INVESTIGATING THE KNOWLEDGE, ATTITUDES AND PRACTICES REGARDING REFRACTIVE ERRORS AMONG SECONDARY SCHOOL STUDENTS IN EGOR LOCAL GOVERNMENT AREA.

BY

Chineye Vivian NWANKWO

LSCI605980

DEPARTMENT OF OPTOMETRY

FACULTY OF LIFE SCIENCES

UNIVERSITY OF BENIN

SEPTEMBER, 2023.

INVESTIGATING THE KNOWLEDGE, ATTITUDES AND PRACTICES REGARDING REFRACTIVE ERRORS AMONG SECONDARY SCHOOL STUDENTS IN EGOR LOCAL GOVERNMENT AREA.

BY

Chineye Vivian NWANKWO

LSCI605980

A PROJECT PRESENTATION TO THE DEPARTMENT OF OPTOMETRY,

UNIVERSITY OF BENIN, NIGERIA

IN PARTIAL FULFILMENT OF THE REQUIREMENT FOR THE AWARD OF DOCTOR OF OPTOMETRY (OD) DEGREE

SEPTEMBER, 2023

CERTIFICATION

DEDICATION

I dedicate this work to my loving mum, my backbone, Mrs E. N Nwankwo for her sincere love and guidance. To my father, my guardian angel, I would never have asked for another.

To my loving siblings especially Engr. And Mrs. Obiora-Okafor for their unfailing love towards me, Mr Samuel and also to my lovely Oppas; Mr Amaechi and Mr Sunny and their lovely wives), may God always bless you.

To the one God sent from heaven to be my mirror, my joy-giver; dearest Barrister Chidinma, heaven blesìs the day you came forth. Thank you for being my strongest system of support.

ACKNOWLEDGEMENTS

All praise to God Almighty, who has preserved my life and kept me safe and in good health throughout my journey in the University of Benin.

My sincere appreciation goes to Professor (Mrs.) S.E. Odjimogho and Dr G. N Atuanya for their invaluable guidance and assistance during the course of this project. Also, I sincerely appreciate the Head of Department, Prof (Mrs) F. K. Idu and all the other lecturers and staff of the Department of Optometry.

To my project supervisor, Dr Mrs Sarah Ebuwa thank you for your love and guidance. To my esteem lecturers, Prof Mrs S. E Odimogho and Dr G Atuanya thank you for your love and guidance.

To my friends to made the journey worthwhile, Idogen Suzan, Ighayin Eseosa, Olasupo Florence, Omoregie Patience and the wonderful class of De Salvavidas '22 thank you all for your love.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

ABSTRACT

Refractive errors, including myopia, hyperopia, and astigmatism, constitute a significant public health concern affecting visual well-being of individuals as well as the academic performance of pupils. Uncorrected refractive error, the second most common cause of preventable blindness globally places a heavy burden on individuals and the society. This study aimed to assess the knowledge, attitudes, and practices of refractive errors among secondary school students in Egor Local Government Area (LGA). The study was carried out for a period of three month. A stratified random sampling method was used where students from the selected schools within Egor LGA were selected for the study. The sample size was 400 with a number of 151 females and 249 males. Data was collected using a well structured self-administered questionnaires. This questionnaire included demographic information and was further divided into three sections. The data collected were analyzed using the statistical package for social sciences (SPSS) version 22.0. Descriptive statistics (frequencies, percentages, mean and standard deviation) was used to summarize the variables. Continuous variables was expressed as the mean ± standard deviation for those that displayed normal distribution. A total of 400 students participated in the study between the ages of 11 to 19years (mean age 16.07± 1.320). Majority of the participants was male (249) while the remaining where females (151). The results showed that those who had good knowledge about refractive errors was about 52.3% while those who had good attitudes to refractive errors was 44% and who with good practice of refractive errors was just 17.5% of the respondents. In conclusion, the knowledge about refractive error was fair, attitude towards refractive error was good but the practices towards refractive error was poor.

CHAPTER ONE

1.0 INTRODUCTION

Refractive error is a condition where the eyes cannot clearly focus the images from the outside world resulting in blurred vision, which if severe, causes visual impairment. Pascolini *et al* (2012). According to Resnokiff *et al* (2004) approximately 12.8 million children between the ages of 5 and 15 years are visually impaired from uncorrected or inadequately corrected refractive error with a global prevalence of 0.969%. Refractive errors affect more than one third a population and although the exact cause of refractive errors remain unknown, common risk factors includes heredity, nutrition and the environment. Hassan *et al* (2018).

Refractive errors cannot be prevented and can be diagnosed by an eye examination. (World Health Organization, 2011). Wedner *et al* (2008) found refractive error to be the leading cause of visual disability among school-aged children of African descent. Refractive errors might hinder a child's academic performance and this is mostly seen in the cases of school children with refractive errors and other visual problems who find it difficult to make out writings on the board that appear to them as blurry and those that experience headaches and eye strain while doing close up tasks such as reading, writing amongst others. Resnokiff *et al* (2008).

Visual disability due to uncorrected refractive errors affects nearly 250 million individuals globally and studies have revealed that uncorrected refractive error are the leading cause of visual impairment. Naidoo *et al* (2003).

Globally, more than 2.3 billion people suffer from refractive error-related poor vision. Thulasiraj *et al* (2003). However, refractive error can simply be detected, diagnosed, measured, and subsequently corrected using optical corrective approaches and devices such as eyeglasses and

contact lenses or by refractive surgical procedures. kempe *et al* (2016). Despite the fact that majority of those with refractive errors could have their sight restored with spectacles or other optical correction it is only 1.8 billion that have access to eye examinations and affordable correction. This leaves approximately 500 million people, mostly in developing countries (close to one-third are in Africa) and many children with uncorrected refractive error which exposes them to blindness and impaired vision. (WHO 2011). Many are not aware that there is a correction for their compromised vision, have no one to provide treatment, or cannot afford the appliances they need. Naidoo *et al* (2003).

Though spectacles has been included in the essential drug list of the World Health Organizations, people are not using glasses even when prescribed by a specialist due to beliefs and attitudes of users, parent (in cases of children) and the community as a whole. (WHO 2011).

Globally, the prevalence rate of uncorrected refractive error (URE) amongst school-going children is estimated to be approximately 11.7%,. Hashemi *et al* (2019). Asian population have the highest prevalence of uncorrected refractive error (36.9%). *Wu et al* (2013) and the African population, the lowest (9.7%). Ngozika *et al* (2018). In contrast, other studies have reported a relatively low prevalence of 4.5% in an Asian population as opposed to 24% in some parts of the African continent. Ovenseri-Ogbomo *et al* (2010). The prevalence of URE in South Africa has been reported to be 7.0%. Wajuihian *et al* (2019). Myopia was found to be the leading type of URE in most studies, followed by astigmatism and hypermetropia. Furthermore, 19 million children have Visual impairment worldwide, of which 1.4 million are blind and 17.5 million have low vision with 90% of them living in Africa. (WHO 2011).

1.1 BACKGROUND INFORMATION

Refractive error still remains a main stay issue in developing countries especially in Africa. It is sad to note that with the advancement of technology and evolution in artificial intelligence a lot of individuals still remain ignorant on the issue of refractive errors especially in our local communities. Naidoo *et al* (2003). It is more surprising that the various forms of correction of this error is perceived as dangerous or harmful by some of these individuals.

Refractive error is highly predominant among school aged children. Castango *et al* (2015). These issues can make it difficult for the affected child to comprehend and interpret written information, which can make reading and learning more difficult. These difficulties can have a significant impact on a child's ability to comprehend and interpret written information, ultimately making reading and learning more challenging.

The definition of visual impairment in the International statistical classification of diseases, injuries and causes of death, 10th revision (ICD-10), H54, is based on “best-corrected” vision, i.e. visual acuity obtained with the best possible refractive correction. However, to assess the extent of visual impairment caused by uncorrected refractive errors, estimates need to be based on “presenting” vision, i.e. visual acuity obtained with currently available refractive correction, if any. Thus, presenting vision, as opposed to best-corrected vision, provides the prevalence of visual impairment that could be improved simply by appropriate corrective refraction. Basing the definition of visual impairment on presenting vision extends the current definition to one that characterizes visual impairment faced by people in day-to-day activities.

Visual impairment from uncorrected refractive errors can have immediate and long-term consequences in children and adults, such as lost educational and employment opportunities, lost

economic gain for individuals, families and societies, and impaired quality of life. Xu *et al.* (1996). Various factors are responsible for refractive errors remaining uncorrected: lack of awareness and recognition of the problem at personal and family level, as well as at community and public health level; non-availability of and/or inability to afford refractive services for testing; insufficient provision of affordable corrective lenses; and cultural disincentives to compliance. Wong *et al* (2001)

Estimates of the prevalence of visual impairment caused by uncorrected refractive errors in 2004 have been determined at regional and global levels for people aged 5 years and over from recent published and unpublished surveys. Resnokiff *et al* (2004). The estimates were based on the prevalence of visual acuity of less than 6/18 in the better eye with the currently available refractive correction that could be improved to equal to or better than 6/18 by refraction or pinhole. Resnokiff *et al* (2008)

A total of 153 million people (range of uncertainty: 123 million to 184 million) are estimated to be visually impaired from uncorrected refractive errors, of whom eight million are blind. (WHO 2011). This cause of visual impairment has been overlooked in previous estimates that were based on best-corrected vision. Combined with the 161 million people visually impaired estimated in 2002 according to best-corrected vision, 314 million people are visually impaired from all causes: uncorrected refractive errors become the main cause of low vision and the second cause of blindness. Resnokiff *et al* (2008). Using best-corrected vision, visual impairment was estimated to affect 161 million people globally in 2002, of whom 37 million were blind. Resnokiff *et al* (2004). The main cause of blindness and low vision was cataract; however, it was recognized that unless uncorrected refractive errors were included among the causes, visual impairment at global level was significantly underestimated.

Uncorrected refractive errors can hamper performance at school, reduce employability and productivity, and generally impair quality of life. Resnokiff *et al* (2008). Yet the correction of refractive errors with appropriate spectacles is among the most cost-effective interventions in eye health care.

The results presented in this paper help to unearth a formerly hidden problem of public health dimensions and promote policy development and implementation, programmatic decision-making and corrective interventions, as well as stimulate further research.

THE VARIOUS TYPES OF REFRACTIVE ERRORS ARE;

1. Hyperopia (long-sightedness)

2. Myopia (nearsightedness)

3. Astigmatism

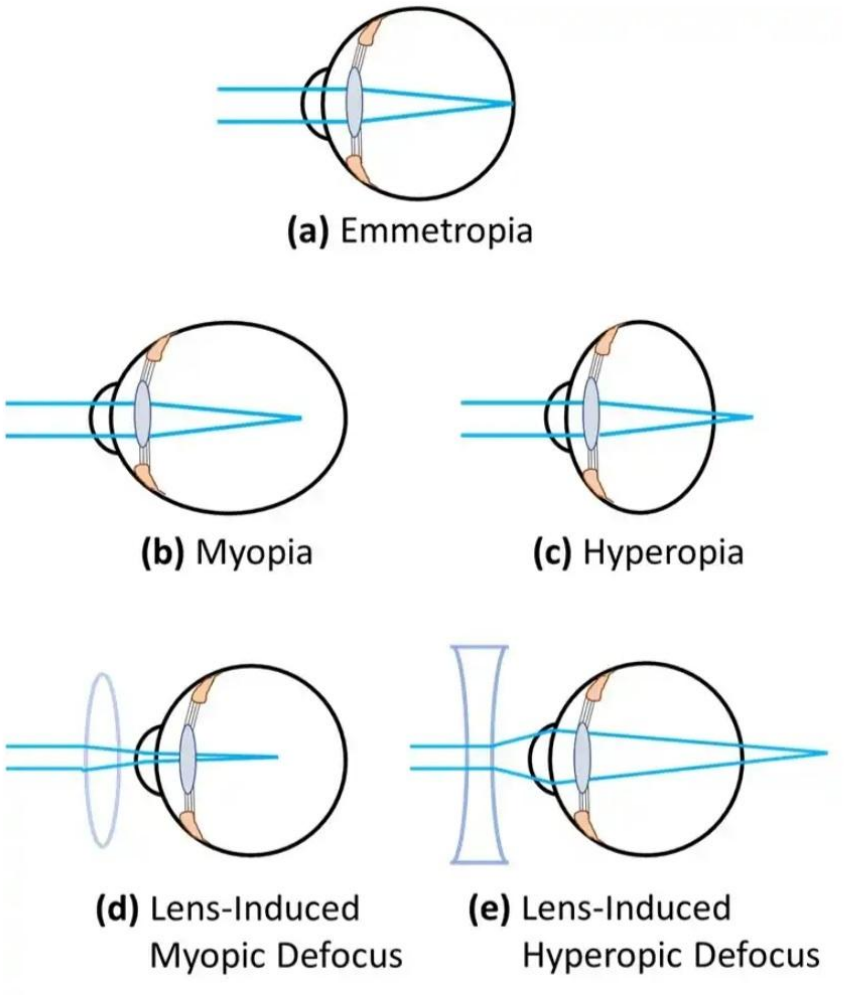


Figure 1.1 Diagram showing emmetropia and refractive conditions.

