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An Approach towards inclusive eye health tailored screening to compare the frequency of ocular problems of people living in residential colonies and homeless communities in Lahore

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ABSTRACT

Background and Objectives: Despite being a vital part of general health, eye health is frequently disregarded, especially among underprivileged groups. Millions of people are suffering around the world from impairments of vision that dramatically lower the quality of their lives and heavily curtail the capacity to take part fully in social and economic activities. To find the prevalence of the most common eye problem in homeless communities and people living in their own houses.

METHODOLOGY: : Cross-Sectional study was conducted after the approval of the ethical review board of the College of Ophthalmology and Allied Vision Sciences (COAVS) Lahore. The study took place in Lahore. The study's sample size was 290. Individuals that were included experiencing homelessness, as defined by the study's operational definition, include those lacking a stable nighttime residence and residing in shelters, on the streets, or in temporary accommodations. Individuals who were excluded who are unable to be examined (i.e. with severe trauma or injury) and with some seductive drugs and who are not considered homeless according to the study's operational definition. Personal data was kept private. Data were collected using a self-designed proforma and entered SPSS version 26 for analysis. p-value under 0.05 was considered significant.

RESULTS: The study examined 289 participants, including 139 homeless individuals and 150 residential colony residents, with an average age of 23.62 years (SD = 18.843. A significant association was found between living conditions and ocular problems ($\chi^2(11, N = 289) = 80.709$, $p < .001$).

CONCLUSION: The study emphasizes the need for targeted interventions and inclusive policies to address disparities in eye health among homeless individuals and residential colonies in Lahore.

KEYWORDS: Refractive error, Cataract, Community health services, Homeless persons, vision Defects.

INTRODUCTION

WHO estimates indicate that over 2.2 billion persons are afflicted with some form of visual impairment and interventions made in time would have prevented or treated more than half of them. This is the crux of why an efficient, all-inclusive, and customer-centric approach to eye health matters.1

This condition is prevalent in Pakistan, and the eye among other eye diseases suffers from cataracts and glaucoma, refractive errors, and diabetic retinopathy. The reasons for it to happen are multiple; main causes are differences in socioeconomies, lack of knowledge, and lesser provision of health services.2 Socio-economic status plays an important role in health care, more particularly in the case of eye care. The service for a screening program, awareness campaign, and medical facilities is generally good in the urban residential colonies. As such, the major issues of the homeless population are poverty, ignorance, and lack of health care. These differences in the downtrodden may contribute to a higher rate of undiagnosed and untreated ocular diseases.3

Equal opportunity is given to everyone irrespective of social class through inclusive eye health practice. Specific targeted screening programs in such cases would be necessary, especially when there is a health-care gap. Some of the advantages these carry include reduction in the burden of avoidable blindness apart from early detection of problems.4 Improved alert

How to cite this: Burhan T, Nasir M. An Approach towards inclusive eye health tailored screening to compare the frequency of ocular problems of people living in residential colonies and homeless communities in Lahore. International Journal of Healthcare Profession. 2024; 1(4):8-13

ness, access to healthcare facilities, and education will be beneficial to residents in housing colonies, but there are very critical imbalances that cannot be ignored since their poorer brethren and those whose health literacy is very low may suffer harmful effects from reduced access to eye care. 5

The housing colony residents will benefit from improved alertness along with better access to health care facilities and education but cannot deny extremely critical imbalances since their poorer brethren, and those whose health literacy is very low, may feel harmful effects from reduced access to eye care.6nThe prevalence of eye problems should be compared among residents in the residential colonies of Lahore, compared to homeless populations, as this should be carried out in tailoring an appropriate and inclusive approach for implementation with specific needs and the challenge faced by each entity, better guiding fair plans for the distribution of care given within metropolitan environments.7

Effective health interventions rely on tailored screening programs that consider the socioeconomic and cultural conditions of target communities. For example, culturally appropriate education campaigns, community outreach activities, and mobile eye care units can significantly enhance access to eye care services among underserved populations.8 This study supports the more general public health objectives, namely, the objectives announced by the Universal Eye Health program of WHO in regard to equitable access to good quality eye care services. This contributed to the global campaign to eliminate avoidable blindness and low vision by addressing the ocular health inequities in Lahore.9 This study will apply comparative methodology in determining differences between the eye health of residential and homeless populations in Lahore. It will be focused on raising awareness among the respective populations about incidents and types of eye problems through the use of extensive and tailored screening methods. The information derived from this study will be highly essential to legislators and doctors who will use it in developing more efficient and equitable eye health programs.

