UNIVERSITY OF EDUCATION, WINNEBA

AWARENESS AND KNOWLEDGE LEVEL OF TEACHERS ON VISUAL IMPAIRMENT AMONG PUPILS AT DUNKWA–ON-OFFIN

KWEKU ANDORFUL ADAAH

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A dissertation in the Department of Educational Foundations, Faculty of Educational Studies submitted to the School of Graduate Studies in partial fulfillment of the requirements for the award of the degree of Post Graduate Diploma (Education) in the University of Education, Winneba

JANUARY, 2023

DECLARATION

Student's Declaration

I, Kweku Andorful Adaah, declare that this thesis, with the exception of quotations and references contained in published works which have all been identified and duly acknowledged, is entirely my own original work, and it has not been submitted, either in part or whole, for another degree elsewhere.

Signature: ……..…….

Date: ……..…….

Supervisor's Declaration

I hereby declare that the preparation and presentation of this project work was supervised in accordance with the guidelines on supervision of project work laid down by the University of Education, Winneba.

Dr. Adam Awini (Supervisor)

Signature: ……..…….

Date: ……..…….

DEDICATION

I dedicate this work to my family.

ACKNOWLEDGEMENTS

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ABSTRACT

This study sought to determine the awareness and knowledge level of teachers on visual impairment (refractive errors) among pupils at Dunkwa-on-Offin in the Upper Denkyira East, Central Region of Ghana. The study used a quantitative method to enroll 70 teachers who were 20 years and above. The participants were sampled using a convenience sampling technique. Data was collected through the use of a structured questionnaire and checklist. Data were analyzed with Statistical Package for Social Sciences (SPSS) version 20 and presented in the form of tables and the use of the Mann-Whiteny U test and Kruskal Wallis test to establish an association between baseline socio-demographic characteristics (age and years of experience) and knowledge level. In total, 70 participants were included in the analysis. The majority of the respondents reported having received information on refractive errors with the majority of the respondents getting their information from mass media. The mean knowledge level of the respondents was 21.63±3.45 standard deviation. The majority of the respondents had good knowledge of refractive error. This was followed by 24.3% of the respondents whose knowledge was satisfactory. The percentage of respondents who had very good and poor knowledge regarding refractive error were 8.6% and 4.3% respectively. Also, there was no significant association between baseline factors like age and number of years of practice, and the knowledge level of primary school teachers. A recommendation was made for the Ministry of Health in collaboration with the Ministry of education in charge of curriculum development to factor education on the identification of visual impairment as part of the courses to be learned in various training institutions.

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

The human eyes play a key role in our everyday lives. It helps us to see the world because it is our gift of eyesight. Vision influences education. Education is a vital factor of growth in society. With good vision, education is enhanced, as well as giving us direction in our lives to facilitate the achievement of our goals and purpose. Visual impairment and blindness are a growing challenge in the world. It has become an issue of public health importance. Globally, an estimated 2.2 billion human beings suffer a near or distance vision impairment, of which 1 billion could have practically been prevented. Uncorrected refractive error is a leading cause of visual impairment and blindness. It accounts for 88.4 million cases out of the 1 billion cases of visual impairment that could have been prevented (World Health Organization, 2021).

Good vision plays an important part in education. Many experts believe that 80% of learning is done through the child‟s eye. Reading, computer usage and chalkboard work are all visual tasks student performs every day. That is the child‟s eyes are always in use in the classroom. Therefore, when a child‟s vision is not clear, learning and classroom participation suffers (American Optometric Association, 2012).

Refractive error is when the shape of the eye does not bend light correctly, resulting in a blurred image (Jill . Bixler, n.d). The symptoms of refractive errors include seeing up close or difficulty reading, blurred vision, and crossing of the eyes in children. According to the World Health Organization, 153 million people worldwide live with visual impairments due to uncorrected refractive errors (WHO, 2013).

The four most common refractive errors are difficulty in seeing distant objects clearly (myopia/nearsightedness), difficulty in seeing close objects clearly (hyperopia/farsightedness), distorted vision resulting from an irregularly curved cornea (astigmatism), and presbyopia (which leads to difficulty in reading or seeing at arm's length, and it is linked to aging and occurs almost universally).

The occurrence of refractive errors in students has been significant across the globe. In 2014, a study conducted in Iran among 434 students aged 14 to 21 showed a prevalence of 29.3% for myopia, 21.7% for hyperopia, and 20.7% for astigmatism (Hashemi et al., 2014). In India, an overall prevalence of 6.7% was recorded for refractive errors among students aged 6 to 17, with myopia being 31.1%, astigmatism being 29.4%, and hyperopia at 2.6% respectively (Bhutia et al., 2021). This global distribution shows a worrying trend in refractive errors among students.

With 7.8 million blind people in India, the country accounts for 20% of the 39 million blind population across the globe of which 62% are on account of cataracts, 19.7% refractive errors, 5.8% glaucoma and 1% corneal blindness. It is estimated that the prevalence of childhood blindness in India in children less than 16 years will be 0.8/1000 implying a total of 300,000 blind children in the country. (Herald, 2012)

In the Ejisu Municipality of Ghana, 5.7% of 504 students aged 12 to 17 had refractive errors in 2015. Out of this number, 39.5% were astigmatism, 31.6 were hyperopia, and 28.9% were myopia (Nakua et al., 2015). If left untreated, refractive errors can affect the full visual development and function of school children.

Limited knowledge about refractive errors makes children be tagged as having special needs when all they needed was a pair of glasses. Children suffering from refractive

errors can struggle to read from the whiteboard, have teary eyes and occasional frontal headaches, and have difficulties in looking at colored objects. Teachers knowledge in refractive errors plays a key role in the academic development of the child because it will enable them identify them identify children with these errors so that they can manage properly and early to avoid any complication such as making the eye lazy.

Furthermore, no studies have been conducted to access the awareness and knowledge level of teachers on refractive errors in Dunkwa on Offin but from my practice as an ophthalmic nurse at Dunkwa on Offin municipal hospital, my observation and concern was drawn to the fact that, most children are seen either straining their eyes when reading from the board or trying to write what their colleagues have written whenever school health outreach program is embarked in some selected schools in Dunkwa on Offin, hence resulting in poor Academic performance of those primary school students identified.

There is anecdotal evidence to suggest that a significant number of school children in need of glasses do not get them because their refractive error is not detected early. This does not only affect the child"s physical, psychosocial, and cognitive development but may also influence future opportunities for employment and earning. If the refractive error is not detected early in children, they risk having a lazy eye (amblyopia), a condition where vision remains low even after wearing glasses. This condition can be treated till 7 to 8 years of age, hence the importance of detecting it early (Sharma, 2008).

One problem associated with eye diseases is that those who suffer from them do not take the earlier symptoms seriously until it gets worse or gets to a difficult end before seeking medical attention. For school-aged children, their teachers need to be able to

identify changes that occur in their eye-related behavior as suggested by Hastings (2008). These changes can include eye rubbing, straining of eyes when reading or looking at the whiteboard, bringing books or reading material very close to the eye, and mostly copying from the person sitting close to them rather than copying from the whiteboard. When teachers can identify these, they can liaise with the child‟s parents to seek early eye health care. It is therefore important for teachers to have good knowledge and awareness of refractive error, and the role they can play in basic eye health delivery.

1.2 Statement of the Problem

Vision is a key factor in students‟ communication, learning, and development. Refractive errors can result in visual impairments with long-term consequences in children. Uncorrected refractive errors have been studied to exert economic burden and reduced quality of life. The burden of refractive errors among children has been as high as 22% (Bahhawi et al., 2018). Globally, an estimated 5 million people suffer blindness are due to severe refractive errors (World Health Organization, 2011). Despite this high burden, many children remain undiagnosed. The undetected prevalence of refractive errors among school children was found to be 13.4% (Sachan et al., 2020).

Teachers of school children are one group of people that can help in identifying refractive error issues in school children, for early diagnosis and treatment. However, the knowledge gap is one problem that has to be solved. In Ethiopia, only 55.9% of 565 Primary School Teachers had good knowledge regarding refractive errors in school children (Alemayehu et al., 2018).

A cross-sectional study was conducted in Kolkata to assess the magnitude of refractive errors among school children aged 5 to 10 years. 2317 students studying in eight schools were included in the study. Data was collected through a detailed ophthalmological examination. Among the 2317 students examined, 582 (25.11%) were suffering from refractive errors with 282 being boys and 300 being girls. Myopia was the most prevalent type of refractive error affecting 14.02% that is 325 children, among them 156 were boys and 169 were girls. The results of the study suggested that visual impairment due to refractive errors is a significant problem in school children.

In Ghana, the knowledge of primary school teachers on the nature of eye problems in children was 60% in the Ga West Municipality (Ceesay et al., 2022). To the best of my knowledge, little or no other research focused on the knowledge and awareness of refractive errors among school teachers has been conducted in Ghana. Also, from my practice as an ophthalmic nurse, my observation for the past two years at Dunkwa on Offin and concern was drawn to the fact that most children are seen either straining their eyes when reading from the board or trying to write what their colleagues have written whenever school health outreach program is embarked, hence resulting in poor academic performance of those primary school students identified. These signs informed my decision to access the awareness and level of knowledge of primary school teachers regarding visual impairment (refractive error). This study seeks to fill that gap by assessing the awareness and knowledge level of teachers regarding visual impairment (refractive errors), and the factors that can help them identify refractive errors among students.

1.3 Purpose of the Study

The purpose of this study was to assess the awareness and knowledge level of teachers on refractive errors and identify the factors that help them to identify refractive errors among their students at Dunkwa On Offin in the Central Region of Ghana.

