducted by an optometrist for two days in the same month at the same location. Most participants lived within walking distance to the location and visited the senior center daily for subsidized lunches and other activities. Recruited individuals were scheduled by the senior center director, the research team, and walk-in vision screening appointments were accommodated.

Data collection

The trained vision screening team consisted of patient navigators (two research coordinators and a research assistant), three CHWs, one ocular photographer, one optometrist, and two remote ophthalmologists. Data were collected on-site by the team and later entered into a Research Electronic Data Capture (REDCap) database, a Health Insurance Portability and Accountability Act (HIPAA)-compliant server at Columbia University Irving Medical Center. After written informed consent was obtained by a research coordinator, CHWs collected the following intake data:

1. Demographics, insurance status, and transportation preferences.
2. Ocular, medical, and family history, including medications and family history of glaucoma and blindness.
3. National Eye Institute Visual Function Questionnaire-8 (NEI-VFQ-8) to assess vision-related quality of life (QOL).[10]
4. Stopping Elderly Accidents, Deaths, and Injuries (STEADI) tests, include the Timed Up and Go test, 30-second Chair Test, and 4-stage Balance Test.[11] Participants were also asked about feelings of unsteadiness when standing or walking, occurrence of falls in the past year, and subsequent Emergency Department (ED) visits or hospital admissions in the past year. Falls risk assessment and multifactorial prevention strategies are important in maintaining the independence and quality-of-life of older adults. Participants were classified as low, medium, and high risk of falling based on these tests.

Vision screening components consisted of the following:

1. Visual acuity was measured by the CHWs using the Snellen eye chart in all participants while wearing their current eyeglasses (with correction). Any individual with a visual acuity 20/40 or worse in either eye failed the vision screening and was scheduled to see the on-site optometrist.
2. Autorefraction was conducted by the study coordinator for participants with visual acuity 20/40 or worse in either eye using the QuickSee Autorefractor (Planoptika, Boston, MA).
3. A lensometer (Nidek LM-820 Autolensometer) was used by the study coordinator to check participants' existing eyeglasses' prescription for those who failed the vision screening and were scheduled to see the on-site optometrist.
4. Intraocular pressure (IOP) was measured by the study coordinator in both eyes in all participants with the TA01I Icare® rebound tonometer (ICare, Helsinki,

Finland). If IOP was >23 mmHg, a second IOP measurement was taken of that eye and the average of the two measurements was recorded. If mean IOP was 23–29 mmHg, the participant failed the vision screening and was scheduled to see the optometrist. If IOP was ≥30 mmHg, the participant was assigned as “fast-track” and immediately referred to a Columbia University Harkness Eye Institute ophthalmologist who accepted their insurance.

5. Fundus photography was performed by a trained ocular photographer using the non-mydriatic, auto-focus, hand-held fundus camera (Volk Pictor Plus, Volk Optical, Mentor, OH, USA). Two non-dilated posterior fundus photographs of each eye were taken for an optimal two-dimensional view of the macula and optic nerve. Within 24 hours, the ocular photographer uploaded these images to a HIPAA-compliant cloud-based database (Forum, Zeiss Oberkochen, Germany). All images were read and graded by two study ophthalmologists specializing in retina and glaucoma and results were combined.

The ophthalmologists reading the fundus images were subspecialists, one trained in glaucoma and the other trained in retina. The glaucoma specialist graded the optic nerve and the retina specialist graded the retina and macula. Grading of each eye included the image quality of the optic nerve and retina (good, fair, poor, or unreadable) based on image features, specifically color, focus, contrast, and illumination.[12] Glaucoma findings for each eye included pathologic cup:disc ratio, asymmetric disc cupping, disc hemorrhage, and nerve fiber layer defect.[13] A comprehensive list of 50 retinal findings for each eye was used and examples included retinopathy, disc neovascularization, vitreous hemorrhage, microaneurysms, and macular edema. Following image grading by the ophthalmologist, an overall determination was made for each eye as 1) normal or abnormal without significant findings, 2) abnormal with significant findings, or 3) unreadable. With asymmetric findings, the worse eye was used to categorize participants, for example, those with a normal image in one eye and ocular pathology in the other eye were categorized as abnormal. Individuals with ocular pathology in one eye and unreadable image in the other eye were categorized as abnormal. Individuals with a normal image in one eye and unreadable image in the other eye were categorized as unreadable. Those with ocular pathology were referred to ophthalmology, and those with an unreadable image were scheduled to see the on-site optometrist.

