

**REFRACTIVE ERRORS AMONG NIGERIAN YOUTHS**

**AGUWA US<sup>1\*</sup>, OVIE FO<sup>1,2</sup>, ONOIKHUA EE<sup>3</sup>, OLU SI<sup>2</sup>**

<sup>1</sup>Department of Human Anatomy, Faculty of Basic Medical Sciences, Nnamdi Azikiwe University, Nnewi Campus. <sup>2</sup>Department of Human Anatomy, Faculty of Basic Medical Sciences, Madonna University Nigeria. <sup>3</sup>Department of Optometry, Faculty of Health Sciences, Madonna University Nigeria. Email: us.aguwa@unizik.edu.ng

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**ABSTRACT**

Genetic, cultural, and environmental factors play key roles in the prevalence and distribution of refractive errors. More youths in Nigeria today use medicated glasses to enhance vision than we had in the past decades. This study is aimed at revealing the prevalence of refractive errors among students of Madonna University Nigeria, Elele campus, Rivers state. One thousand questionnaires were randomly distributed to the 3<sup>rd</sup> year undergraduate students in various departments in the College of Medicine, including anatomy, physiology, medical laboratory science, optometry, public health, and pharmacy. Eight hundred and fifty-two (85.2%) out of the 1000 of the questionnaires shared were retrieved and analyzed using simple percentages. Data collected included information on age, sex, state of origin, place of residence, and presence of refractive errors. Our results reveal that the incidence of refractive errors was highest in the North-west region of the country having (93.55%). This was followed by South-west (50.51%), South-south (32.88%), South-east (27.67%), North-central (18.03%), and North-east (15.79%). The highest occurring refractive error among the six geopolitical regions of Nigeria is myopia (54%), followed by hyperopia (21.01%), astigmatism (15.30%), and presbyopia (9.46%). This work represents the first attempt at having a comprehensive outlook at the statistics of refractive errors among Nigerian youths from across the country.

**Keywords:** Refractive errors, Myopia, Hyperopia, Astigmatism, Presbyopia.

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**INTRODUCTION**

The rate at which younger people below the age of 50 years use medicated glasses today in our society is alarming. Conventionally, we associate poor eyesight with aging; hence, it looks normal when elderly persons use medicated glasses to support their failing eyesight. However, when a good population of teens and youths wear medicated glasses, it is a pointer to the possibility of rising incidence of refractive errors in the population. This study provides data on the incidence of refractive errors among Nigerian youths. Recent studies done among children and young adults show that refractive error has been the most prevalent ocular morbidity despite being to a very large extent correctable (Vinay and Shruithi, 2016; Prakash *et al.*, 2015). Refractive errors vary over age, gender, race and ethnicity, level of education, social class, and degree of urbanization [3].

Reports show that 2.3 billion people worldwide have refractive errors, out of which about 500 million people mostly in developing countries have no access to proper checkup and correction. This has resulted mostly in either blindness or impaired vision [4]. In Pakistan, 11.4% of the blindness is due to uncorrected refractive errors (National Committee for Prevention of Blindness, Ministry of Health 1994-98; P. 24). Studies indicate that refractive errors are mainly caused by genetic factors, while others suggest interplay between genetics and environmental factors [6]. Apart from a positive history of wearing glasses in the family, environmental factors may include close work or near activity such as prolonged study hours and watching computers/television [8,10].

Tebepa [2] reported 26% prevalence of refractive errors in Port Harcourt, Ayed *et al.* found refractive errors in schoolchildren to be 57.2% in a community in Tunisia 3, while Chuka-Okosa reported 1.97% prevalence of refractive errors among students of post primary institution in a rural community in Southeastern Nigeria [4]. Askira [13] reported refractive errors of 31.8% in Obafemi Awolowo University Teaching Hospital. These widely differing reports on prevalence of refractive errors may be due to difference in sample size and the nature of the population studied.