1.4 Specific Objectives

The general concerns outlined above in the objective of the study are transformed into specific research questions. The following are the research questions designed to guide this study;

1. To assess the awareness of primary school teachers regarding refractive errors among primary school children at Dunkwa-on-Offin.
2. To determine the knowledge level of primary school teachers regarding refractive errors among primary school students at Dunkwa-on-Offin.
3. To identify the association between sociodemographic factors (age and years of experience) and the knowledge level of primary school teachers on visual refractive error among primary school students at Dunkwa-on-Offin.

1.5 Research Questions

Based on the research objectives, the research questions to be explored in the study are:

1. What is the level of awareness of teachers on refractive errors among primary school students at Dunkwa -On-Offin?
2. What is the level of knowledge of teachers on refractive error among learners in Dunkwa-On-Offin?

3. What is the association between sociodemographic factors (age and years of experience) and the knowledge level of primary school teachers on visual impairment (refractive error) among primary school students?

1.6 Significance of the Study

Visual impairment has been on the rise among children. Among these, refractive errors have been identified as a major contribution. To help tackle this, teachers, who spend the most time with school children need to be equipped as key actors. However, the knowledge level of teachers on refractive errors has not been encouraging, hence this study will provide insight pertaining to the knowledge level of primary school teachers regarding primary school children with visual impairment (refractive errors). Teacher‟s awareness and knowledge of visual impairment will enable early identification and prompt referral of children with such needs.

The findings of this study will help inform the Ministry of Health, the Ghana Health Service, and decision-makers to formulate policies that will equip teachers as they play a key role in identifying refractive errors in children, to prevent future complications. It will also serve as a reference point or body of knowledge for further research into the subject.

1.7 Delimitations of the study

This study is a cross sectional study that concentrates on the awareness and knowledge level of teachers on refractive errors. Also, the results from the investigation will be delimited to primary school teachers at Dunkwa-on-Offin in the Upper Denkyira East Municipality as the researcher focuses on such a target population.

1.8 Limitations of the Study

This type of study depends very much on the information given by the respondents. However, given that all the respondents who gave consent to participate were surveyed, the researcher believed that the results of the study were a close estimate of the situation in Dunkwa-on-Offin in general. Also, respondent bias is one likely limitation of the study.

1.9 Operational Definition

1. **Awareness**: In this study, awareness refers to receiving any information regarding refractive error.
2. **Knowledge**: For this study, knowledge refers to the correct responses of the primary school teachers in reference to the knowledge level questionnaire regarding refractive errors among primary school children.
3. **Refractive error**: In this study, refractive errors in children include difficulty in seeing distant objects clearly, difficulty in seeing close objects clearly, and distorted vision resulting from an irregularly curved cornea.
4. **Primary School Teachers:** In this study, primary school teachers refer to teachers teaching from class 1 to class 6.
5. **Visual impairment:** In this study, visual impairment refers to a loss or damage to a structure in the field of vision which restrict the proper functioning of the eye. Example is refractive errors.

1.10 Organization of the Study in Chapters

This research would be structured in five chapters. Chapter one deals with background, problem statement, objectives, research questions, significance,

delimitation, and the organization of the research. Chapter two consisting of literature from other published related articles on the topic.

Chapter three will be about the research setting, target population, sample size, sampling technique, the technique for data collection and analysis, the validity and reliability of the study, and ethical consideration. Chapter four will be mainly on data analysis and discussions. Lastly, chapter five will focus on the summary, conclusion, and recommendations.

CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

In this study, the researcher carried out an extensive review of the literature on the topic to gain deeper insight into the problem as well as gather relevant information for building up the study. Published articles and website information were a great aid to this study. Articles were searched from sources including but not limited to PubMed, Google Scholar, Medline, and Science Direct.

The review of literature is organized under the following headings:

1. General overview of refractive errors
2. How vision occurs in a normal eye
3. Prevalence and factors related to refractive error in school children
4. Awareness and perception of teachers on refractive errors
5. Knowledge level of teachers on refractive errors
6. The burden of refractive errors

2.1 General Overview of Refractive Errors

In a normal eye, the front part of the eye which includes the clear window (cornea) and the lens act like camera lens. These two structures enable light to be focused onto the light sensitive part of the eye (retina), which is located at the back of the eye to send a clear information to the brain. Hence, refractive error occurs when the shape of the eye does not bend light accurately, thereby resulting in blurred vision. Refractive error can be attributed to myopia, hyperopia, astigmatism and presbyopia (Wilson, 2014). Refractive error is when the shape of the eye does not bend light correctly, resulting in a blurred image (Bixler, n.d.).

2.1.1 Causes of refractive errors

A child's vision is essential for successful learning in school. When the vision suffers, the pupil‟s routine schoolwork and day to day activities also get affected. Vision problems prevail in common among school-age kids.

Unhygienic living conditions, malnourishment and the alluring media influence like television, computer games and diminishing parental care etc. The students are not mature enough to point out the deficiency at the early stage or the parents have no idea on the gradually developing vision problem. This results in tiredness, distraction, headache and a few other disorders. Children who have been affected could not concentrate on studies or on any other curricular or extracurricular or recreational activities. Emmetropia is the refractive state of the eye in which, with accommodation at rest, parallel rays from a distant object are brought to a focus on the retina. The function of the eye is to clearly see the objects around us. Ametropia is the inability of the eye to accurately focus the rays of light on the retina from a distance. It is called refractive error. This condition may be either because the eye is too short or long in length, or because the cornea or lens does not have the required refractive power. In 1992, the World Health Organization (WHO) published a working definition of low vision: "A person with low vision is one who has impairment of visual functioning even after treatment and/or standard refractive correction, and has a visual acuity of less than 6/18 to light perception, or a visual field of less than 10 degrees from the point of fixation, but who uses, or is potentially able to use, vision for the planning and/or execution of a task for which vision is essential. Refractive errors are an unfortunate but completely natural characteristic. As time passes, our eyes can naturally vary in shape or density, especially during childhood or when we reach our 40s. Anyone can develop refractive errors, but they frequently run in families. For

example, myopia is often an inherited condition. And it‟s generally discovered before a person reaches adulthood. Refractive errors may happen when the length of the eyeball grows too short or too long. For some people, a problem with the shape of the cornea (the eye‟s transparent outer layer) causes refractive errors. The crystalline lens inside the eye is particularly affected by ageing. It can lose its clarity in later life, making your sight deteriorate. If you have refractive errors before middle age, you can also develop presbyopia on top of your other condition when you get older.

Refractive errors can be caused by:

- Eyeball length (when the eyeball grows too long or too short)
- Problems with the shape of the cornea (the clear outer layer of the eye)
- Aging of the lens (an inner part of the eye that is normally clear and helps the eye focus)
- Changes in the shape of your cornea, your lens or your whole eye can cause refractive errors. Which type of refractive error you have depends on how your eye is shaped.
- They can also develop as you get older. Aging eyes can develop a refractive error you didn‟t have when you were younger.
- Some people develop a refractive error after surgery to remove cataracts from their eyes.

2.1.2 Types of Refractive errors

Myopia (near/short sightedness): This is a condition where the light that comes does not directly focus on the retina but rather in front of it. This is due to the fact that the eye ball is longer than normal, or the clear front window part of the eye is too steep. This error is mostly corrected by wearing a concave or a minus lens spectacle or glasses. According to the National Eye Institute (2020), near sightedness makes far

away objects looks blurry. It happens when the eyeball grows too long from the front to the back, or when there are problems with the shape of the cornea (clear front layer of the eye) or the lens (an inner part of the eye that helps the eye to focus). These problems make light focus infront of the retina instead of being on it. They emphasized that severe nearsightedness can increase the risk of other eye conditions like retinal detachment (when the retina is pulled away from its normal position).

Hyperopia (far sightedness): This is a condition in which the light that comes into the eye focuses behind the retina, instead of focusing on it. This results from the eye ball being shorter than normal, or the cornea being too flat. Hence the near vision is worse than the distance vision, and that account for the name far sighted. This condition can be corrected by wearing a converse or a plus spectacle or glasses. National Eye Institute (2020) described far sightedness as a type of refractive error that makes nearby object looks blurry. It happens when the shape of the eyeball makes light focus behind the retina (a light sensitive layer of tissue at the back of the eye) instead of being on it.

Astigmatism: This condition occurs because of an abnormal curvature of the clear front window part of the eye (cornea), making some more steeper or more rounded than others. This intend makes the light not focus in a sharp point on the retina, resulting in blurry vision both for things that are close or far. This condition can be managed by wearing a cylindrical lens,that is a lens with one side curving in one direction than the other. Astigmatism can make far away and nearby objects looks blurry or distorted. It happens when the cornea or the lens has a different shape than normal, which makes light bend differently as it enters the eye. It emphasized that

some people are born with it but many people develop it as children or young adults (National Eye Instiute 2020).

2.1.3 Symptoms of refractive errors

Refractive errors are a type of vision problem that makes it hard to see clearly. They happen when the shape of your eye keeps light from focusing correctly on your retina (a light-sensitive layer of tissue in the back of your eye). Refractive errors are the most common type of vision problem. More than 150 million Americans have a refractive error but many don‟t know that they could be seeing better. That‟s why eye exams are so important. If you have a refractive error, your eye doctor can prescribe eyeglasses or contact lenses to help you see clearly.

The most common symptom is blurry vision. Other symptoms include:

i. Double vision
ii. Hazy vision
iii. Seeing a glare or halo around bright lights
iv. Squinting
v. Headaches
vi. Eye strain (when your eyes feel tired or sore)
vii. Trouble focusing when reading or looking at a computer.