Referral to on-site optometrist or off-site ophthalmologist

The study protocol states that participants who failed the vision screening (i.e., visual acuity 20/40 or worse in either eye with correction 2) IOP 23–29 mmHg, or 3) unreadable fundus image(s), were scheduled to see the on-site optometrist for a non-dilated eye exam either on the same day or within 2 weeks of initial screening. Participants who passed the vision screening and had abnormal fundus images were referred directly to ophthalmology and were assisted with making this appointment by our patient navigators (research coordinators and research assistant).

During the eye exam, the optometrist used a portable slit lamp to diagnose ocular pathology and a trial lens kit to determine refraction (refractive error) for prescription eyeglasses, which were provided complimentary by a partner (Warby Parker®). The color fundus images were also available in the chart to review. The optometrist diagnosed glaucoma and glaucoma-suspects using cup:disc ratio based on the American Academy of Ophthalmology *Practice Pattern Guidelines®*.[13] The optometrist also diagnosed cataract, retina abnormality, and other ocular diagnoses and referred participants with any of these ocular conditions to an ophthalmologist for a dilated eye exam and further ocular testing, such as visual fields and optical coherence tomography (OCT). Ophthalmology appointments for those referred participants were scheduled by patient navigators for March 2020, but the appointments were postponed due to COVID-19.

Vision-related quality of life (VR-QOL) instrument

The NEI-VFQ-8 was utilized to measure vision-related QOL, which evaluates the impact of diseases and treatment, many being disease- or domain-specific.[14,15] The NEI-VFQ-9 evaluates the impact of vision on role limitations, well-being/mental health, driving, and difficulties arising from deficits in general vision, near vision, distance vision, and peripheral vision, referred to as scales.[10] However, the majority of our participants did not drive. We therefore used the NEI-VFQ-8, which excluded the driving question and was validated alongside it in a large-scale study.[10]

Satisfaction surveys

With assistance from Westat, Inc., a survey instrument was created in English and Spanish and administered by CHWs at the completion of the vision screening. Participants were asked to rate their satisfaction with the vision screening (duration, convenience, screening staff), and the likelihood of attending a follow-up eye exam if referred to the on-site optometrist. Participants who completed an on-site optometrist exam were also asked to rate their satisfaction and the likelihood of attending a follow-up eye exam if referred to ophthalmology.

Statistical analyses

Data presented in this paper pertained to the 1-month feasibility study and are summarized using means and standard deviations for continuous variables and frequencies and percentages for categorical variables. Ocular data collected and used in multiple regression analyses include visual acuity, IOP, vision screening failure, last dilated eye exam, history of or current presentation suspicious of glaucoma, and whether a participant required referral from the optometrist to an ophthalmologist. Clinical data included medical diagnoses of diabetes or hypertension, falls risk, and smoking history. Analyses were performed in IBM SPSS Version 25. The NEI-VFQ-8 composite scores were computed using the published standard scoring algorithm.[16] The composite scores, as well as scales related to deficits in general vision, near vision, distance vision, and peripheral vision, were summarized by means and standard deviations among the study population.

Results

The 1-month feasibility study population consisted of 42 participants who were consented, enrolled, and underwent vision screening at the Riverstone Senior Center in New York

City. Participants were scheduled in advance across 6 days, with an average of 7 participants screened per day, including accommodating walk-ins. Demographic and clinical characteristics of the 42 participants are shown in Table 1. Participants were predominantly older adults, with a mean age of 70.0 ± 9.8 years (range: 42.9, 88.0). The majority of participants were female (61.9%) and insured (95%) with Medicare (61.9%) and Medicaid (42.9%). The population was 78.6% Hispanic, 26.2% African American/Black, and 14.3% identified as two or more races (Table 1). Nine participants (21.4%) had a family history of glaucoma and 5 participants (11.9%) had a family history of blindness. Although 59.6% of participants reported having a dilated eye exam in the past 2 years, 7 participants (16.7%) had not, and 10 participants (23.8%) could not remember their last eye exam or never had an eye exam. Most participants had risk factors for eye disease, including hypertension (59.5%), diabetes (31.0%), or smoking history (16.7%). None of the participants were currently smoking cigarettes (Table 1).