Source: Kolb *et al* (1995)

1.1.1 Hyperopia.

Hyperopia which is also known as farsightedness, is a refractive condition in which distant objects can be seen more clearly than objects that are near. Moore *et al* (1997). This means that the eye's ability to focus light onto the retina is affected. In a normal eye, light entering the eye is precisely focused by the cornea and the lens directly onto the retina, the light-sensitive tissue lining the back of the eye. This allows for single and clear vision of both near and distant objects.

However, in hyperopia, the eyeball is either too short or the cornea has too little curvature, causing the light to focus behind the retina instead of directly on it. As a result, when someone with hyperopia tries to focus on a nearby object, the light rays entering the eye are not focused sharply onto the retina, leading to blurry vision. Moore *et al* (1997). Hyperopia is often present from birth, but it can also develop with age as the natural aging process affects the eye's ability to focus. The effort involved in functioning with moderate to higher levels of uncorrected hyperopia is likely to be responsible for asthenopic complaints and can additionally result in fatigue and disengagement with learning activities. This in turn has the potential to make it difficult for the affected individuals to perform efficiently in the classroom and may reduce their academic performance in the context of reading and learning, hyperopia can pose several challenges for school children especially those in secondary. This has to do with the fact that they have more workload and tend to read a lot too. Hu *et al* (2015).

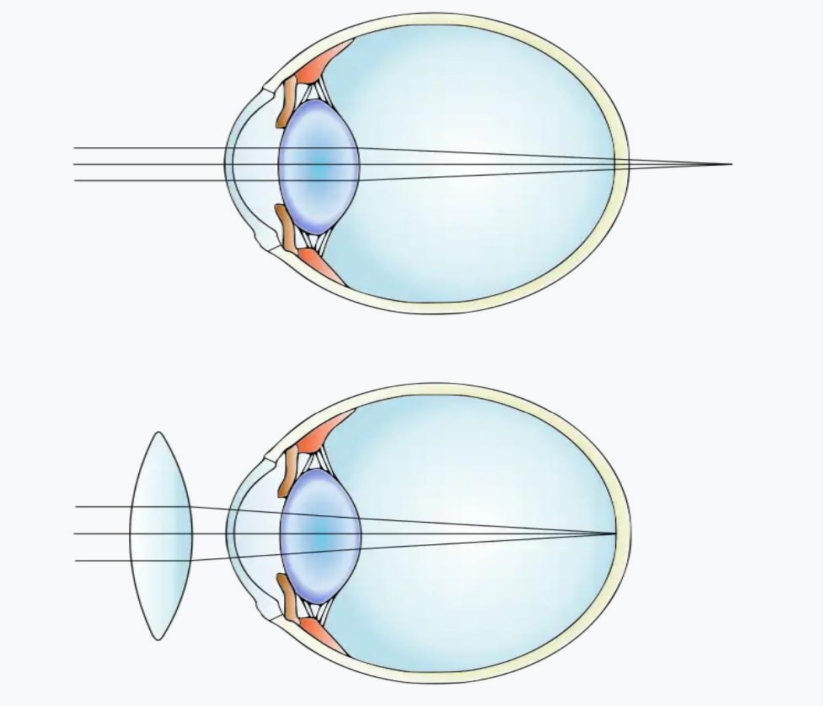
THE SYMPTOMS OF HYPEROPIA CAN INCLUDE:

1. Blurred vision when looking at nearby objects (e.g., reading, writing).

2. Eye strain or discomfort, especially during close-up tasks.

3. Headaches, particularly after prolonged near work.

4. Squinting or straining the eyes to see clearly.



Far-sightedness without (top) and with lens correction (bottom)

Figure 1.1.1 Diagram depicting hyperopia

Source: (Lowth and Mary 2016).

ACCORDING TO KHURANA *ET AL* (2008) CAUSES OF HYPEROPIA CAN BE CLASSIFIED AS:

1. Axial hyperopia; this occur when the axial length of eyeball is too short. About 1 mm decrease in axial length cause 3 diopters of hyperopia. One condition that cause axial hyperopia is nanophthalmos.

2. Curvatural hyperopia; this occur when curvature of lens or cornea is flatter than normal. About 1 mm increase in radius of curvature results in 6 diopters of hyperopia Cornea is flatter in micro-cornea and cornea plana.

3. Index hyperopia: Age related changes in refractive index (cortical sclerosis) can cause hyperopia. Another cause of index hyperopia is diabetes. Occasionally, mild hyperopia shift may be seen in association with cortical or sub capsular cataract also.

4. Positional hyperopia; this occur due to posterior dislocation of lens or IOL. It may occur due to trauma.

5. Consecutive hyperopia; this occur due to surgical over correction of myopia or surgical under correction in cataract surgery.

6. Functional: Functional hyperopia results from paralysis of accommodation as seen in internal ophthalmoplegia, CN III palsy etc.

7. Absence of lens: Congenital or acquired aphakia can cause high degree hyperopia.

CLASSIFICATION OF HYPEROPIA

There are three clinical categories of hyperopia according to Moore *et al* (2008)

1. Simple hyperopia: Occurs naturally due to biological diversity.

2. Pathological hyperopia: Caused by disease, trauma, or abnormal development.

3. Functional hyperopia: Caused by paralysis that interferes eye's ability to accommodate.

CLASSIFICATION ACCORDING TO SEVERITY

There are also three categories according to Moore *et al* (1997) :

1. Low: Refractive error less than or equal to +2.00 diopters (D).

2. Moderate: Refractive error greater than +2.25 D up to +5.00 D.

3. High: Refractive error greater than +5.25 D.

TREATMENT OF HYPEROPIA

The treatment involves the use of

1. Spectacles; refractive error is corrected with the use of plus spherical power. It could come in form of single vision lenses, special order lenses or as bifocals. Moore *et al (*1997).

2. Contact lenses; this includes the use soft contact lenses, rigid gas permeable lenses amongst other.Moore *et al* (1997).

3. Surgical method; this includes the following

A. LASIK; this is an eye surgery done to reshape the cornea so that glasses or contact lenses are no longer needed. Settas *et al* (2012).

B. Refractive lens exchange; this is a variation of cataract surgery. The difference is the existence of abnormal ocular anatomy which causes a high refractive error.

C. LASEK; this is similar to PRK but here alcohol is used to loosen the corneal surface. Settas *et al* (2012).

PROGNOSIS

Young children (ages 0-10) with uncomplicated low-to-moderate hyperopia usually do not require intervention. With aging, loss of accommodation causes visual acuity to decrease and hyperopia to worsen. Decreased quality of life is common with hyperopia. Moore *et al* (1997). There may also be a decrease in the ability to learn and develop within normal limits when vision is poor. Moore *et al* (1997).

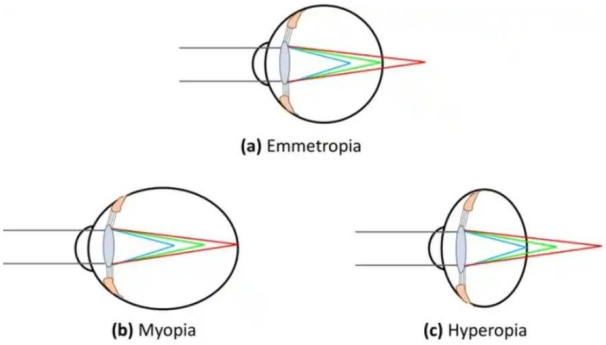
Hyperopia that is not fully compensated with accommodation will force the eye into convergence and an esotropia (crossed eyes) will develop. Trobe *et al* (2006).

Amblyopia can be another complication of hyperopia. Moore *et al* (1997). Monocular amblyopia or Binocular amblyopia may result. Riordan *et al* (2011). Levels greater than 1.00D of hyperopic anisometropia and 5.00D of isometric hyperopia are considered amblyogenic. Moore *et al* (1997). Accommodative esotropia, acute angle closure glaucoma, and strabismus may also result from hyperopia.

1.1.2 MYOPIA

Myopia also known as shortsightedness or nearsightedness is a condition in which visual images are focused in front of the retina thereby making images that are close up clearer than those that are far away. Moore *et al* (1997). Myopia occurs if the eyeball is too long or the cornea is too curved. As a result of this, the light entering the eyes are not clearly focused. Myopia which is the most common refractive error is seen to be on the rise globally and the World Health Organization predicts that if the current trend continues, half of the world's population will be near sighted by 2050 with up to one fifth at an increased risk of blindness due to complications of severe myopia. This is as a result of the long amount of time spent on indoor activities, on

phones, computers, television and other smart devices. Myopia usually develops during childhood and adolescence, and it usually becomes more stable between the ages of 20 and 40. Moore *et al* (1997). Adults with myopia may notice difficulty reading street signs or signs in a store. Some people may experience blurry vision in dim light, as with nighttime driving, even if they see clearly in daylight. This condition is called night myopia. Children may have difficulty seeing things on white boards or screen projections in the classroom. Younger children might not express difficulty seeing, but they may have the following behaviors that suggest difficulty seeing;



1. Persistently squint

2. Seem unaware of distant objects

3. Blink excessively

4. Rub their eyes frequently

5. Sit close to the television

Figure 1.1.2 Diagram showing emmetropia, myopia and hyperopia

Source ; Kolb *et al* (1995)

CLASSIFICATION OF MYOPIA

1. Simple myopia: This is myopia in an otherwise normal eye, typically less than 4.00 to 6.00 diopters. Dolgin *et al* (2015).

2. Degenerative myopia, also known as malignant, pathological, or progressive myopia. It is a high degree of myopia associated with degenerative in the posterior segments of the eyes. Wong *et al* (2001). It is characterized by marked fundus changes, such as posterior staphyloma, and associated with a high refractive error, subnormal or abnormal visual acuity after correction and changes in visual fields.

3. Pseudo-myopia; It is the blurring of distance vision brought about by over stimulation of the eye accommodation system or ciliary spasm. Gwiazda *et al* (2003). This condition is so named because the patient only appears to have myopia due to inappropriate accommodative response.

4. Near work-induced transient myopia (NITM): it is a short-term myopic far point shift immediately following a sustained near visual task. Some authors argue for a link between NITM and the development of permanent myopia. Ong *et al* (1995)

5. Induced myopia, also known as acquired myopia, results from various medications, increases in glucose levels, nuclear sclerosis, oxygen toxicity (e.g., from diving or from oxygen and hyperbaric therapy) or other anomalous conditions. *Wallman et al* (2004).

6. Form deprivation myopia; This occurs when the eyesight is deprived by limited illumination and vision range, or the eye is modified with artificial lenses or deprived of clear form vision. *Napper et al* (1995). In lower vertebrates, this kind of myopia seems to be reversible within short periods of time. Myopia is often induced this way in various animal models to study the pathogenesis and mechanism of myopia development.

DEGREE OF MYOPIA

This classification is according to Cline *et al* (1997) :

1. Low myopia usually described as myopia between −0.50 and −3.00 diopters.

2. Moderate myopia usually described as myopia between −3.00 and −6.00 diopters.

3. High myopia usually described as myopia of −6.00 diopters or more.

TREATMENT OF MYOPIA

These includes

1. Spectacles; this is corrected with the use of minus spherical powers. It could be in the form of single vision, special order lenses or bifocals. Moore *et al* (1997).