Some people may not notice the symptoms of refractive errors. It‟s important to get eye exams regularly, so your eye doctor can make sure you‟re seeing as clearly as possible. If you wear glasses or contact lenses and still have these symptoms, you might need a new prescription. refractive errors affect one‟s vision. In addition to having trouble seeing clearly, your symptoms might include. Sometimes, kids might not know their vision is getting worse. If you notice your child has a hard time

concentrating or if their grades in school suddenly get worse, they might have a refractive error. Visit your pediatrician or eye care specialist if you notice any changes in your child‟s eyes, vision or behavior

2.1.4 Correction for Refractive error

Treatments for refractive errors include:

- Eyeglasses.
- Contact lenses.
- Vision correction surgery such as LASIK and photorefractive keratectomy (PRK).

Usually, your eye care specialist will prescribe you glasses or contacts before you have vision correction surgery. However, you might be a good candidate for vision correction surgery right away. Talk to your eye care specialist about which treatment will work the best for you.

Correcting refractive errors is often easy to do with glasses or contact lenses. An alternative to wearing glasses or contact lenses is having vision correction surgery. Ophthalmologists (eye doctors) check for refractive errors during a standard eye test. They do this by asking you to read letters from a chart and checking the effect of different lenses. If you need corrective lenses, you‟ll get a prescription for the right kind of glasses or contact lenses. Some types of surgery, like laser eye surgery, change the shape of your cornea to fix refractive errors. At Oculase we can help you decide if surgery is the best option. Laser eye surgery is a simple corrective procedure to treat all kinds of refractive errors. For some patients, laser eye surgery might be unsuitable for presbyopia (age-related focusing problems). In these cases, we may offer refractive lens exchange (lens replacement surgery). For this procedure, an

Advanced Technology Lens replaces the natural lens. Its benefits include a much-reduced need to wear glasses or contacts, and no risk of developing cataracts.

An Implantable Contact Lens is an alternative to laser treatment, especially if you need a high eyesight prescription. We implant a custom-made refractive lens on top of your natural lens, enabling you to see better without glasses or contacts. A Refractive Secondary Lens Implant is for people who‟ve had cataract or lens replacement surgery and still need glasses. After this surgery (which involves placing a second lens implant on top of the existing lens implant), you‟ll be able to perform most activities without spectacles.

2.1.5 How vision occurs in a normal Eye

In order to produce a clear image, the light that is reflected off of the object enters the eye through the clear front layer of the eye, called the **cornea**. The cornea bends the light before it passes through a watery substance that fills the area behind the cornea, called the **aqueous humor**.

The light continues to travel through the black opening in the center of the iris, called the **pupil**. The **iris** is the colorful part of your eye that gives it its blue, green, hazel, brown or dark appearance. The pupil then automatically gets bigger or smaller, depending on the intensity of the light.

The iris is actually made up of muscles that expand and contract to control the pupil and adjust its size. So when you see your pupil getting bigger or smaller, it is really the iris that is controlling the pupil opening in response to the intensity of light entering the eye.The light passes through the pupil to the **lens** behind it. The lens adjusts its shape to bend and focus the light a second time, to ensure that

you have a clear image of what you are looking at.The light has been bent twice as it moved from the cornea through the lens, and then from the lens to the retina. This “double bending” has actually flipped the image upside down.The light then passes from the lens to the back of the eye which is filled with a clear, gelatinous substance called the **vitreous** until it reaches the **retina**, the light-sensitive layer at the back of the eye.

The light is then focused throughout the retina which contains nerves called **photoreceptors**. The photoreceptors are made up of rods and cones, and are responsible for transforming the light rays into electrical impulses. While the light is focused throughout the retina, most of the light entering the eye is focused onto the **focal point** on the retina, known as the **macula**.

The nerves of the retina collect all of the electrical impulses, which then travel through the **optic nerve** at the very back of the eye up to the occipital lobe in the back of the **brain**. The light then passes from the lens to the back of the eye which is filled with a clear, gelatinous substance called the **vitreous** until it reaches the **retina**, the light-sensitive layer at the back of the eye. The light that enters the eye is required to go through a specific process in order to focus properly on the retina. If the connections between the eye and brain are not well developed, the visual information that is sent to the brain will not be interpreted properly, and the image will be difficult to see. (Lazarus, October 11, 2020)

2.2 Prevalence and Factors Related to Refractive Error in School Children

The prevalence of refractive errors has been documented worldwide. Asare and Morjaria (2021) conducted a study on the prevalence and distribution of uncorrected refractive error among school children in the Bongo District of Ghana. They used a

descriptive cross-sectional study method and employed a random sampling technique to select 18 Public Junior High Schools. External and internal eye examinations were conducted, and a total of 1,705 school children with a mean age of 14.1±0.9 years were recruited for the study. The overall prevalence of refractive error was found to be 1.8%, with myopia accounting for 0.8%, hyperopia 0.4%, and astigmatism 0.6%. On multinomial logistic regression, female students were found to be three times higher at risk of developing refractive error as compared to the male students (Asare & Morjaria, 2021).

Another study was conducted to evaluate the preventable environmental risk factors of refractive errors among 1292 Egyptian school children aged 7 to 15years. Results of the study showed that the prevalence of refractive errors was significantly higher in females (21.4%) student compared to males (13.6%), among students of high and low socioeconomic status compared with those of middle status among preparatory school students compared with primary students, among students from heavy traffic residential area compared with the other residential areas, among student with positive family history of refractive errors and among students with a past history of refractive error. Prevalence was higher among student exposed to near work for more than 5 hours per day (23.4%) compared to those exposed for less than 5 hours per day. logistic regression after adjustment for sex revealed that school level, near work, socioeconomic status and family history were associated with refractive errors.(Saad A. et al 2007)

A study was conducted by Ande et al. (2015) to research the prevalence of refractive errors among children in a rural setting in India. It was cross-sectional study that involved 8 randomly selected government schools between November 2012 and

August 2014. A total of 3174 school children in the age groups of 10 to 15 years studying from the 5th to 10th standard was screened for refractive errors. A distance of 6 meters using Snellen"s Chart was used to check their visual acuity and near vision of 33 centimeters under day light illumination. The total prevalence of refractive errors was found to be 6.49%. Myopia was the most common refractive error found among the school children. Most of the students were not aware of their problem, with the proportion of uncorrected refractive errors in the study being 63.1% (Ande et al., 2015).

Another study was conducted to determine the prevalence of refractive errors among school children attending lower primary school in Kampala district, Uganda, the frequency of the various types of refractive errors and the relationship to sexuality and ethnicity. A total of 623 children aged 6 to 9years had a visual acuity done at school using the same protocol. Of these, 301 (48.3%) were boys and 322 (51.7%) were girls. The study employed a cross sectional descriptive study. The study revealed that seventy three children had a significant refractive errors of ±0.50 or worse in one or both eyes giving a prevalence of 11.6% with the commonest refractive error to be astigmatism. The study concluded that refractive errors occur among primary school children aged 6 to 9years and that recommend that regular and simple vision testing primary schools should be done at least at the commencement of school so as to detect those children who may have suffer from these errors . (Kawuma M ,et al 2002).

A further study was conducted by Maduka Okafo FC, et al(2021) to determine the prevalence refractive errors and causes of visual impairment in school children in the south-easternregion of Nigeria.

A School-based cross-sectional samples of children 5 to 15 of age in both urban and rural areas were profiled through cluster sampling. A total of 5723 children were examined during the study period comprising 2686 (46.9%) males and 3037 (53.1%) females; (M:F ratio 0.9:1) and aged 10.49± 2.74SD of mean (range, 5 to 15 years). The age group 12 to < 13 accounted for the highest 776 (13.6%) number of the study participants. The uncorrected visual acuity (VA) of < 20/40 (6/12) was seen in 188 (3.4%) of the study participants while the presenting and best-corrected visual acuity of < 20/40 (6/12) were noted in 182 (3.4%) children and 14 (0.2%) children, respectively. Refractive error was the principal cause of visual impairment. The study concluded Prevalence of refractive error is low. Myopia is the principal cause of refractive error occurring more in females and in urban schools. The main cause of visual impairment is refractive error, and most children that need spectacle correction did not have them. Program to identify children with refractive error in addition to providing free or affordable optical services remains the key to preventing visual impairment from refractive error particularly in resource-poor settings.

In a study by Triveni et al (2021), they researched the prevalence of refractive errors in school going children in rural urban areas in India. It was a cross-sectional study that included all children of age group 5 to 15years who are studying in the rural urban schools. A random sampling technique was employed to select 499 students for the study. Students visual acuity was checked using Snellen‟s chart. Hence all student with vision less than 6/6 were subjected to autorefractometry, and all of them were given a full correction. The study revealed a prevalence of refractive error to be 6.41% with the prevalence in the rural and urban areas to be 5.21% and 7.61% respectively (Triveni et al., 2021).

