ABNORMAL VISUAL ACUITY SCREENING AMONG SECONDARY PUPILS IN OWERRI URBAN

A DISSERTATION PRESENTED TO THE DEPARTMENT OF COMMUNITY MEDICINE COLLEGE OF MEDICAL SCIENCES, UNIVERSITY OF NIGERIA ENUGU CAMPUS

IN PARTIAL FULFILLMENT FOR THE AWARD OF MASTERS DEGREE IN PUBLIC HEALTH (MPH)

BY

DR. OBI PASCAL CHIGOZIE

PG/MPH/07/47248

SUPERVISOR

PROF. NWAGBO D.F.E

JUNE, 2013

DECLARATION

I hereby declare that this is my original work and any assistance is duly acknowledge; that I have not previously submitted this dissertation in part or full for any examination or publication.

_____

DR. OBI PASCAL C
Department of Community Medicine university of Nigeria Enugu Campus

ATTESTATION

We certify that the work for this dissertation "ABNORMAL VISULA ACUITY SCREENING AMONG SECONDARY PUPILS IN OWERRI URBAN"

By

Dr. Obi Pascal C.
PG/MPH/07/47248
Was supervised by

Prof. D.F.C Nwagbo
Supervisor

_____
Date

Prof. BSC Uzochukwu
Head of Department

_____
Date

DEDICATION

This work is dedicated to the evergreen memory of my dear father Chief Obi Ihemeje who spared no effort to ensure my attainment of the golden fleece.

ACKNOWLEDGEMENT

I am immensely grateful; to my project supervisor Prof D.F.E Nwagbo for his painstaking efforts in supervising this work and most especially for his patience.

I am grateful to Dr. C.A Okeji for his contributions in analyzing the data. I also thank my senior colleague Prof J.N.B. Nnadozie for criticizing the work at various stages.

I remain indebted to my wife Mrs. Uloma Obi and my loving children for their support and understanding.

Dr. Pascal C. Obi.

CONTENT

CHAPTER SIX: CONCLUSION AND RECOMMENDATION

List of table

ABSTRACT

A cross sectional descriptive study of visual acuity if post-primary school children in one urban and one rural communities in Owerri were undertaken.

A total of 318 children were randomly selected using a multistage sampling procedure. Out of this number, 170 were males while 208 were females representing 45% and 33% respectively of the study group.

The result of the study shows that about 21.4% post-primary school pupils have various degrees of subnormal visual acuity. Two thirds of these (14% of the total) have mild defects. There is a significant sex variation in prevalence, the female being more affected than the male (14%; 74%). There appears to be a relationship to height, tall pupils having a higher prevalence than short ones. Similarly, pupils who spend more time in close works has a higher prevalence that those who do not (14.7% and 100%) of those who read between 1 hour to 2 hours and 4 hours to 5 hours respectively. There is a significant hereditary influence on the incidence of subnormal vision (7.4% and 26.2% of those with negative and positive family history respectively). Eye defect is statistically dependent on family history $P = 0.05$.

Finally the population studied presented no data on the age at which myopia commences, but earlier investigations have shown that only a minority are myopic before school age (6 years). After this age, the frequency of myopia increases from year to year.

CHAPTER ONE

INTRODUCTION

1.1 Overview

Modern technological developments have brought the replacement of man by machines in a wide range of field and have entailed radical changes in our social structure. At the same time, the demands made on each individual have increased and even a slight handicap may nowadays limit a man's opportunities. Defects in visual function are particularly notorious in this regards. Reduced vision limits both possible range of occupations and the exercise of a large number of functions. Slight myopia is only a slight handicap and may even be an advantage in extensive class work, but higher degrees of myopia is a handicap in every situation, and any attempt to reach a better understanding of the causes of myopia is therefore well-motivated.

Conservative estimated indicate that many school children have important eye troubles. It is helpful to teachers, as well as to lay people, to know the causes and effects of defects in vision. It is helpful to know children's behavior suggestive of visual difficulties. Perhaps equally important is the knowledge that some children's

eyes, even after correction with glasses r other methods, may still function less than optimal.[1]

Defective sight is defined as any deviation from, the theoretically normal eye either in structure or in function. In practice however, the term defective sight applies only to those deviation great enough to interfere with efficiency or with comfort.[2]

Different types of defective vision are known to exist in all races, but the frequency varies considerably. Variations are also found within limited population groups and a great deal of research on the subject has therefore been concerned with the fundamental problems: why do some people have a particular refractive error, but not others? Are these caused by external factors or are they hereditary? Are refractive errors a product of civilization-an environmental disease the reasons for which we do not know-or are they genetically determined and only, influenced to a limited degree by external condition?. These problems have occupied prominent places in ophthalmological research for more than a century, and have given rise to heated and passionate debate. The debated have on occasion been characterized by strong polemics, with mutual accusation of scientific irresponsibility - Honest attempts to achieve a rapprochement between adherents of the different schools

of though have been rare, due in part, no doubt, to tradition, orthodoxy and semantic problems.

AIMS/OBJECTIVE

General

The primary effort in this study is the analysis of the prevalence of defective visual acuity among secondary school pupils in Owerri Urban.

Specific aims:

1. To find out the proportion of pupils with normal and subnormal vision.
2. To compare visual acuities among different schools studied.
3. To find out if visual acuity has any relation to sex.
4. To ascertain the effect of nutritional status/states of well being on the vision of students.
5. To find out visual acuity by age.
6. To determine whether it is affected by heredity.
7. To verify if all with major symptoms of eye problems have reduced acuity and vise versa.

CHAPTER TWO

LITERATURE REVIEW

At the twenty-eight World Assembly (1973), an appeal was made on behalf of the blind and people with defective vision. The WHO press release of 27th May, 1973, states. “The present number of about 16 million blind people in the world will have swollen to 30 million blind people in the world by the end of the Century unless decisive action is taken according to sir John Wilson President of the International Agency for the prevention of Blindness. In a moving appeal to delegated attending the World Health Assembly in Geneva, Sir John said that there were times when politically and scientifically an opportunity presents itself to make a great move forward. An occasion of this occurred in the case of smallpox, where a great international effort has been made to wipe out that disease. “Now we have a similar opportunity, at a modest cost to save the sight of millions. One of our basic human right is the right to see. No one should lose his sight unnecessarily.[3]

Sir John, who himself is blind, described the four giants which causes 80 percent of the world’s blind and defective vision: Onchocerciasis or River-blindness which has left numbers sightless in West Africa along; trachoma, a disease which affects 400 million,

people, yet which can be cured at a unit cost of US 50 cents; xerophthalmia, the biggest cause of child blindness although the cost of one year's protection works out at about 12 cents; and cataract which has left some six million blind in Indian subcontinent. He described a mass cataract camp in India where in three weeks 1,200 blind person has their sight restored by a simple operation costing US 5 dollars.[3]

The above world review is not different from the prevalence of abnormal vision obtainable in Nigeria. Chief Anthony Enahoro, the then Federal commissioner for information and labour, in 1968 observed in the Annual Report of the National Advisory Council for the blind (NACB). "Amongst Nigerian's teaming population are, men, women and children who, through one cause or another are blind or have impaired vision. In spite of these disability these blind numbers of our society have individual potentialities which, if developed would enable them to contribute their quota to the development of our society.[4] Not infrequently school children have difficulty in learning in spite of having average or above average intelligence. The reported incidence varies from one area to another, but it is about 10to15 percent of all children. Girls are affected more than boys.[5]

The most common variety is difficulty with reading and or spelling. But it is only one of a wide spectrum of learning disability which are interrelated. Reading facilities is essential in this competitive modern world.

The act of reading is the recognition of visual symbols and their interpretation. These symbols have a spatial and temporal inter relationship and significance, and are interpreted in teams of auditory equivalent. From this memory develop through a process involving memory and association. In other wards reading is the decoding f the written word. How badly affected is this process in students with visual defects or subnormal vision?.

Since in many learning process and particularly reading, the input is visual, it is a common practice to blame the eyes primarily, and thus consult the ophthalmologist first. He should be able to carryout a comprehensive and detailed examination under adequate eyeloplegia, being actively aware of all parameters which he prescribes. But often these simple procedures are neglected resulting in serious visual defect.

One thing that is certain is that early recognition, investigation through multi-disciplined approach, and appropriate early remedial

instructions either in classroom or by personnel teaching holds the best chance of success.[6]

2.1 What Is Visual Acuity?

Visual acuity can simply be described as a measurement of resolving power of the eye or a measure of the smallest retinal on which the form can be appreciated.[7] It is more precisely described as the ability of the eye to see clearly under condition of good illumination of objects places at 6 meters or 20 feet which subtends on angle of 5 minutes from the nodal point of the eye. It means the extent to which the details and form of various objects can be perceived accurately. It represents not only a test of the optical system of the eye, anatomy and functional organization of retina but it also includes the ability to discriminate a target from its background and to convey the perception. The fist requirement for visual acuity estimation is contrast between the target and its background. Black objects on white background are usually used for this determination.