2. Contact lenses; this includes soft contact lenses, rigid gas-permeable lenses amongst others. Moore *et al* (1997).

3. Medications; the use of topical anti muscarinic medications in children under 18 years of age may slow the worsening of myopia.

4. Refractive Surgery; these includes LASIK, LASEK and PHAKIC Intraocular Lenses. Settas *et al* (2012).

1.1.3 ASTIGMATISM

Astigmatism is a common refractive error, where refraction changes in different meridians of the eye. Schiefer *et al* (2016). This occurs when your cornea or lens is curved more steeply in one direction than in another. Vision is distorted or blurry at all distances. The light rays passing through the eye cannot converge at a particular focal point but form focal line. Sutter *et al* (2000). In other words, astigmatism is a condition where parallel rays of light passing from the cornea do not converge to a point focus on the retina. *Wajuihian et al* (2017). To understand astigmatism, it is helpful to think of the normal eye as evenly rounded, like a basketball. With astigmatism, the eye is egg- or oval-shaped like an American football. The steepest and flattest meridians of an eye with astigmatism are called the principal meridians. When the cornea has an irregular shape it is called corneal astigmatism. Mohammadi *et al* (2019). When the shape of the lens is distorted you have lenticular astigmatism. As a result of either type of astigmatism, vision for both near and far objects appear blurry or distorted. The cause of astigmatism is unclear; however, it is believed to be partly related to genetic factors. The underlying mechanism involves an irregular curvature of the cornea and protective reaction changes in the lens of the eye, called lens astigmatism that has the same mechanism as spasm of accommodation. Bamotora *et al* (2017).

The symptoms of astigmatism include;

1. Blurry vision or areas of distorted vision at all distances.

2. Eyestrain especially after prolonged visual task.

3. Headaches especially after reading.

4. Squinting to try to see clearly

5. Eye discomfort or eye irritation

6. Difficulty seeing at night

WITH THE RULE ASTIGMATISM

In this, the two principal meridians are right-angled to each other, with the vertical meridian being steeper than the horizontal. Refai *et al* (2015). This type of astigmatism requires a concave cylinder at 180 ± 20 degrees or a convex cylinder at 90 ± 20. The vertical meridian is usually curved 0.25 D more than the horizontal due to the pressure of the eyelids. Refai *et al* (2015).

AGAINST THE RULE ASTIGMATISM

In this, the horizontal meridian is more curved than the vertical meridian. This will require convex cylindrical correction at 180 ± 20 or a concave cylindrical lens at 90 ± 20. Refai *et al* (2015).

TYPES OF ASTIGMATISM

1. Simple myopic astigmatism; this is a type of astigmatism where there are two line foci point. One is located on the retina and the other in front of the retina. Remol *et al* (2006).

2. Simple hyperopia astigmatism; this is a type of astigmatism where there are two line foci point. One is located on the retina and the other behind the retina. Remol *et al* (2006)

3. Mixed astigmatism; this type of astigmatism where there are two line foci. One is located in front of the retina and the other behind the retina. Xu *et al* (1996).

4. Compound myopic astigmatism; this is a type of astigmatism where there are two line foci. They are both located in front of the retina. Parrey *et al* (2019).

5. Compound hyperopia astigmatism; this is a type of astigmatism where the two line foci are both located behind the retina. Parrey *et al* (2019)

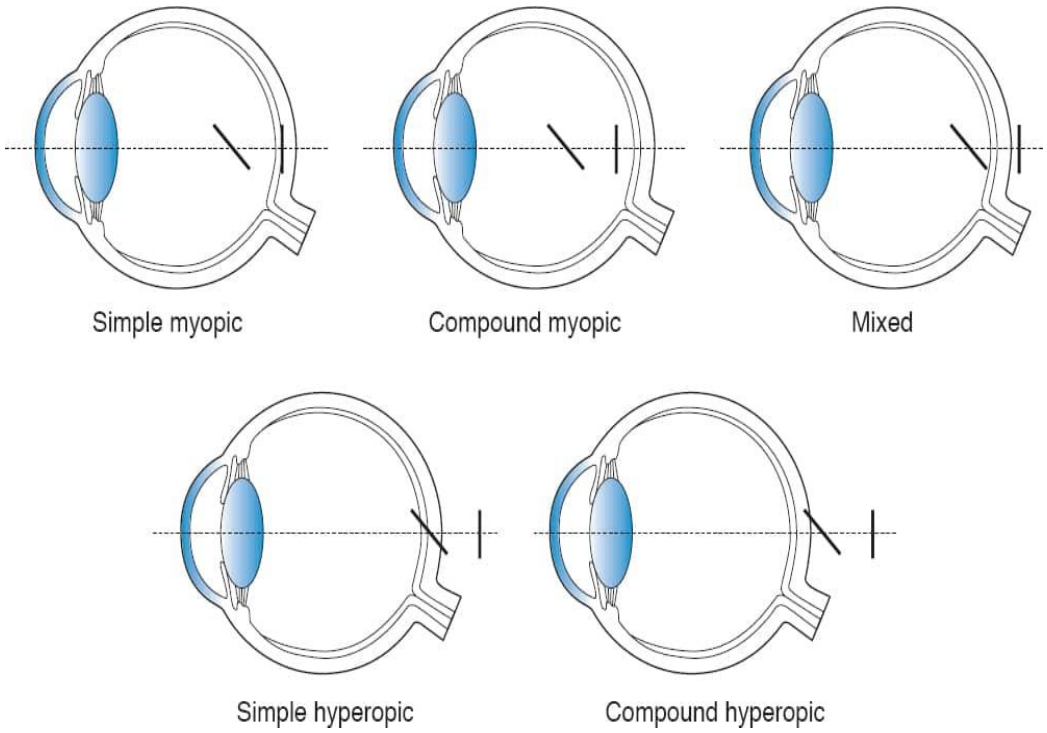


Fig 1.1.3: Diagram depicting different types of Astigmatism.

Source: (Wooley and Charles 2008)

TREATMENT OF ASTIGMATISM

The treatment involves:

1. Spectacles; in addition to spherical lens power, it requires and additional cylindrical lens power to correct the difference between the two principal meridians. Moore *et al* (1997).

2. Contact lenses; this includes soft, extended and rigid gas-permeable contact lenses. Moore *et al* (1997).

3. Refractive Surgery; these includes laser surgery, astigmatic cataract and LASIK. Settas *et al* (2012).

1.1.4 CAUSES OF REFRACTIVE ERRORS

Some factors have led to refractive error, exacerbated and influence their occurrence. Some of these factors include;

1. Genetics: Refractive errors tend to run in families, indicating a genetic predisposition. If your parents or close relatives have refractive errors, you may have a higher risk of developing them too.

2. Eye Shape and Size: The shape and size of the eye play a significant role in refractive errors. Eyes that are too long or too short can result in myopia or hyperopia, respectively.

3. Corneal Shape: The cornea is the clear, front surface of the eye that helps focus light. An irregularly shaped cornea, such as in astigmatism, can lead to blurred vision.

4. Age: As we age, the lens inside the eye becomes less flexible and loses its ability to focus on nearby objects, leading to presbyopia.

5. Environmental Factors: Prolonged near work (e.g., reading or using digital devices for a long period of time) and insufficient outdoor time have been linked to an increased risk of myopia development especially in children.

6. Eye Health: Certain eye conditions or diseases can cause changes in the eye's structure, leading to refractive errors.

7. Systemic Diseases: Some systemic conditions like diabetes can affect the eye's blood vessels and impact the eye's focusing ability.

8. Eye Injuries: Trauma or injury to the eye can alter its shape and affect how light is focused.

9. Medications: Certain medications or drugs can temporarily change the focusing ability of the eyes.

10. Pregnancy: Hormonal changes during pregnancy can sometimes lead to temporary refractive changes.

1.1.5 TREATMENT FOR REFRACTIVE ERRORS

1. Eyeglasses: Prescription eyeglasses are the most common and straightforward way to correct refractive errors. They compensate for the eye's focusing issues by altering the way light enters the eye, providing clear vision.

2. Contact Lenses: Like eyeglasses, contact lenses are used to correct refractive errors. They sit directly on the eye's surface and provide a wider field of view. Contact lenses come in various types, including soft, rigid gas-permeable, and specialized lenses for specific needs.

3. Refractive Surgery: Surgical procedures like LASIK (Laser-Assisted in Situ Keratomileusis) are used to reshape the cornea, thereby changing the way light is focused on the retina. LASIK and other refractive surgeries can correct myopia, hyperopia and astigmatism, reducing or eliminating the need for glasses or contact lenses. Settas *et al* (2012).

4. Ortho-keratology (Ortho-K): This involves using specially designed rigid contact lenses overnight to reshape the cornea temporarily. Settas *et al* (2012). During the day, the cornea retains its new shape, providing clear vision without the need for glasses or contacts. However, this effect is temporary and needs to be maintained with regular use.

5. PHAKIC Intraocular Lenses (IOLS): For people with severe refractive errors who are not suitable candidates for LASIK, PHAKIC IOLS can be implanted in front of the natural lens to correct vision. Settas *et al* (2012).

6. Multifocal IOLS: For presbyopia treatment, multifocal intraocular lenses can be implanted during cataract surgery or as a standalone procedure, enabling clear vision at multiple distances.

1.2 STATEMENT OF PROBLEM

Refractive errors are common vision disorders that can significantly impact the academic performance and overall well-being of secondary school students. There is limited research on the knowledge, attitudes, and practices regarding refractive errors among secondary school students in the Egor Local Government Area. This lack of information can hinders the

development of targeted interventions and awareness campaigns to address and mitigate the impact of refractive errors in this specific population. Therefore, it is essential to investigate the knowledge, attitudes, and practices regarding refractive errors among secondary school students in the Egor Local Government Area in order to identify gaps and develop appropriate strategies for promoting eye health if need be and ensuring timely access to eye care services.

1.3 AIMS AND OBJECTIVES

1.3.1 AIM OF STUDY

The aim of the study is to investigate the knowledge, attitudes and practices of refractive errors amongst secondary school students in Egor local government area.

1.3.2 OBJECTIVES

1. To assess the knowledge among secondary school students in the Egor LGA regarding refractive errors, including their understanding of refractive errors, the common types, causes of refractive errors and available treatment options.

2. To examine the attitudes of secondary school students in the Egor LGA towards refractive errors, including their perception of the importance of seeking professional help.

3. To evaluate the current practices of secondary school students in the Egor LGA concerning refractive errors, including their frequency of experiencing visual disturbances, wearing corrective eyewear if prescribed, and having regular eye examinations.

4. To identify barriers and facilitators influencing the knowledge, attitudes, and practices regarding refractive errors among secondary school students in Egor LGA, such as awareness of and access to eye care services, parental influence and belief.

1.4 RESEARCH QUESTIONS

1. What is the knowledge among secondary school students in the Egor LGA regarding refractive errors, including their understanding of refractive errors, the common types, causes, and available treatment options?

2. What are the attitudes of secondary school students in the Egor LGA towards refractive errors, including their perception of the importance of seeking professional help?

3. What are the current practices of secondary school students in the Egor LGA concerning refractive errors, including the frequency of experiencing visual disturbances, wearing corrective eyewear if prescribed, and having regular eye examinations?

4. Are there barriers and facilitators influencing the knowledge, attitudes, and practices regarding refractive errors among secondary school students in Egor LGA such as awareness of and access to eye care services, parental influence and belief?

1.5 SIGNIFICANCE OF STUDY

1. By understanding the knowledge, attitudes, and practices regarding refractive errors, appropriate interventions such as screening exercises for secondary school students can be developed to address vision problems, leading to improved academic outcomes amongst students.

2. By investigating the knowledge, attitudes, and practices related to refractive errors, awareness and access to eye care services can be improved, leading to better eye health outcomes among secondary school students.

3. The outcome of this study can inform the development of targeted interventions and awareness campaigns aimed at improving knowledge, fostering positive attitudes, and promoting appropriate practices related to refractive errors.

4. The information from this study can help policymakers and stakeholders allocate resources effectively and efficiently to improve access to eye care services, thereby reducing the burden of refractive errors on student's ocular health.

