THESIS DISSERTATION

KNOWLEDGE, ATTITUDE AND PRACTICE OF EYE DISEASES IN CHILDREN AMONG PEDIATRICIANS IN KENYA

A thesis dissertation presented in partial fulfillment of the requirements for the Degree of Masters in Medicine (Ophthalmology), Faculty of Medicine, Department of Ophthalmology, University of Nairobi.

DECLARATION

I declare that this is my original work and it has never been published or presented for a degree in any other university.

PRINCIPAL INVESTIGATOR

DR. SITUMA PETER WANYAMA

H58/71031/2011

MBChB

SIGNATURE..... DATE.....

SUPERVISORS:

DR SHEILA MARCO

MBChB, MMED (OPHTHALMOLOGY), FEACO

SENIOR LECTURER, GLAUCOMA SPECIALIST, DEPARTMENT OF OPHTHALMOLOGY, UNIVERSITY OF NAIROBI

SIGNATURE..... DATE.....

DR. KARIUKI M. M.

MBChB. M.MED (OPHTHALMOLOGY), FEACO

SENIOR LECTURER, DEPARTMENT OF OPHTHALMOLOGY

UNIVERSITY OF NAIROBI

SIGNATURE..... DATE.....

ACKNOWLEDGEMENTS

I wish to acknowledge the under listed for their immense contribution to this work.

1) Dr. Sheila Marco and Dr. Millicent Kariuki, my supervisors, for their visionary guidance throughout the period of actualization of this thesis
2) All pediatricians who found time out of their busy schedules to participate in the study
3) Vision-Mundi my sponsors for affording me this opportunity to scale new heights
4) Mr. Gabriel Otieno, my very able statistician.
5) My family for their unstinting faith in me.
6) God, without whom all else counts for naught.

TABLE OF CONTENT

DECLARATION 2

LIST OF TABLES 6

LIST OF FIGURES 7

LIST OF ABBREVIATIONS 8

ABSTRACT 9

1.0 INTRODUCTION 11

1.1 Introduction to childhood blindness 11

1.2 Prevalence and magnitude of Blindness in children. 12

1.3 Incidence of childhood blindness 13

2.0 Causes of childhood blindness. 13

2.1 Refractive errors 14

2.2 Squints 14

2.3 Congenital glaucoma 15

2.4 Congenital cataracts 15

2.5 Retinopathy of prematurity (ROP) 16

2.6 Retinoblastoma. 16

2.7 Ophthalmia neonatorum 17

3.0 Control of blindness in children 17

3.1 The role of the primary health care physician. 17

3.2 Literature review on K.A.P by pediatricians on eye disease in children 19

4.0 STUDY JUSTIFICATION. 22

5.0 BROAD OBJECTIVE 22

5.1 Specific objectives: 22

6.0 STUDY METHODOLOGY 23

6.1 Study design 23

6.2 Study population 23

6.3 Sample size 23
6.4 Sampling method 23
6.5 Inclusion criteria 23
6.6 Exclusion criteria 23
6.7 Study setting 24
6.8 Study period 24
6.9 Materials 24
6.10 Data collection. 25
6.11 Analysis 25
7.0 ETHICAL CONSIDERATIONS 26
8.0 RESULTS 27
9.0 DISCUSSION 45
Conclusions 51
Study limitations 51
Recommendations 51
REFERENCES 53
APPENDICES 57
Appendix I: Questionnaire. 57
Appendix II: Consent form 62
Appendix III: Map of Kenya showing the 47 counties. 63
Appendix IV: Budget 64
Appendix V: Study Time Frame. 65
Appendix VI: Bloom's original cut off points 66
Appendix VI: Ethical approval 67

LIST OF TABLES

Table 1; Region of practice.....**Error! Bookmark not defined.**
Table 2: Knowledge on retinoblastoma 29
Table 3: Knowledge on systemic illnesses in children associated with congenital cataracts. 31
Table 4: Knowledge on ROP 32
Table 5: Knowledge on congenital glaucoma..... 33
Table 6: Knowledge on refractive errors 34
Table 7: Knowledge on squints..... 35
Table 8: Knowledge on red eye in a child 36
Table 9: Categorization of participants' knowledge level according to bloom's cut off points ... 37
Table 10: Practices of eye examination in children 38
Table 11: Practices of treatment and referral of various eye diseases in children 39
Table 12: Practice of Eye drops prescribed 40
Table 13: Attitudes towards eye diseases in children (agree or disagree) 42
Table 14: Univariate logistic regression assessing the association between satisfactory* knowledge*on childhood eye diseases and socio-demographic factors. 43
Table 15: Multivariate logistic regression assessing the association between satisfactory* knowledge of childhood eye disease and socio-demographic factors 43
Table 16: Univariate Logistic regression assessing the association between the practice of eye examination and socio-demographic factors 44

