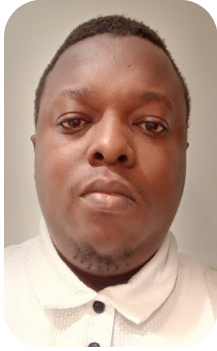


Article • Knowledge, Attitude, and Perception of School-Aged Children Towards Spectacle Use in Delta State, Nigeria

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ABSTRACT

Background: Visual impairment is a global public health concern in the younger population. This study assessed the knowledge, attitude, and perception of school-aged children in Agbor, Delta State, Nigeria towards spectacle use.

Methods: This cross-sectional study was conducted among school-aged children in Agbor, Delta State. A multistage sampling technique was used to select 822 school children. Data were collected through a pretested, interviewer-administered questionnaire that gathered socio-demographic information and ocular history, as well as assessments of knowledge about refractive errors, attitudes toward spectacles, and practices regarding spectacle use.

Results: A total of 822 schoolchildren participated in this study. The participants consisted of 364 (44.3%) males and 458 (55.7%) females, aged 5 to 17 years, with a mean age (SD) of 10.05 (3.05) years. Only 230 children had heard of the term 'refractive error,' among whom 22 children (9.6%) demonstrated good knowledge of refractive errors, while 208 children (90.4%) had poor knowledge. 792 (96.4%) schoolchildren had a positive attitude to spectacle use, while thirty (3.6%) schoolchildren had a negative attitude to spectacle use. Among 36 children wearing spectacles, only 6 children (16.7%) exhibited adequate practices regarding

spectacle use, whereas 30 children (83.3%) showed inadequate practices.

Conclusion: The findings of this study indicate that the overall knowledge of refractive errors among schoolchildren was limited, and the practice of spectacle use was insufficient. Based on these results, it is recommended that the Delta State Government enhance the implementation of the school health program to promote greater awareness of eye care and the importance of spectacle use among students.

Keywords: knowledge, refractive error, spectacle

Introduction

Refractive errors pose a significant public health challenge,¹ as they are the number one cause of visual impairment and the second leading cause of visual loss globally, according to WHO 2010 reports.²⁻⁴ They are the most common cause of visual impairment worldwide.⁴ The WHO estimates that approximately 19 million children are visually impaired, with 1.4 million blind and 17.5 million with low vision, many of whom reside in Africa.⁴ Uncorrected refractive error (URE) is identified as the primary cause of global visual impairment, with over 90% of those affected living in rural and developing countries.^{3,4} In a review study,⁵ it was observed that uncorrected refractive errors were responsible for visual impairments in about 100 million people and blindness in approximately 7 million people. In 2015, it was estimated that 124 million people were blind due to uncorrected refractive errors.⁶

Refractive errors impact a significant proportion of the global population, regardless of age, sex, or ethnic group.¹ Refractive errors can easily be diagnosed, measured, and corrected with spectacles or other refractive corrections to restore normal vision. However, if uncorrected or inadequately corrected, refractive errors can lead to a significant vision impairment and even blindness.^{7,8} Various

factors are responsible for refractive errors remaining uncorrected: lack of awareness and recognition of the issue at a personal and family level, as well as community and public level; non-availability of and/or inability to afford refractive services for testing; insufficient provision of affordable corrective lenses; and cultural barriers that discourage compliance.¹

Despite the clear and comfortable vision derived from spectacle lens use, children often face social pressures against wearing spectacles and may resist wearing the spectacles prescribed for them. Different studies have identified these peer pressures and social discrimination against spectacle-wearing young children; for instance, children in studies from Brazil,⁹ India,^{10,11} and Tanzania¹² experienced being teased or discriminated against. Parents are also influenced by social pressures and hesitate to provide spectacles for their children due to the stigma surrounding their use.^{13,14} Lack of knowledge, myths, and misconceptions towards refractive errors negatively impact the uptake of refractive services such as spectacle use and contact lens wear.¹⁵ This study will contribute to the understanding, maintenance, and improvement of healthy eye care practices among young people and help them establish lifelong healthy behavioral patterns, as practices established early in life are easily sustained. Improved knowledge and a change in attitude will go a long way towards decreasing the prevalence of uncorrected refractive errors and improve quality education and quality of life among schoolchildren.