Further studies was conducted by Fadarin M.A and Ajaiyeoba A.I (2001) to determine the prevalence of refractive errors in primary school children in the Nigerian Army children school, Bonny camp Lagos, Nigeria. A total of 919 pupils from two primary schools were screened. The schools and classes were selected using stratified random sampling technique. Refractive error was defined for the study as visual acuity less than 6/9, or any visual acuity correctable with minimum of plus or minus 1.0 diopter sphere, with or without minimum of plus or minus 0.5 diopter cylinder to normal (6/5) vision. E study revealed a prevalence of 7.3% (95% CI)

Another study was conducted to access the prevalence of refractive errors and visual impairment among school-aged children in Hargeisa, Somali land and Somalia. The study employed a cross sectional approach to recruit 1204 student aged 6 to 15years in 8 randomly selected primary schools in Hargeisa. Their visions were accessed using the Snellen Tumbling E-chart, refraction accessed by retinoscope binocular vision assessment and examination of anterior and posterior segment. The result of the study revealed that using the best corrected visual impairment of 6/12 or worse was 13.6%, 7.6% and 0.75% respectively. Refractive error was seen high among school-aged children in Hargeisa and the leading cause of visual impairment. (Ahmed et al., 2020)

Opubiri and Pedro-Egbe (2013) also conducted a study which aimed at screening for refractive errors among primary school children in Bayelsa State, Nigeria. They used a cross-sectional study in screening for refractive error among school children. A multistage sampling technique was used to select a total of 1242 pupils who will be subjected for the study. Visual acuity for each eye was assessed outside the classroom at a distance of 6meters. Out of the1242 pupil, 56 eye had a visual acuity less than

6/9. Of these 56 eyes, 87.5% (49) eyes improved with pinhole. 27 pupils had refractive error giving a prevalence of 2.2% (Opubiri & Pedro-Egbe, 2013).

In 2010, Ovenseri-Ogboma and Assien conducted a cross sectional study to estimate the prevalence and distribution of refractive error among school children in the Agona Swedru municipality in the Central Region of Ghana. The study involved 24 public and 18 privately owned schools. Two public and private schools were selected for the study taking into consideration the school enrolment figure for each school. They employed convenience sampling technique in selecting 595 children based on the inclusion and exclusion criteria. The study revealed a visual impairment (visual acuity of 6/12 or worse in the better eye) to be 4.5% in the children examined. Of those who failed the reading test, 85.9% had refractive error. Hence the prevalence of hyperopia, myopia and astigmatism was 5.0%, 1.7% and 6.6% respectively (Ovenseri-ogbomo & Assien, 2010).

Yingyong (2010) conducted a study on the risk factors for refractive errors in primary school children (6 to 12years) in Nakhon Pathom Province. The researcher employed a population based cross sectional analytic study for the research between October 2008 and September 2009. Refractive error, parental refractive status and hours per week of near activities (studying, reading books, watching television, playing video games or working on the computer were assessed in 377 children. The study revealed the commonest type of refractive error in primary school children to be myopia. On multivariate odds ratio (95% CI), having two myopic parents (OR 6.37, p=0.005) significantly increased the odds of being a myopia (Pathom et al., 2010).

Xuan (2021) researched the prevalence of refractive error among students and to describe the accuracy of visual acuity screening practices of school staff in some

selected provinces in Vietnam. A multistage stratified sampling was used to select the representatives for the survey. Probability proportional o size sampling and random sampling techniques were used to select the sample. Probability proportional to size approach was initially used to select 26 target schools and 9 non target schools. After the list of classes and all students from selected schools were available, the random sampling technique was employed to one class per grade in each school. Visual acuity assessments were conducted by trained teachers and nurses at all schools participating in the survey covering a sample size of 4838 students. About 30 percent of these students were randomly selected, making up a sub sample of 1404 students. The results of the study denoted that, the proportion of students with untreated eye problems and that of uncorrected refractive errors were high at 18.52% and 24.64% (Xuan et al., 2021)

Nakua et al in 2015 conducted research aimed at assessing the prevalence of refractive errors among students in the Ejisu Juabeng municipality of Ghana. a multistage sampling technique was undertaken to select 540 participants. The participants‟ visual acuity was assessed using a Snellen‟s chart at a distance of 6meters. The researcher interviewed 504 students aged 12 to 17years and examined them for refractive errors. The prevalence of refractive error among those with and without refractive errors was compared by means of Chi square test. Logistic regression analysis using refractive errors as the dependent variable and adjusting for risk factors were performed. The overall prevalence for refractive error was 75%. Out of the number of children with refractive errors, 39.5% had astigmatism, 31.6% had hyperopia and 28.9% had myopia. Multivariate logistic regression model showed no substantial confounding effect between near work, sex and residence suggesting that each covariate has an independent association with refractive errors. The study in

conclusion revealed that near work, sex and high parental education level are factors contributing to refractive errors (Nakua et al., 2015).

Akinremi et all in 2022 also conducted a study which focused on the prevalence of refractive errors and the impact of its correction on academic performance of primary school children in Nigeria. Quasi experimental study was carried out among 2124 primary school pupils aged 5 to 15years. eye examination and refraction were carried out during the first term of the school academic calendar. Children with visual acuity worse than logMar 0.2 (6/9,5) which improved with pinhole had refraction done and were dispensed free eye glasses. The result revealed the prevalence of refractive error among primary school pupils aged 5 to 15years to be 2.8% with myopia being the most common refractive error with prevalence of 1.2% (Akinremi et al., 2022).

A study was conducted to compare the magnitude and risk factors of uncorrected refractive errors in 6 to 15years old school children of urban and rural Maharashtra. The prevalence of myopia, hyperopia and astigmatism in the urban children was 3.16%, 1.06% and 0.16% respectively and that of rural children was 1.45%, 0.39% and 0.21% resp0ectively. The result of the study revealed the prevalence of uncorrected refractive errors especially myopia to be significantly higher in school children of urban as compared to children of rural schools. (Padhey A.S, et al 2009)

A cross sectional study was conducted in Kolkata to access the magnitude of refractive errors among school children aged 5 to 10years. 2317 students studying in eight schools were included in the study. Data was collected through detailed ophthalmological examination. Among 2317 student examined, 582 (25.11%) were suffering from refractive errors. Among them 282 were boys and 300 were girls. Myopia was the most prevalent type of refractive errors affecting 14.02% that is 325

children, among them 156 were boys and 169 were girls. The results of the study suggested that visual impairment due to refractive errors is a significant problem in school children.

2.3 Awareness and Perception of Teachers on Refractive Errors

Communities can perform a key role in championing eye health. One group of people in the community that can play this key role are school teachers. Teachers spend more time with students and can help identify eye conditions in children at school (Mitra & Vishwakarma, 2021).

A cross sectional population-based study was conducted in Southern India to assess the awareness and knowledge level of the general public on refractive errors and strabismus. 782 respondents aged 16years and above participated in the study. A structured questionnaire was used in data collection. Of the782 respondents, 74.3% were aware of refractive errors. With multiple regression about awareness of refractive errors to various variables, those who were educated from the 11th class to degree level had a higher awareness (Pallerla et al., 2022).

When it comes to teachers, Agrawal et al. in 2017 assessed the awareness levels of private school teachers regarding healthy vision and eye screening in Dist. Gautam Budh Nagar, U.P, using training and assessment. 25 study subjects participated in the study. Data collection involved pre- and post-training workshop assessments. They found out that 96% had no awareness regarding age of vision screening in children during the pre-workshop assessment (Screening et al., 2020)

A descriptive study was conducted by Ambika & Nair in 2013 to assess the awareness of primary school teachers in Mysore regarding refractive error and its early

identification among primary school children. Convenient sampling was used to select 60 primary school teachers as participants in Mysore. A structured questionnaire was used in data collection. The majority (80%) of the respondents had adequate awareness regarding refractive errors in children, but none of them had previous experience of identifying visual problems in school children (Ambika & Nair, 2013)

2.4 Knowledge Level of Teachers on Refractive Error

Knowledge of primary school teachers on refractive plays an important role in encouraging children to seek treatment for their eye problems as well as to enhance eye health seeking behavior (Korani et al, 2015). In addition to this, it helps to minimize the burden of visual impairment due to uncorrected refractive error (Sudhan et al., 2009; Sredevi et al., 2016). According to previous studies, the level of knowledge in different studies ranges from 1% to 89% (Chew et al., 2004; Roseman et al., 2009; Sredvi et al., 2016; Thomas 2013). The attitude of primary school teachers towards refractive also has a positive impact on prevention of visual impairment from refractive error in school children (Pascal et al., 2016). In contrast, negative attitude towards RE management options can result in psychological impact as revealed in different studies (Li et al., 2010). Attitude towards refractive error largely depends on the level of knowledge the teacher has on refractive error. Teachers who are much knowledgeable on the consequences of refractive error are more likely to refer the child for eye examination for prompt management as compared to those with scanty information on refractive error. However, this current study focuses mainly on assessing the level of knowledge of teachers on refractive error unlike previous study conducted by Alemayehu et al in 2018.

Another study was conducted to access the effectiveness of screening for refractive errors by school teachers. Three teachers of various disciplines from three schools in Rohtak city were selected. These teachers were asked about their knowledge regarding common symptoms of refractive errors and treatment methods available using questionnaires and they were given a day training on refractive errors and how to test for visual acuity in children. A total of 678 students in the age groups of 5 to 10years were included in the study and vision testing was carried out by the teachers. The incidence of uncorrected refractive errors as projected by this study in urban school children was 11.37%. Out of all these cases, 92.2% were correctly identified by teachers which indicated good knowledge of teachers regarding refractive errors. (Dhull,CS et al 2003)

Alemayehu et al (2018) conducted a study on the knowledge, attitude and associated factors among primary school teachers regarding refractive errors in school children in Gondar city, North west Ethiopia. An institutional based cross-sectional study was conducted on the primary school teachers between April 20th and May 23rd 2017. Samples were taken from about 25% of the total 64 primary schools using a simple random sampling method. A total of 565 primary school teachers were involved in the study. Among that 52.9% (299) were females. The study revealed that 316 (55.9%) participants had good knowledge about refractive error with only 82(14.5%) having poor knowledge. This indicated that, the knowledge level of primary school teachers regarding refractive errors was good (Alemayehu et al., 2018).