Vision screening

Most of the participants (33, 78.6%) failed the vision screening. Visual acuity was 20/40 or worse in either eye in 27 participants, fundus images were unreadable for 8 participants, and 4 participants had an IOP 23–29 mmHg (Figure 1a,b). The on-site optometrist examined 28 participants over 2 days (84.8% adherence) and of those, 13 participants (46.4%) were diagnosed with refractive error (9 with correction, 4 no correction), 9 participants (32.1%) with glaucoma/glaucoma suspect, 7 participants (25.0%) with cataract, 6 participants (21.4%) with retina abnormalities and 1 participant (3.6%) with other ocular diagnosis (Figure 2). Of those, 18 participants were referred to ophthalmology for further follow-up at Columbia Ophthalmology or Harlem Hospital Ophthalmology. A total of 13 participants required eyeglasses, all of which were fitted by our staff and distributed at the Riverstone Senior Center in March 2020.

Telemedicine image reading

As shown in Figure 2, of the 35 participants who had fundus images taken, 40% (n = 14) had a normal image with no significant findings, 37.1% (n = 13) had an abnormal image with significant ocular findings and 22.9% (n = 8) had unreadable images. All images were read and graded by two study ophthalmologists and there was 100% agreement between the glaucoma and retinal specialist regarding referral for follow-up eye exam based on the fundus images.

NEI-VFQ-8

A total of 41 participants completed the NEI-VFQ-8; after the driving question was removed from the analysis, the mean NEI-VFQ-8 composite score was 73.0 + 15.1 (range: 27.50, 96.7). Many participants performed at the optimal level for role limitation (73.2%) and peripheral vision (65.9%). Visual impairment did not hinder participants from performing their day-to-day household and community activities. Floor scores were common on the well-being/mental health scale, with 17.1% reporting they worry about their eyesight all of the time. The average composite score in those participants with normal retinal imaging determined by telemedicine grading was 76.39 ± 10.59, while the average score in those with abnormal images with significant ocular findings was 71.78 ± 13.60 ($P = .10$). Lower

VR-QOL scores were also seen in individuals with diabetes, hypertension, and those who had both Medicare and Medicaid.

STEADI falls risk

A total of 42 participants completed the STEADI falls checklist prior to vision screening. Nearly half (47.6%, n = 20) had a risk of falling based on the STEADI checklist, 33.3% (n = 14) fell in the past year, and 38.1% (n = 16) felt unsteady when standing or walking.

Vision screening satisfaction survey results

Of the 40 participants who completed the satisfaction survey, 77.5% were very satisfied with the overall vision screening, 75.0% were very satisfied with the screening time, 87.5% were very satisfied with the screening team, and 72.5% were very satisfied with the convenience and location of the vision screening (Table 2). Most participants (88%) stated that they were very likely to recommend this vision screening to their family and friends, and of those referred to the on-site optometrist, 97.0% stated that they were very likely to attend this appointment.

Optometrist satisfaction survey

Of the 28 participants who attended the on-site optometrist exam at the Riverstone Senior Center, 86.0% reported being very satisfied with the eye exam, 79.0% were very satisfied with the length of time of the eye exam, 93.0% were very satisfied with the optometrist, and 71.0% were very satisfied with the convenience and location (Table 2).

Discussion

Approximately 50% of uninsured/underinsured Americans identified as needing eye exams fail to attend due to numerous barriers leading to poor access to eye care[8,17,18] In addition to co-payments for eye exams being a significant barrier, vulnerable populations, including seniors and underrepresented minorities, also experience challenges with navigating eye exam appointments including arranging transportation.[18,19] Studies investigating barriers to eye care also cite limited understanding of ocular symptoms and risk factors for eye disease and causes of blindness among vulnerable populations. Findings have revealed that Hispanics and African Americans are less knowledgeable about glaucoma than whites, even though they are more likely to develop glaucoma.[17,19]

As underutilization of routine preventive eye care remains a significant public health concern, it is crucial to improve access to eye care and reduce vision-related disparities. The present study shows promising benefits associated with utilizing CHWs to participate in community-based vision screenings to detect eye diseases and using patient navigators to link community members to appropriate follow-up eye care.