From a clinical standpoint, visual acuity is generally defined in terms of the minimum distance that two lines can be separated and still be perceived individually. The minimum separable distance is frequently measured in practice by use of snellern letter charts,

which are read from a distance of 6 meters (20 feet) – description of this method is included in chapter two.

Visual acuity is affected by such factors as physiological Nystagmus, the eyes are never absolutely still even when gazing fixedly at one point or an object; optical mechanisms that form images on the retina, retinal parameters including the level of photochemical, in rods and cones; the wavelength and intensity of visual stimulus; the simultaneous or successive contrast between the visual stimulus and the background, the temporal exposure to the visual stimulus and the state of adaptation of the eye.

2.2 The structure of the Eye and Visual Pathway

No attempt is made here to go into details about the components since this information, though interesting will add very little to the study of defective visual acuity in a group of Nigeria children.

They eye is protected by several mechanisms:

a. A bony cavity
b. Tissues which absorb shock
c. The eye lashes to protect the exposed parts
d. Tear glands to wash the front of the eyes.

e. Reflex action by which the brain automatically closes the lid against objects which threaten the eye – the blink reflex.

They eye is almost rounded and is made up of three basic layers.

(i) Outer corneo-sclera layer: The corneo-sclera layer forms a tough, fibro-elastic capsule which supports the eye ball. The posterior five-sixths, the sclera is opaque and provides insertion for the extra-occular muscles. The anterior one-sixth, the cornea is transparent and has a smaller radius of curvature.

(ii) Uveal layer: The middle layer, the uveal tract is a highly vascular area made up of three parts from back forwards: the cleroid, ciliary body and the iris. The choroid lies between the sclera and retina in the posterior five-sixths of the eye. It provides nutritional support for the retina and is heavily pigmented, thus absorbing light which has passed through theretina. Anteriorly the choroid merges with the ciliary body which surrounds the coronal equator of the lens and is attached to it by the suspensory ligaments. The lens is a biconvex transparent structure.

The ciliary body contains smooth muscle, the tone of which controls the shape of the lens via the suspensory ligaments. The lens,

suspensory ligament and ciliary body petition the eye into an anterior and posterior compartments. The Iris, extending in front of the lens from the ciliary body is highly pigmented and acts as an adjustable diaphragm which regulate the amount of light reaching the retina. It has an aperture called the pupil.

The anterior compartment contains a watery fluid, the aqueous humour, secreted by the ciliary body and drains into the canal of schlemn. It is a source of nutrition to the lens and cornea and its pressure maintains the shape of the cornea. The posterior compartment contains a gelatinous mass, the vitreous humour which supports the lends and helps in maintaining the shape of the eye.

(iii) Inner Layer: The photosensitive retina forms the lining of the posterior compartment. It contains special cells known as rods and cones. The visual axis of the eye passes through a depression in the retina called the fovea. The fovea retina is the area of greatest visual acuity and contains only cones. Different nerve fibres from the retina converge around the optic disc, devoid of photoreceptors and is this referred to as the blind spot.

2.3 The Visual Pathway

Figure 2. Illustrated the visual pathway from the retinal back to the visual cortex. After impulses leave the retina they pass back through the optic nerve. The spatial organization of the retina is preserved in the pattern of orientation of fibres which leave the eye in the optic nerve. Fibres that represent signals originating in the temporal retina do not cross the midline at the optic chiasma but travel up into the optic tract on the same side of the brain. Fibres originating in the nasal retina cross at the chiasma and of the brain. The fibres of each optic tract synapses in the lateral geniculate body, and from here, the geniculocalcarine fibres pass in the optic radiations of geniculocalcarine tract to the optic or visual cortex in the calcarine area of the occipital lobe. In addition nerve fibers from the retina pass to three other areas of the brain:

(i) From lateral geniculate body to the lateral thalamus.

(ii) From the optic tracts directly to the superior calculi, and

(iii) From the optic tract directly into the pretectal nuclei of the brain stem.

2.4 Refractive errors of the eye and amblyopia

Emmetropia: The eye is considered to be normal or “emmetropic” if, when the ciliary muscle is completely relaxed, parallel light rays from distant objects are in sharp focus on the retina. This means

that the emmetopic eye can, with its ciliary muscle completely relaxed see all distant objects clearly, but to focus objects at close range it must contract. This is accommodation: the ability of the eye to alter its focus to see objects nearer than infinite.

Hypermetropia (Hyoeropia): Also called “farsightedness,” is due either to an eyeball that is too short or to an optical system that is too weak when the ciliary muscle is completely relaxed. In this condition parallel light rays are not bent sufficiently by the optical system to come to a focus by the time they reach the retina. In order to overcome this abnormality, the ciliary muscles may contract to increase the strength of the lens. Therefore the far-sighted person is capable, by using his mechanism of accommodation of focusing distant objects on the retina. If he has used only a small amount of strength in his ciliary muscle to accommodate for the distant objects, then has much accommodative power left, and objects closer and closer to the eye can also be focused sharply until the ciliary muscle has contracted to its limit. The distance the object away from the eye at this point is known as the “near-point of vision.

Myopia: In myopia or near-sightedness, even when the ciliary muscle is completely relaxed, the strength of the lens is still so

great that light rays coming from distant objects are focused in front of the retina. This may be due either to long an eye ball or too much power of the lens system of the eye.

No mechanism exist by which the eye can decrease the strength of its lens beyond that which exist when the ciliary muscle is completely relaxed. Therefore, the myopic person has no mechanism by which he can even focus distant object sharply on his retina. However, as an object comes nearer and near to his eye, it finally comes near enough that its image is focused on the retina.

Astigmatism: Astigmatism is a refractive error of the lend system of the caused usually by an oblong shape of the cornea or, rarely by an oblong shape of the lens. A lens surface like the size of a football lying edge wise to the incoming light, for instance, would be an example of an astigmatic lens.[10] The degree of curative in a plane through the long axis of the football is not nearly so great as the degree of curvature is a plane through the short axis. The same is true of an astigmatic lens along the other plane light rays striking the peripheral portions of the lens in one plane are not bent nearly so much as are light rays striking the periphery of the other plane.

Presbyopia: In old persons when the lens become presbyopic, the lend loses it elastic nature and becomes a relatively solid mass.

Probably because of progressive denaturation of lens protein, the ability of the lens top assume a spherical shape progressively decreases, and the power of accommodation deceases to approximately 17 diopters at 50 years. In this condition the already farsighted person often is unable to accommodate his lens sufficiently to focus even distant objects, much less to focus near objects.

Amblyopia: The term amblyopia is generally used in a restricted sense to denote reduced vision in an eye in the absence of opthalmoscopically detectable retinal anomaly or any disorder of the afferent pathways which might cause the defect. In its widest sense it may be used to include a defect of vision owing to the absence of adequate symmetrical stimuli to the two eyes so that the binocular reflexes cannot be developed. It is a relatively common condition and it is to be remembered that it is not confined to patients with squint for in many instances, particularly when due to omisometropia or any organic lesion, the image in the less efficient eye retain a normal or near normal orientation.[11] Different types of this defect has been recognized including strabismic amblyopia, anisometric, form vision deprivation amblyopia (by cataract), form vision deprivation in strabismus.

Strabismic amblyopia: Also known as “crossed-eyes” leads to an inability to direct both eyes to the same object. This may be due to muscular imbalance, near-sighedness of far-sightedness, weak power of focusing, or a combination of all these. It is usually functional in type and occurs as a result of a squint and is due to an active inhibition or suppression adopted as a means of eliminating the adverse effects of diplopia and visual confusion, but in contrast to facultative suppression it is an obligatory nature persisting constantly even when the squinting eye is forced to fixate. It characteristically occurs after an interval in a uniocular squint.

2.5 factors Affecting Visual Acuity

(i) ***Presence of refractive errors in the eyes:***

In anemetropic eye, each point on the retina receives rays from several points only. Thus there is no sharp boundary between black and white on the retina as in emmetropic eye and the gradient of contrast is low there.[12] Thus visual discrimination will be poor.

(ii) ***Contrast:***

Ludirgh has found that as the contrast between the letters on the chart and their background is increased from a sub-minimal at which no vision is possible, the visual acuity mounts rapidly at fist

but more and more slowly thereafter.[13] i.e. a loss of contrast sensitivity would lead to a lowered visual acuity.