METHODOLOGY

Cross-Sectional study was conducted after the approval of the ethical review board of the College of Ophthalmology and Allied Vision Sciences (COAVS) Lahore. The study took place in COAVS/Mayo Hospital, Lahore. The study's sample size was 289 Homeless individuals' people in Lahore and calculated by formula

$$n = \frac{Z^2_{1-\alpha/\varsigma} P(1-P)}{d^2}$$

having confidence level 95% and was taken from a study in which ocular screening program provides a viable option for screening in a pandemic.11 Individuals that were included experiencing homelessness, as defined by the study's operational definition, include those lacking a stable nighttime residence and residing in shelters, on the streets, or in temporary accommodations. Individuals who were excluded who are unable to be examined (i.e. with severe trauma or injury) and with some seductive drugs and who are not considered homeless according to the study's operational definition. All participants gave their informed consent after being fully told about the study's protocol and made aware of their right to discontinue participation at any moment. Personal data was kept private. It was found that the most common eye problems among homeless people and people living in their own houses. complete eye examinations along with visual acuity and pen torch examination, etc. The Mann-Whitney U tests were conducted to compare the severity of ocular problems among both groups, chi-square tests for analyzing the association of living environments with ocular difficulties, and descriptive statistics were applied to determine the prevalence of different ocular disorders. Data were collected using a self-designed proforma and entered into SPSS version 26 for analysis.

RESULTS

The goal was to document the incidence of eye disease in two relatively contrasting populations: homeless people dwelling in Lahore and the residents of residential colonies. 289 such persons were enrolled in the study, with an age range of 2 to 75 years. The age prevalence in the two groups was widely disparate since the age averages of homeless persons were on an older side at 28.16 as compared to that of the residential colony group whose average age was 19.08 years. Refractive error was the most prevalent ocular condition seen in both groups, involving 34.6% of all participants. It was more common in residential colonies (46%) than among the homeless (22.3%). Compared to the residential colony group (2% and 0.7%, respectively), the homeless group had a considerably higher prevalence of cataracts and lens alterations (21.6% and 16.5%, respectively).

Additionally, the survey discovered that a higher percentage of people living in residential colonies (42%) than those experiencing homelessness (24.5%) reported having no eye issues. The prevalence of ocular issues was significantly correlated with living conditions, according to statistical analyses employing the chi-square test ($\chi^2(11, N = 289) = 80.709$, $p < .001$). The trustworthiness of the test results may be limited, nevertheless, as 66.7% of the cells in the chi-square test had predicted counts of less than 5. The results may be confirmed by other investigations employing different techniques.

To evaluate the degree of ocular issues in the two groups, a Mann-Whitney U test was also performed. The findings showed a significant difference ($U = 8855.500$, $p = .021$) between the homeless and residential colony members, with the former having more severe eye problems. The descriptive study, which demonstrated that the total burden of eye problems was higher among homeless people, is supported by this. The results show how the two communities' eye health differs, and they imply that homeless people could need more specialized and easily available eye health care.

1. Descriptive Statistics:
2. Groups * Ocular Problems Crosstabulation:
3. Mann-Whitney Test Results:

Test Statistics

These tables summarize the key data and results of the study, offering insight into the prevalence of ocular problems among different living conditions in Lahore.

DESCRIPTIVE ANALYSIS:

Table 1 showed Descriptive Statistics

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
age of patients	289	2	75	23.62	18.843
Valid N (listwise)	289				

The study included 289 participants, with ages extending from 2 to 75 years. The typical age was 23.62 years, but there was significant variability in age (SD = 18.843). Further analysis discovered a statistically weighty difference in mean age between the homeless individuals (mean = 28.16 years, SD = 19.86) and those living in residential colonies (mean = 19.08 years, SD = 17.08). The median age for the homeless group was 25, while the median age for the residential group was 17. Both distributions exhibited a slight right skew, with a higher concentration of younger individuals observed in the residential colonies group. The most frequent ocular problem observed among all participants was refractive error, found in 100 individuals (34.6%).