CHAPTER TWO

LITERATURE REVIEW

Assefa *et al* (2021) performed a school-based cross-sectional study was in Gondar city, Northwest Ethiopia. The survey was carried out amongst public school students in selected schools who were available. A total of 390 study participants were included in this study with a 92.4% response rate. The overall proportion of good knowledge and a favorable attitude towards a refractive error were 53.8% and 52.1%, respectively. From the study participants, 38.7%, 41.7%, and 64.1% did not know the definition, the risk factors, and the symptoms of refractive error, respectively. Moreover, about 31.3% of the participants believed that wearing spectacle could damage their eyes, whereas 44.1% of the participants agreed with the need for spectacle correction for young people with RE. From the results proportion of good knowledge and a favorable attitude towards refractive error among public high school students were fair.

Institution based cross-sectional study was conducted on 565 primary school teachers in Gondar city using pretested and structured self-administered questionnaire by Alemayehu *et al* (2018). Of these study participants 55.9% had good knowledge and 57.2% had favorable attitude towards refractive error. Knowledge and attitude of study subjects were low which needs training of teachers about the refractive error.

Population survey of secondary school year 3 students in Nairobi City was carried out by Nyamai *et al* (2020). A total of 11 out of 80 eligible schools were selected and 1390 students

enrolled into the study. Only 539 (39%) of the 1390 students had ever had an eye-checkup. Overall 418 (30.1%) of the students did not know whether they had normal vision or not, and 316 (22.7%) did not know where to seek eye-health services. The students believed, as reported by 526 (37.8%) students, that the most common reason for poor vision was inadequate nutrition. Spectacles were identified as the commonest method of correcting poor vision by 851 (61.2%) students. Of 427(30.7%) students who had been advised to wear spectacles during previous screenings, only 148 (10.5%) of them admitted to using spectacles, The commonest reasons for students failing to wear spectacles to correct poor vision were; fear of being teased and cost as reported by 529 (38.1%) and 488 (35.1%) students respectively. Generally, students had a positive attitude towards spectacles but the myths that spectacles can damage your eyes, lead to dependence, or worsen eyesight were still prevalent. Conclusion: Accessibility and affordability of eye-health services are the major reasons for non-correction of low vision. There is also inadequate knowledge of refractive error as a cause of poor vision. However, attitudes towards spectacle use are generally poor.

A study was conducted in Sao Paulo, Brazil to assess the level of awareness of participants, concerning their own refractive errors and the use of corrective lenses found that 73% of the participants were using corrective lenses for over five years and 59% did not know what type of lenses they used. The most prevalent ametropia from the account of participants, which was later checked was near-sightedness (17%) and 68% did not know what type of ametropia they had. Out of this 68%, 38% reported that they did not know what type of refractive error they had because their doctor had not explained it to them. Another relevant fact raised by the study is that the vast majority of the participants (95%) had their spectacles prescribed by an ophthalmologist: a general practitioner had prescribed 3% and only 2% by an optometrist. The participants of this

study showed a low level of knowledge regarding their refractive error and corrective lenses. Low level of education and lack of interest were the main causes for the high number of uninformed patients.

A cross-sectional survey by Ormsby *et al* (2012) was performed to investigate how knowledge and attitudes influence the access to eye-care services in Takeo Province, Cambodia. It was found that knowledge of eye diseases was highest for eye injury (97.0%). Knowledge regarding red eye was 15.0%, age-related macular degeneration was 12.0%, glaucoma knowledge was 12.0% and diabetic associated eye disease knowledge was 8.0%. Older people were less likely to know about different eye diseases compared with the younger ones and more women compared with men were likely to go for an eye examination when experiencing eye problems. More men than women reported using spectacles with 68.0% of spectacles being from the market, 26.0% from an optical shop, 16.0% from a relative and 10.0% from an eye hospital. Most of the participants (47.0%) reported that they did not know of conditions that could lead to blindness. Cataract treatment was unknown by 48.5% of participants and 19.0% reported surgery as the best treatment to restore blindness. Knowledge about cataract and refractive error was low amongst this population sample. This study reveals that poor knowledge of eye diseases could contribute to a higher occurrence of untreated cataracts and uncorrected refractive error.

A study was performed to assess the psychosocial aspects of refractive errors and the effectiveness of health education in correcting stigmas related to spectacle use in high-school students. Dhoble *et al* (2013) reported that the respondents did not use their prescribed spectacles, as they believed that spectacles were cosmetically unacceptable, feared rejection from the opposite sex and were afraid of being teased by colleagues. Following health education, there were statistically significant changes in the knowledge, attitude and care seeking behavior of

spectacle use. In another cross-sectional school-based study based in Sudan to assess the attitudes and perceptions of high-school students and their parents towards spectacle wear, the results revealed that the students believed that wearing spectacles negatively affected their opportunities for education, employment and marriage. A total 36.4% of the students believed that wearing spectacles could lead to making the eyes weaker or could damage the eyes, resulting in early blindness, and 22.5% of the respondents believed that spectacles were only for older people. Overall, perceptions towards spectacle use differed between genders. Females reported to be more vulnerable to social and psychological distress when wearing spectacles compared with males. The study also showed that parents believed that their children had lost an important asset, the community looked at them as handicapped and their children would be blind in future. These results show that the fear and stigma related to spectacle use was widely experienced amongst students and their parents, particularly amongst females.

A descriptive cross-sectional study was performed on undergraduate students from a Ghanaian university to determine their attitudes and beliefs about spectacle wear by Mireku *et al.* (2017). The results revealed that 75.8% of the student population had heard of refractive error before, 57.4% felt that spectacles could be used to correct refractive error and 61.0% agreed they would wear spectacles if they were prescribed by an eye doctor. The majority of the sample population did not know that spectacles could be used to relieve other forms of ocular discomfort such as headache and tearing. Approximately 54.2% of respondents saw people who wore eyeglasses as visually handicapped, whilst 14.6% believed that eyeglasses were only for old people and 27.8% of the respondents believed that they would be teased if they wore spectacles. Although spectacles are still the most commonly preferred modality for the correction of refractive errors in the world today, acceptance of spectacles for the correction of refractive errors amongst the

undergraduates was not encouraging. The research found that certain misconceptions regarding refractive errors and the methods of correction still lingers in the minds of the educated population, which needs to be addressed.

A study conducted to determine the knowledge, attitude and practice (KAP) towards refractive error amongst high school students was conducted by Naimah *et al* (2016) reported that 39.0% of the students had never had an eye check-up, 30.1% of the students were not aware of whether they had normal vision or not and 22.7% did not know where to seek eye-health services. Many of the students believed that poor vision was because of inadequate nutrition. Approximately 10.5% of students who were previously advised to wear spectacles admitted to actually using them. The reasons cited for students failing to wear spectacles to correct poor vision were the fear of being teased and the cost factor associated with spectacles.8 Accessibility and affordability of eye-health services were the major reasons for non-correction of vision. Inadequate knowledge of refractive error as a cause of poor vision was observed, however overall attitudes towards spectacle use were positive.

A study in Saudi Arabia by Saber *et al* (2013) established that most of the participants who used eyeglasses appreciated the need to use spectacles all the time, as the need was explained to them by their eye doctor. It was also reported in the same study that level of education influenced the level of knowledge of spectacle use in the correction of refractive error. 41% of those with high and medium education knew more on the need to use spectacles while only 20% of the participants with low education knew about the need to use spectacles to correct refractive error.

Ogbu *et al* (2022) carried out a study on knowledge of rural secondary school students in Ebonyi State on spectacle wear for correction of refractive errors. It was a descriptive cross-

sectional questionnaire-based survey of 11 randomly selected rural secondary schools in Ebonyi State. There were 453 participants comprising 192 males and 261 females. Most (60.3%; n=273) of the respondents had good knowledge of spectacle wear for refractive error correction. Knowledge of spectacle wear for correction of refractive error was generally good. However most of the participants had poor knowledge of the use of eye glasses for correction of refractive errors.

Ebeigbe *et al* (2018) carried out a cross sectional study of 500 undergraduates of the University of Benin, Nigeria. Age range was from 18 to 30 years. There were 269 males and 231 females. Semi structured questionnaires were distributed to the participants and collected same day after completion. Two-thirds (68%) of the total population studied had not heard of refractive error. About a third (38%) believed wearing eyeglasses was one of the methods used to correct refractive error. Half (50%) believed they would wear spectacles if prescribed with one by their doctor. Sixty-four percent believed eyeglasses are harmful to the eyes; and 65% did not know that eyeglasses could be used to relieve other forms of ocular discomfort like headache and tearing. Fifty-seven per cent of respondents saw people who wore eyeglasses as visually handicapped, while 60% believed that eyeglasses were meant for old people. Majority of the respondents (56%) believed that they would be teased if they wore glasses. The conclusion was that knowledge of refractive errors and acceptance of glasses for the correction of refractive errors among Nigerian undergraduates was not encouraging.

Resnikoff *et al* (2004) carried out a study on global magnitude of visual impairment caused by uncorrected refractive errors in 2004. The result was as follows in the age group 5–15 years, non-correction of refractive errors is due to several factors: the lack of screening, and the availability and affordability of refractive corrections are the most important. However, cultural

disincentives also play a role, as shown in surveys from countries where routine screening and provision of corrections are free of charge or easily accessible, but compliance remains low. Perhaps one of the most remarkable findings in this study is that even in economically advantaged societies, refractive errors can go undetected or uncorrected in children. In this age group the prevalence of myopia reported in studies that used the same definitions and cut-off levels ranges from 3% to 35%, hypermetropia from 0.4% to 17%, astigmatism from 2.2% to 34% depending on the region and on the urban/rural setting. The estimated number of people aged 50 years and older visually impaired from uncorrected refractive errors is over 94 million, a figure that could be an underestimate, being based in part on studies that used only pinhole in place of full refraction. In countries where the prevalence is very high, important underlying causes are index myopia caused by cataract, uncorrected aphakia and insufficient intra-ocular lens correction. This is particularly true in rural areas.

Ebri *et al* (2019) carried out a study to determine the proportion of students with vision impairment among learners aged 10–18 years. The study site included two of 18 local government areas of the Cross River State in Nigeria, with 23 public and mission secondary schools. The prevalence of vision impairment (presenting visual acuity worse than 6/12) was 7.9%. The prevalence of vision impairment because of refractive error was 7.2%. Astigmatism was the predominant type of refractive error with a prevalence of 4.2%, followed by myopia 1.72% and hyperopia 1.3%. There were statistically significant differences in proportions of female participants who presented with myopic astigmatism (30.8%; $p < 0.012$). Statistically significant difference in proportions was found in older (33.3%; $p < 0.0004$) and male (29.6%; $p < 0.0003$) participants who presented with hyperopic astigmatism compared to younger and female participants, respectively. Myopia accounted for 4.8% and was significantly higher in

female participants. The results from this study concluded that refractive error was the major cause of vision impairment and myopic astigmatism was the predominant type of refractive error among secondary school children in Calabar.

A cross sectional study on screening for refractive error in school children was carried out in Yenagoa Local Government Area of Bayelsa State in Nigeria by Ibeinmo *et al* (2013) in pupils aged between 5-15 years). Visual acuity (VA) for each eye , was assessed outside the classroom at a distance of 6 meters. Those with VA ≤6/9 were presented with a pinhole and the test repeated. Funduscopy was done inside a poorly lit classroom. An improvement of the VA with pinhole was considered refractive error. A total of 1,242 school children consisting of 658 females and 584 males were examined.About 97.7% of pupils had normal VA (VA of 6/6) while 56 eyes had VA ≤ 6/9. Of these 56 eyes, the visual acuity in 49 eyes (87.5%) improved with pinhole. Twenty seven pupils had refractive error, giving a prevalence of 2.2%. Refractive error involved both eyes in 22 pupils (81.5%) and the 8-10 years age range had the highest proportion (40.7%) of cases of refractive error followed by the 9-13 year-old age range (37%). The study concluded that the prevalence of refractive error was 2.2% and most eyes (97.7%) had normal vision.

