

Original Research Article

OCULAR MORBIDITY IN RIVERINE AND UPLAND COMMUNITIES IN RIVERS STATE, NIGERIA: ANY DIFFERENCE?

ABSTRACT

A community- based cross- sectional comparative study was carried out to compare the pattern of ocular morbidity between residents in upland and riverine communities in Rivers State.

Sample size was calculated using the formula for comparative studies, based on alpha of 0.05, beta of 0.20, proportion of eye disorder of 40.4% from a community-based study in Rivers State.

A minimum sample size of 84 per group was attained.

Data on age, sex, visual acuity, cup-disc ratio, intra-ocular diagnosis were obtained using an interviewer-based pro forma. Collected data were entered into Microsoft Excel and exported to the United States Centers for Disease Control and Prevention(CDC) Epi Info version 7 software for statistical analysis. The Pearson's Chi square/Fisher's exact tests were used as appropriate to determine significant differences in demographic and eye examination findings between the two groups (riverine versus upland) while Chi square homogeneity was performed to determine significant differences in the individual ocular diagnosis across the groups. Statistical significance was set at $P \leq 0.05$.

A total of eighty-six (86) participants per group were involved in the study, making a total of one hundred and seventy-two participants. The mean age was 37.9 (± 18.1) and age range of 1-90years. The commonest causes of ocular morbidity in both communities were Refractive error. Allergic conjunctivitis and cataract was more common in the Riverine community compared to the upland one.

Our study shows that the pattern of ocular morbidity may differ based on land surfaces. Ocular morbidity appears to be more prevalent in Riverine areas than upland.

Government interventions and eye care service providers should take cognizance of this while planning intervention programs at the State and National levels.

Keywords: Ocular morbidity, Upland, Riverine, Rivers State, Nigeria

1. INTRODUCTION

Ocular morbidity is defined as the spectrum of eye diseases including both visual and non-visual impairing conditions seen in a population. It could be either significant to the individual (the individual is concerned enough about the condition to seek care) or to the professionals (an eye health professional determines that the individual would benefit from advice, further review or treatment)¹

The National blindness survey estimated that 4.25 million adults over 40 years have moderate to severe visual impairment or blindness, and according to WHO, 9 out of 10 blind persons live in the developing countries.^{2,3} The above information requires that there is ample data on the distribution and prevalence of ocular morbidity in communities to aid in the planning and delivery of eye care services globally.

Rivers State is situated in the coastal plain of the eastern Niger Delta. Its topography is mainly characterized by rivers, lakes, creeks, lagoons and swamps of varying dimensions. The riverine area has a land surface between 2 to 5 meters above sea level and covers about 39% percent of the state, while the drier uplands occupy about 61% of the landmass.⁴ The upland coastal sand ridge zone is susceptible to recurrent inundation by riverine flooding, creating flow patterns that are responsible for the deposition of fine-grained sediments.⁴ These climatic and geographical influences may explain certain health predispositions including ocular morbidities. Ocular morbidity across the communities may also be compounded by environmental degradation from petroleum exploration or illegal refining activities in the riverine communities⁵.

Our study seeks to find out if there are any differences in ocular morbidity patterns based on the land surfaces. This is the first study to our knowledge that actually compares ocular morbidity in the 2 land surfaces.

MATERIALS AND METHODS

This was a community- based cross- sectional comparative study carried out in two communities: Ogu in Ogu Bolu local government area a riverine community and Igwuruta in Ikwerre local government area an upland community.

A free medical outreach carried by the ProSight International Eye foundation in collaboration with other organizations in Ogu Bolu in April 2018 while the outreach at Igwuruta, Ikwerre LGA was carried in May 2018.

Participants who presented at the outreach had a comprehensive ocular examination comprising visual acuity using the Snellen charts(Literate and illiterate charts). They then had an anterior segment examination using a pen torch while the posterior segment was done using the direct ophthalmoscope (Welch Allyn). Participants with any form of media opacity were subjected to a dilated examination using 1% Tropicamide. Every participant also had a tonometry done using the Keeler non-contact tonometer.