Multiple studies in various geopolitical zones of Nigeria have evaluated the prevalence of refractive error and its impact on the younger population. However, most of these studies were conducted in urban areas, which have higher literacy levels, socioeconomic status, and health facilities. Some focused on only primary or secondary schoolchildren,^{14,16} while others focused on older adults.¹⁷⁻¹⁹ Also, some studies assessed the knowledge of refractive errors using a self-administered questionnaire in schoolchildren in public schools,²⁰ which did not capture children in private schools. Still others focused more on high school children.²¹ There is a dearth of information about knowledge of refractive errors among school-aged children in Nigeria. Therefore, to fill this gap and provide baseline data for intervention, this study was carried out among school-aged children in primary and secondary, both private and public, schools in Agbor, Delta state to assess their knowledge of

refractive error as well as their attitude and perception towards spectacle use.

Methods

This school-based study was conducted in Ika South Local Government Area (LGA) of Delta state. Ika South LGA is one of the 27 LGAs in the northwestern part of Delta State, which is situated in the South-South geopolitical zone of Nigeria. The projected population for Ika South Local Government Area in 2021 was approximately 2.5 million. Ika South LGA has 12 political wards, two state government-owned general hospitals, 14 primary health care (PHC) centres, and two privately owned eye clinics.²² It has six education zones, made up of 57 government-owned primary schools, 20 government-owned secondary schools, 51 approved private primary schools, and 28 approved private secondary schools.^{23,24} Few schools had health facilities like a clinic, first aid box, visual acuity charts, etc., and none of them had clinic personnel or a preschool screening program in place.²⁴ Also, none of the schools had trained health care personnel such as school nurses, doctors, or certified school first aiders.²⁴

The study population included schoolchildren aged 5 to 17 years from selected government and private, primary and secondary schools in the LGA. Children whose parents provided signed informed consent and who were present on the screening day were included in the study. Sick children and those who withdrew their participation were excluded from the study.

The minimum sample size was calculated using Cochran's formula, $n = (z^2pq)/d^2$,²⁵ where p = prevalence of refractive error of 9.7% from a previous study among school children in Anambra State,¹⁴ at 95% confidence interval and degree of accuracy of 0.03 with a design effect = 2. Considering a non-response rate = 10%, a sample size of 822 was estimated. The participants were selected by a multistage sampling technique comprising three stages. The first stage involved random selection of three out of the six educational zones in Ika south LGA using a balloting technique. The second stage involved selection of schools using a stratified sampling technique. Also, a 'proportional allocation to size method' was used to determine the number in each stratum.²² A total of 23 schools comprising ten government primary, six private primary, two government secondary, and five private secondary schools was selected using a simple random technique by balloting. In stage

three, eligible children were selected from classes in each school using a simple random sampling technique by balloting.²² Data was collected between September and December 2021 using an interviewer-administered questionnaire to obtain the participant's socio-demographic information and ocular history. Three research assistants were thoroughly trained on how to measure visual acuity and on questionnaire administration technique. The questionnaire was pretested among schoolchildren in selected schools Ika North East LGA, and adjustments were made thereafter. The visual screening was done using the 'modified Refractive Error Study in School Children (RESC)' protocol.²⁵ Tumbling E charts and Snellen letter charts were used to assess visual acuity (VA) at a distance of 6 meters (20 feet).

The questionnaires were thoroughly reviewed for completeness in the field, data entry was double checked for accuracy, and analysis was done using SPSS version 22. Univariate analysis was carried out on socio-demographic data and presented as frequencies and percentages. Bivariate analysis was done using the chi-square test of association to determine the association between participants' socio-demographic characteristics and knowledge of refractive errors, attitude, and practice with spectacle use. A p-value less than 0.05 was considered as statistically significant.

Ethical approval (ADM/E 22/A/VOL.VII/14831091) was obtained from the Ethics and Research Committee University of Benin Teaching Hospital (UBTH), Benin City. Permission was sought from the Ika South Local Government Education Secretary, Post-primary Education Board, and head teachers of the selected schools. Written informed consent was obtained from participants' parents/guardians, and assent was obtained from selected school children before participating in the study. Confidentiality of records was observed.

The school-based setting of this study limits its generalizability relative to community-based studies as some school-aged children may not be enrolled in school because of poverty.

Results

A total of 830 schoolchildren participated in the study, with 822 providing complete data for analysis, resulting in a high response rate of 99%. The mean age of the children was 10.1 ± 3.1 years, with a significant proportion (43.9%) falling within the age range of 9 to 12 years. The distribution of age groups reflected

a broad representation of childhood developmental stages, with the largest subgroup being children aged between 9 and 12 years, followed by younger children, and a smaller proportion of older children (Table 1).