Over 6 days of vision screening among 42 participants, 78.6% failed the vision screening, indicating the high need for vision care in this vulnerable population. In addition, 13 participants had ocular pathology seen on the fundus image reading. Most participants were very satisfied with the vision screening and on-site eye exams. A large percentage acknowledged the convenience of attending the vision screening and follow-up eye exam at the Riverstone Senior Center, which they already visit daily. Of the 33 participants who failed the vision screening and were referred to the optometrist, 28 attended this eye exam (84.8%), which is a significantly high adherence rate compared to previous studies.[20]

These results are promising and reveal that vision screenings and follow-up optometrist-based eye exams at a senior center yielded successful adherence to follow-up eye exams and resulted in timely and efficient ocular diagnoses to connect participants to additional eye care and resources. Consistent with previous studies, these findings also highlight the critical role that patient navigators play in the delivery of team-based care to improve clinical outcomes, including patient satisfaction and referring patients for follow-up care.[7–9]

The Philadelphia Telemedicine Glaucoma Detection and Follow-up Study, which utilized staff trained as CHWs, demonstrated a greater than 60% adherence rate to eye exam appointments, supporting the value that CHWs bring in reducing barriers to care for vulnerable individuals that would otherwise hinder access to eye care and detection of eye disease.[8,21] Our ocular findings and reasons for referral to the optometrist and ophthalmologist were consistent with previous studies.[20,21]

Telemedicine has been well established as an effective way to detect glaucoma and other retinal pathologies in remote settings.[22–24] In the present study, utilization of telemedicine images, which were read by two study ophthalmologists, detected unreadable images and ocular pathology following vision screening. Participants with unreadable images in this study were referred to the on-site optometrist for a follow-up eye exam and most attended this exam. Our findings build upon the understanding that an unreadable fundus image justifies referral for a follow-up eye exam and our optometrist was able to examine these subjects.[24]

Due to the short study period, the majority of participants with abnormal images were also seen by the optometrist because their visual acuity was 20/40 or worse and/or IOP was greater than 22 mmHg. After presenting their optometrist’s eye exam findings to our Data Safety and Monitoring Committee, it was confirmed that anyone with an abnormal image would bypass the optometrist and be referred directly to the ophthalmologist in the larger study, supporting our previous protocol design.

The importance of training CHWs to assess falls risk when conducting vision screening was also highlighted in the study, given that 47.6% of participants had a high risk of falling based on the STEADI test, 33.3% fell in the past year, and 38.1% felt unsteady when standing or walking. In the U.S., one in three adults aged 65+ years falls each year and falls are the leading cause of injury-related morbidity and mortality among older adults,[25] including in NYC.[26] Older adults may fall because of poor vision, coordination, and balance and it is well documented that vision impairment is an important factor increasing the risk of falling.[27,28] Data from the Beaver Dam Eye Study suggested that improving vision function may decrease falls risk and improve mobility.[29] A recent study provided nationally representative data on the prevalence of fall-related outcomes in older Americans with self-reported vision impairment.[30] Results demonstrated the need to treat avoidable vision impairment and develop interventions to prevent falls and fall-related outcomes among elderly populations.[30]

A strength of this study is that it provides clear evidence that a research team, including research coordinators, optometrists, CHWs, patient navigators, and ophthalmologists as telemedicine image readers, can provide accurate and high-quality vision screenings in a community-based setting such as the NYC Department for the Aging Riverstone Senior Center. One limitation of this study is that we were not able to assess outcomes for participants who had scheduled ophthalmology appointments in March 2020, as they were postponed due to COVID-19. Another limitation of this study is that 12.5% of participants failed to attend their referred optometrist eye exam. While this is not a high attrition rate, we did not investigate why these participants did not attend their appointment.