(iv) ***Influence of the size of the pupil***

Changes in the size of the pupil have two effects that are mutually antagonistic. The larger the pupil the more the light will enter the eye. If the illumination of the test chart is low this will improve visual acuity. But an increase in the size of the pupil will also permit participation of the more peripheral zones of the refracting surfaces in forming the retinal images so that aberration are intensified

(v) intensity of Illumination

Within certain limits, increasing illumination results in better visual acuity. Since an increased illumination generally produces narrower pupils and since chromatic and spherical aberrations are lessened by small pupils, one would expect such relationship. However miosis is not the sole cause since visual acuity increases with increased

illumination even if the pupils were kept constant by artificial means.

(vi) Retinal influence

The fovea is the most photo-sensitive part of the retina. Foveal acuity is therefore greater than that of any other region and the fall in acuity occurs abruptly as one leaves the fovea.

(vii) Influence of fixation

In the snellen's chart, as the angular size of the letters become smaller, the angular distance between each letter is likewise diminished. Thus apart from testing the resolving power of the eye as an optical instrument, we are also testing the power of fixation.

(viii) Influence of the eyelid

Most people with myopia learn to obtain a better visual acuity without glasses by narrowing the fissures of the eyelids, A chalazion if fairly large by pressure may change the refraction considerably.

(ix) Effect of tear film and winking

The optical proper tips of the eyes are increased to a great extent by tear film since microscopic irregularities in the corneal

epithelium are abolished thus producing a perfectly smooth polished optical surface.

(x) Legibility of the various letters in the snellen's chart.

Some of the letters in the snellen's chart are interpreted more easily than others by all subjects. This can be traced back to manufacturers of such charts.

(xi) Variability of visual acuity

Visual acuity measurement are fairly constant and changes very little in the same person from day to day without pathological cause. Variation that may occur may be due to change in illumination of the room in which the test is carried out which influence the size of the pupil. Other factors like variation in the anterior surface of cornea due to composition of the tear film may come into play. Changes in frequency of discharge of nerve cells concerned with vision contributes.

(xii) Miscellaneous factors

When a person reads a snellen's chart the power of attention or concentration consisting of both willingness, ability of the subject to make a conscious effort to read and removing all anxiety is required of him. The intelligence, personal interest, status of health or fatigue at the time of reading and the degree of interest and sympathy shown by the screener contribute.

2.6 Previous investigations on the aetiology of myopia

It is believed that myopic man has certainly existed on the earth for more than 50,000 years. On the other hand, written reports on myopia are only known from about the last 2000 years. Aristotle is

generally thought to have been the first to provide data on myopia, in that he remarked that short sighted people blink and wrote a small hand. Great influence was exercised by Galen, who lived in the 2nd, century A.D and whose theory of the body fluids came to influence opinion on the refractive errors throughout the whole of middle ages and the Renaissance. Galen believed that vision and refractive errors depend on the composition and consistency of the fluid of the eye.

Towards the end, the literature on myopia started to follow different paths, and the edifice built on Galan's teaching began to crumble. An astronomer and physicist at the beginning of the 17th century, created the foundation for optics in general and physiological optic in particular. This was Keppler who, in 1`604, was the first to recognize that a prerequisite of clear sight was a clear image on the retina. Keppler further drew attention to the fact that those who used their eyes a lot for reading and writing became mmopic. Since then a lot of literatures pointing to the increased knowledge of myopia appeared in the European scene. The oldest proof the use of concave lens is to be found in a Raphael portrait of Pope Leo X in the 15th Century.[14]

The Dutch ophthalmologist, Bonders (1864) published several works on the use of spectacles and on the refractive errors, and few years later published his now classical study on the accommodation and refraction of the eye. From then on it was clear that myopic emerged and developed during growth.[15] It was found that both the number of myopes and its degree increased with age.

The investigation of Cohn and others indicated that short sight was far more frequent in grammar schools than in primary school, and this combined with the fact that myopia mainly first arose after a number of years at school, confirmed the then common belief that the development of myopia was due to close work. However, it was at the same time apparent to many ophthalmologist that hereditary factors also played some part. Is was an accepted fact that some families had a large number of myopes, and Dander advance the hypothesis that myopia was acquired as a result of close work, but that the acquired characteristic was then transmitted to descendant. Donder considered it a proven fact that close work disposed to myopia and found three factors to be of particular importance;

(i) The pressure f the muscle of the eye during convergence.

(ii) Increased pressure in the ocular fluid caused by blood stesis when a person adopts a stooping lead to a softening and extension f the coast of the eye.

(iii) Consequent funds changes, which were supposed lead to a softening and extension of the coats of the eye.

The problem which many researchers had to contend was how he increased axial length that most frequently causes myopia came about.

In 1913, Adolph Steiger published a monograph which radically changed the course of research on refraction. He worked on corneal refraction and astigmatism occurred with varying frequency at different age. Moreover, comparative analysis of parents and offspring showed that hereditary played on extremely significant role.

Innumerable investigation then followed which then showed that all the optical components except that axial length mainly follow a normal distribution, the distribution curve for the axial length so that hypernetropic eye on an average are short, and myopic eyes are long.

Straub (1918) could not accept Steigers reasoning. He submitted that during growth, the eye underwent a process of

emmetropization which was governed by the images on the retina and the tone of the ciliary muscle. In comparing the refraction in newborn infants with that of school children and army volunteers, he found a constaintly decvreasing variance in the refraction curve. He believe that the tone of the ciliary muscle adapted itself to the eye so that parallel rays converged to the retina, and hypermetropia and myopia were thus de to failure of this adaptation.

More recent works on myopia has then been concentrated on

(i) The genetic background of myopia using twin, familial and population studies and genealogical investigation.[16]

(ii) The importance of environment in the etiology of myopia particularly close work, intelligence and debility since positive correlation has been ascertained between myopia and various diseases such as tuberculosis, syphilis, “diseases of childhood” particularly measles, anaemia, endocrimal complaints, deficiency of vitamin A and D, calcum deficiency and flat foot, and finally eye infection especially keratitis with the *0* I development of corneal opacities.

2.7 signs and Symptoms of Eye problems

Some of these signs can be picked up by the affected student whereas others need the attention of a third party such as the teacher/parents and persons knowledgeable in ophthalmology.

1. Unusual frequent blinking.
2. Attempts to 'brush away' blur
3. Squient connected with looking at distant objects.
4. Habit of rubbing the eyes.
5. Tendency to stumble over small objects.
6. Frequent or continuous frowning.
7. Red, encrusted or swollen eyelids.
8. Undue sensitivity to light.
9. Inflamed or watery eyes.
10. Recurrent sties.
11. Complaint of headaches sometimes even stomach aches.
12. Crossed eye.
13. General inefficiency.

Other warning signs may be:

14. Holding a book abnormally close to, or away from the face when reading.

15. Inattention during reading periods or during chalkboard, chart or mapwork.
16. Evidence of difficulty in reading or in other work requiring close use of the eyes.
17. Inability or lack of desire to participate in games requiring distant vision.
18. Poor alignment in written work.
19. Tilting head to one side or thrusting head forward when looking at near or distant objects.
20. Nervousness and irritability when doing close work
21. Shutting or covering one eye when reading.
22. Low moral or fatigue.

Table 14 Prevalence of myopia reported by various authors adapted from Duke – Elder and Abram (1970) and Ar-Shalom et al (1967)

Author	County	Year	Subject	Prevalence myopia %
Holm	Congo	1964	Genera; population	0.12
Av-Shalom	Africa	1967	General population	1.7
Hertz	Liberia	964	Children	2.0
Pipov	Russia	1931	Students	2.4
Douning	USA	1945	Children	3.
Clearke	UK	1924	Army recruits	4.5
Ar-Shalam	Africa	1967	Eye clinic patients	3.8
Goldschmidt	Denmark	1968	Children	9.5
Sorsby	UK	1960	Youngmen	10.7
Betsch	Germany	1929	Adult clinic Patients	12.5
Witte	Germany	1923	General population	13.8
Kronfeld	Germany	1929	Adult clinic Patients	14.6
Undgren	Sweden	1953	Children	17.0

Thompson	UK	1919	Adult clinic population	19.8
Sato	Japan	1964	Children	27.0
Harman	UK	1936	Eye clinic patients	27.0
Hess	Germany	1894	Children	27.8
Takahashi	Japan	1939	General population	31.0
Li	China	1920	General population	53.0
Sato	Japan	1964	Young adults	67.0
Rasmussen	China	1936	Young adults	70.0
Girgis	Egypt	1948	Children	70.0

CHAPTER THREE

METHODOLOGY AND LIMITATION

THE STUDY POPULATION

Nature and scope of study

This project is a screening and descriptive study for the prevalence of defective visual acuity among secondary school pupils in Owerri Urban. Out of the fifteen secondary schools in Owerri Urban, three were chosen by simple random sampling, one of which is a mixed school. Within the selected schools, three classes were selected randomly to represent each form of JSS and SSS students. Within the selected classes student were randomly selected using systematic sampling procedure. This method which is a multistage method was adopted to ensure equal representation of students of various ages. A total of 378 students were used.