A study was conducted to access young public awareness to refractive error deficiency. Survey questionnaires were distributed to randomly selected people from 6 different location n Riyadh. The population ages ranged from 15 to 61. Of the 2039

who participated in the survey, intellect was a determining factor in knowing the most common symptoms related to refractive error problem. Only 26% of those with basic education were found to have an idea about blurred vision, eyestrain or headaches that they are due to refractive errors as such, compared to about 35% for intermediate and 39% for those with higher education. The study concluded that there is an overall probability to show that the general public is not aware of most of the problems that concerns their visual health.(Aldebesi et al, 2011)

Another study was conducted by Sudhan et al (2009) in Madhya Pradesh to access the effectiveness of using teachers to screen school going children. Five hundred and thirty teachers screened 68,883 children. Teachers referred 3,822 children with eye defects for further examination by an ophthalmic assistant and confirmed eye defect in 1242 children. In this, myopia was the commonest eye problem (33.01%). Ophthalmic assistant identified 57.97% referrals as false positives and 6.08% children as false negatives from the random sample of normal children. The results of the study indicated that, utilizing the services of teachers for screening the eyes of school going children reduces the workload of eye care service providers.

Another study on the knowledge and attitude of primary school teachers regarding refractive errors in school children was conducted by Sravani et al (2019). The study involved 100 primary school teachers in Visakhapatnam district between June 2018 and August 2018. An institutional based cross sectional study was used in conducting the study. The study involved government primary school teachers of both sexes and different age groups. The mean age of the participant was 47years. The result of the study indicated that, 74 (74%) of the participant had good knowledge regarding refractive error while the remaining 26 (26%) had poor knowledge (Sravani, 2019).

Another study was conducted by Ahmad k, et al (2006) study was conducted to explore the perception of primary school teachers regarding visual impairment (refractive errors) among primary school children in Pakistan. Sixteen teachers from four different primary schools were selected and individuals interviews, focus group discussions and questionnaires were used to collect the data. The results of the study denoted that teachers had good knowledge but many of them had serious misconceptions. Majority of the teachers (75%) noted that children with eye problems have difficulty seeing from the blackboard well, 43.8% said children holds their books too close, 12.5% said children have difficulty reading books or watching television but they were not aware of other signs like persistent headache, difficulty writing in straight lines.

2.5 Global Burden

The process of learning begins in childhood and accurate vision can greatly affects a child's learning capacity. It is documented that visual impairment in children can have a significant impact on their performance at school as well as their social interaction and development.

Around the globe, an estimated 1 billion people suffer from vision impairment. This is a burden of public health importance. In 2021, Yang et al. estimated the global burden of Uncorrected Refractive Error (URE) among adolescents, and assessed how varying risk factors contributes to Disability-Adjusted Life Years (DALYs) due to URE. In this study, DALY numbers and rates due to URE among adolescents at the global, regional and country levels were acquired from the Global Burden of Diseases Study 2019 database. Regression analyses was employed to evaluate associations between DALY rates of adolescents and potential predictors. The results showed that Global

DALYs due to Uncorrected refractive errors among adolescents rose by 8% between 1990 and 2019. Females were found to have higher DALY rates as compared to males. From 5 to 9 years, DALY rates increased sharply, and a slow rise observed afterwards, plateauing before age 20. There was positive associations between country-level DALY rates in 2019 with Human Development Index (HDI), Socio-Demographic Index (SDI), and urbanization rates (Yang et al., 2021).

Another study was conducted to access the impact of uncorrected refractive errors and visual impairment on the quality of life amongst school- going children aged 14 to 18years in Sekhukhune district(Limpopo), South Africa. The tool used to access the quality of life was the National eye institute quality Questionnaires (NEI-VFQ-25). A modified refractive error study in children (RESC) protocol was employed to determine the value of the uncorrected refractive errors. The test performed included Logarithm of the Minimum of the Minimum Angle of Resolution (LogMAR) visual acuity, cycloplegics, auto refraction, binocular motor function tests, media and fundus examination. A total of 154 learners aged 14 to 18years completed the NEI-VFQ-25 which was offered in an interview. A total of 56 learners (36.3%, 95% confidence interval) had uncorrected refractive errors and visual impairments. Children with uncorrected refractive errors and visual impairments had low score on the NEI-VFQ-25 as compared to those whose refractive errors has been corrected. The study concluded that uncorrected refractive errors had impact on the quality of life of learners in Sekhukhune. (S.S, 2022)

Further study was conducted which aimed at accessing the quality of education of children with uncorrected refractive errors in Sokoto Metropolis, Sokoto state Nigeria. The study employed a cross- sectional survey of school children in four randomly

selected primary schools within the sokoto metropolis from July 2016 to October 2016 using illiterate E chart and a pinhole. Relevant history and basic ocular examinations were done using a multistage sampling technique. A total of 113 student were surveyed, 56(49.6%) males and 57 (50.4%) females. The age range was between 5 to 15years. The study revealed that more than 90% of the respondent had a prior eye examination. The average mean academic performance of the pupils with uncorrected refractive errors (49.54±10.49%) was statistically significantly lower than those without refractive errors (71.08±10.09). (Olatunji & Abdulsalam, 2019).

A study was conducted to access the impact of refractive corrections on the academic performance of high school children in Lahore. A total of 2,000 students with equal distribution of gender, public, private school, and locality were included in the study. All students were screened for defective vision. The academic performance before and after corrections was recorded on the prescribed proforma. The prevalence of refractive error was high among the public high schools 244 (59.2%) as compared to the private schools 168 (40.8%). The area-based prevalence was higher among the students in urban settings 255 (62%) while in rural it was 157 (38%). It was found that in the public sector, the average score of academic results before the intervention was 56.39 ± 13.24 which was increased to 60.27 ± 14.94 after the intervention while in the private sector, before the intervention, the average score was 63.53 ± 17.50 which was improved to 67.12 ± 18.48. It was found to be statistically significant at p-value < 0.05. The study concluded that significant impact was observed in the average academic scores of the results after refractive corrections. (Muhammad Zahid L, et al 2022)

The total number of persons with visual impairment worldwide, including that due to uncorrected refractive error, was estimated as 259 million, 61% higher than the commonly quoted WHO estimate. This includes 42 million persons with blindness defined as presenting visual acuity less than 3/60 in the better eye, and 217 million persons with less severe visual impairment level defined as presenting visual acuity less than 6/18 to 3/60 in the better eye, 14% and 75% higher, respectively, than the WHO estimates based on best-corrected visual acuity. Sensitivity analysis, taking into account the uncertainty of the proportion of visual impairment caused by refractive error, revealed that the number of persons in the world with visual impairment due to uncorrected refractive error could range from 82 to 117 million. The study concluded that the actual burden of visual impairment worldwide, including that caused by uncorrected refractive error, is substantially higher than the commonly quoted WHO estimate that is based on best-corrected visual acuity. We suggest that the indicative estimate of 259 million persons with visual impairment worldwide, which includes 42 million blind with visual acuity less than 3/60 in the better eye, be used for further planning of the VISION 2020 initiative instead of the often quoted 161 million estimate that includes 37 million blind.(Dandona l and Dandona R 2006).

Another study was conducted to assess the impact of VA loss on patient reported utilities taking both eyes into account compared to taking only the better or the worse eye into accounts. In this cross-sectional study 1085 patients and 254 controls rated preferences with the generic health-related (EQ-5D; n=868) and vision-specific (Vision and Quality of Life Index (VisQoL); n=837) multi-attribute utility instruments (MAUIs). Utilities were calculated for three levels of VA in the better and worse eyes, as well as for 6 different vision states based on combinations of the better and worse eye VA.

Using the VisQoL, utility scores decreased significantly with deteriorating vision in both the better and worse eyes when analysed separately. When stratified by the 6 vision states, VisQoL utilities decreased as VA declined in the worse eye despite stable VA in the better eye. Differences in VisQoL scores were statistically significant for cases where the better eye had no vision impairment and the worse seeing fellow eye had mild, moderate or severe vision impairment. In contrast, the EQ-5D failed to capture changes in better or worse eye VA, or any of the six vision states.the study concluded that Calculating utilities based only on better eye VA or using a generic MAUI is likely to underestimate the impact of vision impairment, particularly when the better eye has no or little VA loss and the worse eye is moderately to severely visually impaired. These findings have considerable implications for the assessment of overall visual impairment as well as economic evaluations within eye health. (Robert P., Eva F, et al 2013)

A study was carried out by Bekibele & Gureje O(2008) which aimed at examinining the impact of self-reported visual impairment on the quality life of an elderly Nigerian sample.The results of the study indicated that Four hundred and fifty-three (22.3%) of the respondents reported impairment for distant vision, 377 (18.4%) reported near vision, and 312 (15.2) reported impairment for both far and near. Impairment of near vision had a significant impact on all domains of quality of life. Distant vision had less impact, with a significant decrement only in the domain of environment. After adjusting for the possible effects of age, sex, and co-occurring chronic physical illness, near-vision impairment accounted for 3.92% decrement in the overall quality of life of elderly persons. It concluded that Impairment of vision is associated with significant decrement in diverse areas of quality of life in this elderly sample.

Problems with near vision were nevertheless more likely than those of distant vision to affect quality of life.