LIST OF FIGURES

Figure 1: Flow chart of data collection 27
Figure 2: Distribution by sex 28
Figure 3: Distribution by age 28
Figure 4: Type of practice 29
Figure 5: Duration of practice 29

LIST OF ABBREVIATIONS

W.H.O……. World Health Organization

ROP……. Retinopathy of Prematurity

UNICEF……...The United Nations Children's Fund

U5MR …….Under Fives Mortality Rate

IOP ……. Intraocular Pressure

PEC……..Primary Eye Care

PHC…….Primary Health Care

AAP……American Association of Pediatricians

KNH……Kenyatta National Hospital

VAD ……..Vitamin A Deficiency

UoN……University of Nairobi

HIV…….Human Immunodeficiency Virus

AIDS…….Acquired Immunodeficiency Syndrome

NICU…….Neonatal Intensive Care Unit

CMV…….cytomegalovirus

PHPV……Persistent hyperplastic primary vitreous

FBO……..Faith Based Organization

PHPV……..Persistent Hyperplastic Primary Vitreous

TORCHES…… Toxoplasmosis Rubella cytomegalovirus Herpes simplex Syphilis

ABSTRACT

Background: Childhood blindness is the second largest cause of blind person years after cataracts accounting for70million blind person years globally. Amblyopia cannot be corrected in adult life, so there is a level of urgency about treating childhood eye disease. Pediatricians thus should play an important role in preventing blindness by early diagnosis, treatment of simple ocular ailments while identifying conditions requiring referral to the ophthalmologist. Previous studies have focused primarily on preschool children and have revealed deficiencies in vision-screening and referral practices among pediatricians.

Objective: To assess the knowledge, attitude and practice of eye disease in children among pediatricians working in Kenya.

Study type: Descriptive cross-sectional study with participants drawn from pediatricians practicing in Kenya.

Methodology: The study was carried out among pediatricians working in the various hospitals and clinics in Kenya. They were requested to participate by first filling a consent form and subsequently answering a semi-structured questionnaire. Dependent variables were knowledge attitude and practice. Independent variables were age, sex, duration of practice, and type of practice. The data collected was analyzed statistically using STATA and the level of knowledge was grouped according to Bloom's original cut-off points into good (>80%), moderate (60-80%) and poor (< 60%).

Results: out of the 125 respondents, 69.60% percent had a level of knowledge classifiable as poor. The mean score of participants in this study was 58.20%. However participants showed varied levels of knowledge in different subject matters.

In terms of practice, most pediatricians (69.60%) carry out eye examination in children, though in varied ways with each participant seemingly doing only the test they are conversant with. Their referral of children with eye diseases was found to be generally appropriate.

The attitudes of participants were positive. 99.20% of participants agreed that eye examination by pediatricians could help with early detection of retinoblastoma.

Conclusion: The participants had poor level of knowledge on childhood eye diseases. However their practice was generally good as were their attitudes which were positive.

1.0 INTRODUCTION

1.1 Introduction to childhood blindness

Childhood blindness is the second largest cause of blind person years after cataracts, accounting for about 70million blind person year's globally.[1]

Visual loss in children has implications for all aspects of the child's development.[1]

It poses educational occupational and social challenges with affected children being at risk of behavioral, psychological and emotional difficulties, impaired self esteem and poorer social intergration.[2]

Many children with visual impairment have chronic disorders not amenable to ophthalmic treatment and will require visual rehabilitation educational support and or developmental interventions. Thus the impact of child blindness can extend beyond the child to siblings parents and other members of the family. Studies in the U.S.A show that having a disabled child increase the risk of divorce, of the mother not going to work, of the father working shorter hours and of the parents having shorter social interactions.[3]

It is estimated that, in almost half of the children who are blind today, the underlying cause could have been prevented, or the eye condition treated to preserve vision or restore sight, [4] thus emphasizing the critical role of early diagnosis and proper treatment in preventing childhood blindness.

The control of blindness in children is considered high priority within the World Health Organization' (WHO)'s VISION 2020 — The Right to Sight program, [5] there are several reasons for this.

Firstly, the number of blind years resulting from blindness in children is almost equal to the number of "blind years" attributable to cataracts in adults.[5] Such children have a lifetime of blindness ahead of them, with all the associated emotional, social and economic costs to the child, the family, and society.[4]

Secondly, many of the causes of blindness in children are either preventable or treatable.[4]

Thirdly, many of the conditions associated with blindness in children are also causes of child mortality (e.g. premature birth, measles, congenital rubella syndrome, vitamin A deficiency (VAD), and meningitis). Control of blindness in children is, therefore, closely linked to child survival.[4]

Fourthly, causes of blindness in children differ from those in adults and require different strategies.[3, 6] Furthermore; children's eyes cannot be considered as smaller versions of adult eyes, because they respond differently to medical and surgical treatment.

