Visual Impairment Among Undergraduates: A Situational Analysis of Eye Health in Bowen University Iwo, Nigeria

Olumide Thomas Adeleke[1], *Akinsola Aina*[2], *Adewumi Oluwafemi Oyabambi*[3], *Timothy Samson*[4], *Oludamola Victoria Adeleke*[5], *Temitayo Aderemi Olabode*[6], *Ifeoluwasemilojo Aina*[7], *Oluwaseun Awe*[8]

[1]Department of Family Medicine, Bowen University, Iwo, Osun State, Nigeria

[2]Ophthalmology Unit, Department of Surgery, Bowen University, Iwo, Osun State, Nigeria

[3]Department of Physiology, University of Ilorin, Ilorin, Kwara State, Nigeria

[4]Statistics Programme, Bowen University, Iwo, Osun State, Nigeria

[5]Department of Nursing, Bowen University, Iwo, Osun State, Nigeria

[6]Department of Public Health, Fountain University, Osogbo, Osun State, Nigeria

[7]Department of Radiology, Ladoke Akintola University of Technology, Ogbomoso, Oyo State, Nigeria

[8]Department of Ophthalmology, Obafemi Awolowo University, Ile-ife, Osun State, Nigeria

Correspondence to: Akinsola Aina; email: akinsola.aina@bowen.edu.ng

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Abstract

Background: Eye health is an essential aspect of overall health, and visual impairment (VI) can significantly impact academic performance and quality of life. This study aimed to determine the prevalence of VI among undergraduates and the pattern of VI. We set out to give the situational analysis of the student's eye health. **Methods:** A cross-sectional study was conducted among 1407 undergraduate students at the institution. Data obtained includes sociodemographic characteristics, vital signs, and visual acuity using a structured questionnaire. Visual acuity was classified using the International Statistical Classification of Diseases and Related Health Problems version 11 (ICD-11) of VI. **Results:** VI was found in either the right or left eyes of 797 (56.65%) participants. Of the 645 respondents with right-eye VI, 531 (82.3%) had mild VI while 104 (16.1%) had moderate VI.. VI was found in the left eye of 657 (46.7%) respondents. The study also found that females had a significantly higher prevalence of VI than males ($p < 0.05$). Only 231 (28.98%) of the respondents had corrective lenses presently. **Conclusions:** The prevalence of VI among undergraduates is high, and the proportion currently using corrective spectacles among them is quite low. Eye health should be prioritized among undergraduates.

Keywords: Visual impairment, Undergraduates, Eye health, blindness

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Introduction

Within the global population of over 7 billion individuals, about 1.1 billion people have some degree of visual impairment (VI), while 295 million individuals are living with moderate to severe VI (3.5% of the world population), 258 million people have mild VI, 510 million people have near VI, and 43 million people are blind (1). Remarkably, almost half of these cases of VI were not only avoidable but also remained unaddressed (2). This alarming statistic underscores the urgent need for heightened attention and concerted efforts in the realm of visual healthcare. Visual acuities are used to classify various levels of VI (3), which range from blindness (defined as presenting visual acuity worse than 3/60) (3, 4) to severe VI (presenting visual acuity worse than 6/60) (3) to moderate VI (presenting visual acuity worse than 6/18) (3) to mild VI (presenting visual acuity worse than 6/12) (3, 4). Functional presbyopia (defined as having near vision worse than N6 or N8 at 40 cm when the best-corrected distance visual acuity was better than 6/12) (4) significantly impacts not only an individual's physical well-being but also their overall quality of life (5).

The implications of an individual having VI are profound, causing social, psychological, and economic consequences for the individuals and their caregivers (6). These consequences extend to multiple domains of human existence (6). First and foremost, it casts a formidable shadow over the quality of life, as those affected often find themselves grappling with limitations that hinder their ability to engage fully in daily activities (7). VI can curtail one's capacity to experience the world in its full vibrancy, impairing one's mobility and independence and causing a profound sense of isolation. Moreover, the impact of VI transcends the boundaries of the personal sphere, extending to socioeconomic aspects (7). Employment opportunities become restricted as many professions require unimpaired vision (6). Individuals with VIs may face challenges in accessing education and training, limiting their potential and opportunities for personal and professional growth (7).