The sample included 364 males (44.3%) and 458 females (55.7%), indicating a fairly balanced representation of both genders. Additionally, the study encompassed a mix of educational stages, with 499 children (60.7%) attending primary school, while the remaining 323 (39.3%) were in secondary school. This distribution allowed for an exploration of age-related and educational stage-related variables across the dataset (Table 1).

Geographically, the sample was split between urban and rural areas, with 413 children (50.2%) residing in urban environments and 409 children (49.8%) living in rural areas. This nearly even distribution between urban and rural participants enabled the examination of potential geographic differences in the study outcomes (Table 1).

The data collected was consistent across gender, age, and residential location, providing a representative sample of the target population. These demographics also offer a broad perspective on the study's findings, ensuring that the results can be generalized to a wider group of schoolchildren across various regions and age groups (Table 1).

Ocular History and Spectacle Use

Out of the 822 respondents, 132 (16.1%) reported a history of eye problems. Among these, 82 (62.1%)

Table 1. Socio-Demographic Characteristics of Respondents

Variables	Frequency (n=822)	Percent
Age Group (Years)		
5 – 8	298	36.3
9 – 12	361	43.9
13 – 17	163	19.8
Sex		
Male	364	44.3
Female	458	55.7
Class		
Primary	499	60.7
Secondary	323	39.3
Place of Residence		
Urban	413	50.2
Rural	409	49.8
Birth Order		
1 – 3	591	71.9
> 3	231	28.1

Mean Age (SD) = 10.1 (3.1) years

had undergone an eye test, and 102 (77.3%) of those with an ocular history used spectacles. Of the spectacle users, 46 (45.1%) wore prescription spectacles, with the majority (39.1%) having started using them after the age of 12. The observed age at first use, with many children starting after 12, aligns with the typical onset of myopia during early adolescence. Additionally, 281 (34.2%) respondents reported a family history of prescription spectacle use. The significant proportion of respondents with a family history of spectacle use further emphasizes the need for awareness and proactive eye health measures within families (Table 2).

Knowledge of Refractive Errors

Only 230 children had heard of the term ‘refractive error’, among whom 22 demonstrated good knowledge. The knowledge of refractive errors varied significantly with age, with older children demonstrating a higher level of awareness ($p < 0.001$) (Table 3).

Male respondents (10, 10.6%) had better knowledge of refractive errors compared to female respondents (12, 8.8%). However, this difference was not statistically significant ($p=0.646$), suggesting that gender may not be a determining factor in awareness levels. Children who had resided in either urban or rural areas for more than eight years (16, 14%) had significantly higher knowledge of refractive errors

Table 2. Ocular Health History of Participants

Variables	Frequency	Percent
History of eye problem (n=822)		
Yes	132	16.1
No	690	83.9
Ever had an eye test (n=132)		
Yes	82	60.7
No	50	39.3
Spectacle use (n=822)		
Yes	102	17.9
No	468	82.1
Prescription spectacles (n=102)		
Yes	82	47.9
No	50	52.1
Age at first spectacle use (years) (n=46)		
5 – 8	12	26.1
9 – 12	16	34.8
> 12	18	39.1
Family history of spectacle use (n=822)		
Yes	281	34.2
No	541	65.8

Table 3. Association Between Participants’ Demographic Characteristics and Level of Knowledge of Respondents

Variables	Level of knowledge		χ ²	p-value
	Poor (n=208) n (%)	Good (n=22) n (%)		
Age Groups (Years)				
5 – 8	70 (94.6)	4 (5.4)	12.566	<0.001
9 – 12	100 (94.3)	6 (5.7)		
13 – 17	38 (76.0)	12 (24.0)		
Sex				
Male	84 (89.4)	10 (10.6)	0.212	0.646
Female	124 (91.2)	12 (8.8)		
Class				
Primary	112 (93.3)	8 (6.7)	2.437	0.119
Secondary	96 (87.3)	14 (12.7)		
Place of Residence				
City/Town	153 (91.6)	14 (8.4)	0.985	0.321
Village	55 (87.3)	8 (12.7)		
Duration in Location (Years)				
1 – 4	18 (100.0)	0 (0.0)	5.880	0.053
5 – 8	92 (93.9)	6 (6.1)		
> 8	98 (86.0)	16 (14.0)		
Mother's Educational Level				
Primary	32 (100.0)	0 (0.0)	4.092	0.129
Secondary	119 (89.5)	14 (10.5)		
Tertiary	57 (87.7)	8 (12.3)		
Father's Educational Level				
Primary	36 (100.0)	0 (0.0)	4.519	0.104
Secondary	77 (88.5)	10 (11.5)		
Tertiary	95 (88.8)	12 (11.2)		

compared to those who had lived in these areas for fewer years ($p = 0.0053$). This could be attributed to prolonged exposure to health education or healthcare infrastructure prevalent in these regions (Table 3).