Lastly, delay or absence of treatment in the early stages leads to conditions which are not treatable or not easily treatable in adults, such as amblyopia, [3, 6] this is because Children are born with an immature visual system and, for normal visual development to occur, they need clear, focused images to be transmitted to the higher visual centers so there is a level of urgency about treating childhood eye disease which does not necessarily apply to adult conditions.[3, 4,8]

1.2 Prevalence and magnitude of Blindness in children.

Childhood blindness remains a significant global problem. However, accurate prevalence data are difficult to obtain, because very large samples are required for population-based prevalence surveys. Some data are, however, available from population surveys that included children, from community-based rehabilitation programs, and from registers of the blind. These sources suggest that the prevalence of blindness in children varies according to socioeconomic development and under-5 mortality rates (U5MR).[4, 8, 9]

In low-income countries with high U5MR, the prevalence maybe as high as 1.5 per1000 children, while in high-income countries with low U5MR, the prevalence is around 0.3per 1000 children.[7,8]

If this correlation is used to estimate the prevalence of blindness in children, the number of blind children in the world is estimated to be1.4 million.[8]Approximately three-quarters of the world's blind children live in the poorest regions of Africa and Asia, where the prevalence is high, and the child population large.[4, 8]

1.3 Incidence of childhood blindness

The incidence of blindness in children is very difficult to ascertain, requiring very large longitudinal studies, accurate registers of the blind, or reliable active surveillance systems.[4]

It was estimated in 1999 that approximately 500,000 children go blind each year in the world of which 50-60% die within the subsequent 1-2 years from the diseases which contributed to their blindness[8, 25] or from neglect consequent upon being blind because poor parents have more difficulty in caring for their blind children than their sighted siblings.[25]

Data from industrialized countries suggest that the incidence of blindness in children resulting from acquired conditions has declined over the last few decades, but there are no reliable data from developing countries. It's only in sub Saharan Africa that the number of blind children is estimated to have increased over the last ten years. This is explained in part by the 5.4% growth in child population and also the increase in the U5MR over the past decade due to direct and indirect impact of HIV/AIDS.[10]

2.0 Causes of childhood blindness.

The major causes of blindness in children vary widely from region to region, being largely determined by socioeconomic development and the availability of primary health care and eye care services.[4, 9] Among high-income countries, lesions of the optic nerve and higher visual pathways predominate as the cause of blindness.

In developing countries, 30% to 72% of such blindness is avoidable, 9% to 58% is preventable, and 14% to 31% is treatable[4]. Corneal scarring from measles, vitamin A deficiency (VAD), the use of harmful traditional eye remedies, and ophthalmia neonatorum are the major causes in low-income countries.[4]

Retinopathy of prematurity (ROP) is an important cause in middle-income countries and in urban centers in developing countries.[8] Other significant causes in all countries are cataract, congenital abnormalities, hereditary retinal dystrophies, squints and congenital glaucoma while retinoblastoma remains a major cause of childhood mortality in the developing world.

2.1 Refractive errors.

These can cause anisometropic amblyopia in children. They results from a difference in refractive error between the two eyes which can be as little as 1.0DS.The more ammetropic eye receives a blurred image.

Refractive errors are the commonest cause of visual impairment in children.[8] Some 12.8 million children in the age group 5–15 years are visually impaired from uncorrected or inadequately corrected refractive errors, a global prevalence of 0.96%, with the highest prevalence reported in urban and highly developed urban areas in south-east Asia and in Africa. In studies of children 3-15 yrs of age the proportion of visual impairment due to uncorrected refractive error varies: 72.6% in Sydney,Australia,[12] 75% in Beijing china,[13] 78.6% in Sao Paolo brazil[14] and as high as 94.6% I Guangzhou, china.[15]

Uncorrected refractive errors can hamper performance at school, and generally impair quality of life,[8, 11] yet the correction of refractive errors with appropriate spectacles is among the most cost-effective interventions in eye health care.[11]

In 95% of the cases of children with visual impairment the provision of spectacles improves their vision to within normal limits.[8]

2.2 Squints.

Strabismus affects approximately 4% of children younger than 6 years of age.[4, 16]

Heterophoria implies a tendency of the eyes to deviate (latent squint). Ocular alignment is maintained with effort when the fusional mechanisms are eliminated. Heterotropia implies a manifest squint- the eyes are misaligned and are not controlled by the fusional mechanisms.