The findings of the present study highlight the need for ongoing efforts to ensure that underserved and vulnerable populations have access to and utilize eye care services. Community-based models of delivery, such as on-site vision screening using CHWs and an optometrist, should be further examined. The feasibility study was effective in collecting preliminary data and testing intake and survey instruments, all used to revise materials for the larger study. In the 5-year study, facilities will be added, and effectiveness of the patient navigators and outcome measures will be further examined.

To conclude, this study demonstrates the feasibility of using CHWs and patient navigators for reducing barriers to vision screening and optometrist-based eye exams in vulnerable populations, ultimately improving early detection of eye disease and linking individuals to additional eye care appointments. The full five-year study aims to further examine these outcomes.

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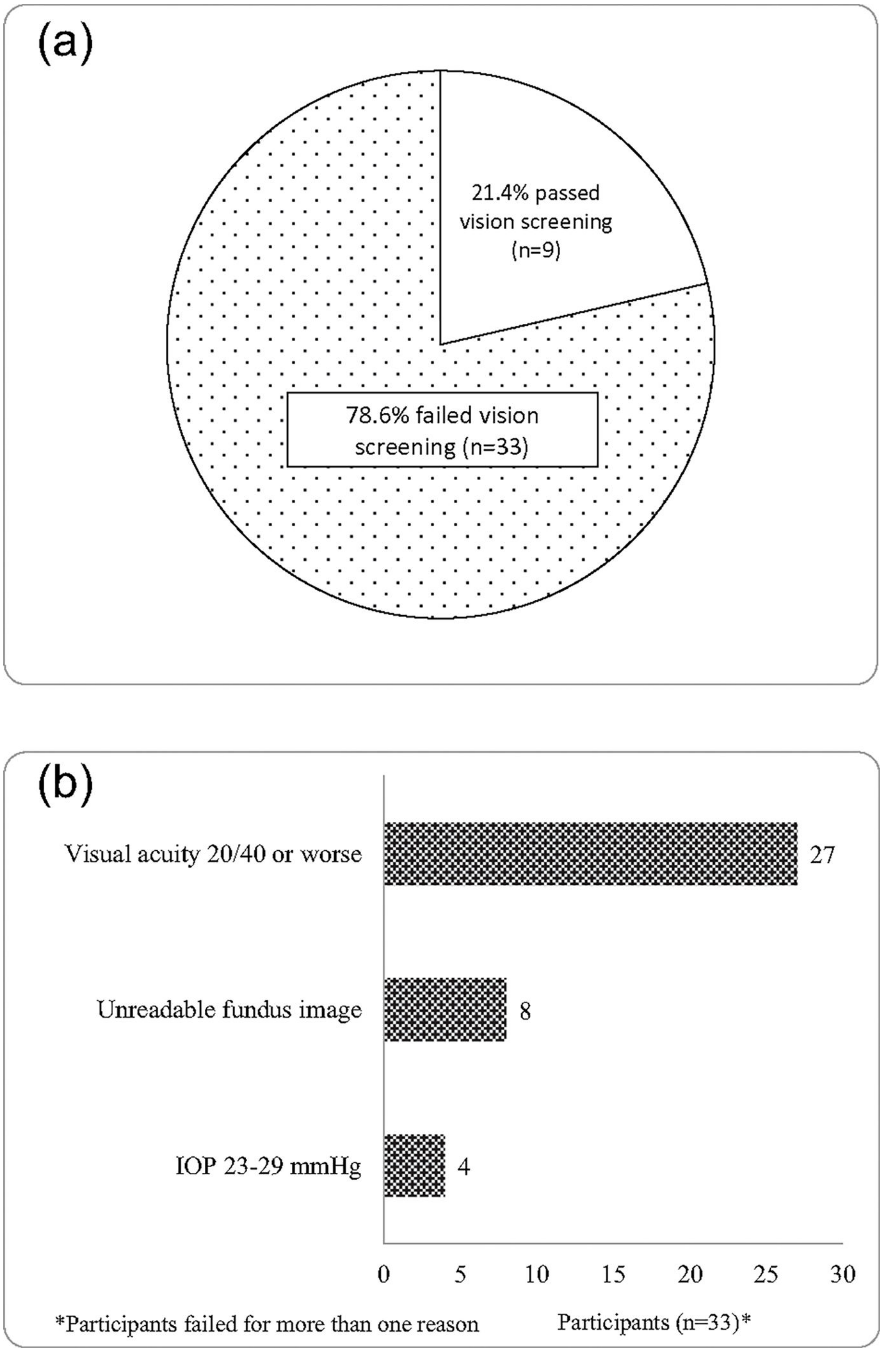

Figure 1.