Furthermore, secondary school students (14, 12.7%) exhibited better knowledge of refractive errors compared to primary school students (8, 13.6%), with a statistically significant difference ($p = 0.003$). This trend may reflect the curriculum's inclusion of health education topics and increased maturity leading to greater health awareness. In contrast, knowledge of refractive errors was less prevalent among children residing in urban areas (8.4%), compared to those living in rural areas (12.7%), though this difference was not statistically significant ($p = 0.321$), indicating that urban residence may not necessarily correlate with higher awareness (Table 3).

Parental education levels, for both mothers ($p = 0.129$) and fathers ($p = 0.104$), were not significantly

Table 4. Association Between Demographic Characteristics and Attitude

Variables	Attitude		χ ²	p-value
	Poor (n=30) n (%)	Good (n=22) n (%)		
Age groups (Years)				
5 – 8	8 (2.7)	290 (97.3)	1.577	0.455
9 – 12	14 (3.9)	347 (96.1)		
13 – 17	8 (4.9)	155 (95.1)		
Sex				
Male	16 (4.4)	348 (95.6)	1.034	0.309
Female	14 (3.1)	444 (96.9)		
Class				
Primary	19 (3.8)	480 (96.2)	0.090	0.764
Secondary	11 (3.4)	312 (96.6)		
Place of residence				
Urban	16 (3.9)	397 (96.1)	0.119	0.730
Rural	14 (3.4)	395 (96.6)		
Duration in location (years)				
1 – 4	4 (6.6)	57 (93.4)	1.652	0.438
5 – 8	14 (3.6)	376 (96.4)		
> 8	12 (3.2)	359 (96.8)		
Mother's educational level				
Primary	8 (5.0)	152 (95.0)	1.030	0.597
Secondary	16 (3.3)	466 (96.7)		
Tertiary	6 (3.3)	174 (96.7)		
Father's educational level				
Primary	6 (4.2)	138 (95.8)	1.893	0.388
Secondary	12 (2.8)	413 (97.2)		
Tertiary	12 (4.8)	237 (95.2)		

associated with the respondents' level of knowledge about refractive errors (Table 3). This finding contrasts with studies suggesting that higher parental education correlates with increased awareness of pediatric eye health.²⁶ The lack of association in this study may be influenced by cultural factors.

Attitude Towards Spectacle Use

A majority of the respondents, 792 (96.4%), exhibited a positive attitude toward wearing spectacles, while 30 (3.6%) had a negative attitude. The positive attitude was consistent across age groups (97.3% in 5-8 year-olds), gender (96.9% in females), school levels (96.6% in secondary school students), and residence (96.6% in urban dwellers). However, this distribution was not statistically significant (Table 4).

Practice of Spectacle Use

Among the 822 respondents, 36 (4.4%) children were identified as spectacle users. Of these, only 6

Table 4. Association Between Demographic Characteristics and Level of Practice

Variables	Poor (n=30) n (%)	Good (n=22) n (%)	χ ²	p-value
Age groups (Years)				
5 – 8	11 (84.6)	2 (15.4)	0.289	1.000
9 – 12	14 (82.4)	3 (17.6)		
13 – 17	5 (83.3)	1 (16.7)		
Sex				
Male	16 (84.2)	3 (15.8)	0.022	1.000
Female	14 (82.4)	3 (17.6)		
Religion				
Christianity	28 (82.4)	6 (17.6)	0.491	1.000
Islam	2 (100.0)	0 (0.0)		
Place of residence				
Urban	17 (77.3)	5 (22.7)	1.180	0.385
Rural	13 (92.9)	1 (7.1)		
Duration in location (years)				
1 – 4	3 (75.0)	1 (25.0)	0.686	1.000
5 – 8	11 (84.6)	2 (15.4)		
> 8	16 (84.2)	3 (15.8)		
Mother's educational level				
Primary	7 (77.8)	2 (22.2)	0.960	0.689
Secondary	18 (81.8)	4 (18.2)		
Tertiary	5 (100.0)	0 (0.0)		
Father's educational level				
Primary	7 (87.5)	1 (12.5)	0.521	1.000
Secondary	16 (84.2)	3 (15.8)		
Tertiary	7 (77.8)	2 (22.2)		