Sample size determination: Applying sample size determination formula for infinite population, the minimum sample size

$$n=\frac{Z^2P\ (I-P)}{d2} = \frac{4(.15)(.85)}{(0.04)^2} = 318$$

Allowing for attrition 20% was built into the calculated minimum sample size. Hence 378 was used as the sample size for this study. Study Design: This is a Descriptive cross sectional study involving secondary school students of Owerri Urban. A multistage sampling technique was adopted in this study.

Technique of data collection

The source of data for this work is essentially a primary one, from the schools selected for this study. Two distinct methods were used for the collection of necessary information.

i. Questionnaires
ii. Measurements.

The questionnaires (appendix) is designed with open and closed ended questions so that one could get standard answers from specific questions, and to give room for a discrete analysis of results. It is divided into three parts. Part 1 is personal data providing answers about the respondent, nature of visual symptom if any and the use of spectacle. Part II is family data and question were directed towards close relations only about visual symptoms, use of spectacles and occupation of parents for completeness. Then comes part III being the results of measurement of visual acuity, height and weight.

After distributing the questionnaires, information was handed down on how to fill them as many have never has such an experience, and to minimize error. It was not long before finding out that the students were not used to some terms contained in the questionnaire like 'blurred vision' and even 'spectacles.' It is funny but it's true. The needed explanation was carefully made so that each pupil can by himself explain these new words.

Since part II of the questionnaire is about family data it was necessary to allow the pupils to go home with them for the assistance of their relations. This was collected back the following day.

Measurement of visual acuity was a standard snellen's chart, courtesy of Ophthalmology department, Federal Medical Centre, Owerri. Snellen concept for visual acuity is widely sued today. Each of the constituent part of the letters subtends a visual angle of one minute of are at the eye, at the distance the letter is supposed to be seen. The minimum resolvable visual angle is taken as the visual acuity which is designated according to snellen's classical formula v=s/D, where d is the distance at which the letters are read and D that at which they should be read.[17]

The distant visual acuity of each eye is recorded as an expression of the line or letters which can be discerned at a particular distance (usually 6 meters) from the eye; if, for example, letters in the seventh line are read the acuity is recorded as 6/6, when numerator equals the distance of the chart from the eye in metres and denominator equals the distance at which the letters substend 5' at nodal point of the eye. If unable to read letters in this line he is requested to read from the sixth line upward until a line is reached at which he can read all the letters and the corresponding visual acuity of that eye is recorded. If, however, the pupil is unable to read the tope letters at 6 metres he is asked to approach the chart until he is able to repeat it. If this distance is, for example, 3 meters the vision is recorded at 3/60. The eye not being tested is closed with one hand; after which the whole procedure was repeated for the other eye.

Measurement of height in meters and weight in kilograms was done for every pupil.

Precautions

Since errors abound which can lead to wrong judgment and analysis if certain principles were neglected, the following precaution were taken to reduce such.

1. Illumination: In each school a free classroom or hall was used with adequate illumination from natural light and for uniformity.
2. No measurement of visual acuity was done with correcting glass on the eye.
3. The standard distance of 6 meters was used with all pupil except those who cannot read the biggest letter at this distance.
4. Adequate temporal exposure was allowed before each reading.
5. All sources f distractions and anxiety were minimized reassurance was given when necessary.
6. The eye not being used during each measurement was properly closed.
7. Pupils were educated on the effect of any wrong information submitted in the questionnaire whether inadvertent or not. Those who wanted to remain anonymous were encouraged to do so provided correct, and only correct information were submitted.

Limitation of study

Time: Time was obviously a limitation as other issues were competing for it.

Resources: Nothing good goes without some spending various stages of this study need not only academic input but also financial commitment which must be provided otherwise catastrophic results may jeopardize my efforts.

Literatures: The lack of necessary literatures/journals in the Medical library was a great set back. The result of any research without adequate literature review could not be expected to be excellent. In most cases excellent articles contained in the cumulated index Medicus could not be traced in the Library. They are simply not there.

CHAPTER FOUR

RESULTS AND ANALYSIS

Population Description

Total number of schools in Owerri urban	25
Number of schools selected for study	3
Total population of selected schools	5,142
Number of pupils examined	378
Number of males examined	170
Number of females examined	208
Number of eyes examined	756
Number of eyes with defective vision	150
Number of pupils with subnormal vision	81

Table 1: Summary data of group and population studies.

The studied population size was 378 from post-primary school, 207 were females and 171 males. Out of the 756 eyes examined, 606 eyes had normal vision and 150 eyes had various degree of subnormal vision from which 2 eyes had no finger counting at the standard distance of 6 meters.

Among the 378 pupils examined, 81 had subnormal vision representing an incidence of 21.4%

Table 2: Age/Sex distribution of poor vision in 387 pupils of post-primary institution in Owerri metropolis

AGE (Y)	MALE			FEMALE			TOTAL		
	No. examined	No. with poor vision	% with poor vision	No. examined	No. with poor vision	% with poor vision	No. examined	No. with poor vision	% with poor vision
10 -11	-	-	-	3	1	0.3	3	1	0.3
12 -13	36	12	3.2	36	15	4.0	72	27	7.2
14 -15	45	4	1.1	63	20	5.3	108	24	6.4
16–17	51	6	1.7	74	13	3.6	125	20	5.3
18 -19	35	4	1.1	31	3	1.0	66	8	2.1
20 -21	3	1	0.3	1	1	0.3	4	2	0.6
total	170	27	3.4	206	53	14.0	378	80	21.4

The age with the highest incidence of visual defect is 12-13 year. 208 female and 170 boys were studied. There was a preponderance of females with defect than the males, 14.0% of females and 7.4% of females. On the whole 21.4% of pupils had visual defect.

Note: the calculated percentage is that of the whole student (378) and not those of the corresponding sex.

Table 3: Visual acuity of students of Owerri Girls secondary school

Category	**Visual acuity**	**Number of eye**	**%**
Normal	6/6 and better	209	77.4
Minor defect	6/9 – 6/12	39	14.4
Moderate defect	6/18 – 6/36	18	6.7
Severe defect	6/60 – 3/60	4	1.5
Blindness	3/60 and less	-	-
Total		**270**	**100**

A total of 270 eyes were examined in this school out of which 209 (77.4%) hand various degree of defect. Non of the students was blind in one or both eyes. About two-fifth of the normal vision fall into V.A of 5/0, the rest being 6/6

Table 4: Visual acuity of pupils of Owerri Urban secondary school, Owerri.

Category	Visual acuity	Number of eye	%
Normal	6/6 and better	185	79.8
Minor defect	6/9 – 6/12	32	13/8
Moderate defect	6/18 – 6/36	11	4.7
Severe defect	6/60 – 3/60	3	1.3
Blindness	3/60 and less	1	0.4
Total		**232**	**100**

A total of 232 eyes were screened, in this schools, out of which 185 (79.8%) had normal vision and the rest 47 (20.2%) hand various degree of defective vision. One out of the later is blind. The incidence of defective vision is lower here probably as a result of sex, the school being a mixed school. A little above two-fifths of the normal vision had visual acuity of 5/6.

Table 4: Visual acuity of pupils of Owerri Urban secondary school, Owerri.

Category	Visual acuity	Number of eye	%
Normal	6/6 and better	211	83.1
Minor defect	6/9 – 6/12	29	11.4
Moderate defect	6/18 – 6/36	12	4.7
Severe defect	6/60 – 3/60	1	0.4
Blindness	3/60 and less	1	0.4
Total		**254**	**100**

A total of 254 eyes were screened in this school out of which 211 (83.1%) had normal vision and the rest of 43(16.9%) eye with various degree of subnormal vision. One of the eye had a complete loss of light perception. The incidence of subnormal vision is less on this boy-only school. Nearly half of those with normal vision had a visual acuity of 5/8

Table 6: Prevalence of Refractive error in studied population

Visual Acuity	**Number of eyes**	**%**
6/6	597	79
6/9	79	10.5
6/12	25	3.3
6/18	23	3.0
6/24	6	0.8
6/36	15	22.0
6/60	8	1.1
<6/60	3	0.4
Total	**756**	**100**

A total of 597 (79%) eyes out of the 756 eyes had normal vision. Out of these about two-fifth had a visual acuity of 5/6, and the remainder being 6/6. About 159 (21%) eye has subnormal vision. One eye had a complete loss of light perception.