Conducting this study among undergraduate students in our country is paramount, given the unique significance of the university phase in individuals' lives and the potential impact of VI on academic performance, well-being, and prospects. By focusing on this demographic, the study aims to shed light on the prevalence and pattern of VI within the undergraduate population, providing essential insights to advocate for accessibility, availability, and affordability of an efficient eye care service within the educational environment. Presently, there is no existing eye care service on campus manned by a specialist eye care provider, and students can only access specialized eye care in an outside facility. The study's objectives encompass determining the prevalence of VI, classifying the pattern of VI among the students using International Statistical Classification of Diseases and Related Health Problems version 11 (ICD-11) criteria (3), and determining the proportion of the students currently using corrective lenses in our university. These findings will cover the gap in knowledge that existed and will be a tool for advocacy in identifying areas where interventions can be instituted to ultimately ensure that the undergraduate's visual functions are optimized within the higher education system in our country.

Methods

Study site

We carried out the study at our university health center in the southwestern part of our country. The university is one of the oldest private coeducational institutions of higher education in our country, with a student population of 4751.

Study design and participants

We performed a cross-sectional study involving 1407 consenting undergraduate students between October 2022 and February 2023 at the university. Undergraduates from different departments and gender groups took part in the study. We used convenience sampling technique, in which interested students voluntarily presented to the university health center for the study. A structured questionnaire was used to obtain the sociodemographic characteristics such as age, gender, and course of the study. The nursing staff measured some physiological parameters, such as the

pulse rate and systemic blood pressure. Participants had blood pressure measured in the sitting position. The blood pressure greater than 140/90 mmHg was classified as hypertensive (8). The presenting visual acuity test was carried out by the optometrists. The visual acuity of each eye was tested separately using an illuminated Snellen chart, which was positioned 6 m away and recorded accordingly in the study pro forma. Study participants were asked verbally if they were using corrective lenses, and individuals' own were cross-checked physically. Those with their corrective lenses had their visual acuity done with the correction in place. Ethical approval was obtained from the University Research and Ethical Review Committee. Informed consent was obtained from the study participants.

Table 1. Demographics of the respondents

Demographic variables	Frequency	Percentage (%)	Median
Sex			
Male	637	45.3	–
Female	770	54.7	–
Total	1407	100.0	–
Colleges			
"A" level	31	2.2	–
Management and Social Sciences	171	12.2	–
Agriculture, Engineering, and Science	176	12.5	–
Health Sciences	582	41.4	–
Environmental Sciences	20	1.4	–
Computing and Communication Studies	305	21.7	–
Liberal Studies	79	5.6	–
Total	1407	100.0	–
Age (years)	–	–	17

Operational definitions

We classified VI using ICD-11 criteria (3,6,7) as follows:

Class 0: No VI (≥6/12)
Class 1: Mild VI (<6/12 to 6/18)
Class 2: Moderate VI (<6/18 to 6/60)
Class 3: Severe VI (<6/60 to 3/60)
Class 4: Legal blindness (<3/60 to 1/60)
Class 5: Blindness (<1/60 to light perception)
Class 6: Absolute blindness (no light perception)

Statistical analysis

The completed questionnaires were serially coded and entered into a computer. Data cleaning was performed, and then analysis was performed using SPSS version 22 (IBM, New York, USA). Medians, ranges, standard deviations, frequencies, and percentages of participant characteristics were calculated. The independent variables included sociodemographic parameters, while VI was the outcome variable. Chi-square was used to examine associations between categorical variables, and $p < 0.05$ was considered statistically significant.

Results

Demographics of the respondents

A total of 1407 subjects participated in this study out of 4751 students in the school, which gave a response rate of 29.6%. More than half of the participants were females (770, 54.7%). The age range was from 15 to 26 years, and the median age for all the participants was 17 years. This result showed that the majority of the respondents (21.7%) were from the College of Computing and Communication Studies, as shown in Table 1.

Prevalence of VI

VI was found in either the right or left eye of 797 (56.65%) participants, while 645 (45.84%) had VI in their right eye and 657 (46.7%) had VI in their left eye.

The prevalence of right-eye VI was significantly higher among females than males (58.6% versus 41.4%, $p = 0.008$). However, there was no significant difference in pulse rate, systolic blood pressure (SBP), or diastolic blood pressure (DBP) between those with and without right VI ($p > 0.05$), as shown in Table 2.

