

Mobile eye screenings for Hawaii's homeless: results and applications

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Purpose: To describe the status and perceptions of ocular health in Oahu's homeless population in Hawaii.

Patients and methods: A total of 127 participants were included in this community-based cross-sectional study. Examinations included demographic history, near and far presenting visual acuity (PVA), autorefractometry, and nonmydriatic retinal photography. PVA was measured using the participants' current eyeglasses or contacts, or without correction if they did not use glasses. Visual disability was categorized as "legally blind" (20/200 or worse), "impaired vision" (20/40 to 20/150), or "not impaired" (better than 20/40). Refraction data were categorized using the eye with a greater absolute spherical equivalent. Hyperopia was defined as more than 0.5 D of plus and myopia as more than 0.5 D of minus. Astigmatism was defined as cylindrical values more than 0.50 D of minus or 0.50 D of plus.

Results: Of 127 participants, 60.5% were displeased with their vision, 48.8% did not know where to go to seek eye care, and 66.7% did not know where to go to seek corrective lenses. Self-reported diabetes (17.1%) was significantly higher ($P < 0.001$) than that of the general population of Hawaii (7.5%). Less than one-third of diabetic participants had ever been evaluated by an ophthalmologist. The prevalence of refractive error was comparable with national rates, with myopia, hyperopia, and astigmatism at 23.5%, 1.2%, and 35.3%, respectively. Presenting visual acuity was found to be impaired or blind in 19.5% of participants for near vision testing and 12.1% for distance vision. The rates of retinal pathology in participants were found to be 1.6% with diabetic retinopathy, 0.8% with retinal hypertension, 2.4% with epiretinal membrane, 4.0% with drusen, and 0.8 with nevus.

Conclusion: The homeless population of Oahu has a high dissatisfaction with vision, comparable rates of ocular pathology with national samples, and poor knowledge of eye care services. This suggests that mobile eye screening could provide an ideal setting for providing ocular health care to the homeless population, and has enormous potential for improving health care in this population.

Keywords: homeless, visual acuity, refractive error, retina, Hawaii

Introduction

The detrimental affects of poverty¹ and homelessness² have been well documented. The homeless have been shown to be at substantially greater risk for infectious disease,³ dental problems,⁴ mental illness,⁵ chronic obstructive pulmonary disease,⁶ and cardiovascular disease.⁷ Health disparities seen in the homeless may be due to issues such as lack of mobility or financial means to access care, cultural or language barriers to following self-care instructions, and environmental conditions, such as harsh weather, risk of trauma, and lack of secure storage for medications.⁸

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While a wealth of published information exists on health issues in the homeless, to our knowledge, few studies have specifically investigated ocular health in this vulnerable population.^{9,10}

The homeless population on the island of Oahu, Hawaii, is notoriously difficult to census. Between June 2006 and July 2007, 5066 individuals received shelter services from state-sponsored agencies.¹¹ However, this is a gross underestimation of the homeless population, because it does not take into account a substantial number of homeless that live outside the shelter system, eg, in parks and on beaches. It has been estimated that the homeless represent 0.47% of Hawaii's population, the fourth highest nationwide rate.⁸ One factor contributing to this high rate is Hawaii's increasing cost of living. The median home price on Oahu has jumped from \$158,600 in 1985, to \$643,500 in 2007, an increase of over 400%.¹²

The real and perceived health of Oahu's homeless follows the national trend of disparity. Oahu's homeless have been shown to be hospitalized in acute care and psychiatric hospitals far more frequently than members of the general population¹³ and, in a recent survey, nearly half of Oahu's homeless rated their health as fair to poor, compared with only 13% in Oahu's general population.⁸

Our goal in this study was to obtain baseline information about visual acuity and ocular pathology, perceptions of ocular health, and knowledge of treatment access in Oahu's homeless population.

Material and methods

This paper reports a prospective, community-based, cross-sectional study of eye disease in homeless persons officially registered at three shelters on Oahu (Kaka'ako, Barber's Point, and Waianae). The Project Vision Van, a mobile eye screening unit operated by the Retina Institute of Hawaii, was dispatched to each site. Convenience sampling screenings were performed on board the van by three medical students and an optometry technician. A board-certified ophthalmologist (CSO) was on hand to supervise all screenings. A standardized protocol was employed to maximize the convenience sampling participation of shelter residents at each site. After arriving on site, Project Vision Van volunteers notified all shelter residents individually and described the nature of the screenings. Interpreters were employed to recruit and assist those with language barriers. The sample size included a total of 127 homeless participants. Participants volunteered to complete a survey asking about subjective perceptions of

eye health, knowledge about where to access eye care, and past ocular medical history.