Table 7: Visual Acuity distribution of Female Pupils

Visual Acuity	Number of eyes	%
6/6	297	71.7
6/9	57	13.8
6/12	21	5.1
6/18	18	4.3
6/24	4	1.0
6/36	8	1.9
6/60	7	1.7
<6/60	2	0.5
Total	**414**	**100**

A total of 297 (71.7%) out of the 414 eyes had a normal vision. Less than two-fifths of these had an acuity of 5/6. The incidence of subnormal visual acuity is 28.3% representing 317 eyes No eye was found to have complete loss of light perception.

Table 8: Visual Acuity distribution of Male Pupils

Visual Acuity	Number of eyes	%
6/6	299	87.4
6/9	22	6.4
6/12	4	1.2
6/18	5	1.5
6/24	2	0.6
6/36	7	0.6
6/60	2	0.6
<6/60	1	0.3
Total	**342**	**100**

A total of. 299 (87.4%) out of the 342 eye had normal visual acuity, out of which nearly half had a visual acuity of 5/6. The incidence of sub-normal vision 12.6 is less than those of females. One eye had a complete loss of light perception.

Figure X: Graph of Sex Distribution of Visual Acuity

This is a significant difference between the sex incidence of visual acuity. About 3 28.3% of the eyes examined in the female category had subnormal vision. The corresponding incidence for the male is 12.6%. This can be attributed to the factor that more girls than boys suffer from myopia.

Table 9: Age distribution of Visual Acuity

Age (Y)	6/6	6/9	6/12	6/18	6/24	6/36	6/60	other	total
10 -11	2	-	-	1	-	-	-	-	3
12 -13	47	12	5	5	4	1	-	-	72
14 -15	84	12	3	2	-	4	2	-	108
16–17	105	8	7	-	-	2	1	2	125
18 -19	58	3	2	1	-	1	1	-	66
20 -21	3	2	-	-	-	-	-	-	4
total	297	38	15	9	4	8	4	2	378

The visual acuity of the better eye was used to represent the individual. The ages between 12 and 15 years has the highest incidence of subnormal vision. All visual acuity less than 6/60 are included in the column of ‘others’

	Negative History Number of pupil	%	Positive History Number of pupil	%
6/6	88	92.6	209	73.8
6/9 - 6/12	5	5.3	48	17.0
6/18 – 6/36	2	2.1	20	7.1
6/60 - 3/80	-	-	6	2.1
3/60	-	-	6	-
Total	**95**	**100**	**283**	**100**

	Family N	History %	No Family N	History %
Defect	74	26.2	7	7.4
No defect	207	73.8	88	92.6

$X^2 = 16.59$; C.V = 3.84; P<.05

	6/6		6/9 – 6/12		6/18 – 6/36	
Height (CM)	N	%	N	%	N	%
140 -144	2	100	-	-	-	-
145 - 149	6	100	-	-	-	-
150 - 154	5	71.4	2	28.6	-	-
155 – 159	18	78.3	5	21.7	-	-
160 - 154	21	80.7	3	11.5	2	7.7
165 – 169	18	81.8	3	12.6	1	4.5
170 - 174	12	70.6	4	23.5	1	5.9
175 – 179	2	50.0	1	25.0	1	25.0
	84		18		5	

Table 11: Visual Acuity Related to Height in Pupils aged between Fourteen and Fifteen years.

Within the first two groups all pupils screened had no defect. As the height increases, the incidence of subnormal vision decreases as those for normal vision decreases. As can be seen 50% of the tallest pupil had defect. The age group above was chosen so as to reduce the effect of age of my finding.

Table 12: Effect of Study Time/Day on Distant Vision among Pupil between fourteen and fifteen years.

Apron. Study Time/Day	Total	defect	%
Less than 1 hour	16	1	6.3
Up to 1 hour	27	4	14.8
2 hours	34	5	14.7
3 hours	22	6	27.3
4 hours	5	3	100
5 hours	2	2	100

Close work has a significant effect on the incidence of subnormal vision. Pupil that spend less hours on private studies have lower incidence contrary to what is obtained with pupil that spend more time reading. Whether myopia or the study time is the causal factor could not be ascertained.

Table 13: Visual Acuity related to Symptoms of eye Problems

Visual Acuity	Total Number of Students	symptomatic		A symptomatic	
6/6	297	114	61.3	184	94.8
6/9 - 6/12	52	44	23.7	8	4.2
6/18 – 6/36	22	22	11.8	-	-
6/60 - 3/80	6	6	3.2	-	-
3/60	-	-	-	-	-
	378	186	100	192	100

	symptomatic		A symptomatic	
	N	%	N	%
Defect	72	38.7	8	4.2
No defect	114	61.3	184	95.8
	$X^2 = 48.18$		C.V = 1.96	P<.05

The symptom used here includes blurred vision and pain in the eye. Many pupil with demonstrable visual defect has existing symptoms indicative of this anomaly, and very few pupil without symptom has visual defect. That a large number of pupil without defect had symptoms can be used in identifying student that are predisposed.

CHAPTER FIVE

DISCUSSION

5.1 General Result

A knowledge of the refractive errors is essential when studying the incidence of various disease processes which are related to the refractive state, such as retinal breaks, retinal detachment, angle-closure glaucoma and more importantly as in this study will help to present a proposal for rectifying any unhygienic irregularities or short coming that the investigation might disclose in the organization of the school system.

Table 1 is the summary of my result. Out of 328 pupils examined (81/21.4%) had various ranges of visual impairment, out of which nearly two-thirds (51 pupils or 14%) has mild impairment. The total number of eyes with subnormal vision was 150 (19.8%).

As can be seen from the table below the population groups investigated very as regards to period, age and population selection. The method of investigation and definition of myopia are subject to similar variation. The prevalence of myopia reported by various authors varies between 0.12 and 3.8% in Africa, 2.4 and 27.8% in

Europe and up to 70% in China, Japan and Egypt. The finding of these scholar is summarized in Table 14.[8]

However, my results are comparable to those of Alakija who found in a screening of 965 post-primary school pupils for poor distant vision that 216 (22.4%) suffered from minor visual defect (6/9-6/12). Surprisingly, he found no pupil to be substantially or seriously handicapped (6.18).[19] In another study, vision screening of adolescents and their use of glasses by Peckham et al in over 11,000 16-year olds, 75% had normal acuity of 6/6 in both eyes, the rest (25%) having various categories of visual defect.[20]

It is interesting to note the high rate of myopia in my survey when compared with the table above. As has been observed about the method of investigation and definition of myopia are based on different criteria.

Ideally to measure the incidence of defective vision in a given population, one needs to rule out organic eye lesions in the individuals to be screened. This is done by subjecting those with poor visual acuity to further screening using the slit launp, fundoscope, retinoscope and the cover or uncover tests. The demands of the above tests are greatly beyond the reach of my work. The survey did not exclude those with organic lesions.

Malaria is endemic in this region resulting in the rampant and unethical use of chlorquine. Large doses given for a year to a group of healthy volunteers occasionally caused some visual symptoms (blurring of vision due to difficulty in accommodation and, diplopia). Also Bernstein and his colleague (1963) have demonstrated that chloroquine is stored in the iris and choroid of laboratory animals in significantly higher concentration than in other tissues.[21]

Also economic factors like poverty 1 adding to neglect of eye infection which might have a lasting impairment of vision is rampant in this society. Again retardation of normal growth and development even starts in many during the most vital period is during intrauterine life. The effect of these might contribute to the differences.

Native treatment of visual problems whereby a particular substance is introduced into the eye, some of which are quite toxic may have had some effect on the visual acuity.

Mention should be made of amblouopia as it was not ruled out in my study. Explanation of this ocular defect was made earlier in this study. Many other studies take special precautions to identify people with amblyopia.

5.2 School Variation

Table 3,4 and 5 show the results of visual acuity from the three schools. There was a great variation in the various schools. For instance out of the 270 eyes screened in Owerri Girls High School 6122.6%) had subnormal vision, the rest having normal vision. But in Owerri Urban secondary school (Mixed pupils) 47 (20.3%) eyes had defective vision while the rest 105 (79.7%) eyes had visual acuity of 6/6. Also in Government secondary School, Owerri (boys only) 43 (16.9%) eyes had various degree of visual defect while the rest 211 (83.9%) eyes had normal vision.