Table 2 Groups * Ocular problems Crosstabulation

Groups * Ocular problems Crosstabulation				
Count				
		Groups		
		Home Residents	Homeless	Total
Ocular problems	Cataract	3	30	33
	glaucoma	4	3	7
	Refractive error	69	31	100
	Conjunctivitis	1	5	6
	Squint	7	1	8
	Corneal opacity	1	3	4
	Blepharitis	0	3	3
	Stye/Chalazion	1	2	3
	Lens changes	1	23	24
	Pterygium	0	2	2
	DR	0	2	2
	no ocular problem	63	34	97
Total		150	139	289

This was followed by cataracts, identified in 33 individuals (11.4%), and lens changes, present in 24 individuals (8.3%). Notably, the prevalence of cataracts was considerably higher among homeless individuals (30 out of 139; 21.6%) compared to those residing in residential colonies (3 out of 150; 2%). A similar trend was observed for lens changes, with a higher proportion seen in the homeless group (23 out of 139; 16.5%) than in the residential group (1 out of 150; 0.7%). Other ocular problems, such as glaucoma, conjunctivitis, squint, corneal opacity, blepharitis, stye/chalazion, pterygium, and diabetic retinopathy, were observed at lower frequencies in both groups. Interestingly, a greater proportion of individuals in the residential colonies group (63 out of 150; 42%) had no ocular problems compared to the homeless group (34 out of 139; 24.5%).

Table 3 showed Chi-Square Tests

Chi-Square Tests			
	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	80.709[a]	11	.000
Likelihood Ratio	93.000	11	.000
Linear-by-Linear Association	1.801	1	.180
N of Valid Cases	289		
a. 16 cells (66.7%) have an expected count of less than 5. The minimum expected count is .96.			

A chi-square test of unconventionality was executed to scrutinize the association between living situations (homeless vs. residential colonies) and the presence of ocular problems. The results showed a statistically significant connotation between the two variables ($\chi^2(11, N = 289) = 80.709$, $p < .001$). This suggests that the prevalence of ocular problems differs significantly between homeless individuals and those living in residential colonies. However, it is important to note that a large percentage of cells (66.7%) had anticipated counts less than 5, which may affect the dependability of the chi-square test. Further analysis using alternative methods may be warranted to confirm these findings.

Table 4 showed Test Statistics

Test Statistics	
	Ocular problems
Mann - Whitney U	8855.500
Wilcoxon W	18585.500
Z	-2.307
Asymp. Sig. (2-tailed)	.021
a. Grouping Variable: Groups	

To further investigate the difference in ocular problems between homeless individuals and residents of residential colonies, a Mann-Whitney U test was conducted. This non-parametric test equivalences the ranks of the data rather than the raw values, making it suitable for data that may not be normally distributed. The test discovered a statistically momentous difference between the two groups (U = 8855.500, p = .021), indicating that the severity of ocular problems is higher among homeless individuals. This finding supports the observation from the descriptive analysis that homeless individuals experience a greater burden of eye conditions compared to those living in residential colonies.

DISCUSSION

This study found a significantly higher prevalence of cataracts (21.6% vs 2%) and lens changes (16.5% vs 0.7%) among homeless individuals this study parallels with previous research highlighting the increased risk of ocular morbidity in these two group population populations. In research (2022)11 Emphasized the role of social factors of health, such as access to care and socioeconomic status, in contributing to these disparities. Similarly, In Jadoon12 Research article (2024) demonstrated the importance of community eye health programs in reaching underserved populations and reducing the burden of avoidable blindness, particularly from conditions like cataracts. Our findings reinforce the need for such programs to specifically target homeless individuals and address the unique barriers they face in accessing eye care. This may involve implementing mobile eye clinics, providing free or subsidized eye examinations and treatments, and integrating eye care services into existing homeless support programs.

The significant incidence of refractive problems in both groups (34.6% total) highlights the significance of providing accessible vision repair services to all people, regardless of housing situation. The prevalence of refractive errors was higher among the residents of residential colonies than in slum dwellers, 46% vs 22.3%. However, this might be because of better access to diagnostic services and not an actual difference in need, as noted by research done by Noel in 2015.13 Uncorrected refractive defects have huge impacts on the quality of life as well as on opportunities and economic potential, especially for vulnerable populations such as the homeless. Plans going forward therefore must be aimed at enhancing access to cheap spectacles and optometry for the group. This would involve collaborating with optical companies and suppliers in a bid to facilitate provision of discount spectacles or free glasses while at the same time enhancing vision screening as well as referrals through the homeless shelters among other interventions.14

The data paint quite a stark picture of inequity, with homeless people facing a considerably higher rate of eye illness. Homeless people had tenfold frequencies of cataracts compared with members of residential colonies 21.6 vs 2%. Lens changes occurred considerably more than 20 fold among the homeless group (16.5% vs. 0.7%).15 This must be multilayered once again, a result of the complicated game of financial disadvantages, limited health care, and street life realities.