Sample size was calculated using the formula for comparative studies, based on alpha of 0.05, beta of 0.20, proportion of eye disorder of 40.4% from a community-based study in Rivers State. A minimum sample size of 84 per group was attained.

Data on age, sex, visual acuity, cup-disc ratio, intra-ocular diagnosis were obtained using an interviewer-based pro forma. Collected data were entered into Microsoft Excel and exported to the United States Centers for Disease Control and Prevention(CDC) Epi Info version 7 software for statistical analysis. The Pearson's Chi square/Fisher's exact tests were used as appropriate to determine significant differences in demographic and eye examination findings between the two groups (riverine versus upland) while Chi square for homogeneity was performed to determine significant differences in the individual ocular diagnosis across the groups. Statistical significance was set at $P \leq 0.05$.

RESULTS

A total of 86 participants per group were involved in the study, making a total of 172 participants with a mean age (SD) of 37.9 (± 18.1) and age range of 1-90years.

Table 1: Age and sex characteristics of the groups in the study

Variables	Groups in the study		Total N=172 n (%)
	Riverine N=86 n (%)	Upland N=86 n (%)	
Age category			
≤ 10 years	7 (8.1)	4 (4.7)	11 (6.4)
11 – 20 years	16 (18.6)	9 (10.5)	25 (14.5)
21 – 30 years	13 (15.1)	9 (10.5)	22 (12.8)
31 – 40 years	15 (17.4)	14 (16.3)	29 (16.9)
41 – 50 years	20 (23.3)	33 (38.4)	53 (30.8)
51 – 60 years	5 (5.8)	7 (8.1)	12 (7.0)
61 – 70 years	6 (7.0)	8 (9.3)	14 (8.1)
71 – 80 years	2 (2.3)	1 (1.2)	3 (1.7)
81 – 90 years	2 (2.3)	1 (1.2)	3 (1.7)
	<i>Fisher's exact = 8.143; P = 0.419</i>		
Sex			
Male	25 (29.1)	27 (31.4)	52 (30.2)
Female	61 (70.9)	59 (68.6)	120 (69.8)
	<i>Chi-Square = 0.110; P = 0.740</i>		

Table 2: Comparison of ocular characteristics between groups

Variables	Right Eye		Left Eye	
	Riverine	Upland	Riverine	Upland
	N=86 n (%)	N=86 n (%)	N=86 n (%)	N=86 n (%)
Visual acuity				
>6/18	58 (67.4)	72 (83.7)	61 (70.9)	69 (80.2)
6/18 – 6/36	11 (12.8)	10 (11.6)	9 (10.5)	11 (12.8)
<6/60	17 (19.8)	4 (4.7)	16 (18.6)	6 (7.0)
	<i>Chi-Square = 9.603; P = 0.008*</i>		<i>Chi-Square = 5.238; P = 0.073</i>	
VCDR				
<0.5	66 (76.7)	72 (83.7)	64 (74.4)	70 (81.4)
0.5 – 0.8	18 (20.9)	13 (15.1)	20 (23.3)	15 (17.4)
>0.8	2 (2.3)	1 (1.2)	2 (2.3)	1 (1.2)
	<i>Fisher's exact = 1.472; P = 0.492</i>		<i>Fisher's exact = 1.390; P = 0.508</i>	
IOP				
0 – 15 mmHg	65 (75.6)	81 (94.2)	65 (75.6)	75 (87.2)

16 – 30 mmHg	20 (23.3)	5 (5.8)	21 (24.4)	11 (12.8)
> 30 mmHg	1 (1.2)	0 (0.0)	-	-
	<i>Fisher's exact = 11.906; P = 0.001*</i>		<i>Chi-Square = 3.839; P = 0.05*</i>	