Table 2. Association between VI and some factors

	Right eye			Left eye			Both eyes		
Factors	**No VI (n=762)**	**VI (n=645)**	***p* value**	**No VI (n=750)**	**VI (n=657)**	***p* value**	**No VI (n=610)**	**VI (n=797)**	***p* value**
Gender									
Male	370 (48.6%)	267 (41.4%)	0.008**	370 (49.3%)	267 (40.6%)	0.000**	85(48.3%)	252 (41.3%)	0.011*
Female	392 (51.4%)	378 (58.6%)		380 (50.7%)	390 (59.4%)		412 (51.7%)	358 (58.7%)	
Age	16.95±1.85	16.84±1.81	0.252	16.95±1.84	16.84±1.82	0.320	16.96±1.84	16.82±1.82	0.153
SBP	111.56±17.28	110.60±15.84	0.282	111.77±16.11	110.38±17.20	0.1170	111.61±17.16	110.48±15.93	0.208
DBP	17.46±15.40	70.98±113.81	0.837	71.28±15.25	70.83±14.02	0.562	71.18±15.33	70.93±13.81	0.756
PR	85.23±15.74	85.85±15.21	0.435	85.42±15.51	85.62±15.49	0.809	85.22±15.71	85.89±15.21	0.424

DBP, diastolic blood pressure; PR, pulse rate; SBP, systolic blood pressure; VI, visual impairment.
*Significant at 5% ($p < 0.05$).
**Significant at 1% ($p < 0.01$).