Examinations involved presenting near and far visual acuity using standard Snellen distance charts and Rosenbaum near vision cards, refraction using autorefractometry (Canon AutoRef R-22), and nonmydriatic retinal photography (Canon DGI nonmydriatic retinal camera with Canon Rebel XTI 10.2 digital back). Following the screenings, nonmydriatic, nonstereo, retinal photographs were evaluated and scored for pathology by a board-certified ophthalmologist (CSO). No discrimination was made between nonproliferative versus proliferative status of diabetic retinopathy.

Presenting visual acuity was measured using the participants' current eyeglasses or contacts, or without correction if they did not use glasses. Visual disability was categorized as "legally blind" (20/200 or worse), "impaired vision" (20/40–20/150), or "not impaired" (better than 20/40). Refraction data were categorized using spherical equivalents (sphere + ½ cylinder [diopters]) from the eye with the greatest absolute value. Hyperopia was defined as more than 0.5 D of plus and myopia as more than 0.5 D of minus. Astigmatism was defined as cylindrical values more than 0.50 D of minus or 0.50 D of plus.

A two-tailed z-test was used for group comparison to determine 95% confidence intervals. The standard for statistical significance was defined as P values ≤ 0.05 .

Screenings were approved by the Independent Review Board of the University of Hawaii and conducted in accordance with the guidelines of the Declaration of Helsinki. Written informed consent, in the participants' own language, was obtained from all study participants. For those under 18 years of age, written informed consent was obtained from the parents. All participants, regardless of screening findings, were encouraged to follow-up with an eye physician for routine care and were given a list of low-cost eye clinics in their respective communities. Those participants requiring further evaluation or treatment were referred to a local optometrist or ophthalmologist.

Results

Population demographics

Data were collected for a total of 127 participants from all three sites. Of these, 61 participants were male (47%) and 68 were female (53%). The mean age of participants was 35 years (median 37, range 7–68 years). The majority of participants were of mixed ethnic (cosmopolitan) background, with the largest group being of part-Hawaiian descent ($n = 66$, 51%).

Access to care

Questions regarding self-reported access to ophthalmologic care and individual's perceptions of their ocular health revealed that the majority of individuals (60.5%) were dissatisfied with their vision, had trouble seeing near objects (49.6%) or far objects (57.4%), and did not know where to go to seek eye care or corrective lenses (48.8% and 66.7%, respectively). Of those who responded to an open-ended question on where to seek eye care, the most common responses were "doctor", "eye doctor", or a local "free health center". Table 1 shows the results of questions regarding self-reported health perceptions and access to ophthalmologic care among the homeless.

Diabetes and eye care

Diabetes in Hawaii's general population is estimated to be 7.5%.¹⁴ When asked if "a doctor had ever diagnosed" participants with diabetes, the self-reported prevalence of diabetes in our study population was significantly higher than this (17.1%, $P < 0.001$). In addition, less than one-third of participants with self-reported diabetes had ever been evaluated by an ophthalmologist. This is in stark contrast ($P < 0.0001$) to the care received by Hawaii's general population of diabetics,

81.6% of whom had received a dilated eye examination within the past year.¹⁴

Presenting visual acuity

Results for near and far presenting visual acuity (PVA) are reported in Table 2 and the Figure 1. Each participant was tested with their current spectacles or contacts. Only nine participants (7.3%) had any correction for far vision and only one participant (0.8%) had correction for near vision. This is significant, because the rate of vision impairment found for both near and far vision was 19.5% and 12.1%, respectively.

Refractive error

No statistical significance was found in the prevalence of myopia, hyperopia, and astigmatism between our study population and the 1999–2004 National Health and Nutrition Examination Survey, a nationally representative sample in the US¹⁵ (Table 3).

Retinal pathology

Retinal pathology is reported in Table 4. Of the abnormal findings found on review of retinal photography, three were diagnosed as urgent cases. These persons were immediately referred to an ophthalmologist for evaluation and treatment.

Table 1 Ocular health perceptions and access to care of the total sample population (n = 127)

	Number (n)	Percentage (%)
When was the last time your eyes were examined by a doctor?		
< 1 year	29	22.5
1–5 years	47	36.4
5+ years	22	17.1
Never	31	24.0
Have you ever had corrected vision (glasses or contacts)?		
No	71	55.0
Do you have trouble seeing near objects?		
Yes	64	49.6
Do you have trouble seeing far objects?		
Yes	74	57.4
If you had vision problems, where would you go for help?		
Specific place (doctor or clinic)	66	51.2
I don't know	63	48.8
If you ever needed a pair of glasses or contacts, where would you get these?		
Specific place (doctor or clinic)	43	33.3
I don't know	86	66.7
Have you ever been diagnosed with an eye disease?		
Yes	14	10.9

Discussion

Although we report a trend of better visual acuity in the homeless and lower rates of myopia/hyperopia, these trends are not statistically significant when compared with a national sample.¹⁵ This is in contrast with previous vision studies in the homeless that have found significantly higher rates of visual impairment.^{9,10} This disparity may be an interesting avenue of future research. While this disparity may be due to low sample size, the unique ethnic makeup of Hawaii may play a role. Retinal pathology was found to mirror crude national rates of prevalence.