Myopia, the most studied refractive error, is emerging as a global health problem, due to the costs associated with correction, and its associated pathology such as retinal tears, retinal detachments, and macular degeneration [5]. The prevalence of myopia varies in different parts of the world, being more prevalent in industrialized countries and cities compared to rural areas (Uzma, *et al.*, 2009). Other studies have found an association between socioeconomic status, education, academic achievement, and myopia (Teasdale and Goldschmidt, 1988; Rosner and Belkin, 1987; Parssinen, 1987). In the US, the prevalence of myopia for people between the ages of 12 and 54 surged from 25% in the early 1970s to 42% by 2000 [10]. In Taiwan and Singapore, myopia is found in approximately 30% of all children 6 and 7 years old and increases to 80% in young adults [10]. The rapid increase in the prevalence of myopia strongly suggests that environmental factors are having a considerable influence on the development of myopia not explainable by the genetic model (Saw *et al.*, 1996; Mutti *et al.*, 1996).

The prevalence of myopia is about 20% in the United States [5,6]. In Sumatra, Indonesia Saw *et al.* [7] reported 26.1% prevalence of myopia while Raju *et al.* [8] in India reported 26.99%. Askira [13] reported 21.1% and Adegbehingbe *et al.* [9] reported myopia as the most common spherical error constituting 22.7% of their series in a study on the pattern of refractive errors at Obafemi Awolowo University Teaching Hospital, Ile-Ife, in the western part of Nigeria. The prevalence of myopia is about 20% in the United States, but varies with age, sex, race, ethnicity, occupation, environment, and other factors in various sampled populations [5,6]. In Sumatra, Indonesia Saw *et al.* [7] reported 26.1% prevalence of myopia while Raju *et al.* [8] in India reported 26.99%. Adegbehingbe *et al.* [9] reported myopia as the most common spherical error constituting 22.7% of their series in a study on the pattern of refractive errors at Obafemi Awolowo University Teaching Hospital, Ile-Ife, Nigeria.

Myopic youths tend to be bookworms and introverts which could be as a result of the inability to see properly at far distances thereby

making near work a favorable and safer routine. Hyperopia has usually been found to be less prevalent than myopia among youths. This could be as a result of the still high accommodative state present in youths which compensate for any latent hyperopia (Megbelayin *et al.*, 2014). Although in young children, hyperopia and astigmatism may be found to be higher than myopia (Jimenez *et al.*, 2012, Krishnamurthy *et al.*, 2014).

In young children, hyperopia and astigmatism may be found to be higher than myopia (Jimenez *et al.*, 2012, Krishnamurthy *et al.*, 2014). Hypermetropia is considered to be the most common refractive error in infants. Faderin [10] reported hypermetropia constituting 52.2% of refractive errors in primary schoolchildren in Nigeria while Montes-Mico [11] reported 35.6% prevalence of hypermetropia in Spain. In a survey of the prevalence of refractive errors among children in lower primary school in Kampala district, Kawuma [12] reported astigmatism as the most common single refractive error accounting for 52% of all errors of refraction while Adegbehingbe [9] reported 52.8 in Ile-Ife, Nigeria, Askira [13] reported 22.9% while Presbyopia accounted for 51.3% of patients with refractive errors.

**Table 1: Incidence of refractive errors across the regions of Nigeria**

Region	Total respondents	Number using medicated glasses	Percentage
North-west	31	19	61.29
South-west	97	49	50.51
South-south	295	97	32.88
South-east	300	83	27.67
North-central	122	22	18.03
North-east	19	3	15.79

**Table 2: Distribution of refractive error cases**

S. No.	Refractive error	n	Percentage
1.	Myopia	148	54.21
2.	Hypermetropia	77	28.21
3.	Presbyopia	5	1.83
4.	Astigmatism	43	15.75
	Total	273	100

**Table 3: Distribution of refractive errors across the regions of Nigeria**

	n	%	n	%	n	%	n	%
South-east	47	31.76	21	27.27	1	20.00	11	25.58
South-south	52	35.13	33	42.86	0	0.00	9	20.93
South-west	27	18.24	7	9.09	2	40.00	11	25.58
North-east	3	2.03	0	0.00	0	0.00	0	0.00
North-central	11	7.43	9	11.69	1	20.00	5	11.63
North-west	8	5.41	7	9.09	1	20.00	7	16.28
Total	148	100	77	100	5	100	43	100