The most striking finding was the cataract incidence. While 2% of sheltered colony residents suffered from cataracts, 21.6% of homeless people suffered from this disease that can cause blindness. Several factors may explain such a stark contrast. Exposure to prolonged UV radiation, for instance, is common among homeless people since they do not have shelters.16 Furthermore, poor nutrition and higher rates of smoking, often associated with homelessness, can also contribute to cataract formation.17

Similarly, lens changes, another age-related eye condition, were significantly more prevalent among the homeless (16.5%) compared to those in residential colonies (0.7%). This difference aligns with the observed disparity in age between the two groups, with the homeless population having a higher mean age (28.16 years) than residents of residential colonies (19.08 years). Age is a known risk factor for lens changes, leading to decreased visual acuity and potentially impacting daily activities. 18

While refractive errors were the most common ocular problem overall (34.6%), their distribution also differed between the groups. Residents of residential colonies exhibited a higher prevalence of refractive errors (46%) compared to the homeless (22.3%). This finding might reflect better access to eye care and awareness of refractive errors among those with stable housing, leading to earlier diagnosis and correction. However, it also underscores the need for accessible

and affordable vision correction services for homeless individuals, as uncorrected refractive errors can hinder education, employment, and overall quality of life.19

The chi-square test of independence confirmed a statistically significant association between living situations and ocular problems ($\chi^2(11, N = 289) = 80.709$, $p < .001$). This result strongly suggests that homelessness is a significant risk factor for ocular morbidity. The Mann-Whitney U test further corroborated this finding, revealing that homeless individuals experience not only a higher prevalence but also a higher severity of ocular problems ($U = 8855.500$, $p = .021$). This emphasizes the critical need for customized solutions to alleviate the health inequality. The chi-square and Mann-Whitney U tests reveal that homeless people have a much higher burden of ocular issues, comprising a higher incidence of particular diseases such as cataracts and lens alterations, as well as a higher overall seriousness of eye illness.20

This should once again be multilayered, product of the complex game of financial disadvantages, limited health care, and street life realities.The most dramatic finding was the incidence of cataracts. As many as 2% of sheltered colony residents were reported to have cataracts, whereas 21.6% of homeless people suffered from this disease, which can lead to blindness. Several factors could account for such a difference. Among other things, exposure to extended periods of UV radiation is routine for homeless people because they lack shelters.21 Outreach beyond the awareness of eye health can also be done by coordinating with shelters and community organizations. Additionally, strategies on the elimination of homelessness such as affordable housing, among others, and poverty eradication are part of its processes which can help in identifying the real causes for this health gap.22 Through health's societal drivers, we can build a more just society where everyone, without any respect to the status of his or her residence, has the opportunity to attain optimal eye health.23

Figure 1 presents a bar chart comparing the prevalence of various ocular problems between homeless individuals and residents of residential colonies in Lahore. Refractive error was the most common condition in both groups, affecting 69 individuals (23.88%) in residential colonies and 31 individuals (10.73%) among the homeless. A striking difference was observed in the prevalence of cataracts, with a much higher proportion among the homeless (30 individuals, 11.76%) compared to residents of residential colonies (3 individuals, 1.04%). Similarly, lens changes were more common in the homeless group (23 individuals, 7.96%) than in the residential group (1 individual, 0.35%). While other conditions like glaucoma, conjunctivitis, and squint were present, their prevalence was relatively low in both groups. Notably, a larger proportion of individuals in residential colonies (63 individuals, 21.80%) reported no ocular problems compared to the homeless group (34 individuals, 11.76%).

CONCLUSION

As mentioned in the report, the eye health of homeless persons is significantly different from that of people residing in residential colonies in Lahore, Pakistan. For example, there is ten-fold increased risk of cataract and more than 20 fold increased recurrence of lens change among various eye conditions and conjunctivitis that homeless persons have. Conversely, squinting and refractive problems are common among the residents of residential colonies. Poor nutrition, restricted access to health facilities, increased exposure to environmental hazards, and the social challenges associated with homelessness all contribute to this disease's high prevalence among homeless populations. This is alarming because homeless populations are highly susceptible to diseases like cataract that cause blindness.

ACKNOWLEDGEMENT: None

CONFLICT OF INTEREST: None

GRANT SUPPORT AND FINANCIAL DISCLOSURE: None.

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Authors Contributions:

Tayyaba Burhan: Substantial contrib ution to the conception, design of the work.

Muhammad Nasir: Survey and design of the work. Data collection. SPSS computing tool and drafting for approval of the final version to be published

Submitted for publication: 01-10-2024
Accepted after revision: 08-11-2024