The most important contributing factor to the variation is the sex make up of these schools. It will not be difficult to note that as we move from girls-only school to boys-only school, the incidence of defective vision decreased from 22.6%, 20.3% and 16-9% respectively in Owerri Urban Secondary school and Government Secondary school Owerri. That the mixed school falls in between the girls-only and boys-only schools further confirms this. The sex incidence will be discussed later.

Other possible contributory factor include difference in illumination, state of health or fatique, intelligence and interest. Mention should be made that to some extent the determination of

visual acuity with only Snellen's notation of the individual eye is subjective. The state of health of pupils was not assessed before the measurement; therefore ill health or fatique could have effected the result. The overall difference in intelligence of the various schools arising from different 1.0 of each pupil and their duration of close academic work could have contributed.

5.3 Sex Distribution

Table 2,7 and 8 show the sex distribution of visual acuity. The proportion of male and female with subnormal vision out of the 378 pupils are 7.4% and 14.0% respectively. Similarly 117 (28%) eyes and 43(12.65) eye among females and males showed defective vision.

In a study by Goldschmidt among Danish population of 9243 13 – 14 year old children, 40% of the 877 myope were male and 60% frmales.[22] Alakija found the incidence among post-primary school pupil in Denin as 25.6% and 19.6% for girls and boys respectively. Similarly in study of vision screening of adolescents by Peckhan C et al, impairment at 11. Years was equally prevalent among boys and girls but by 16 years more girls had visual impairment. The sex differences were particularly pronounced in group with severe defect and may be accounted for by the suggestion that myopia is

more prevalent in girls than boys since there was a preponderance of girls with defects of distant vision only.[23] The sex difference in poor distant vision in children has been noted by Hirsch (1954).24 No explanation can be attributed to this difference but emblyopia associated with squint may be a factor.

5.4 Age of Distribution

Table 2 and 9 show the variation of visual acuity with advancing age. In my study the age with the highest incidence of poor distant vision was 12 – 13 years in both boys and girls. At the ages of

10 -11, 12 -13, 14 -15, 16–17, 18 -19 and 20 -21 years the total percentage of pupil with defect were 0.3%, 7.7%,6.4%,5.3%,2.1% and 0.6% respectively. The ages between 12 and 17 have the highest incidence.

My observation is comparable to the study by Tibbenham A,D. et al, vision screening in children tested at 7,11 and 16 years. Only 87% of children with normal vision at years had normal vision at 11, while about 12% of these who had normal distant vision at 11 had defect at 16. Of children with normal distant vision at 7, 18% showed deterioration of at least one line in one or both eye by the age of 16 conversely, of the 471 children with a severe bilateral

defect at 16, no fewer that 282 (61%0 had normal vision at the age of 7, while only 48 (10%) had a severe bilateral defect at both ages.[25]

The above observations among adolescent is different from studies in childhood where visual acuity rises with advancing age as reported by workers like Lippman in his study conducted among pre-school children. This observation is not surprising since full development of the eye and emmetropia is reached at about the age of 10 years.[26]

The development of poor distant vision may be associated with puberty but Holm (1937) having observed that the "Palenegrides of Gabon" in French Equatorial African develop myopia, a form of poor distant vision, very early in life conclude that the relationship between myopia and puberty is not close after all.[27] It should be noted that the range of focusing or accommodation decreased throughout life as the lens becomes stiffer with age so that the neared point that can be brought into focus on the retina receded beyond the normal reading distance at 45 years and presbyopia sets in.

5.5 Hereditary influences

Table 10 is the result of my finding from question about the presence of visual defect among immediate members of their family.

Out of the 378 pupils, 283 (75%) had positive history of visual impairment while 95(25%) had no positive history.

Out of the 283 pupils with positive family history, 209 (73.8%) had normal vision while 74(26.2%) had various degrees of visual impairment. On the other hand out of the 95 pupils without positive history 88(92.6%) had normal while the rest of 7(7.4%) pupils had defect. This showed that one quarter of students with family history of visual defect had some defects but only one twelfth of those without family history had some visual defects. This result is quits significant.

That far greater number of student with family history of visual defect had impairment than those without family history is not surprising particularly when one remembers the long list of pathological courses of visual defects. Among this list are organic and functional disorders that are probably transferable to offsprings of affected individuals, and manifest at different stages of development. In a similar study by Alakiji (1981)28 he found that 27.4% of pupil with family history or visual defect had subnormals vision while 19.35 of pupil with no family history of visual defect had some degree of impairment. This has to the conclusion that environment along may not be a major variable in this

determination and the effect of hereditary may also be equally important (Young,1977).

Twin studies are particularly suitable for clarifying the interaction of genetic and environmental factors, and increasing importance has been attached to comparisons of uniovular and binovular twins in the research of refraction. Twin data on refraction in the aetiology of myopia. In all the studies done so far, concordance is higher in uniovular than in binovular twins. Genealogical investigations had a similar conclusion. Low myopia, which develops during the fist twenty years of life, is thus principally genetically determined, and familial studies produce a pattern that fits well with the assumption of a polymeric mode of inheritance, whereas a monomeric mode must be considered as highly improbable. The genes for this type of myopia do not appear to be uniformly distributed throughout the population of benmark; they are particularly frequent in the sector that has enjoyed a higher education, and rare in the sector with a lower level of education. This distribution may result from selection over many generations.[29]

5.6 Myopia and social class/height

Since the study was carried among adolescent I used height (cm) as an index of nutritional status and hence social class. In order to

minimize the effect of age and to use a significant number of students in analysis of the effect of height on vision, I used pupil between the ages of fourteen and fifteen years. It has been known and conferment by a large number of investigations that children of low social standing are less well developed from the point of view of height and weight than are children from a better social sphere. They are, however, not unanimous as to the cause of this difference in growth, since some of them attach decisive significance to hereditary conditions while others consider environment to the decisive factor. Table 11 shows the result of visual acuity related to height. Almost all the pupil between 140-154cm had normal vision. The incidence of subnormal vision increased among the tallest pupil (175-179cm). it is interesting to note that non of the moderately myopic pupil could be found between 140-159cm but the incidence increased that they constituted 20% of the tallest students. The various results reported is different journals among adolescents depend on the parameter used in the assessment of nutritional status and or nocial class. Alajija (1981) used salary/grade level in his study dividing his population study into high, middle and low class. In this study no statistically significant result was obtained between social class and poor distant vision (P 0.2) although in a study by Tiberniham et la (1978), within group difference were

observed of children from manual and non-manual social class.[30] the by Tibernham et al showed that more children with normal vision at 7 who were of non-manual background than manual background showed deterioration in visual acuity by the time they were 16(P.05).[31] the effect of nutritional status on visual acuity can be seen properly among preschool and primary school children as reported by different studies. This is because of the higher incidence of the effects of malnutrition seen among this age group. The eye at birth shows about 75% of its adult development and is small and hypermetropia full development and emetropia is reached at about the age of 10 year. Gessel et al here pointed out how much development of vision in interrelated to the total development of the child. Thus malnutrition which affects the development of the child will also affect vision.[32]

Francke (1938) carried out a number of anthropological measurement and compared them with refraction. Among 256 short sighted persons he found 59 percent to be leptosomatic, 22 percent were average type while 19 percent were Pyknic. The corresponding figures for 159 emeretropes examined were 28 percent, 45 percent 45 percent and 27 percent, while among 112 hypermetropes they were 16 percent, 37 percent and 47 percent respectively. He showed that myopic subjects are 3 me taller tan hypermetropia.[33] Also in a

study comprising 3511 conscripts, Goldschmidt (1965) found on an average myopia persons were 1.6cm taller than non-myopic persons.[34]

5.7 variations with duration of study time

Table 12 shows the effect of study time per day on distant vision. Similarly, in order to eliminate the effect of age only pupil between the ages of fourteen and fifteen were analysed. That only 4(14.8%) students whose average study time per day is about an hour had visual defect, and all pupils that study up to four hours or more hours per day had subnormal vision is significant. None of the students that study upto four hours on the average per day had a normal distant vision.

Syanor and his associated (1972)34 in the study of sofia school children found most of the myopes to be those who habitually read more often in supine position and spent less time on sports. It had also been found that an increasing number of the literate population are myope when compared with the illiterated.