A study was carried out by Ajaiyeoba *et al* (2006). The aim of the study was to assess the prevalence and identify the causes of blindness and visual impairment in school children of Ilesa-East Local Government Area of Osun State, Nigeria. A total of 1144 school children in primary and secondary schools were selected using a 2-stage random sampling method and examined to determine the prevalence and causes of blindness and visual impairment. A total of 17 (1.48%) children were blind or visually impaired. These comprised of 11 (0.96%) children who were visually impaired and 4 (0.3%) who were severely visually impaired. Only 2 (0.15%) school

children were blind. The causes of visual impairment were refractive error 10 (0.87%) and immature cataract 1 (0.08%), causes of severe visual impairment included corneal opacities 2 (0.2%), amblyopia leading to squint 1 (0.08%) and 1 cataract 1 (0.08%). The conclusion was that refractive error was one of the major cause of visual impairment.

A study conducted by Kotingo *et al* (2014), among secondary school children in South-South Nigeria, highlighted the importance of screening for uncorrected refractive errors and other eye conditions that can cause visual impairment. This topic has been extensively researched in recent years. Scholars suggest that school vision screening is an effective method to identify children who may benefit from vision therapy, such as wearing glasses. The study involved 350 students from two schools, and the results revealed that 28.29% of them had reduced visual acuity, while 71.71% had normal visual acuity in one or both eyes. Among the 350 students, 46.57% had unsatisfactory or poor school performance. However, among those with reduced visual acuity, only 42.42% had such poor academic performance. The study found a significant correlation between visual acuity and academic performance.

Comparably, Kathryn *et al* (2003), conducted a study titled 'Prevalence of undetected ocular conditions in a pilot sample of school children'. The study involved performing LogMAR visual acuity tests and other ocular assessments, including cycloplegic auto refraction and examination of the media and fundus. The prevalence of significant ocular conditions was found to be 28.2%. Out of the sample, 8.4% of children wore glasses, and five of them were referred for a change in their correction. Previously undetected ocular conditions, including ocular pathology and strabismus, were found in 19.8% of the children. The most common reason for referral was uncorrected refractive error, which accounted for 16.8% of cases. It was noted that senior students had a higher prevalence of uncorrected refractive error (25%), suggesting an age-related

shift towards myopia in mean spherical equivalent refraction. Although the focus of the study was not to establish a relationship between oculo-visual problems and academic performance, its results are relevant to this research.

In the same vein, Vincent *et al* (2018) provided an extensive review of the relationship between vision and academic learning in a 2019 publication titled 'Do reduced visual acuity and refractive error affect classroom performance? The review highlighted the long-standing debate on the connection between vision and academic achievement, with various visual factors associated with learning-related problems. These factors include reduced visual acuity, uncorrected refractive error, binocular vision dysfunction, and delayed development of visual information processing skills. Binocular vision dysfunction encompasses anomalies related to accommodation, vergence, and ocular motility, while visual information processing involves perceptual skills such as visual spatial awareness, visual analysis, and visual motor integration.

Rakhi *et al* (2018) carried out a study to assess the prevalence, distribution, and demographic associations of refractive error in an urban population in southern India. Two thousand five hundred twenty-two subjects (2522) of all ages, representative of the Hyderabad population, were examined in the population-based Andhra Pradesh Eye Disease Study of the 2,321 subjects, 663 (28.6%) were ≤15 years of age. Data on objective refraction under cycloplegia were available for 599 (90.3%) subjects. Of these 599 subjects, 352 (58.8%) were between 0 and 9 years, and 295 (49.2%) were females. Myopia in the worse eye was present in 30 subjects, an age-gender–adjusted prevalence of 4.44% (95% CI, 2.14%–6.75%). On applying multiple logistic regression, myopia was significantly more frequent in subjects 10 to 15 years of age (odds ratio, 2.75; 95% CI, and 1.25–6.02). Hyperopia in the worse eye was present in 350 subjects, an age-gender–adjusted prevalence of 59.37% (95% CI, 44.65%–74.09%). Astigmatism

in the worse eye was present in 44 subjects, an age-gender–adjusted prevalence of 6.93% (95% CI, 4.90%–8.97%). No significant associations of hyperopia and astigmatism with age, gender, socioeconomic status, and religion were found on applying multiple logistic regression.

This study was done by Kalikivayi *et al* (1997) to determine the prevalence of visual impairment due to refractive errors and ocular diseases in lower middle class school children of Hyderabad, India. A total of 4,029 children, which included 2,348 males and 1,681 females, in the age range of 3 to 18 years from 9 schools were screened with a detailed ocular examination protocol. Among 3,669 children in whom visual acuity could be recorded, on presentation 115 (3.1%) had visual acuity < 6/18 in the better eye (equivalent to visual impairment), while 41 (1.1%) had visual acuity of 6/60 in the better eye (equivalent to legal blindness) out of which 18 (0.5%) had visual acuity < 6/60 in the better eye (equivalent to economic blindness). Of 115 children who presented with initial visual acuity < 6/18, vision improved to ≥6/18 with refraction in 109 (94.8%). No child was legally or economically blind after refractive correction. Prevalence of hyperopia was 22.6%, myopia 8.6% and astigmatism 10.3%. The prevalence of myopia was significantly higher among children ≥10 years of age (P<0.001). The maximum, mean and median values for myopia were 10.00, 1.35 and 0.75 D in the better eye. For hyperopia these values were 8.50, 0.65 and 0.50 D. The major causes for best corrected visual acuity < 6/9 in the worse eye for 51 (1.4%) children included amblyopia in 40 (1.1%), corneal diseases in 5 (0.1%), cataract in 2 (0.05%) and others in 4 (0.1%). Out of the total, 30 (0.7%) children had strabismus. These data support the assumption that vision screening of school children in developing countries could be useful in detecting correctable causes of decreased vision, especially refractive errors, and in minimizing long term permanent visual disability Murthy et al.

Ezegwui *et al* (2021) carried out a study in Enugu south east on to determine the prevalence and cause of refractive errors in school children. A total of 1167 children were examined. The mean age (standard deviation) was 10.58 ± 3.0 years. Females were 653 (54.4%) of the study population. The uncorrected, presenting and best-corrected visual acuity of ≤20/40 (6/12) in the better eye of the children in this study were 3.6%. 3.5% and 0.4%. Among the children that had visual impairment, refractive error accounted for 33.3% of reduced vision while the overall prevalence of refractive error was 2.1%. Prevalence of myopia was 1.9% and hyperopia, 0.1%. The most prevalent astigmatism was ≤0.75 dioptre cylinder. The study concluded that prevalence of refractive error in this study is low, with myopia being more common.

CHAPTER THREE

METHODOLOGY

3.1 STUDY DESIGN

This study is a cross sectional study design.

3.2 STUDY AREA

This study was conducted in secondary schools located within Egor Local Government Area of Edo state, Nigeria.

3.3 SAMPLING TECHNIQUE

A stratified random sampling method was employed for this study. Each class represented a stratum.

3.4 SAMPLE POPULATION

The study population was drawn from secondary school students within SS1 - SS3 located in Egor LGA who was willing to participate in the study.

3.4.1 STUDY DURATION

The study was carried out within three months from June to August.

3.4.2 SAMPLE SIZE

A sample size of 400 secondary school students were used.

3.5 STUDY MATERIAL

A research questionnaire was employed for this study. This was adapted from the study of Ogbu et al (2022).

3.5.1 INCLUSION CRITERIA

1. Secondary school students in Egor LGA.

2. Secondary school students in Egor LGA who are willing to participate in the study.

3.5.2 EXCLUSION CRITERIA

1. Secondary school students not in Egor LGA.

2. Secondary school students in Egor LGA who do not want to participate in the study.

3.6 DESCRIPTION OF PROCEDURE

The study employed a pretested semi-structured questionnaire as its primary data collection tool. The questionnaire comprised four distinct sections. The initial section focused on gathering participants' demographic characteristics, including factors such as age, gender, and academic class. The subsequent section delved into assessing participants' knowledge regarding refractive errors. This segment addressed queries about their familiarity with refractive errors, their various types, and the accessibility of eye care services within their localities.

The third section of the questionnaire explored participants' attitudes towards refractive errors. It included inquiries about their inclination to consult eye care professionals when confronted with visual discomfort. Lastly, the fourth section was devoted to understanding participants' practices concerning refractive errors including if they wear corrective aids if prescribed and how often they go for check up.

Two secondary school was used for the purpose of this study. The first was the Technical college (a public school) while the second was Calvary crown academy (a private school) both in Egor LGA. Approval was got from the principals of both schools before the research questionnaire was administered. The purpose of the questionnaire was first explained to the students in each class that was visited and those who were willing to participate in the survey were selected and the questionnaire distributed to them. The research questionnaire was distributed per class and the questionnaire was also collected the same day after the students filled it. This was done in a span of three weeks.

3.7 STATISTICAL ANALYSIS

The data collected were analyzed using the statistical package for social sciences (SPSS) version 22.0. Descriptive statistics (frequencies, percentages, mean and standard deviation) were used to

summarize the variables. Continuous variables were expressed as the mean ± standard deviation for those that displayed normal distribution.

3.8 ETHICAL CONSIDERATIONS

Ethical approval was obtained from the Departmental Research and Ethics Committee of the Department of Optometry, University of Benin. This study adhered to the tenets of the Declaration of Helsinki.

Informed consent was sought from each of the participants and only consenting participants was participated for the study.

Personal details such as name was not collected to maintain anonymity of the participants.

CHAPTER FOUR

4.0: RESULTS

Table 4.1 showing Age Distribution of Respondents

AGE	FREQUENCY	PERCENT (%)
13	8	2.0
14	28	7.0
15	117	29.3
16	90	22.5
17	109	27.3

18	29	7.2
19	19	4.8

Mean Age: 16.07± 1.320

The table 4.1 shows the age groups range from 13 to 19 years old, with the highest frequency of respondents being 15 years old (117 respondents or 29.3%). The second highest frequency is 17 years old (109 respondents or 27.3%). The least frequent age group is 13 years old (8 respondents or 2.0%).

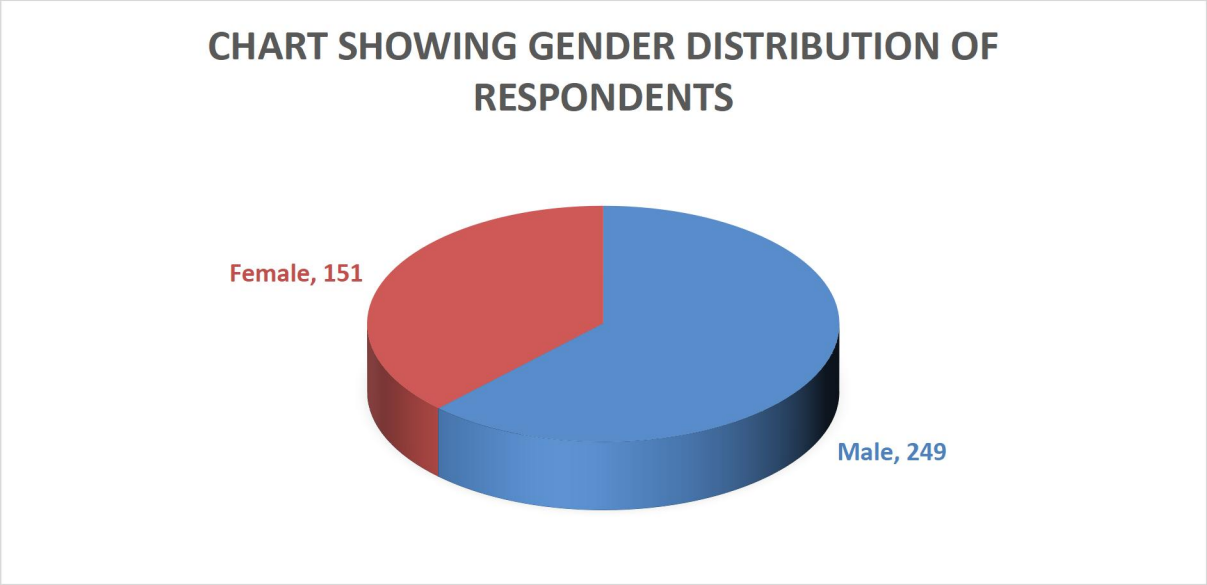


Figure 4.1 : Diagram showing gender distribution where females were 151 and males 249

Table 4.2 showing class distribution of respondents

CLASS	FREQUENCY	PERCENT (%)
1	147	36.8
2	247	61.8
3	6	1.5

According to the table 4.2, the majority of the respondents are from Class 2, with 247 respondents or 61.8%. Class 1 has 147 respondents or 36.8%, while Class 3 has only 6 respondents or 1.5%.