(a) Manhattan vision screening and follow-up study in vulnerable populations: vision screening results. The majority of participants (n = 33; 78.6%) failed the vision screening. Only 21.4% of participants (n = 9) passed the vision screening. (b) Manhattan vision screening and follow-up study in vulnerable populations: reasons for vision screening failure. A total of 27 participants who failed vision screening had visual acuity 20/40 or worse in either eye, 8 participants had unreadable fundus images, and 4 participants had

IOP measurements 23–29 mmHg. Participants may have failed the vision screening for more than one reason.

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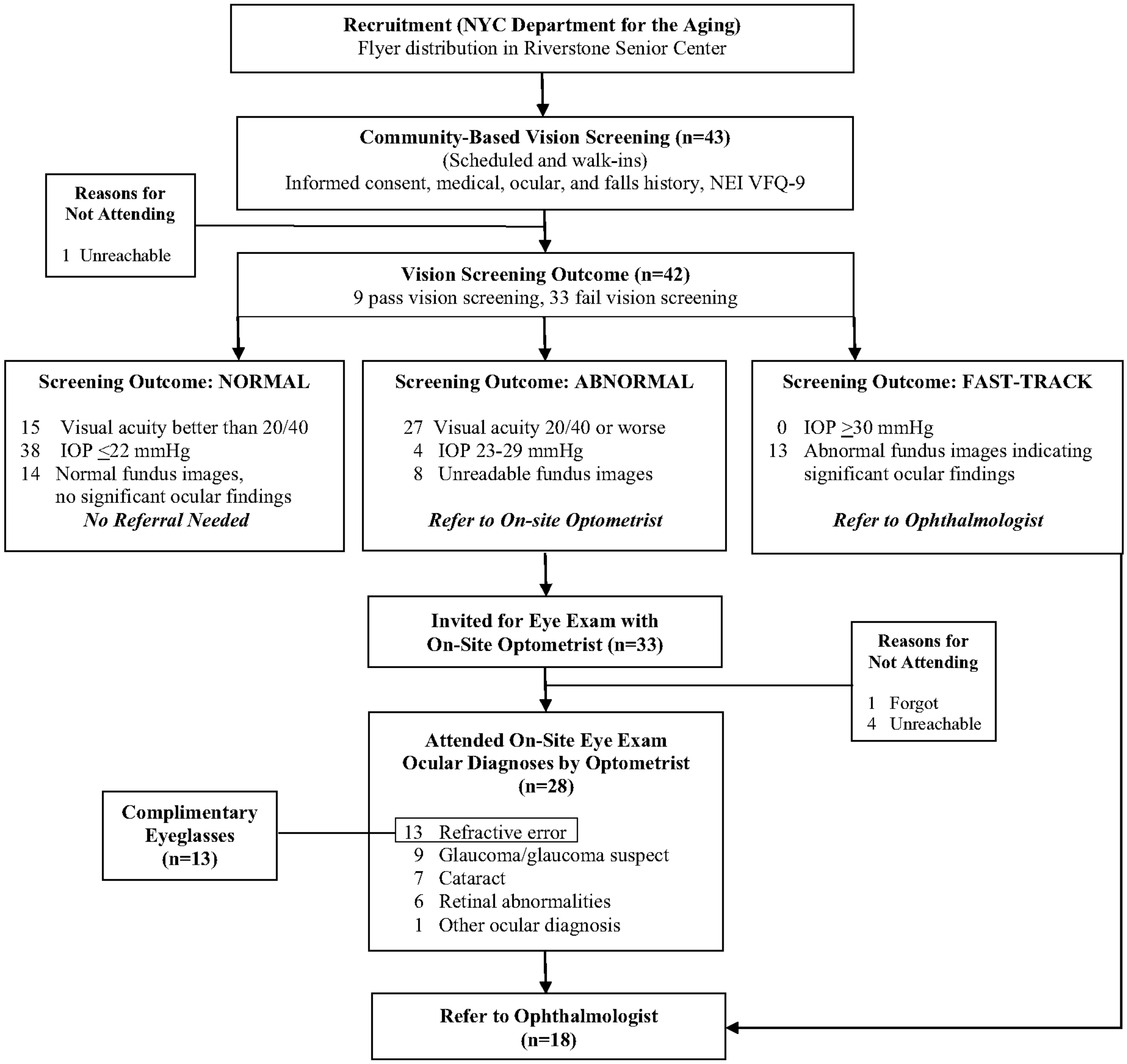

Figure 2.