In a nationwide study of the relationship between refractive error, intelligence scores, and years of schooling in 157, 748 males ages 17 to 19 years, Mordechal et al found that there was a strong correlation between the ate of myopia and the intelligence level. The

prevalence of myopia in the group with very low intelligence score was 8.0%. The myopia rate become gradually higher with an increase in intelligence level until it reached 27.3% among those with the highest intelligence similar correlation was found between myopia and years of school attendance.[36]

The cause of effect relationship among educational level, intelligence and refractive error is not clear. Some theories favour an environmental explanation, claiming that person endowed with high intelligence tend to rend more, and achieve higher educational level, with the myope being the result of excessive reading and close work.[37]

Other theory on this subject suggested that genetic factors play the determinant role in the development of myopia and the preference of persons with myopia to work at short distance is the cause of their high educational and academic achievements rather than the effect.

Studies on the geographical and social distribution of myopia have suggested that both genetic and environmental factors play a role.[38] As higher intelligence level is determined genetically, it thus might be linked to the myopia trait.

5.8 symptoms of visual impairment

The pupils were asked some relevant questions with regard to eye problems like blurred vision and pain in the eye either with near or for objects. Results of my finding is represented in Table 13.

Out of the 378 pupils examined, 192 are asymptomatic while 186 has some visual symptoms. Among the 192 asymptomatic pupil, only 8(4.2%) had minor defect, the rest 184(95.8%) having normal vision. But, out of the 186 pupil with eye problem 72)38.7%) had various degree of subnormal vision while 114(61.3%) had normal vision. This tool is very important in the provision of school health services.

No attempt was made to elucidate the specific causes of these eye symptoms as this us beyond the study but the following factor has been mentioned some studies as contributing factors. Three studies by Ridley in 1945 and a study by Scott shortly afterwards as well as the four years study of Rodger F. C (1952-1956) are very important. They contain an important account of the lives of the people as a background to the causes or eye problems.

Congenital eye disturbances

1. Congenital catatract. Common cause are genetic defect (autosomal dominant), congenital reubella and galactosalmia.
2. Congenital glaucoma which is often transmitted as a recessive trait.
3. Retinitis pigmentosa is an inherited condition which being with the loss of right vision followed by gradual decreasing day vision and may finally and in total blindness.

Infections and infestation of the eye

1. Measles; eye complication of measles are often due to secondary bacterial infection of the conjunctive leading to corneal ulceration and, at times damage to the optic nerve.
2. Treachoma is due to rickettsial infection usually associated with poor hygiene and poor social-economic conditions. It leads to scaring of the conjunctive and opacity of the cornea.
3. River blindness; Onchocerclassis is caused by filarial worms transmitted b (inflammation of the cornea) may lead to glaucoma, cataract and blindness.
4. Malaria with high fever may occur at any early stage of development leading to cerebral malaria and meningitis which may affect visual centre.

5. Venereal diseases like syphilis, gonorrhea etc may lead to partial or complete loss of vision.
6. Chorioretimitis due to toxoplasomis, herpes simplex, syphilis or cytomegals inclusion disease.

Other causes of eye disorders.

1. ***Malnutrition:*** Mention should be made that not all malnutrition is a result of poverty, it occurs also in people who eat enough to satisfy hunger but shoes diet is deficient in essential elements, and in malabsorption syndrome.
2. ***Accidents:*** These include direct injury to the eye by foreign bodies, prolonged exposure to heat or ultraviolet light, chemicals such as acid, alkli and other irritants
3. ***Metabolic:*** Diabetic retinopathy is due to tiny blood vessels in the retinal breaking and causing little haemorrhage on or in the retina which may be the beginning of blindness in people with diabetes.

CHAPTER SIX

CONCLUSION AND RECOMMENDATION

5.1 conclusions

For all living creature there is some dependence upon sight, as opposed to other senses. Man is one of those to whom sight is of utmost significance. The Principal causes of preventable visual impairment vary from one region to another and are intimately related to ecology, socio-economic and cultural factors. In our society as with other developing countries, visual impairment associated with infection; nutritional deficiencies and trauma is more common than in developed countries and affects all age groups. The burden on society is thus proportionally higher.

The snellen's chart used for the study has its limitation, thus one study along cannot given an accurate estimate of the prevalence of visual impairment. What matters in a visual acuity test object is its ability as a geometrical pattern to test refraction and retinal functional. However the recognition of letters is a perceptive process with strong personal factors.[39] Tibbenham A.D. et al wrote "the result of a single screening, cannot, however, be used for a single diagnosis of permanent visual handicap: Over three in five children with a minor defect at one screening had normal vision at the next. These improvements were probably more apparent than real, being

due partly to the technical difficulties of screening children in ordinary school settings.[40]

The prevalence of subnormal visual acuity as shown by my study is 21.4%, out of which nearly two-thirds (14%) had mild impairment, the category of which some writers consider as normal. Sheriden warned in 1974 that among children of 5 to 7 years “a visual acuity of 6.9, even when occurring in only one eye, should be regarded as suboptimal distant vision requiring careful follow-up or, in some cases immediate referral to a consultant ophthalmologist.[41] Two eyes were found to be blind, if blindness is defined as inability to count fingers at a distance or three meters or a visual acuity or 3.60. no pupil was found to have unilateral blindness.

Some factors have been noted as having significant influence in the prevalence of myopia, where as other do not. Among the former are age, sex, family history or visual impairment – hereditary and the average reading hour per day/intelligence. Height/social status seems not have significant effect in the group studied.

Health is defined in the constitution of the World Health Organization as “a state of complete physical, mental and social well being and not just the absence of disease.[42] in accepting the ambitious goal of health for all by the year 2000, the member states

of WHO have raised important questions as to how this can be achieved. Young people's health, the group this study was carried out has constantly been mentioned, by various group and it is my ambition that the following recommendation should be carefully carried out so that young people's vision will be improved by the end of the century.

5.2 Recommendations

Subnormal vision and blindness are an enormous burden to the society, and their cost from most of productivity, labour, and from rehabilitation and education of the blind in immense and growing. Swift and effective application of overall resources to prevention of subnormal vision will provide an enormous national swing both in cost and human suffering. The cost of preventing human blindness, for example, is only small proportion of the cost in caring for the blind.

1. ***Primary Eye Care***

   The aim of this is to reach a greater percentage of out population. The prevention of subnormal vision must be an integral part of the Primary Health Care. Primary eye care comprises a simple but comprehensive set of preventive and curative action, which can be carried out by primary health

workers, by specialized auxiliary personnel and by other interested bodies.

Locally available personnel and training programmed for primary health care should be adapted and use to promote and strengthen the delivery f eye care at the local levels.

The clinical activities involved in primary eye care consist of basic ways of dealing with the three major eye symptoms presented by patients: inflamed (“red”) eyes, various degrees of loss r blurring of vision, and pain in the eye. At the primary level, the health worker can manage these problem either by definitive treatment, by referral after immediate treatment or by referral alone. In addition, the primary health care worker should carry out promotive and preventive activities, focusing on essential education and community participation with regard to prevention of visual loss.

2. Compulsory visual acuity screening for all post primary school entrants and the existing students. The aim is to detect as an early stage all students with defective vision as this determines the outcome of treatment and because visual defects may occur at any stage during school life; thus satisfactory test during the early school years should not lead to complacency about the need for tests later. Principals should be made to

understand the importance and the exercise repeated at regular intervals. Such a system requires adequate back-up services for those needing further assessment.

3. ***Manpower development:*** In this society lofty ideas failed to achieve their goal because of inadequate manpower. For the above eye care services to be effective effort should be made towards raising trained personnel who should not necessarily be medical professionals but primary health workers trained to recognize eye conditions and to take appropriate action to deal with the problem. Participants should include personnel from ministries of health, education and information. This can easily be achieved by incorporating eye care education as art of the primary health service training.

4. ***Subsidization of ophthalmic services:*** In the study by Alkija (1981) among post-primary schools in Benin-City. 50% of those who knew of their poor distant vision could not afford to war glasses for financial reasons.

   Ophthalmic services are still not subsidized by the government and can be very expensive. It may be that those who knew of their defect and were glasses (20%) were those who could not tolerate the discomfort of poor distant vision any longer and

therefore sought help despite the cost. However, it is possible that among those who knew of their defect and did not were glasses for financial reasons will constitute a significant number of school drop-outs. The government should make ophthalmic services to school children free.

5. ***Inclusion of basic eye care studies in school curriculum:*** Adequate education has been known to drastically change the natural history of certain disease in a particular group. This knowledge should be applied in the case of avoidable visual loss by a earful inclusion of basic eye care in health sciences and allied subjects as studied in post-primary schools. This will enable both teachers and pupil to abide by the rule of preventive rather than curative eye care services.

5.3 Areas of Further studies

The various studies in this area of ophthalmology have not established the association of certain factors with myopia thus necessitating further studies.

That myopia has a strong genetic basis has been known to many researchers but the extant of such relationship has never been determined. With the development of modern technology the stage is now set for such an important move.