Table 2 Presenting visual acuity, and near and far vision for all ages

	Number (n)	Percentage (%)
Classification of visual impairment based on nearpresenting visual acuity		
Not impaired (20/40 or better in either eye)	100	80.5
Impaired vision (20/50–20/100 in either eye)	18	14.6
Blind (20/200 or worse in either eye)	6	4.9
Classification of visual impairment based on farpresenting visual acuity		
Not impaired	109	87.9
Impaired vision	12	9.7
Blind	3	2.4

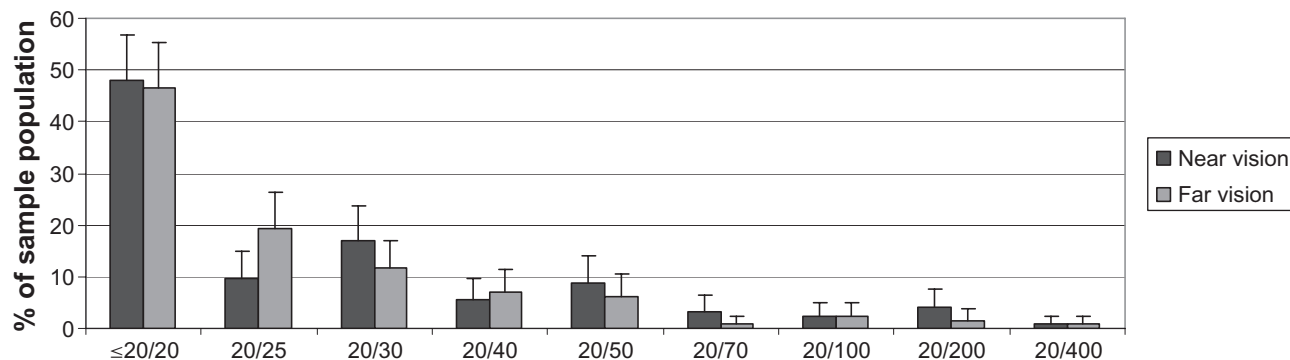


Figure 1 Presenting near and far visual acuity in the study population of Oahu’s homeless with 95% confidence intervals.

Table 3 Prevalence of refractive error in the homeless, and in the 1999–2004 National Health and Nutrition Examination Survey (NHANES), in participants 18 years and older

	Homeless (%)	NHANES (%)
Myopia*	23.5	33.1
Hyperopia **	1.2	3.6
Astigmatism***	35.3	36.2

Notes: *P value = 0.079; **P value = 0.366; ***P value = 0.953.

Previous literature has shown that 77% of Oahu’s homeless have health insurance coverage.⁸ Our data suggest that this population is not utilizing their coverage for eye care. Over 40% of our respondents reported not having had their eyes examined within the last five years. Alarming, nearly 70% of those with self-reported diabetes have never been evaluated by an eye doctor.

Our data suggest that one reason for this underutilization may simply be that the homeless population does not know where to go for care. Over half of our respondents did not know where to go to receive eye care, while two-thirds did not know where to obtain corrective lenses. Other factors affecting health care access by the homeless include lack of transportation, financial resources, and secure storage, along with the social stigma felt by a homeless person visiting an office not accustomed to treating this disadvantaged group. In addition, there is a pronounced lack of eye care services targeted to this surprisingly well-insured population. Perhaps mobile eye screenings may be a method of bridging this gap.

Table 4 Prevalence of retinal pathology via funduscopy (n = 124)

	DR	Hypertension	ERM	Drusen	Nevus
Number	2	1	3	5	1
Percentage	1.6	0.8	2.4	4.0	0.8

Abbreviations: DR, diabetic retinopathy, ERM, epiretinal membrane.

We found that poor knowledge of available eye care services for the homeless is a major barrier to routine eye examinations and potential treatment. Furthermore, despite adequate insurance coverage, the relatively low usage of traditional ophthalmologic services available suggests that additional measures could help facilitate access and usage of eye care and improve vision in this population. While this study is a convenience sample of relatively low sample size, and is not a statistical representation of Oahu’s homeless population, the Project Vision Van provided an ideal setting for ocular screenings in homeless populations, and could be applied for subsequent larger epidemiologic analysis. The free examinations and the ability to bring the screenings directly to the study population made it possible to screen a large number of participants over a short period of time. Given this, mobile eye screenings have enormous potential for improving health care in homeless populations. For example, mobile eye screenings have been shown to be an effective outreach method of ophthalmology care in areas such as Africa,^{17–19} the United Kingdom,²⁰ Australia,²¹ Costa Rica,²² and Los Angeles.¹⁰ Additional resources need to be mobilized at the local and national level to insure that such vision screenings are available to our growing homeless population.

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Disclosure

The authors report no conflicts of interest in this work.

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