(16.7%) demonstrated adequate spectacle-wearing practices, while the remaining 30 (83.3%) exhibited inadequate practices. Females had a slightly higher rate of adequate practice (17.6%) compared to males (15.8%). However, this difference was not statistically significant (p = 1.000), suggesting that gender may not be a determining factor in spectacle-wearing practices. Children residing in urban areas had better spectacle-wearing practices (22.7% with adequate practices) compared to those from rural areas (7.1%). Nonetheless, this difference was not statistically significant (p = 0.385), indicating that residence may not significantly influence spectacle-wearing practices. No significant association was found between the educational level of mothers (p = 0.689) or fathers (p = 1.000) and the respondents' spectacle-wearing practices. This suggests that parental education may not directly impact children's adherence to recommended spectacle-wearing behaviors (Table 5).

Discussion

The impact of uncorrected refractive error among school-aged children and society at large cannot be overstated. Uncorrected refractive error is a major cause of visual impairment among schoolchildren. Visual impairment from refractive error impacts both individuals and society, leading to reduced educational performance and success among children, fewer work and educational opportunities, social isolation, increased susceptibility to other health issues, and higher mortality rates, which in the long run lead to lower quality of life and poverty.²⁷ According to the findings of the survey, a majority of the participants in this study were between the ages of 9 and 12 years. This is similar to studies in Ghana, with a majority 8 to 13 years (mean age 10.5 ± 3.4 years);¹⁵ Onitsha, with a majority aged 8 to 10 years (mean age 9.01 ± 2.5 years);¹⁴ and Addis Ababa, with a majority aged 10 to 14 years.²⁷ This study had more females than males, similar to other studies.^{28,29} Almost an equal proportion of the participants resided in either urban or rural areas, with urban residence slightly more.

It was observed that more than half of the respondents' parents had secondary education. Education is necessary for parents, as this will enable them to make informed decisions about their children's health. In this study, the health-seeking behavior of schoolchildren was not negatively influenced by the lower educational level of their parents. However, it was observed that a higher level of parental education was associated with increased awareness of refractive errors, which in turn had a positive impact on the health status of their children.³⁰ These findings suggest that while parental education may not directly affect children's health-seeking behaviors, it plays a crucial role in enhancing awareness of health issues, such as refractive errors, thereby contributing to better health outcomes for the children. We can infer that most of the schoolchildren's parents might have meager earnings. Their income will likely affect the affordability of spectacle correction and overall attitude towards eye care.

Less than one fifth of the participants used spectacles, amongst which only one tenth of respondents had their eyes examined in the past. This means that some of the respondents were using spectacles without a prior eye examination. When a patient undergoes an eye exam by a trained professional, it provides an opportunity to detect a variety of other eye problems other than uncorrected

refractive error. When people purchase spectacles from the street, they miss out on the opportunity to undergo a comprehensive eye examination.

The level of knowledge of refractive errors increased statistically as the age of the respondents increased. Respondents' knowledge was independent of the sex of the schoolchildren, place of residence, parents' educational level, and class. Respondents who lived in either urban or rural settlements for a duration of above 8 years had statistically significantly higher knowledge of refractive error, followed by respondents who lived for 5 to 8 years. This can be attributed to the maturity of the individual regardless of location.

More than one-third of the schoolchildren agreed that spectacles are not harmful to the eyes, that spectacles do not worsen vision, and that they would wear them even when teased by friends. Similarly, this was also true among students in Kenya³¹ and South Africa,³² where most of the respondents had a positive attitude to spectacle use. In contrast, students in Ejisu-Juaben Ghana had a negative attitude to spectacle use.²¹ A positive attitude to spectacles in this study showed an immense possibility for a positive outcome and sustenance of any intervention program. Also, the attitude of schoolchildren to spectacles was independent of the socio-demographic characteristics of the respondents.

Among the schoolchildren with refractive error, only about 20% had spectacles. This shows a poor awareness of the problem among schoolchildren and their caregivers. In this study, more than 75% of the schoolchildren had poor practices with spectacle wear.

Conclusion

The overall knowledge of schoolchildren of refractive error was poor, although the respondents' knowledge increased statistically as the age of the schoolchildren increased. Knowledge of respondents was independent of other socio-demographic characteristics. A majority of the respondents had a positive attitude to spectacle use, which was independent of the socio-demographic characteristics of the respondents. The practice of schoolchildren with spectacle use was inadequate, and this was independent of the socio-demographic characteristics of the respondents. The Delta State Government should take steps to strengthen implementation of the school eye health program, such as integrating eye health education into the

school curriculum to raise awareness, organizing regular eye screenings, and establishing monitoring and evaluation program to track progress.

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