The correlation between myopia and academic attainments. It has been established that many people with high intellectual attainments are myopic, but the study as to which is the causal factor have not been conclusive. Kalsson postulated that “myopic gene had a stimulating action on the brain.[43] While other believe that parental interest may be an important determinant of the myopic’s child academic attainment. No information is yet available about the mode of action of either the genetic or the environmental factors, and future research should therefore concentrate on intensive analysis of the process of ocular growth. The goal must be to discover how we can stimulate emetropization i.e. reduce the hypermentropia found in may children, and seek a means of preventing the development of myopic.

Finally researches should be directed towards the use of suitable criterion for classification of myopia for all ages. The importance of this is to note all factor that affect the prognosis of myopia which is very vital for treatment.

Besides the axiallenght, it is also reasonable to investigate whether the time of onset and the progress during growth are parameters that affect the prognosis. It should be carefully investigated whether

contact lenses can retard the progress of myopia as implied by stuart-black and butler (1964) in a preliminary study.

REFERENCES

1. Anunonye, A: Adaoation To Blindness in Nigeria. Lagos University Press Lagos, Nigeria. 1981 p. 27.
2. Ibid, p 27
3. WHO, The Blind Village Onchocrerciasis, Geneva, 1973.
4. Enahoro, A; Annual Report of the Nigerian Advisory council for The Blind, Lagos. Gene Government Printer, 1968 Quoted from Anumonye A; Adaptation to Blindness in Nigeria. p.30.
5. Stogdil, C.G; Schol Achievement. Learning difficulties and mental health. Canada's mental Health, supp, 48, 1965 Quoted from Nicholas J.V.V; Vision and learning difficulties p.375.
6. Nichola, J.V.V; Vision and learning difficulties. The Canadian Journal of Ophthalmology Vol. 8,1973, p.382.
7. Duke Elder S; system of Ophthalmology Vol. VII: The Foundations of Ophthalmology; Mosby Company U.S.A., 1962, p.366.
8. Whyber, K; Ophthalmology 0-The English Language Book Society and Bailliere Tindall, London, 1979, p.6.
9. Whybar; K; Ophthalmology – The English language Book Society and Bailliere Tindall, London, 1979, p.6.

10. Gtton, A.C; Text Book of Medical Physiology. 3ed Edition W.B Saunders Company Philadelphia and London, 1970, p. 130.
11. Duke-Elder, S; System of Ophthalmology Vol. VI: Occular Motility and Strabismus, Henry kinsptom London, 1973. p.294.
12. Adder, H.F; Physiology of the Eye. English Language Book Society, London, 1978, p.52.
13. 13 Ludrigh, E, Effect of reduced Contrast on Visual Acuity as measured with snellen's letters. Archieve of Ophthalmology Ophthalmologyol.25. Dec. 1963. p.409.
14. Goldschmidt. E; On the Aetiology of Myopia, An epidemiological Study. Act Ophthalmologica Vol. 44 1967-68, Sup. 91.98, p.14
15. Ehlers, H; Myopia and Height. Act Ophthalmologica Ophthalmologyol 44 1966, p.751-761.
16. Goldschmidt, E; On the Aetilogy of Myopia, An epidemiological Study. Acta Ophthalmologica 1967-68, Sup. 91-98 p. 1-14 137.
17. Mahmoud Al-Salem; A new Snellen's Visual Acuity Chart with Indian numerals. British Journal of Ophthalmology, 1987, 71 p.923.

18. Duke-Elder, S and Abrams D. (1970): Ophthalmic Optic and refraction. In systems of Ophthalmology Vol 5 Quoted by S.W. Hyams, E Pokotilo and G. Shkurko. Prevalence of refractive errors in adults over 40: A Surey of 8102 eyes, British Journal of Ophthalmology, 177,61, p.430.
19. Alkija W: Poor Distant Vision in Post-Primary Schools in Benin City. Public London (1981) p. 166.
20. Peckham, C.S. el at; Vision Screening of adolescents and their use of glasses. British Medical Journal 1979, 1, p.IIII.
21. Goodman. L.S; and Gilman A; The Pharmacological basis of therapeutics 3rd Edition, Ccllier – Macmillam Ltd., London, 1965 p. 1094.
22. Goldschmidt E. On the Aethiology of myopia, an epidemiological Study. Acta Ophthalmologica 1987 – 68, supp. 91-98, p. 37.
23. Peckham C. Gardner P.A.; Tibbenham A; Vision Screening in adolescents and their use of glasses British Medical Journal, April 1997, p. 1111-1113.
24. Hirsch, M.J. Sex differences in the incidence of various grades of myopia American Journal Optometry and Archives of the American Academy of Optometry, 30, p. 135-8.

25. Tibbernheam et al; Vision screening in Children tested at 7, 11, and 16 years. British Medical Journal May 1978, 1, p. 1312-1314.
26. Jellife D.B. and stand field J.P. (ed). Disease of Children in Subtropic and Tropics. The English Language Book Society London, 1981, p. 638.
27. Hodm, S: The Sate of ocular refraction among the Palenegrides of Gadbon in French Equatorial Africa. Acta Ophthalmologica, Supp. V, 15. Sited by Alakija W. Poor distant vision in post-primary school in Benin City.
28. Stogdill, CG. School Achievement, Learning difficulties and mental health. Canada's mental health, Sup. 48,1965 p. 168.
29. Goldsmidt, E. on the Aetiology of myopia; Acta Ophthalmologica, 1967-68, Supp. 91-98, p.132.
30. Stogdill, C.G; School achievement learning difficulties and mental health, Canada's mental health, Supp. 48, 1965, 166.
31. Tibbernham et al. vision Screening in Children. British Medical Journal, 1978, 1, p. 1313.
32. Gessel, A. and Bullis, E Vision, its development in infants and children. New York: Paul B Hoeber Inc. 1949 p. 50-58. Cited by Okoye J.C. Visual Acuity screening in Primary schools in Mbanabo, Agwu Local Government Area Nov. 1987.

33. Francke, E.: Korperbau and Refraktion. Klin. Mbl. Augenheilk. 1938, 101:184-20. Cited by Goldschmidt E; Myopia and height.
34. Goldschmidt E; Myopia and height: Acta Ophthalmologica, Ophthalmologicaol. 44 1966, p.760.
35. Syanov, N.P., Pavlova P., Serger D. are Alexandrora L; Myopia in school age and general health condition of ablescent in the school in sofia (Bulgeria). Ophthalmologica (sofia) 20, p. 24-32 Cited by Alakija W. Poor distant vision in post-primary schools in Benin-city.
36. Nordechal R, Belkin M; Intelligence, Education and Myopes in Males. Archives of Ophthalmology Nov., 1987, p. 1509
37. Peckham C.S; Gordiner P.A; Godlstein H; Acquired Myopia in 11 years old children. British Medical Journal, 1977, p. 542-544.
38. Duke-Elder S. and Abrour D; Ophthalmic Optics and refraction, System of Ophthalmology. London, Kumpton, 1970, Vol. 5. P. 541-545.
39. Gasellato L; testing visual Acuity. British Journal of Ophthalmology 1971, 55: 44-47.

40. Tibbernham A.D., Peckham C.S., Gardner P.A; Vision Screening in Children tested at 7, 11 and 16 years. British Medical Journal, 1987,1, p.1313
41. Shoridan M., Developmental Medicine and Child Meurology. 1974, 16 p. 189.
42. World Health Organization, Basic documents. 34th edicion Geneva, WHO, 1984.
43. Karlson, J.L, Clinical Genetic, 1975, 8, p. 314 cited by Peckham O.S. et al. acquired Myopia in 11 year old children.

DEPARTMENT OF COMMUNITY MEDICINE UNIVERSITY OF NIGERIA TEACHING HOSPITAL, ENUGU.

Project Topic Abnormal Visual Acuity Screening Among Secondary Pupils In Owerri Urban.

Questionnaires

Mark for yes and X for no where appropriate

Part 1 – personal Data.

1. Name
2. Age
3. Sex
4. Class
5. Do you have blurred vision while looking at objects?

   Yes ( ) No ( )
6. Do you have pain on the left eye, right eye or both on exposure to bright light?
7. Do you wear spectacle? Yes ( ) No ( )
8. Is it for reading or for looking at distant objects or both?
9. Does it improve your vision? Yes ( ) No ( ) if Yes, is it very little ( ) average ( ) or very well ( )
10. Average reading hours/day_____

11. Does the above happen to any member of your family?

Father ( ) Mother ( ) Brother's ( ) Sister's ( )

12. Does any of them wear spectacle?

Father ( ) Mother ( ) Brother's ( ) Sister's ( )