Further studies were conducted to assess the economic impact of excess medical and informal care and the health utility loss associated with visual impairment and blindness in adults aged 40 years and older in the United States. Medical Expenditure Panel Survey data from 1996 to 2002 were pooled to estimate the relationship of visual impairment and blindness with total medical expenditures, components of expenditures, days of informal care received, and health utility. Estimates accounting for the complex sampling design were based on regressions including confounders such as comorbidities and demographics. The aggregate economic impact was estimated by projecting average individual effects to the population of individuals with blindness and visual impairment. The results of the study revealed that blindness and visual impairment were significantly associated with higher medical care expenditures, a greater number of informal care days, and a decrease in health utility. The home care component of expenditures was most affected by blindness. The aggregate annual economic impact included $5.5 billion spent for medical care and the value of informal care as well as a loss of more than 209 000 quality-adjusted life years. It concluded that visual impairment has a large effect on home care. Any economic analysis of prevention, treatment, and rehabilitation should account for the fraction of the annual monetary cost and loss of quality-adjusted life years that can be averted.

2.6 Screening of School Children

For the initial screening, a single optotype of the Snellen‟s chart or the „E‟ chart can easily be administered by minimally trained personnel such as trained school based

SHEP coordinator or community Health Nurses. This is a low cost, non-invasive, rapid, reliable, and acceptable method. The conventional Snellen‟s charts with all the 7-lines of the optotypes may be confusing for use by personnel like the schoolteachers and staff. In addition, the conventional charts are easily memorized by the children thus making them less useful for screening. A single optotype like the „E‟ can be rotated each time the child sees it, and thus each eye can be tested differently. With the limbs of the „E‟ facing in different directions, children are asked to identify at least three optotypes with each eye (rotating the card for the second eye, so that the letters are in different configuration) before labeling them as having abnormal or normal vision. The screening is carried out in the following way: From a distance of six meters (measured with the tape provided), child is shown the vision card, which is white with four black "Es" of standard size (6/9 of Snellen‟s chart). For each eye, child has to indicate the direction of the open end of the "E". By simply rotating the card, the sequence can be changed. The child indicates the direction correctly (eyesight "good") or incorrectly (eyesight "not good"). If there is any doubt, the teacher should record the eyesight as "not good."

2.7 Conceptual Framework

A conceptual framework is an analytical tool used to explain the relationship between variables identified in the study (Bhat, 2018). According to Grant et al, (2015); Fisher (2017), conceptual framework serves as a building block that simplifies the idea in a study for easy understanding by relating real events. In other words, illustrating the study's purpose in a diagrammatic and logical sequence aids readers in appreciating and comprehending the linkages between the variables in the study. The variables can either dependent or independent or relational. In this context, teachers‟ knowledge

level on visual impairments and refractive error could help improve the academic performance of school children.

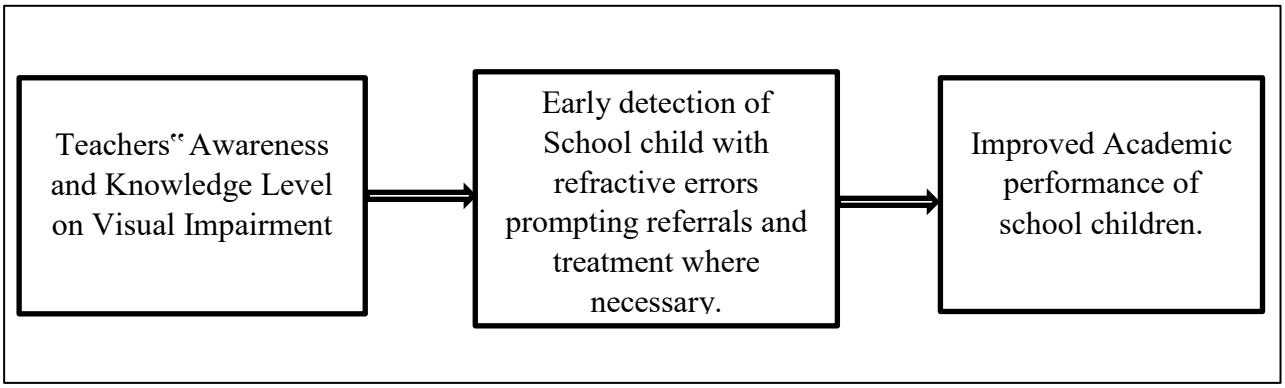

Figure 1: Awareness and Knowledge Level of Teachers on Visual Impairment Among Pupils Source: Author‟s own construct, 2022

The figure above explains the main idea of the study. Figure xx depict that if teachers are aware and have good knowledge in refractive error and other vision issues among school children. This will help them detect vision issues such as refractive error and recommend referrals since uncorrected refractive error could lead to vision impairment. Detection of refractive errors and other eye conditions among school children could afford the teachers recommend a better sitting position for the school children in class. This would help them see better. School children with such problems could also be given further attention in class thereby helping to improve their academic performance. In sum, creating the teacher‟s awareness and increasing their knowledge in visual impairment will enable early identification and prompt referral of children with such needs and this could help improve the academic performance.

CHAPTER THREE

METHODOLOGY

3.0 Introduction

This chapter entails the processes that were used in conducting the study. It is aimed at explaining the research design and methods employed in the study. The chapter includes a description of the research design, the research setting, the target population, inclusion and exclusion criteria, sample size and sampling technique, data collection tool and procedure as well as data analysis

3.1 Research Design

The study adopted was a descriptive cross-sectional study. A research design, according to Algozzine (2017) is simply a systematic plan created by a researcher to use in studying a scientific problem. In other words, a research design is the framework formulated by the researcher to use in finding answers to the research questions. A descriptive research is used to obtain information concerning the current status of the phenomena to describe "what exists" with respect to variables or conditions in a situation. This research design has a lot of advantages such as it is relatively quick and easy to conduct, no problems with drop outs and data on all variables are only collected once. The study is a quantitative research. The researcher used the design to assess the awareness and knowledge level of primary school teachers regarding refractive error among school children in Dunkwa-On-Offin in the Upper Denkyira East Municipality.

3.2 Research Setting

The study area is Dunkwa-On-Offin. It is the capital of the Upper Dernkyira East Municipal in the Central Region of Ghana. The Upper Denkyira East is one of the thirteen Adminoistrative District in Central Region. It lies within latitudes 5 degrees, 30 degrees and 6 degrees north of the equator. Dunkwa-On-Offin has a 2013 settlement population of 33,379 people (world Gazetteer online). It shares boundaries with Bibiani- Awhiaso Bekwai and Amansie West on the North, Wassa Amenfi West and East Districts on the Northwest and West respectively. Twifo- Hemang lower Denkyira and Assin north municipalities on the south, Obuasi municipality on the southeastr and Amansie Central on the northeast. The town is located on the Offin River and it is a low-lying town with loose quaternary sand and the town rises up to 117 meters above the sea level (Upper Denkyira East Municipal, 2006). It is predominantly a rural settlement. The Upper Denkyira East Municipality covers a total land area of 1700 square kilometers which is about 17% of the total land area of the central region (Upper Denkyira East Municipal Assembly, 2006).

MAP OF THE STUDY AREA

3.3 Target Population

A population study is a study of a group of individuals taken from the general population who share common characteristics such as age, sex or health conditions. This group may be studied for different reasons such as their responses to a drug or a risk of getting a disease (Umair 2018). The study population covered 90 participants

comprising 90 primary school teachers from the public schools at Dunkwa-On-Offin in the Upper Denkyira East Municipality specifically.

3.3.1 Inclusion Criteria

Inclusion criteria are defined as the key features of the target population that the investigators will use to answer their research question (Polit & Beck, 2014). Only primary school teachers at Dunkwa on Offin in the Upper Denkyira East municipality and were willing to take part in the study.

3.3.2 Exclusion Criteria

Exclusion criteria are those characteristics that disqualify prospective subjects from inclusion in the study (Polit & Beck, 2014). Teachers in the Junior High Schools and the Educational directorate were excluded from the study.

3.4 Sample Size

Using a total of 90 primary school teachers, a sample size of 74 was determined using the Yamane formula (1967) with an error of 5% and with a 95% Confidence coefficient**.**

Using the Yamane formula

$$n = \frac{N}{1+N\,e^2}$$

Where n= the sample size

N= the size of population

e=the error of 5percentage points

$$n= \frac{\mathbf{90}}{\mathbf{1+90(0.05^2)}}$$

$$= \frac{90}{1+90(0.0025)} = 73.56$$

= 74 respondents

3.5 Sampling Technique

Sampling is the process of selecting a portion of a population to represent the entire population so that inferences about a population can be made. The convenient sampling technique was used in selecting the participants the study. Convenience sampling is a type of nonprobability sampling in which people are sampled simply because they are "convenient" sources of data for researcher.

3.6 Data Collection Technique/ Instrument

Data was collected using self-administration of structured questionnaire (APPENDIX). The entire questionnaire is in 3 sections, where section A is on respondent‟s socio demographic characteristics (age, gender, years of experience, educational qualification, and medium of instruction). Section B assesses the awareness of refractive errors by asking if the respondents have received any information on refractive errors and the source of their information. Lastly, section C asseses the knowledge level of teachers regarding refractive errors using an 18-item questions. The questionnaires were distributed and collected in unmarked envelopes by the researcher with the support of the District SHEP coordinator. Those who did not wish to participate were not be forced to take the questionnaire. The data collected will help to ascertain the awareness and the knowledge of teachers on refractive errors among pupils at Dunkwa-On-Offin and to identify if there is any relationship between knowledge level and other baseline factors like age and years of experience.