**Table 4: Distribution of myopia according to states in Nigeria**

S. No.	State	Number	Percentage	S. No.	State	Number	Percentage
1.	Rivers	27	18.12	11.	Ondo	3	2.01
2.	Lagos	22	14.80	12.	Osun	2	1.34
3.	Delta	21	14.10	13.	Bauchi	2	1.34
4.	Anambra	15	10.10	14.	Kano	2	1.34
5.	Imo	12	8.05	15.	Ebonyi		0.67
6.	Enugu	11	7.38	16.	Oyo		0.67
7.	Abia	9	6.04	17.	Borno		0.67
8.	FCT	8	5.37	18.	Kogi		0.67
9.	Cross River	5	3.36	19.	Sokoto		0.67
10.	Kaduna	4	2.68	20.	Katsina		0.67
					Total	149	100

## METHODS

This study was carried out among the 2<sup>nd</sup> year students of Madonna University Nigeria, Elele campus.

This population was chosen to ensure that whatever visual problems seen were not acquired within the period as a student but was already present before the individual came into the school. This was also ensured further using only respondents who have used medicated glasses for at least 5 years. Meaning that usage must have commenced before studentship. One thousand questionnaires were randomly distributed to undergraduate students in various departments in the College of Medicine, including anatomy, physiology, medical laboratory science, optometry, public health, and pharmacy. Furthermore, our distribution of students according to the states of Nigeria is based on residency, not place of origin. As such, this work leans more toward environmental rather than genetic causes. Future analysis will consider the genetic factors. Nine hundred and thirty of these questionnaires were retrieved (93%). Out of that number, 864 (86.4%) met with the conditions stated above and were used for the study. The remaining 66 were discarded. Data were analyzed using simple percentages. Data collected included information on age, sex, state of origin, place of residence with duration, and presence of refractive errors.

## RESULTS

Table 1 shows that the incidence of use of refractive North-west and South-west had the highest incidences of refractive errors with 61.29% and 50.51%, respectively. North-east and North-central had the least incidences with 15.79% and 18.03%, respectively.

From Table 2, myopia had the highest occurrence with 54.21% of all cases, followed by hypermetropia (28.21%), astigmatism (15.75%), and presbyopia (1.83%).

Table 3 shows the distribution of refractive errors across the six geopolitical zones of the country. Myopia was highest in South-south and least in North-east. South-east and South-west had high values. Hypermetropia was also highest in South-south followed by South-east and North-central. It was lowest South-west and North-west.

Table 4 shows the frequency of myopia according to individual states of Nigeria. This frequency, however, only represents a direct numerical counting, comparing a state with the total number of cases. So as expected, states in the south will have more frequency than those in the north as the university is located in Rivers state, South-south part of the country.

Table 5 shows the frequency of hypermetropia by states. As in above, states in the southern part of the country had the highest frequency by number.

Table 6 shows the distribution of presbyopia according to states where cases were recorded in our work.

Table 5: Distribution of hypermetropia according to states in Nigeria

S. No.	State	Number	Percentage	S. No.	State	Number	Percentage
1.	Rivers	19	24.67	10.	Kogi	2	2.60
2.	Delta	8	10.40	11.	Kano	2	2.60
3.	Imo	7	9.09	12.	Cross River		1.30
4.	Anambra	6	7.79	13.	Sokoto		1.30
5.	Edo	6	7.79	14.	Plateau		1.30
6.	Lagos	6	7.79	15.	Kaduna		1.30
7.	FCT	6	7.79	16.	Niger		1.30
8.	Abia	5	6.49	17.	Osun		1.30
9.	Enugu	4	5.19				
					Total	77	100 %