**Statistically significant*

Table 3: Comparison of ocular disorders between the two groups in the study

Ocular disorders	Groups in the study		Chi square*	P
	Riverine	Upland		
Refractive error	22 (25.6%)	49 (57.0%)	10.268	0.001*
Allergic conjunctivitis	16 (18.6%)	5 (5.8%)	5.762	0.016*
Cataract	13 (15.1%)	4 (4.7%)	4.765	0.029*
Presbyopia	12 (14.0%)	13 (15.1%)	0.040	0.841
Glaucoma suspect	11 (12.8%)	6 (7.0%)	1.471	0.225
Glaucoma	3 (3.5%)	1 (1.2%)	1.000	0.317
Age related macular degeneration	3 (3.5%)	1 (1.2%)	1.000	0.317
Bacterial conjunctivitis***	1 (1.2%)	0 (0.0%)	-	-
Vernal keratoconjunctivitis***	1 (1.2%)	0 (0.0%)	-	-
Optic atrophy	1 (1.2%)	1 (1.2%)	0.000	1.000
Pingueculum	1 (1.2%)	1 (1.2%)	0.000	1.000
Phthisis bulbi***	1 (1.2%)	0 (0.0%)	-	-
Asthenopia***	1 (1.2%)	0 (0.0%)	-	-

Dry eyes***	0 (0.0%)	1 (1.2%)	-	-
Pterygium***	0 (0.0%)	2 (2.3%)	-	-
Pseudophakia***	0 (0.0%)	2 (2.3%)	-	-

*Chi square for homogeneity

**Statistically significant

***No statistical test done due to absence of cases in one of the groups

DISCUSSION

The mean age in this study population was 37.9 years. This is similar to the reports of community studies done in the same state by Ani et al and Wokoma et al where they reported a similar pattern.^{5,6} This likely reflects the visual needs of this age group. More women presented in both the upland and riverine areas than the men, though this was not statistically significant, and a similar trend was reported in the study carried out by Ani et al and Onua et al in upland communities.^{5,7} This could be due to the fact that women being economically disadvantaged as compared to their male counterparts would be more likely to take up free ophthalmic consultations.

Poorer visual acuity of less than 6/60 was found in those in the Riverine community compared to those in the upland community. This may be due to the fact that those in the upland communities have better access to health care facilities and are thus able to seek medical attention faster, see Table 2. This was statistically significant, $P=0.008$. Omoni in her study in a riverine community reported a high prevalence of blindness compared to the 1% estimate for Nigeria and suggested the lack of accessible eye care facility as a mitigating factor.⁸

The intraocular pressure of those in the Riverine area was found to be higher than those in the upland communities with a statistically significant difference – $P=0.001$. This cannot be immediately explained from our study, but more data from large scale studies targeting biomedical risk factors for glaucoma maybe necessary to unmask this association.

From our study, refractive error was the commonest ocular morbidity seen in both riverine and upland communities. The prevalence of the combination of refractive error and presbyopia was found to be almost 2 times more in those in the upland community. Though we did not set out to study their educational status, but illiteracy may have been more prevalent in the Riverine areas and less access to social amenities such as schools may play a role. Pedro-Egbe et al also reported a high prevalence of refractive error in an upland community.⁹ This was in variance with a study carried out by Onua et al in a riverine community within the same land space where a high prevalence of refractive error was reported.¹⁰

Allergic conjunctivitis however was commoner in the Riverine group than in the upland with a statistically significant difference of $p=0.016$. This is surprising as riverine communities experience more rainfall annually with fewer periods of dryness compared to the upland communities and it is expected that pollens and other allergens are washed away. A possible reason could be due to petroleum related pollution in the air from illegal refining activities.^{10,11,12} Most studies carried out in the state have reported a high incidence of

allergic conjunctivitis with a tendency to a higher prevalence in the Upland communities.^{5,6,11,12} However a study carried out among school students in a Riverine community in the same state reported a low prevalence of allergic conjunctivitis.¹³ This may not be unconnected with the natural history of allergic conjunctivitis which has a lower prevalence in the age group in their study as well as a similar study carried out in a nearby State.^{13,14}

Cataract was significantly higher in the Riverine than in the upland, $p=0.029$. Omoni in her series while analyzing the different occupations reported that cataract was higher in the fishing folk than the other occupations and postulated the constant exposure to weather elements such as ultraviolet rays as being a risk factor.^{7,15} The same factors could be adduced to explain our findings. Other studies in the upland areas noted that cataract was a significant cause of blindness¹⁶

Those who were suspected of having glaucoma and those who had established glaucoma were found to be more in the Riverine community. This is in contrast to Omoni's series where glaucoma was not found to be a significant cause of ocular morbidity and also contrary to studies done in upland communities in the same state where glaucoma was reported to rank highly in the causes of visual impairment and blindness.^{12,13} Wide scale community based studies are needed to unmask this association.