3.7 Pilot Testing

A pilot stage was conducted to enable the investigator to assess that all the research questions are understandable and appropriate, the order of data collection was correct and all ambiguous or leading questions were identified (Fox, 2006). It helped familiarize the investigator with all aspects of the study and identify problem areas requiring attention prior to the implementation of the study to help standardize the data collection procedure. The pilot study was carried out in Kyekyewere, a town in the Upper Denkyira East Municipality of the Central Region of Ghana with 5 participants. During the pilot exercise both enrollment into the study and procedures were carried out as per the protocol. Data forms was completed and the data entered into the database. Data entry and management associated with the pilot study ensured familiarity with all aspects of the data process. Data cleaning and analysis was conducted. Based on the pilot study experience and findings, problem areas requiring attention was addressed as necessary.

3.8 Validity and Reliability

3.8.1 Validity

Validity refers to the degree to which the instrument used measures what it is supposed to measure (McCusker and Gunaydin, 2014; Hancock and Algozzine, 2017). In general, validity is an indication of how sound the research is. More specifically, validity applies to both the design and the methods of the research. Validity in data collection means that research findings truly represent the phenomenon the researcher is claiming to measure. Valid claims are solid claims. The study findings represented the actual phenomenon of the study. To assess these, a pretesting of the instrument was conducted using five (5) primary school teachers at kyekyewere basic school before the main survey was conducted. Based on the

responses that was gathered, some questions were re-framed of errors that was encountered before the actual study was carried out.

3.8.2 Reliability

Reliability on the other hand is the degree of consistency with which the instrument measures the attributes under study (McCusker & Gunaydin, 2014; Hancock & Algozzine, 2017). The reliability was to ensure that the pre-testing schedule yielded similar results after the actual study was done by ensuring that the information collected was relevant to the research questions. The questionnaire was given to the research supervisor for appropriate scrutiny and corrections before administering them to respondents.

3.10 Data Collection Procedure

A school health program was organized for teachers within Dunkwa-On-Offin by Ghana Health Service in partnership with Operation eyesight Universal which was aimed at educating teachers on good eye care and their responsibilities as teachers during a school eye screening exercise which was about to be rolled out in the area. Consent was sought from the District SHEP coordinator. The investigator took that opportunity to administer his questionnaires before a presentation was made on refractive errors. The questionnaires were administered by the researcher with the help of the SHEP coordinator. All 74 participants took active part in answering the questionnaires. Meanwhile 4 respondents opted out due to reason personally known to them.

3.10 Method of Data Analyses

SPSS version 20.0 was used for data entry and processing. Statistical frequency distribution and percentages, including mean age with standard deviation was used to

analyze data on socio-demographic characteristics of the respondents. For objective 1, a frequency distribution table was used to assess the awareness levels of teachers. For objectives 2, a frequency distribution with mean knowledge and standard deviation, and a cross-tabulation was used to assess the knowledge level of teachers. A chi-square test was performed to test the relationship between socio-demographic characteristics (independent variables) and knowledge level of teachers (dependent variable).

3.11 Ethical Considerations

Since the respondents are human beings with rights, their rights were observed as such. Adequate information was given regarding the research and the respondents were made aware that they can either choose to participate or decline to take part in the study and that no punishments or rewards were offered. Participants were also made to understand that they could voluntarily leave the study at any time without incurring any penalty or pre-judicial treatment. Participants were not coerced to participate in the study. Approval was sought from the municipal education office. Data collected was kept confidential and anonymity ensured. Coding systems were developed so that sources of various data were identified only by the researcher.

CHAPTER FOUR

RESULTS AND DISCUSSION

4.0 Overview

This chapter presents an analysis of the data collected during the survey. It discusses the themes which are relevant and responses to the research questions which have been raised. Discussions of research findings are presented in frequency and simple percentages using tables and graphs. The first section presents an analysis of the biographical data of the respondents and proceeds to analyzing other issues.

4.1 Participation Rate

A total of 74 participants were available for the study, and of these 74 participants otherwise available, three participants did not complete the questionnaire and one participant was excluded because he did not consent to join the study. The 70 remaining eligible participants, all of whom completed the entire study protocol, formed the basis for continuing analyses unless otherwise stated.

4.2 Socio-Demographic Data

The socio-demographic data includes information on respondents age, gender, educational qualification, years of experience and medium of instruction. Table 1 presents results on the socio-demographic characteristics of the respondents.

Table 1: Socio-demographic factors

Variables	Parameter	Frequency	Percentage (%)
	Total	70	100
	Age	**36.57±6.17**	
Gender	Male	40	57.1
	Female	30	42.9
Age	20-30	9	12.9
	31-40	48	68.6
	41-50	12	17.1
	51 and above	1	1.4
Educational Qualification	O/A level	2	2.9
	Diploma	28	40.0
	Degree	39	55.7
	Post graduate	1	1.4
Years of experience	Less than 5years	15	21.4
	6-10years	27	38.6
	11-20years	25	35.7
	21-30years	2	2.9
	31 and above	1	1.4
Medium of instructions	English	63	90.0
	Others	7	10.0

Source: Author"s Compilation, (2022)

Table 1 shows information on respondents" socio-demographic data. The results show that the mean age of the 70 respondents was 36.57±6.17, with majority (57.1%) being males and minority (42.9%) being females. Of the total respondents, 68.6% were between 31-40 years, 17.1% were between 41-50 years, 12.9% were within 20-30 years, and the least percentage (1.4%) being 51years and above. With regards to the

respondent‟s educational qualifications, majority (55.7%) had a bachelor‟s degree, 40% had a diploma qualification, 2,9% had an O/A level qualification, and those with post-graduate certificates were 1.4%). Furthermore, most respondents (38.6%) had 6-10 years of teaching experience, 35.7% had 11-20 years of teaching experience, 21.4% had below 5 years of teaching experience, 2.9% had 21-30 years of teaching experience, and only 1.4% had 31 years and above teaching experience. Majority (90%) of the respondents used the English Language as their primary medium of instruction, whilst 10% used other languages as their medium of instruction.

4.3 Awareness level of respondents regarding refractive errors

Table 2: Level of awareness of respondents regarding refractive errors

Variables	Parameter	Frequency	Percentage (%)
Received information	Yes	54	77.1
on Refractive errors	No	16	22.9
Total		**70**	**100**

Source: Author‟s Compilation, (2022)

Table 2 presents results on the awareness of respondents expressed through their source of information regarding refractive errors. Results from the above table shows that majority of the respondents (77.1%) had received information on refractive error, whiles 22.9% had received no information regarding refractive errors.

4.4 Knowledge level of teachers regarding refractive error among primary school children

Table 3 presents the knowledge level of teachers regarding refractive errors among primary school children. The knowledge level has been defined per knowledge scores, and a mean knowledge level has been included in the table.

Table 3: Knowledge level

Variable	Parameter	Definition	Frequency	Percentage (%)
	Knowledge		**21.63±3.45**	
Knowledge level regarding refractive error	Less than 15	Poor	3	4.3
	15-19	Satisfactory	17	24.3
	20-25	Good	44	62.9
	26-31	Very Good	6	8.6

Source: Author"s Compilation, (2022)

Results from the above table shows that, the mean knowledge level of the respondents was 21.63±3.45. Majority 62.9% of the respondent had good knowledge on refractive error. This was followed by 24.3% of the respondents whose knowledge was satisfactory. Percentage of respondents who had very good and poor knowledge regarding refractive error were 8.6% and 4.3% respectively.

4.5 Awareness of Refractive errors and source of information regarding RE

Table 4 is a cross-tabulation of awareness of teachers on refractive errors and their source of information. Awareness as a variable was only based on teachers who responded Yes to the question on awareness of refractive error. This analysis seeks to find the sources of information regarding their awareness of refractive errors.

Table 4: Cross-tabulation of source of information and awareness of RE

Source of Information	Variable	Frequency	Percentage (%)
Mass Media	Awareness of RE	24	44.4
Health Personnel	(YES)	18	33.3
School Health Program		9	16.7
Others		3	5.6
Total		**54**	**100**

Source: Author's Compilation

From table 4, majority (44.4%) of the respondents who were aware of refractive error had their source of information from mass media. This was followed by 33.3% whose source of information regarding refractive errors was from health personnel, and 16.7% had their source as school health programs. However, 5.6% of the respondents had their information from other sources which were not listed.

Table 5: Factors that enable teachers to identify pupils with Refractive errors

Factors Characteristics	**N**	**Percentage (%)**	**P- value<0.05**
Age			0.993
20-30	9	12.9	
31-40	48	68.6	
41-50	12	17.1	
51 and above	1	1.4	
Years of experience			0.173
Less than 5	15	21.4	
6-10	27	38.6	
11-20	25	35.7	
21-30	2	2.9	
31 and above	1	1.4	
Total	70	100	

Source: Author"s Compilation

Data from table 5 shows that the p-value for the ages of the teachers and their years of experiences were 0.993 and 0.173 respectively. These values were greater than 0.05 showing that there was no significant association between knowledge level of teachers on refractive errors and the baselines variables.

4.6 Discussions

Awareness of Visual Impairment (Refractive errors)

Results from the study shows that majority of the respondents (77.1%) had received information on refractive error, whiles 22.9% had received no information regarding refractive errors. These findings are supported by Ambika & Nair (2013) when they assessed the awareness of primary school teachers in Mysore regarding refractive

error and its early identification among primary school children. In the study, 80% of the respondents had adequate awareness regarding refractive errors in primary school children. The results also support a cross sectional population-based study conducted in Southern India by Pallerla et al., (2022) to assess the awareness and knowledge level of the general public on refractive errors and strabismus. Results from the study showed that 74.3% were aware of refractive errors.