Table 4.3 showing Respondents' Knowledge about Refractive Errors

VARIABLE	FREQUENCY	PERCENT
Do you understand what refractive errors are?		
Yes	209	52.3
No	177	44.3
No response	14	3.5
Do you know the common types of refractive errors?*		
Myopia	72	18.0
Hyperopia	56	14.0
Astigmatism	118	29.5
None	103	25.8
All	32	8.0
Are you aware that refractive errors can affect academic performance?		
Yes	259	64.8
No	119	29.8
I don't know	22	5.5
Do you know that refractive errors can be corrected with eyeglasses or contact lenses?		
Yes	267	66.8
No	104	26.0

I don't know	29	7.2
Are you familiar with the importance of regular eye examinations?		
Yes	207	51.7
No	183	45.8
I don't know	10	2.5
Do you know about available eye care services in your area?		
Yes	170	42.5
No	222	55.5
I don't know	8	2.0

* Multiple choice

The table 4.3 is divided into several sections, each with a different question related to knowledge about refractive errors.

Table 4.4 showing Respondents' Attitudes to Refractive Errors

Variable	Knowledge					Mean	SD
	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree		
It is important to seek professional help if I experience visual disturbances	51(12.8	27(6.8)	28(7.0)	118(29.5)	176(44.0)	3.85	1.382
I believe that wearing eyeglasses or contact lenses can improve my vision	74(18.5)	40(10.0)	52(13.0)	102(25.5)	132(33.0)	3.44	1.491
I think regular eye examinations are necessary to maintain good eye health	52(13.0)	22(5.5)	26(6.5)	111(27.8)	189(47.3)	3.91	1.387
I am comfortable discussing my vision problems with my parents/guardians	56(14.0)	21(5.3)	42(10.5)	114(28.5)	165(41.3)	3.78	1.398
I believe that refractive errors can negatively impact my academic performance	66(16.5)	34(8.5)	42(10.5)	119(29.8)	137(34.3)	3.57	1.451

Table 4.4 is broken down into different sections, each with questions pertaining to the attitudes of the participants regarding refractive errors.

Table 4.5 Showing Respondents' Practices towards Refractive Errors

VARIABLE	FREQUENCY	PERCENT
Have you ever experienced any visual disturbances?		
Yes	172	43.0
No	224	56.0
Have you sought professional help (e.g. visited an eye doctor, optometrist) for any visual disturbances?		
Yes	97	24.3
No	297	74.3
N/A	6	1.5
Were you ever prescribed with glasses or contact lens?		
Yes	64	16.0
No	72	18.0
N/A	264	66.0
If yes, do you wear your glasses or contact lens?		
Yes	46	11.5
No	18	4.5
N/A	336	84.0
If no, why don't you wear them?*		
It does not make any difference.	6	1.5
I feel headaches.	6	1.5
I don't like the way it makes me appear.	12	3
I lost the glasses	3	0.8

My parents would not want me to wear them.	6	1.5
I think they make my eyes go bad	6	1.5
Do you have regular examinations (at least once a year) to monitor your vision?		
Yes	70	17.5
No	328	82.0
No response	2	0.5

Table 4.5 is broken down into different sections, each with the practices of the respondents towards refractive errors.

CHAPTER FIVE

5.0 DISCUSSION

Refractive error is a common eye disorder in Nigeria and is one of the most significant causes of visual impairment and second foremost cause of blindness following cataract. Dandona *et al* (2001) When left uncorrected, refractive errors can hamper school performance, reduce employability and productivity, and generally impair quality of life. Adeoye *et al* (2007).

The table 4.1 shows the age groups range from 13 to 19 years old, with the highest frequency of respondents being 15 years old 117 respondents (29.3%). The second highest frequency is 17 years old 109 respondents (27.3%). The least frequent age group is 13 years old 8 respondents (2.0%). The table also shows that 28(7%) were aged 14years, 90(22.5%) were aged 16years, 29 (7.2%) were aged 18years and 19(4.8%) were aged 19years. The mean age for both males and females was 16.07 ± 1.320. This is above the expected age for secondary school students in Nigeria public schools. The mean age of the respondents in the study of Ebeigbe *et al* (2018) was 14.6 ±1.8 years with majority of them females (57.5%). This was similar to a study done in Kebbi State where mean age of respondents was found to be 15.5 years (±2.12 standard deviation), however male (50.8%) and female (49.2%) were almost on equal distribution.

From the pie chart we can deduce that majority if the students who participated in this study were males. The sample consisted of 400 populations, (37.8%) were females n = 151 and (62.3%) were males n = 249.

According to the table 4.2, the majority of the respondents are from Class 2, with 247 respondents or 61.8%. Class 1 has 147 respondents or 36.8%, while Class 3 has only 6 respondents or 1.5%.

The table 4.3 is divided into six sections, each with a different question related to refractive errors. The first section asks whether respondents understand what refractive errors are, and the majority of respondents 209 or (52.3%) answered "YES". This is an important finding because it suggests that more than half of the respondents have a basic understanding of what refractive errors are. This is similar to the study of Assefa *et a*l (2021) were those who has good knowledge were 53.8% and that of Alemayehu *et al* (2018) were 55.9% of the study participants had good knowledge of refractive errors both of which was conducted in Gondar city. A study conducted in Ghana by Mireku *et al* (2017) showed that those who had good knowledge of refractive error was 75.8% which is higher than that of this study and the reason could be because the study by Mireku *et al* (2017) carried out on undergraduate students while than of this study was on secondary school students. Those who had no knowledge of refractive error was 44.3%, it also means that almost half of the respondents do not have a clear understanding of this concept. This value is lower than the study done by Ebeigbe *et al* (2018) were the individuals who have no good knowledge of refractive errors were 68%. From this study, those who were neutral was 3.5%.

The second section asks whether respondents know the common types of refractive errors, and the majority of respondents (118 or 29.5%) answered "Astigmatism". Other common types of refractive errors mentioned were "Myopia" (72 or 18.0%) and "Hyperopia" (56 or 14.0%). This findings is lower than that of a study that was done in Gondar by Assefa *et al* (2021) were the knowledge about myopia was 31%. This finding is important because it shows that many respondents are aware of the different types of refractive errors, which can help in identifying and addressing specific eye care needs.

The third section asks whether respondents are aware that refractive errors can affect academic performance, and the majority of respondents (259 or 64.8%) answered "Yes". This is higher than that of the study done in Gondar city by Alemayehu et al (2018) where only 40% believed that uncorrected refractive error can affect academic performance. 119(29.8%) of the respondents answered "No". This finding is significant because it highlights the potential impact of refractive errors on academic performance, which can have long-term consequences for an individual's education and career prospects.

The fourth section asks whether respondents know that refractive errors can be corrected with eyeglasses or contact lenses, and the majority of respondents (267 or 66.8%) answered "Yes". This findings is similar to that of Ogbu *et al* (2022) were 60.3% believed that wearing spectacles could correct their refractive errors. The findings is also slightly higher than that of Mireku *et al* (2017) were 57.4% believed that spectacles could be used for correction of refractive errors and this is way higher than the study performed by Ebeigbe *et al* (2018) were only 38% believed that spectacles could correct their refractive error. From this section, 29(7.2%) of the respondents stayed neutral and 104(26%) believed that refractive errors cannot be corrected with eyeglasses or contact lenses.

This finding is important because it suggests that many respondents are aware of the available treatment options for refractive errors, which can help in promoting early detection and intervention.

The fifth section asks whether respondents are familiar with the importance of regular eye examinations, and the majority of respondents 207 (51.7%) answered "YES", 183 (45.6%) believed that there was no importance on routine eye check this percentage is close to half of the

respondents while 10(2.5%) were neutral. This finding is significant because it highlights the importance of regular eye examinations in maintaining good eye health and preventing vision problems.

The final section asks whether respondents know about available eye care services in their area, and the majority of respondents answered "NO" 225 (55.5%) while 170 (42.5%) answered yes. This findings was higher than those in the study by Naimah et al (2017). 22.7% did not know where about eye care facilities in their environment. From this section, 8(2%) were neutral. This finding is important because it suggests that many respondents are aware of the available eye care services in their area, which can help in promoting access to eye care services and reducing barriers to eye care.

The table 4.4 represents the attitudes of the respondents towards refractive errors.

The first section asks whether respondents think it is important to seek professional help if they experience visual disturbances, 12.8% strongly disagreed, 6.8% disagree, 7% were neutral, 29.5% agree and majority of the participants 44% STRONGLY AGREED . This finding is significant because it suggests that many respondents recognize the importance of seeking professional help if they experience visual disturbances, which can help in promoting early detection and intervention.

The second section asks whether respondents think it is important to wear corrective eyewear if they have refractive errors, and the majority of respondents 132 (33%) answered "STRONGLY AGREED", 18.5% strongly disagreed, 10% disagreed, 13% were neutral, 25.5% agreed. This finding is important because it suggests that many respondents recognize the importance of using

corrective eyewear to correct refractive errors, which can help in improving their vision and quality of life.

The third section asks whether respondents think regular eye examinations are necessary to maintain good eye health, and the majority of respondents 47.3% answered "strongly agreed ", 13% strongly disagreed, 5.5% disagreed, 6.5% were neutral, 27.8% agreed.

The fourth section asks whether respondents are comfortable discussing their vision problems with their parents or guardians, and the majority of respondents 165 (41.3%) answered "STRONGLY AGREED", 14% strongly disagreed, 5.3% disagreed, 10.5% were neutral, 28.5 % agreed. This finding is important because it suggests that many respondents feel comfortable discussing their vision problems with their parents or guardians, which can help in promoting early detection and intervention.

The final section asks whether respondents believe that refractive errors can negatively impact their academic performance, majority of the respondents 34.3% ticked "STRONGLY AGREED", 29.8% agreed, 10.5% were neutral, 8.5% disagreed while 16.5% strongly disagreed. This finding is significant because it highlights what the respondents think about the potential impact of refractive errors on academic performance, which can have long-term consequences for an individual's education and career prospects.

From table 4.5, the first section of the table asks whether respondents have ever experienced any visual disturbances, and the majority of respondents 224 (56%) answered "No" while 43% answered yes. This finding is significant because it suggests that a significant proportion of respondents have not experienced any visual disturbances, which can gave an insight for the prevalence and burden of refractive errors in the population.

The second section asks whether respondents have sought professional help for any visual disturbances, and the majority of respondents 74.3% answered "No" while 24.3% answered yes. This finding is important because it highlights the potential underutilization of eye care services among young people, which can have implications for the early detection and intervention of refractive errors.

The third section asks whether respondents have ever been prescribed with glasses or contact lenses, and the majority of respondents 66% answered "Not applicable" while 16% answered yes and 18% answered no. This finding is significant because it suggests that a significant proportion of respondents have not been prescribed with corrective eyewear, which can have implications for the accessibility and affordability of eye care services and the percentage of those who do not wear their correction is slightly higher than that of those who wear theirs.

The fourth section asks whether respondents who have been prescribed with glasses or contact lenses wear them, and the majority of respondents or 84% answered "Not applicable", 11.5% wear their prescribed spectacles while 4.5% of the respondents do not wear theirs. This findings shows that most of the population who have been prescribed with spectacles wear their correction and also a lot of the respondents have not been prescribed with spectacle wear.

The fifth section asks respondents who do not wear their prescribed corrective eyewear why they do not wear them, and the majority of respondents 3% answered "I do not like the way it (the glasses) makes me appear", 1.5% felt it did not make any difference, 1.5% said they had headaches with it, 0.8% lost their glasses, 1.5% said their parents would not want them to wear and 1.5% said it made their eyes go bad. This finding is significant because it highlights the potential barriers to treatment adherence.

From the final section on those who have regular eye examinations, 17.5% said they had regular eye examination to monitor their vision while majority of the respondents 82% do not have regular examination to monitor their vision. This finding is way higher than the findings by Naimah *et al* (2017) where 39% of the students had never had an eye checkup and the reason for this could be due to lack of awareness of eye care facilities in Egor LGA.