CONCLUSION

Our study shows that the pattern of ocular morbidity may differ based on land surfaces. Ocular morbidity appears to be more prevalent in Riverine areas than upland. Government interventions and eye care service providers should take cognizance of this while planning intervention programs at the State and National levels.

REFERENCES

1. Mahesh D, Gauri S, Nabin P, Niraj J, Madhu, T et al. (2012) Visual status and ocular morbidity in older adults living in residential care. *Graefe's Archive of Clinical & Experimental Ophthalmology* 250:1387
2. Kyari F, Gudlavalleti MV, Sivsubramaniam S, Gilbert CE, Abdull MM, Entekume G, et al. Prevalence of blindness and visual impairment in Nigeria: The National Blindness and Visual Impairment Study. *Invest Ophthalmol Vis Sci* 2009;50:2033-9. ResnikoffS, PascoliniD, Etya'aleD, et al. Global data on visual impairment in the year 2002. *Bull World Health Org.* 2004;82:844–851. [[PubMed](#)]
3. World Health Organization. Press release WHO/12 17 February 1999. Available from: <http://www.who.int>. [Last accessed on 2013 Nov 17].
4. United Nations environment program: Environmental assessment of Ogoni land Pg 22

5. Ani EU, Fiebai B. Pattern of ocular disorders in an oil community. *International Journal of Community Medicine and Public Health*. 2018;5:1726-1729
6. Friday, S., Wokoma, T. Ichenwo, pattern of eye disorders in a rural community, *The Nigerian Health Journal*. 2011;11:14-18
7. Onua AA, Tobin West C, Ojule I. The burden of blindness and visual impairment according to age and gender: A case study of Emuoha local government area, Nigeria. *PMJ*. 2006; 10:73-78.
8. Omoni AO. The epidemiology of blindness and visual impairment in a fishing village in Rivers State. *The Nig Health J* 2005; 59(1/2): 256-260
9. Pedro-Egbe CN, Chukwuka IO, Babatunde S, Umeh RE. Blindness and visual impairment in the Niger-Delta: a study of Ahoada East LGA of Rivers State, Nigeria. *P Harcourt Med J* 2006; 1: 56-61.
10. Onua AA, Pedro-egbe CN, Babatunde S. Prevalence of Refractive Error in a Rural Ogoni Community in Southern Nigeria. 2012; 20(1): 30-32
11. Tebepah T. *Pattern of eye disease* in Port Harcourt and an oil producing rural community. *Niger J Ophthalmol* 1995;3:6-8. .
12. Awoyesuku EA, Chinawa NE, Ejimadu SC. Distribution of Ocular disorders in Communities Affected by Crude Oil-spillage in Rivers State. *Ophthalmology Research: An International Journal*. 2019; 11(3):1-5
13. Awoyesuku EA, Ogbuehi H, Pedro-Egbe CN. Pattern and Prevalence of Ocular Diseases in Secondary School Students in an Oil Producing Community in Rivers State, Nigeria. *W J Ophthalmol & Vision Res*. 2019; 2(4); . <https://dx.doi.org/10.33552/WJOVR.2019.02.000545>
14. Adio AO, Opubiri RI. Pattern of Eye diseases among children in Bayelsa State. *Afr j educ res admin*. 2011; 4(2): 72-79
15. Bekibele CO, Ashaye AO, Ajayi BG. Risk factors for visually disabling age-related cataract in Ibadan. *Ann Afr Med* 2003;2:27-32.
16. Ejimadu CS, Pedro-Egbe CN. Prevalence and causes of Blindness in Ikwerre Local Government Area of Rivers State, Nigeria. *The Nigerian Health Journal*. 2009; 9:26-29