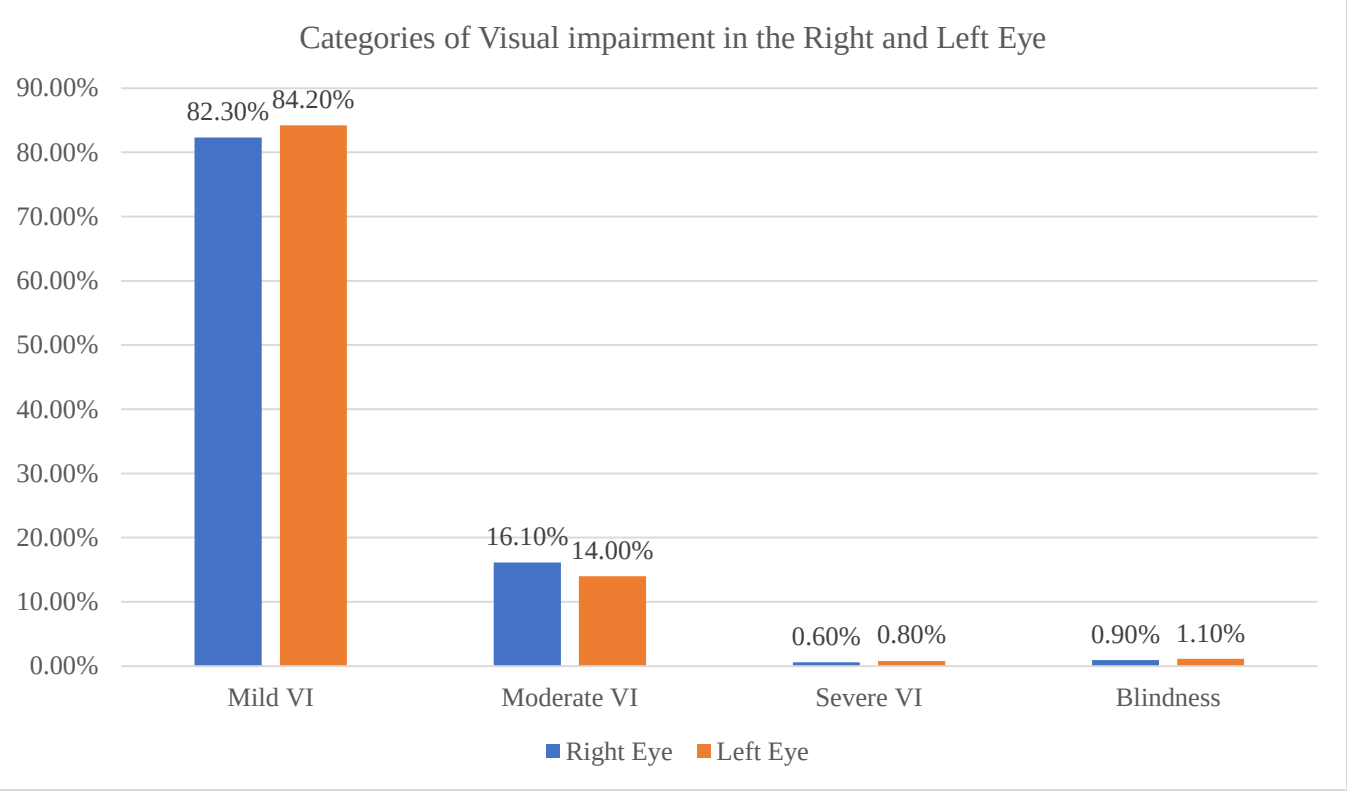

Figure 1. Categories of Visual Impairment in the Right and Left Eye

Table 3. Association between gender, hypertension, and right-eye VI

Variables	Mild VI (n=531)	Moderate VI (n=104)	Severe VI (n=4)	Blindness (n=6)	Total (n=645)	*p* value
Gender						
Male	225 (42.4%)	37 (35.6%)	2 (50.0%)	3 (50.0%)	267 (41.4%)	0.580
Female	306 (57.6%)	67 (64.4%)	2 (50.0%)	3 (50.0%)	378 (58.6%)	
Hypertension						
Not hypertensive	514 (96.8%)	101 (97.1%)	4 (100.0%)	5 (83.3%)	624 (96.7%)	0.307
Hypertensive	17 (3.2%)	3 (2.9%)	0 (0.0%)	1 (16.7%)	21 (3.3%)	

VI, visual impairment.
$p < 0.05$ is significant.

Of the 645 respondents with right-eye VI, 531 (82.3%) had mild VI, 104 (16.1%) had moderate VI, while 4 (0.6%) and 6 (0.9%) respondents had severe VI and blindness, respectively, as shown in Figure 1. These categories of right-eye VI were found not to be statistically significantly associated with sex ($p = 0.580$, $p > 0.05$) and hypertensive status of the respondents, as shown in Table 3.

Prevalence of VI in the left eye

VI was found in the left eye of 657 (46.7%) participants. The test of association between demographic data and the left-eye VI was statistically significantly higher in females than males (50.7% versus 49.3%, $p = 0.000$, $p < 0.05$). However, the pulse rate, SBP, and DBP were not statistically significantly different between those with and without left-eye VI, as shown in Table 2. Out of the 657 respondents who have left-eye VI, a majority had mild VI (553, 84.2%), while 92 (14.0%) had moderate VI, 5 (0.8%) had severe VI, and 7 (1.1%) had blindness, as shown in Figure 1. Gender ($p = 0.958$, $p > 0.05$) and hypertension ($p = 0.931$, $p > 0.05$) were found not to be statistically significantly associated with the various categories of left-eye VI ($p > 0.05$), as shown in Table 4.

Prevalence of students currently using corrective lenses

Out of 797 participants with VI in either right or left eyes, only 231 (28.98%) had corrective lenses presently, while the rest 566 (71.02%) did not have corrective lenses as of the time of the study.

Table 4. Association between gender, hypertension, and left-eye VI

Variables	Mild VI (n=553)	Moderate VI (n=92)	Severe VI (n=5)	Blindness (n=3)	Total (n=657)	*p* value
Gender						
Male	227 (41.0%)	35 (38.0%)	2 (40.0%)	3 (42.9%)	267 (40.6)	0.958
Female	326 (59.0%)	57 (62.0%)	3 (60.0%)	4 (57.1%)	390 (59.4)	
Hypertension						
Not hypertensive	553 (96.4%)	90 (97.8%)	5 (100.0%)	7 (100.0%)	635 (96.7%)	0.931
Hypertensive	20 (3.6%)	2 (2.2%)	0 (0.0%)	0 (0.0%)	22 (3.3%)	

VI, visual impairment.
$p < 0.05$ is statistically significant.