CHAPTER SIX

6.0 CONCLUSION

The study findings reveal that while the knowledge about refractive error was fair a notable portion still lacks awareness regarding these vision issues, their impact on academic performance, and the necessity of regular eye check-ups. Regarding attitudes, most respondents have a positive inclination towards seeking professional assistance for visual problems and recognize the importance of regular eye exams. However, a significant segment of respondents displays negative attitudes towards wearing corrective eyewear. Practice towards refractive error was poor as the results indicate that most respondents have not encountered visual disturbances, sought professional help, or received prescriptions for corrective eyewear. Among those with prescriptions, a substantial proportion does not use them.

6.1 RECOMMENDATIONS

1. Regular awareness campaigns at the grassroots level, such as in schools, churches, and community gatherings, to educate people about the importance of consulting eye care professionals when needed should be carried out.

2. Adequate informations about available eye care facilities in Egor Local Government Area should be provided via ocular awareness programs.

3. Routine based vision screening programs should be carried out in secondary schools to enhance visual health awareness.

4. Advocating for visits to government officials and policymakers to integrate refractive services into school eye health programs is also advised.

REFERENCES

Abdull, M. M., Sivasubramaniam, S., Murthy, G. V., Gilbert, C., Abubakar, T., and Ezelum, C. (2009). Nigeria National Blindness and Visual Impairment Study Group. Causes of blindness and visual impairment in Nigeria: the Nigeria national blindness and visual impairment survey. *Investigative ophthalmology and visual science*, 50(9), 4114-4120.

Adeoye A and Omotoye O. (2007). Eye disease in Wesley Guild Hospital, Ilesa, Nigeria. *African Journal Medical Science* ;36(4):377380.

Ajaiyeoba, A. I., Isawumi, M. A., Adeoye, A. O., and Oluleye, T. S. (2006). Prevalence and causes of eye diseases amongst students in South-Western Nigeria. *Annals of African Medicine*, 5, 197-203.

Alemayehu, A. M., Belete, G. T., and Adimassu, N. F. (2018). Knowledge, attitude and associated factors among primary school teachers regarding refractive error in school children in Gondar city, Northwest Ethiopia. 13(2).

Assefa, N. L., Tegegn, M. T., and Wolde, S. Y. (2021). Knowledge and Attitude of Refractive Error among Public High School Students in Gondar City. *Clinical Optometry*, 13, 201-208.

Bamotra, R. K., Meenakshi, Kesarwani, P. C., and Qayum, S. (2017). Simultaneous Bilateral Anterior and Posterior Lenticonus in Alport Syndrome. *Journal Clinical Diagnosis Respondents*, 11(8).

Castagno, V. D., Fassa, A. G., Vilela, M. A., Meucci, R. D., and Resende, D. P. (2015). Moderate hyperopia prevalence and associated factors among elementary school students. Cien Saude Colet, 20(5), 1449-1458.

Cline D, Hofstetter HW and Griffin JR (1997). Dictionary of Visual Science (4th ed.). Boston: Butterworth-Heinemann.

Dandona R and Dandona L. (2001). Refractive error blindness. Bull World Health Organ. 79(3):237243.

Dhoble, P., Agarwal, R., Patel, C., Anand, G., Sharma, J., and Sabde, Y. (2013). Study to assess the psychosocial aspects of refractive errors and effectiveness of health education in correcting stigmas related to spectacle use in high-school students of rural India. *International Journal Medical Science Publications Health*, 2(3), 716.

Dolgin E. (2015). The myopia boom. Nature, 519(7543):2768.

Ebeigbe, J. A., Kio, F., and Okafor, L. I. (2013). Attitude and Beliefs of Nigerian Undergraduates to Spectacle Wear. *Ghana Medical Journal*, 47(2), 70–73.

Ebri, A. E., Govender, P., and Naidoo, K. S. (2019). Prevalence of vision impairment and refractive error in school learners in Calabar, Nigeria. *African Vision Eye Health*, 78(1), 18.

Ezegwui, I. R., Oguego, N. C., Okoye, O. I., Maduka-Okafor, F. C., Udeh, N., Aghaji, A. E., and Okoye, O. (2021).

Fischer, A. J., Morgan, I. G., and Stell, W. K. (1999). Colchicine causes excessive ocular growth and myopia in chicks. *Vision Respondents*, 39(4), 685-697.

Foster P.J., and Jiang Y.(2014). *Epidemiology of myopia*. Eye (London). ;28(2):202–8.

Grosvenor, T. (1978). Etiology of astigmatism. *American Journal Optometry Physiological Optics*, 55(3), 214-218.

Gwiazda Jane E, Leslie Hyman, Thomas T. Norton, Mohamed E. M. Hussein, Wendy Marsh-Tootle, Ruth Manny, Ying Wang., and Donald Everett. (2004). Accommodation and

Related Risk Factors Associated with Myopia Progression and Their Interaction with Treatment in COMET Children. *Investigative Ophthalmology Vision Science*. 45(7):2143-2151.

Hassan Hashemi, Akbar Fotouhi, Abbasali Yekta, Reza Pakzad, Hadi Ostadimoghaddam and Mehdi Khabazkhoob. (2018). *Journal Current Ophthalmology.* Mar; 30(1): 3–22. Published online 2017 Sep 27.

Hashemi, H., Fotouhi, A., and Yekta, A. (2018). Global and regional estimates of prevalence of refractive errors: Systematic review and meta-analysis. *Journal Current Ophthalmology*, 30(1), 3-22.

Hu YY, Wu JF, Lu TL, Wu H, Sun W, Wang XR, Bi HS., and Jonas JB. (2015). Effect of cycloplegia on the refractive status of children: *the Shandong children eye study*. 10(2).

Ibeinmo Opubiri. (2013). Screening for refractive error among primary school children in Bayelsa state, Nigeria. *Pan African Medical Journal*, 14, 74.

Lowth and Mary. (2016). "Long Sight (Hypermetropia)". Patient. Patient Platform Limited. Archived from the original on 03-03.

Kalikivayi, V., Naduvilath, T. J., Bansal, A. K., and Dandona, L. (1997). Visual impairment in school children in Southern India. *Indian Journal of Ophthalmology*, 45, 129-134.

Kathryn & Hodell, David & Becquey, Sabine, Gersonde, Rainer Teitler., and Winston. (2010). Determination of Antarctic Ice Sheet stability over the last 500 ka through a study of iceberg-rafted debris. *Paleoceanography*. 25. 10.

Kempes, C., Wang L., and Amend, J. (2016). Evolutionary tradeoffs in cellular composition across diverse bacteria. ISME J, 10, 2145-2157.

Khurana, AK (2008). "Errors of refraction and binocular optical defects". *Theory and practice of optics and refraction* (2nd ed.). Elsevier. pp. 62–66.

Kolb H, Fernandez E and Nelson R. (1995). editors. Webvision: The Organization of the Retina and Visual System [Internet]. Salt Lake City (UT): University of Utah Health Sciences Center.

Mireku Felix A and Ebenezer E. (2017). Attitudes and beliefs of undergraduate students to spectacle wear. *Optometry Open Access*, 2(1), 123.

Mohammadi SF, Khorrami-Nejad M., and Hamidirad M. (2019). Posterior corneal astigmatism: a review article. *Clinical Optometry* . 11:85-96.

Moore BD, Augsburger AR, Ciner EB, Cockrell DA, Fern KD., and Harb E. (1997). Optometric Clinical Practice Guideline: Care of the Patient with Hyperopia. St. Louis, MO: *American Optometric Association*;1-29.

Moore, Bruce D.; Augsburger, Arol R.; Ciner, Elise B.; Cockrell, David A.; Fern, Karen D., Harb and Elise. (2008). "Optometric Clinical Practice Guideline: Care of the Patient with Hyperopia" (PDF). *American Optometric Association*. pp. 2–3, 10–11.

Murthy GVS, Gupta SK and Ellwein LB. (2002). Refractive error in children in an urban population in New Delhi. *Investigative Ophthalmology Vision Science*. ;43(3):623631.

Naidoo KS, Raghunandan A and Mashige KP. (2003). Refractive error and visual impairment in African Children in South Africa. *Investigative Ophthalmology Vision Sciences*.;44(9).

Naimah Ebrahim Khan, Misbah Mahomedy, Lungelo Mngadi, Zaakirah Moola, Zahraa Moosa, Gcinile Ndwandwe and Ayanda S.M. Ntombela. (2017).

Napper G.A., Brennan N.A., Barrington M., Squires M.A., Vessey G.A and Vingrys A.J. (1995). The duration of normal visual exposure necessary to prevent form deprivation myopia in chicks. *Vision Respondents*.35(9):133744.

Ngozika E. Ezinne, Chukwuebuka S. Ojukwu, Kingsley K. Ekemiri, Obinna F. Akano, Edgar Ekure and Uchechukwu Levi Osuagwu. (2018).

Nwobi, E., Umeh-Aneji, C., Onwasigwe, E. N and Umeh, R. E. (2021). Prevalence of refractive errors and visual impairment in school children in Enugu South-East Nigeria. *Nigerian journal of clinical practice*, 24(3), 380386.

Nyamai, K., Kanyata, D., Njambi, L., and Njuguna, M. (2020). Knowledge, Attitude and Practice on Refractive Error among Students Attending Public High Schools in Nairobi County. *The Journal of Ophthalmology of Eastern, Central and Southern Africa.* 78.(5).

Ogbu, N., Arinze, O and Okoloagu, N. (2022). The knowledge of rural secondary school students on spectacle wear for correction of refractive errors: a south east Nigerian study. *Advanced Ophthalmology Vision System*, 12(1), 23-28.

Ormsby, G. M., Arnold, A. L., Busija, L., Morchen, M., Bonn, T. S., and Keefe, J. E. (2012). The Impact of knowledge and attitudes on access to eye-care services in Cambodia. *Asia Pacific Journal Ophthalmology*, 6(1), 331-335.

Ong E and Ciuffreda KJ (1995). "Nearwork-induced transient myopia: a critical review".Documenta Ophthalmologica. *Advances in Ophthalmology.* 91 (1): 57–85.

Ovenseri-Ogbomo, G. O and Omuemu, V. O. (2010). Prevalence of refractive error among school children in the Cape Coast Municipality, *Ghana Clinical Optometry.* 2010;2:5966.

Parrey MUR and Elmorsy E.(2019). Prevalence and pattern of refractive errors among Saudi adults. *Pakefield Journal Medical Science*. Mar-Apr;35(2):394-398.

Pascolini, D and Mariotti, S. P. (2012). Global estimates of visual impairment: *The British journal of ophthalmology*, 96(5), 614-618.

Rakhi Trivedi, Helen W. Bland, Valamar Reagon and Jazzmin Williams. (2018). "Child Public Health." Oxford Bibliographies in Childhood Studies, Heather Montgomer.

Refai, R and Ali, A. (2015). Easy-Care Properties of Simultaneously Grafted and Crosslinked Cotton Fabrics.

Remón L, Tornel M and Furlan WD. (2006). Visual acuity in simple myopic astigmatism: influence of cylinder axis. *Optometry Vision Science.* May;83(5):311-5.

Resnikoff, S., Pascolini, D., Etya'ale, D., Kocur, I., Pararajasegaram, R and Pokharel, G. P. (2004). Global data on visual impairment in the year. *Bull World Health Organ*, 82, 844-851.

Resnikoff, S., Pascolini, D., Mariotti, S. P and Pokharel, G. P. (2008). Global magnitude of visual impairment caused by uncorrected refractive errors. *Bull World Health Organ,* 86(1), 63-70.

Riordan-Eva P, Cunningham, Jr. ET and Vaughan. (2011). *Asbury's General Ophthalmology*. 18th ed. New York, NY: McGraw-Hill; :396-411.

Schiefer, U., Kraus, C., Baumbach, P., Ungewiß, J and Michels, R. (2016). Refractive errors. *Dtsch Arztebl International*. 89(4): 345.

Settas, George; Settas, Clare; Minos, Evangelos; Yeung and Ian Yl. (2012) "Photorefractive keratectomy (PRK) versus laser assisted in situ keratomileusis (LASIK) for hyperopia correction". *Cochrane Database of Systematic Reviews.* 6 (6): CD007112.

Strang NC, Schmid KL and Carney LG. (1998). Hyperopia is predominantly axial in nature. *Current Eye Respondents*. Apr;17(4):380-3.