Manhattan vision screening and follow-up study in vulnerable populations: vision screening outcomes and eye exam results consort diagram. Recruitment strategy involved distributing English and Spanish IRB-stamped approved flyers to Riverstone Senior Center members (top row center). A total of 43 participants consented and completed questionnaires (second row from top center). Among 43 enrolled participants, 42 completed the vision screening; 9 participants passed, and 33 participants failed (third row from top center). Normal screening outcome: 15 participants had visual acuity better than 20/40, 38 had IOP ≤22 mmHg, and 14 had normal fundus images (fourth row left). Abnormal screening outcome: 27 participants had visual acuity 20/40 or worse in either eye, 4 had an IOP 23–29 mmHg, and 8 had unreadable images (fourth row center). Fast-tracked: 13 participants had an abnormal fundus image and were referred to ophthalmology (fourth row right). Of the 33 participants invited for an eye exam (fifth row center), 28 attended; 13 were diagnosed with refractive error, 9 with glaucoma/glaucoma suspect, 7 with cataract, 6 with retina abnormalities, and 1 with other ocular diagnosis (sixth row center). Of those, 18 were referred to the ophthalmologist (sixth row right). All 13 participants with refractive error received complimentary eyeglasses (sixth row left).

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Table 1.

Demographic and clinical characteristics of participants (n = 42) Riverstone Senior Center, New York City, February 2020.

Characteristics	Summary Statistics
Age, y	
Mean ± standard deviation (range)	70.0 ± 9.8 (42.9, 88.0)
40–59	6 (14.3%)
≥60	36 (85.7%)
Gender	
Male	13 (31.0%)
Female	26 (61.9%)
Prefer not to say	3 (7.1%)
Race	
African American/Black	11 (26.2%)
White	7 (16.7%)
Identifies as 2 or more races	6 (14.3%)
Unknown/Prefer not to answer	18 (42.9%)
Ethnicity	
Hispanic	33 (78.6%)
Marital status	
Single	11 (26.2%)
Married	10 (23.8%)
Divorced	12 (28.6%)
Widow	9 (21.4%)
Health insurance	
Yes	95%
Two or more types of insurance	36%
Medicare	26 (61.9%)
Medicaid	18 (42.9%)
Uninsured	2 (4.8%)
Family history	
Blindness	9 (21.4%)
Glaucoma	5 (11.9%)
Last dilated eye exam	
Within past two years	25 (59.6%)
Over two years ago	7 (16.7%)
Cannot remember/Never had an eye exam	10 (23.8%)
Chronic comorbidities	
Hypertension	25 (59.5%)
Diabetes	13 (31.0%)
Smoking history	
Current smokers	0 (0%)

Characteristics	Summary Statistics
≥1 pack per year	7 (16.7%)

Table 2.

Satisfaction survey results: vision screening and on-site optometrist eye exam, Riverstone Senior Center, New York City, February 2020.

Item	Very Satisfied	Satisfied	Dissatisfied	Very Dissatisfied
Vision screening[b]	77.5%	20%	2.5%	-[a]
Vision screening convenience[b]	72.5%	27.5%	-[a]	-[a]
Vision screening team[b]	87.5%	12.5%	-[a]	-[a]
Vision screening time[b]	75%	20%	2.5%	2.5%
Optometrist[c]	93%	7%	-[a]	-[a]
On-site eye exam[c]	86%	14%	-[a]	-[a]
On-site eye time convenience[c]	71%	25%	4%	-[a]
On-site eye exam time[c]	79%	21%	-[a]	-[a]

[a]no reported data.

[b]n = 40 participants.

[c]n = 28 participants.