Discussion

The study involved 1407 participants from different colleges in the university, with more than half of them being females in gender. The sociodemographic characteristics of the respondents are important to consider when interpreting the findings of the study, as suggested by Vo et al. (9). The prevalence of right-eye VI affecting 45.84% of the participants underlines that this is a substantial burden within the population. The prevalence of VI, which was significantly higher among

females than males, is in tandem with the findings of the study by Zhang et al., which revealed that girls have worse vision than boys, especially when the female is the oldest or middle child in the family (10). Meta-analyses have shown that two out of three blind people are women globally, a gender discrepancy that holds true for both developed and developing countries (11, 12). Likewise, in Africa, the Nigeria National Blindness and Visual Impairment Survey (13) reported that female gender had significantly higher odds of cataract-induced blindness and severe VI. This may be due to male dominance, lack of financial resources among females, differences in visual seeking habits between both genders, and reduced access to eye care services by females, which have been widely reported in the literature (14-16). This finding emphasizes the importance of gender-sensitive interventions, advocacy, and screening programs (15) needed to address this disparity, which was also in tandem with the findings of Courtright and Lewallen (16) on the significance of addressing gender issues when assessing vision.

The majority of the respondents were from the College of Health Sciences, followed by the College of Computing and Communication Studies. This may be because those in the health sciences-related courses might have a little more insight into their health issues as compared with others, so they consented more than others to participate in this study, as noted by Getnet et al. (6). Their high participation may also be because the workload of these students is greater than that of their colleagues, and as a result, they are more exposed to different environmental factors that may affect their visual health. Similarly, their work schedule is likely to involve longer hours on near work, such as handling of computers and laptops as part of their coursework. This is also in tandem with the findings of the studies by Shantakumari et al. (17) and Reed and Curtis (18). The findings of this study highlight significant implications of public health and healthcare intervention strategies. Some physiological parameters such as pulse rate, SBP, and DBP that were not statistically significant between individuals with and without VI in this study were similar to the findings of the study by Moreno et al. who noted similar heart rate variability at resting or upon stressful challenges between blind patients and normal vision subjects acutely submitted to low vision (19). This indicates the absence of differences in the cardiovascular risk between normal vision and visually impaired individuals.

The distribution of either right- or left-eye VI found in 797 (56.65%) study participants, with right-eye VI severity levels of 82.3% for mild VI, 16.1% for moderate VI, 0.6% for severe VI, and 0.9% for blindness, highlights the varying categories of vision impairment within the affected population, which is in tandem with the findings of the studies by Getnet et al. (6, 20). These results emphasize the need for tailored healthcare interventions and rehabilitation services to meet the needs of individuals with different levels of VI (15).

The proportion of participants currently using corrective lenses is less than one-third of the participants, which is relatively low. This is similar to a study performed by Ezinne et al.(21), where only 20.6% of the participants were using their spectacles, and some of the reasons for not using them include “parents disapprove of the use of spectacles,” “concerned or teased about appearance,” “forgot spectacles at home,” and so on. These reasons are likely applicable to this cohort of students because both studies were performed in similar countries where parental approval (22) is a major consideration in the acceptance of spectacle use. Likewise, some other studies (23-25) reported low use of corrective lenses and then advocated that there is the need to make refractive services more available, accessible, and affordable for citizens in both rural and urban areas.

Study limitations

The use of a single study site that may not fully represent the diverse nature of our country’s undergraduate population might be one of the limitations of this study, as the findings will only apply to the target group. The methodology of using convenience rather than systematic sampling technique might introduce some bias into the study. Furthermore, the study did not investigate the underlying causes of VI and ascertain the ocular diagnosis among the study participants; therefore, these underscore the need for further research to provide

a more comprehensive understanding of VI among this demographic.

Conclusion

This study provides valuable insights into the prevalence and pattern of VI among our country's undergraduates, as VI was found in about two-thirds of our undergraduates. The findings that the female gender had a significantly higher prevalence of VI than the males should help the policymakers institute targeted eye health intervention strategies among our undergraduates. Efforts should be made to promote eye health education and make refractive services available and accessible within the university community.

Future studies should investigate the impact of VI on academic performance and quality of life among our undergraduates.

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Authors' Contributions

OTA led in formal analysis, AA led in conceptualization, project administration, supervision and in writing, reviewing & editing of the original draft and, TS led in data curation. All authors equally contributed to investigation, methodology, resources, software, validation and visualization.

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