Table 6: Distribution of presbyopia according to states in Nigeria

S. No.	State	Number	Percentage
1.	Lagos	2	50
2.	Anambra	1	25
3.	FCT	1	25
	Total	4	100

Table 7: Distribution of astigmatism according to states in Nigeria

S. No.	State	Number	Percentage	S. No.	State	Number	Percentage
1.	Lagos	11	25.58	8.	Katsina	2	2.33
2.	Imo	7	16.28	9.	Abia		2.33
3.	Delta	6	13.95	10.	Anambra		2.33
4.	FCT	5	11.63	11.	Osun		2.33
5.	Enugu	3	6.98	12.	Plateau		2.33
6.	C. River	2	4.65	13.	Kaduna		2.33
7.	Rivers	2	4.65				
					Total	43	100

Table 7 shows the distribution of astigmatism according to states in Nigeria.

## DISCUSSION

Our results reveal that out of the total of 864 respondents used for this study, 31.60% (273) had a refractive error. It means from our results that the incidence of refractive errors among Nigerian youths in tertiary institution stands at 31.60%. This is comparable to 37.39% reported by Prema, 2011, in a study carried out in India. Our results reveal that North-west region had the highest prevalence of the use of medicated glasses among youths at 61.29%. This is followed by South-west (55.67%), South-south (36.27%), South-east (31.67%), North-central (19.67%), and North-east (15.79%).

The incidence of refractive errors according to the different regions of the country shows that North-west had the highest incidence with 61.29%, South-west 50.51%, South-south 32.88%, South-east 27.67%, North-central 18.03%, and North-east 15.79%. This could be associated with the reported high level of poverty and living conditions in this region of the country. It is in line with the report of Feldkamper and Schaeffel (2003) which shows that environmental factors are associated with the frequency of refractive errors.

The highest occurring refractive error among the six geopolitical regions of Nigeria is myopia (54.21%), followed by hyperopia (28.21%), astigmatism (15.75%), and presbyopia (1.83%). This is similar to the report of Adeoti and Egbewale, 2008, in a study carried out in Ado ekiti where myopia constituted 39.33%, hypermetropia 23.33%, and astigmatism 21.80%. The increasing incidence of refractive errors and consequent use of medicated glasses may be associated with the longer time our youth spend reading books, working on the computer, and watch television according to the report of Prema (2011). This may explain why the incidence was higher in more developed cities

and states of the country than the less developed places. Our study population is undergraduates in one of Nigeria's foremost private university. This population has no difficulty with access to eye clinic or basic medical treatment. South-east and South-south had the highest frequency of myopia. These regions are among the most urbanized in the country. This is in line with the previous works that show a positive correlation between myopia and urbanization/industrialization [10].

## CONCLUSION

Our results suggest that there is a rise in the incidence of refractive errors among our youths, leading to increase in the use of medicated glasses, a phenomenon that was more common among the elderly in our society.

## Recommendation

- We, therefore, recommend that government and its agencies should pay attention to those environmental factors that predispose our youths to visual impairments.
- This study can be extended to specific regions of the country, especially those with observed high incidence from this study.
- Furthermore, attention should be paid to sexual disparity in the manifestation of these refractive errors.

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## APPENDIX

### Questionnaire

This research work is been carried out in Madonna University, Elele campus on FREQUENCY OF REFRACTIVE ERRORS AND USE OF MEDICATED GLASSES AMONG NIGERIA YOUTHS. Please kindly respond to the questions as genuinely as possible. Be assured that your confidentiality shall be respected. As the information given cannot be traced to you in any way. All information are strictly for research purposes. Thank you for your cooperation.

#### Section A: Personal information (please tick the appropriate box).

1. Sex: M  F
2. Age: 15-20  21-25  26-30  31-35
3. State of origin:
4. Where have you resided for the most part of your life?  
 State  City/Town
5. For how long have you or did you stay there?

#### Section B:

1. Do you use glasses? Yes  No
2. Are your glasses medicated? Yes  No
3. Please specify the type.
  - A. Myopia (short-sightedness)
  - B. Hypermetropia (long-sightedness)
  - C. Presbyopia
  - D. Astigmatism
  - E. Others (please specify)
4. How long have you used it?  Years
5. How many siblings do you have?
6. How many of them use glasses?