A study conducted by Agrawal et al. (2017) however contradicts the findings in table 2. In the said study which assessed the awareness of private school teachers regarding healthy vision in primary school children, 96% of the teachers had no awareness regarding healthy vision among primary school children.

Knowledge level of teachers

The findings regarding the knowledge level of teachers on refractive errors are consistent with a study conducted by Sravani et al. (2019) that found that 74% of primary school teachers had good knowledge regarding refractive errors. Research by Alemayehu et al. (2018) to assess the knowledge, attitude, and associated factors among primary school teachers regarding refractive error in school children in Gondar City revealed that majority (55.9%) of the teachers had good knowledge about refractive errors.

Association between knowledge level and baseline factors

The findings regarding the association between knowledge level of teachers and baseline factors indicated that there was no significant association between knowledge level of teachers on refractive errors and the baselines variables. This is not in consistence with what was reported by Ume et al (2017) which indicated that,

teacher‟s age and educational levels are significant predictors of the knowledge level of teachers on visual impairment.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.0 Introduction

This chapter presents the summary, key findings, conclusion and recommendations of the study. The chapter is therefore divided into four sections. The first section summarizes the results of the entire study, followed by the key findings, conclusion and the last section present the recommendations and suggestions for further studies.

5.1 Summary

This study explored the awareness and level of knowledge of primary school teachers regarding visual impairment among pupils at Dunkw- On-Offin in the Upper Denkyira East Municipality. This was a descriptive cross-sectional study that used convenient sampling technique to select 70 respondents. Data was collected through the use of structured questionnaire and check list. Data was analyzed with Statistical Package for Social Sciences (SPSS) version 20 and presented in the form of tables and the use of Mann-Whiteny U test and Kruskal Wallis test to establish association between baseline socio demographic characteristics and knowledge level. Summary of findings were presented as follows:

5.2 Key Findings

At the end of the research, the following key findings were made after analyzing the data collected;

- The result of the study provided information on respondents‟ socio-demographic data. The results showed that the mean age of the 70 respondents was 36.57±6.17, with majority (57.1%) being males and minority (42.9%) being females

- The study reported that majority of the respondents (77.1%) had received information on refractive error, whiles 22.9% had received no information regarding refractive errors. Also, Majority (90%) of the respondents used the English Language as their primary medium of instruction, whilst 10% used other languages as their medium of instruction.
- The study furthermore revealed that, the mean knowledge level of the respondents was 21.63±3.45. Majority 62.9% of the respondent had good knowledge on refractive error. This was followed by 24.3% of the respondents whose knowledge was satisfactory. Percentage of respondents who had very good and poor knowledge regarding refractive error were 8.6% and 4.3% respectively
- Also, there was a no significant association between baseline factors like age and number of years of practice and the knowledge level of school teachers.

5.3 Conclusion

The findings of the study were beneficial and the following conclusions were drawn from the study. From the findings gained from the study, it can be concluded that the majority of the respondent were aware of refractive errors. Also, majority of the respondent had good knowledge regarding refractive errors. There was no significant association between socio demographic factors and knowledge level of teachers regarding visual impairment refractive errors.

5.4 Recommendations

Based on the study findings, the following recommendations were made:

1. Ministry of Health in collaboration with the Ministry of Education in charge of curriculum development should factor education on the identification of visual impairment as part of the courses to be learnt in various training institutions.
2. Ministry of Health in collaboration with the Ministry of Education should formulate a policy that ensures that children undergo mandatory eye examination by a professional eye care practitioner before they are enrolled in any educational institutions with their report kept in their school records.
3. Ministry of Health in collaboration with the Ministry of Education should organize periodic in service training for teachers to enable them identify minor eye conditions among pupils.

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APPENDIX A

SURVEY QUESTIONNAIRE

TOPIC: **AWARENESS AND KNOWLEDGE LEVEL OF TEACHERS ON VISUAL IMPAIRMENT AMONG PUPILS AT DUNKWA – ON- OFFIN**

The aim of the survey is to access the awareness and knowledge level of teachers on visual impairment (refractive errors) among pupils at Dunkwa-On-Offin. Your participation is voluntary to answer the following questionnaires. Your answer would be confidential.

INSTRUCTIONS:

1. The questions are into sections. Section A describe the demographic characteristic of the participants, Section B answers the awareness level of teachers on visual impairment, Section C answers the knowledge level of teachers on refractive errors.
2. Tick good (√) against the correct response/s in the spaces provided.
3. Provide additional information as appropriate in the spaces provided

SECTION A

SOCIO-DEMOGRAPHIC CHARACTERISTICS

Instruction: You are requested to provide some information about yourself, please read the items carefully and complete them by placing a tick mark (□) in the appropriate space provided for each item on right side.

1. Age in years
   a. 20-30 ( )
   b. 31-40 ( )
   c. 41-50 ( )

d. 51 and above ( )

2. Gender

a. Male ( )

b. Female ( )

3. Educational qualification

a. O/ A Level ( )

b. Diploma ( )

c. Degree

d. Postgraduate ( )

4. Years of experience

a. ≤5years ( )

b. 6-10 years ( )

c. 11-20 years ( )

d. 21-30 years ( )

e. 31 and above ( )

5. Medium of instruction

a. English ( )

b. Others …… ( )

SECTION B: Structured questionnaire to access the awareness level of teachers on refractive errors and the source of the information

6. Do you received any information regarding refractive error

c) Yes ( )

d) No ( )

7. If yes, source of information

   a. Mass media

      - Newspaper ( )
      - Magazines ( )
      - Text books ( )
      - Television ( )
      - Radio ( )
      - Internet ( )

   b. Health personnel ( )

   c. School health programs/ training programs

   d. Any other (specify) ( )

SECTION C

Structured questionnaire on knowledge level of teachers regarding visual disorder (refractive errors) among Pupil

Instructions: This tool consists of questions related to refractive error. Each question has options and there is only one best answer. You are requested to read each question carefully and choose the most appropriate option and place a tick mark (√) in the space provided against it. Each correct response is scored with 1 point. Please answer all the items

1. Refractive errors can be easily identified in

   a) Infants ( )

   b) School children ( )

   c) Adults ( )

2. Refractive errors occur when

   a) eye infections are present ( )

   b) nutritional deficiencies are present ( )

   c) shape of eye prevent light rays from focusing ( )

3. Risk factor for refractive error include

   a) family history of refractive error ( )

   b) contact with children with refractive error ( )

   c) vitamin deficiency ( )

4. Common types of refractive errors

   a) Long-sightedness, nearsightedness ( )

   b) Cataract and glaucoma ( )

   c) Squint and conjunctivitis ( )

5. Refractive error affects

   a) Only Near vision ( )

   b) Only Distant vision ( )

   c) Vision at different distances ( )

6. Children with nearsightedness will have problem in seeing

   a) near objects ( )

   b) near and distant object ( )

   c) Distant objects ( )

7. Most common clinical feature of refractive error is

   a) blurred vision ( )

   b) redness of eye ( )

   c) eye discharges ( )

8. A child with refractive error can have

   a) squint eye ( )

   b) whitish spot on the eye ( )

   c) loss of eye lashes ( )

9. The child holds the book very close to eyes while reading because of

   a) Long-sightedness ( )

   b) Nearsightedness ( )

   c) Conjunctivitis ( )

10. The refractive error can

   a) not affect on academic performance ( )

   b) lead to poor academic performance ( )

   c) Improve the academic performance. ( )

11. A child with refractive error has problems with

   a) Only Reading ( )

   b) Only Writing ( )

   c) Both reading and writing ( )

12. A child with refractive error

   a) avoids sports and other recreational activities ( )

   b) actively participates in sports ( )

   c) active in classroom ( )

13. Uncorrected refractive error leads to

   a) chronic headache ( )

   b) loss of vision ( )

   c) dryness of eye ( )

14. Common and simple method to test visual acuity is

    a) snellen chart ( )

    b) laboratory investigations ( )

    c) x ray ( )

15. Refractive error goes unnoticed because

    a. it is asymptomatic ( )

    b. children try to adjust with the problem ( )

    c. it does not require treatment ( )

16. Common refractive errors are easily corrected with

    a. medications /eye drops ( )

    b. nutritional supplement ( )

    c. spectacles ( )

if you suspect any visual difficulties in a child you should

    a) Discuss with parent and referred to ophthalmologist ( )

    b) do not require attention ( )

    c) discuss with parents and refer to special schools ( )

18. Children with spectacles should go for eye examination

    a) once in a month ( )

    b) once in a year ( )

    c) once in 5 years ( )

Instructions: given below are some statements about refractive errors in children. Read and place tick mark (□) in appropriate column.

S no.	Statement	True	False
19.	A child with refractive error can change their focus quickly from far to near objects but gets frequent headaches.		
20	A child with refractive error will not miss words while reading or do not use finger to guide his eyes when reading		
21	Children with long-sightedness will do activities which require near vision, such as reading or homework.		
22	Children with nearsightedness hold the book very close to their eyes while reading.		
23	Children with refractive error rub their eyes while trying to see distant objects like blackboard.		
24	Children will tilt the head to one side or close one eye to see well.		
; 25	Children have difficulty in writing straight lines.		
26	Children leave out small words while reading.		
27	Children will finish the board work within assigned time.		
28	Children will talk to other students to get some help.		

29	Eye pain and headache are not present in children with refractive error.		
30	Children with refractive errors have normal attention span and have no learning difficulties.		
31	Children may tend to fall because they cannot see the steps		