Sutter, E., Foster, A and Francis, V. (2000). *Optics & refraction. Community Eye Health*, 13(33), 8.

Thulasiraj, R. D., Nirmalan, P. K., Ramakrishnan, R., Krishnadas, R., Manimekalai, T. K., Baburajan, N. P., Katz, J., Tielsch, J. M and Robin, A. L. (2003). Blindness and vision impairment in a rural south Indian population: *the Aravind Comprehensive Eye Survey Ophthalmology,* 110(8), 14911498.

Vincent, C., Taylor-Adams, S and Stanhope, N.(1998). Framework for analysing risk and safety in clinical medicine. (*Clinical research education*.), 316(7138), 1154–1157.

Wajuihian, S. O. (2017). Characteristics of astigmatism in Black South African high school children. *African Health Science,* 17(4), 1160-1171.

Wallman J and Winawer J. (2004). Homeostasis of eye growth and the question of myopia. 43(4):44768.

Wedner, S., Masanja, H and Bowman, R. (2008). Two strategies for correcting refractive errors in school students in Tanzania: randomized comparison, with implications for screening programmes. *British Journal Ophthalmology*, 92(1), 192-194.

Wong TY, Klein BE, Klein R, Tomany SC and Lee KE. (2001). Refractive errors and incident cataracts: the Beaver Dam Eye Study. *Investigative Ophthalmology Vision Science.* Jun;42(7):1449-54.

Wooley, Charles, Sparks and Elizabeth. (2008). *Aorta–Aortic Valve Interrelationships.* 10.9.

World Health Organization. (2011). Global initiative for the elimination of avoidable blindness: Action plan 2006-2011. Geneva: *World Health Organization*.

Wu JF, Bi HS and Wang SM. (2013). Refractive error, visual acuity and causes of vision loss in children in Shandong, China. *The Shandong children eye study*. Barnes S, editor.

Xu, G., Xu, B and Zhou, J. (1996). A clinical report on mixed astigmatism. Zhonghua Yan Ke Za Zhi, 32(2), 126-129. PMID: 9051959.

Yanoff, M and Duker, J. S. (2019). *Ophthalmology*. Edinburgh, Scotland. Mosby Elsevier.

Zhang, X and Qu, X. (2019). Genetic factors in myopia*. Investigative Myopia* (pp. 11-31).

APPENDIX

QUESTIONNAIRE

RESEARCH PROJECT QUESTIONNAIRE; INVESTIGATING THE KNOWLEDGE, ATTITUDES AND PRACTICES REGARDING REFRACTIVE ERRORS OF SECONDARY SCHOOL STUDENTS IN EGOR LOCAL GOVERNMENT AREA.

Dear participant, my name is Chineye Vivian Nwankwo, a 600l student Optometry Department, University of Benin.

Thank you for taking the time to participate in this research project, which is part of my final year Optometry research project at UNIBEN. Your valuable input will contribute to our understanding of the factors affecting school-based vision screening programmes in Egor LGA.

Please carefully read the instructions for each question and select the option(s) that best apply to you by ticking the appropriate box or choosing the most relevant answer.

Section 1: Demographic Information

Please provide the following information:

Age: _____ years

Gender: Male / Female / Other

Grade/Class: _____

Section 2: Knowledge about refractive error

Do you understand what refractive errors (visual problems) are? Yes ( ) No ( )

Do you know the common types of refractive errors? Pls tick the ones you know: A. Myopia ( )

B. Hyperopia ( ) C. Astigmatism ( ) D. None ( ) E. All ( )

Are you aware that refractive errors can affect academic performance? Yes ( ) No ( )

Do you know that refractive errors can be corrected with eyeglasses or contact lenses? Yes ( ) No ( )

Are you familiar with the importance of regular eye examinations? Yes ( ) No ( )

Do you know about available eye care services in your area? Yes ( ) No ( )

Section 3: Attitudes to refractive errors

For the following items, we ask you to mark only one number that corresponds to your answer, as follows:

1: Strongly disagree; 2: I disagree; 3: Neutral; 4: Agree; 5: Strongly Agree

It is important to seek professional help if I experience visual disturbances. 1( ) 2( ) 3( ) 4( ) 5( )

I believe that wearing eyeglasses or contact lenses can improve my vision. 1( ) 2( ) 3( ) 4( ) 5( )

I think regular eye examinations are necessary to maintain good eye health.1( ) 2( ) 3( ) 4( ) 5( )

I am comfortable discussing my vision problems with my parents/guardians.1( ) 2( ) 3( ) 4( ) 5( )

I believe that refractive errors can negatively impact my academic performance. 1( ) 2( ) 3( ) 4( ) 5( )

Section 4: Practices towards refractive error

Have you ever experienced any visual disturbances (e.g., blurred vision, difficulty reading or seeing the board) Yes ( ) No ( )

Have you sought professional help (e.g., visited an eye doctor, optometrist) for any visual disturbances.

Yes ( ) No ( )

Where you ever prescribed with glasses or contact lens? Yes ( ) No ( )

If yes do you wear your glasses or contact lenses? Yes ( ) No ( )

If no. Why don't you wear them A. It doesn't make any difference( ) B. I feel headaches( )

C I don't like the way it makes me appear ( ) D. I lost the glasses ( ) E. My parents would not want me to wear them ( ) F. I think they make my eyes go bad ( )

Do you have regular eye examinations (at least once a year) to monitor your vision. Yes ( ) No ( )

Thank you.

Adapted from Ogbu et al (2022).

APPENDIX II

Table showing Age Distribution of Respondents

Age					
		Frequency	Percent	Valid Percent	Cumulative Percent
Val	13	8	2.0	2.0	2.0

id	14	28	7.0	7.0	9.0
	15	117	29.3	29.3	38.3
	16	90	22.5	22.5	60.8
	17	109	27.3	27.3	88.0
	18	29	7.2	7.2	95.3
	19	19	4.8	4.8	100.0
	Total	400	100.0	100.0	

Gender

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	249	62.3	62.3	62.3
	Female	151	37.8	37.8	100.0
	Total	400	100.0	100.0	

Class

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	147	36.8	36.8	36.8
	2	247	61.8	61.8	98.5
	3	6	1.5	1.5	100.0
	Total	400	100.0	100.0	

Do you understand what refractive errors are?

		Frequency	Percent	Valid Percent
Valid		14	3.5	3.5
	No	177	44.3	44.3
	Ye	209	52.3	52.3

	s			
	Total	400	100.0	100.0

Myopia

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		328	82.0	82.0	82.0
	Selected	72	18.0	18.0	100.0
	Total	400	100.0	100.0	

Hyperopia

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		344	86.0	86.0	86.0
	Selected	56	14.0	14.0	100.0
	Total	400	100.0	100.0	

Astigmatism

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		282	70.5	70.5	70.5
	Selected	118	29.5	29.5	100.0
	Total	400	100.0	100.0	

None					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		297	74.3	74.3	74.3
	Selected	103	25.8	25.8	100.0
	Total	400	100.0	100.0	

All					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		368	92.0	92.0	92.0
	Selected	32	8.0	8.0	100.0
	Total	400	100.0	100.0	

Are you aware that refractive errors can affect academic performance?					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		22	5.5	5.5	5.5
	No	119	29.8	29.8	35.3
	Yes	259	64.8	64.8	100.0
	Total	400	100.0	100.0	

Do you know that refractive errors can be corrected with eyeglasses or contact lenses?					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		29	7.2	7.2	7.2
	No	104	26.0	26.0	33.3
	Yes	267	66.8	66.8	100.0
	Total	400	100.0	100.0	

Are you familiar with the importance of regular eye examinations?					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		10	2.5	2.5	2.5
	No	183	45.8	45.8	48.3
	Yes	207	51.7	51.7	100.0
	Total	400	100.0	100.0	

Do you know about available eye care services in your area?					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		8	2.0	2.0	2.0
	No	222	55.5	55.5	57.5
	Yes	170	42.5	42.5	100.0
	Total	400	100.0	100.0	

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
Age	400	13	19	16.07	1.320
It is important to seek professional help if I experience visual disturbances	400	1	5	3.85	1.382
I believe that wearing eyeglasses or contact lenses can improve my vision	400	1	5	3.44	1.491
I think regular eye examinations are necessary to maintain good eye health	400	1	5	3.91	1.387
I am comfortable discussing my vision problems with my parents/guardians	398	1	5	3.78	1.398
I believe that refractive errors can negatively impact my academic performance	398	1	5	3.57	1.451
Valid N (list wise)	398				

It is important to seek professional help if I experience visual disturbances					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly disagree	51	12.8	12.8	12.8
	Disagree	27	6.8	6.8	19.5
	Neutral	28	7.0	7.0	26.5
	Agree	118	29.5	29.5	56.0
	Strongly Agree	176	44.0	44.0	100.0

	Total	400	100.0	100.0	

I believe that wearing eyeglasses or contact lenses can improve my vision					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly disagree	74	18.5	18.5	18.5
	Disagree	40	10.0	10.0	28.5
	Neutral	52	13.0	13.0	41.5
	Agree	102	25.5	25.5	67.0
	Strongly Agree	132	33.0	33.0	100.0
	Total	400	100.0	100.0	

I think regular eye examinations are necessary to maintain good eye health					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly disagree	52	13.0	13.0	13.0
	Disagree	22	5.5	5.5	18.5
	Neutral	26	6.5	6.5	25.0
	Agree	111	27.8	27.8	52.8
	Strongly Agree	189	47.3	47.3	100.0
	Total	400	100.0	100.0	

I am comfortable discussing my vision problems with my parents/guardians					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly disagree	56	14.0	14.1	14.1
	Disagree	21	5.3	5.3	19.3
	Neutral	42	10.5	10.6	29.9
	Agree	114	28.5	28.6	58.5

	Strongly Agree	165	41.3	41.5	100.0
	Total	398	99.5	100.0	
Missing	System	2	.5		
Total		400	100.0		

I believe that refractive errors can negatively impact my academic performance					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly disagree	66	16.5	16.6	16.6
	Disagree	34	8.5	8.5	25.1
	Neutral	42	10.5	10.6	35.7
	Agree	119	29.8	29.9	65.6
	Strongly Agree	137	34.3	34.4	100.0
	Total	398	99.5	100.0	
Missing	System	2	.5		
Total		400	100.0		

Have you ever experienced any visual disturbances?					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		4	1.0	1.0	1.0
	No	224	56.0	56.0	57.0
	Yes	172	43.0	43.0	100.0
	Total	400	100.0	100.0	

Have you sought professional help?					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		6	1.5	1.5	1.5
	No	297	74.3	74.3	75.8
	Yes	97	24.3	24.3	100.0
	Total	400	100.0	100.0	

Were you ever prescribed with glasses or contact lens?					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		264	66.0	66.0	66.0
	No	72	18.0	18.0	84.0
	Yes	64	16.0	16.0	100.0
	Total	400	100.0	100.0	

If yes, do you wear your glasses or contact lenses?					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		336	84.0	84.0	84.0
	No	18	4.5	4.5	88.5
	Yes	46	11.5	11.5	100.0
	Total	400	100.0	100.0	

Q4.5A					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		394	98.5	98.5	98.5
	Selected	6	1.5	1.5	100.0
	Total	400	100.0	100.0	

Q4.5B					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		394	98.5	98.5	98.5
	1	3	.8	.8	99.3
	Selected	3	.8	.8	100.0
	Total	400	100.0	100.0	

Q4.5C					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		388	97.0	97.0	97.0
	1	5	1.3	1.3	98.3
	Selected	7	1.8	1.8	100.0
	Total	400	100.0	100.0	

Q4.5D					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		394	98.5	98.5	98.5
	1	3	.8	.8	99.3
	Selected	3	.8	.8	100.0
	Total	400	100.0	100.0	

Q4.5E					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		394	98.5	98.5	98.5
	1	3	.8	.8	99.3
	Selected	3	.8	.8	100.0
	Total	400	100.0	100.0	

Q4.5F					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		394	98.5	98.5	98.5
	1	3	.8	.8	99.3
	Selected	3	.8	.8	100.0
	Total	400	100.0	100.0	

Q4.6					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		2	.5	.5	.5
	No	328	82.0	82.0	82.5
	Yes	70	17.5	17.5	100.0
	Total	400	100.0	100.0	