Strabismic amblyopia results from abnormal binocular interaction where there is continued monocular suppression of the deviating eye. Treatment include occlusion, penalization, refraction and or surgery.[17]

2.3 Congenital glaucoma.

Pediatric glaucoma encompasses a diverse group of diseases that have one thing in common, raised intraocular pressure leading to optic disc cupping.[3] Common presentations include corneal haze due stromal and epithelial edema secondary to raised intraocular pressure (IOP), lacrimation and blepharospasm.[17]Signs include buphthalmos, enlarged corneal diameters breaks in descemet membrane and optic disc cupping.

It's a relatively rare condition and hence is sometimes misdiagnosed or sub optimally treated leading to irreversible optic nerve damage. Consequently it accounts for up to 18% of children in blind institutions around the world.[18, 19]Overall glaucoma is responsible for 5% of blind children worldwide.[20]

Primary congenital glaucoma almost always is managed surgically. Medical therapy is used only as a temporizing measure prior to surgery and to maximize pressure control after surgery. Early recognition and appropriate therapy of the glaucoma can significantly improve the child's visual future.

2.4 Congenital cataracts

The term cataract refers to opacification of the crystalline lens. Cataracts remain one of the most important causes of treatable blindness in children. If a lenticular opacity is in the visual axis, it is considered visually significant and may lead to blindness. If the cataract is small, in the anterior portion of the lens, or in the periphery, no visual loss may be present.

The cause of cataract formation can be identified in about half of those with bilateral opacities. The common cause is genetic mutation usually autosomal dominant. Others include chromosomal abnormalities such as Down syndrome metabolic disorders such as galactosaemia intrauterine insults like rubella infection. Congenital cataract may also occur as part of a complex developmental disorder of the eye such as Aniridia.[17]

In 1999 it was estimated that approximately 200,000 children were blind from disorders of the lens principally un-operated cataracts as well as deep amblyopia.[21]Prevalence of cataracts in children has been estimated at 0.8-13.6/10,000children.[3]In children early detection and surgery is vital to avert later lifelong visual impairement.[8, 22]

2.5 Retinopathy of prematurity (ROP)

It's a potentially blinding vasoproliferative disease of retina of children born prematurely. Occurs when the normal process of vasculogenesis is interrupted, leading to abnormal vessel development at junction of vascular and avascular retina.[8, 23]It's a common blinding disease in children in the developed world despite current treatment, and is becoming increasingly prevalent in the developing world.[38]

All babies less than 1500 g birth weight or younger than 32 weeks' gestational age at birth are at risk of developing ROP.As younger and smaller infants are surviving, the screening protocols are changing to include earlier gestational age. In any neonatal intensive care unit (NICU), the timing of the first evaluation must be based on the gestational age at birth.[37]

If the baby is born at 23-24 weeks' gestational age, the first eye examination should be performed at 27-28 weeks gestational age. If the baby is born at or beyond 25-28 weeks' gestational age, the first examination should occur at the fourth to fifth week of life. Beyond 29 weeks, the first eye examination should probably occur before the child is discharged.[37]

Though spontaneous regressions are common, progression to blinding retinal blindness can occur. The mainstay of control of visual loss lays in the prevention through good neonatal care and programs of secondary prevention where babies at risk are examined to detect those needing treatment.[8, 23]

2.6 Retinoblastoma.

Retinoblastoma is the most common intraocular cancer of childhood. Incidence of retinoblastoma is constant worldwide at one case per 15 000–20 000 live births, which corresponds to about 9000 new cases every year.[32] In Kenya, mean age at diagnosis is 36 months for unilateral retinoblastoma, and 25 months for bilateral disease.[33]

Leucocoria is the most common initial sign of retinoblastoma but it can also indicate other vision threatening conditions e.g., Coats' disease, cataract, toxocariasis, ROP for which prompt medical attention is needed. Retinoblastoma remains intraocular and curable for 3–6 months after the first sign of leucocoria. A delay of more than 6 months from the first clinical sign to diagnosis is associated with 70% mortality recorded in developing countries.[24]Strabismus, poor visual

tracking, glaucoma, and inflammation are other presenting signs and in late presentation, proptosis.

A definitive cure for intraocular retinoblastoma is achieved by removal of the eye before the tumor spreads. Prompt removal of high-risk eyes showing signs of potential tumor spread (e.g., orbital cellulitis, poor view of the inside of the eye, bleeding inside the eye, neovascular glaucoma, tumor anterior to the retina, suspicious optic nerve, or suspected extra-ocular disease on imaging) will cure most children.[24]

2.7 Ophthalmia neonatorum

Ophthalmia neonatorum is defined as any conjunctivitis with discharge from the eyes during the first 28 days of life. Its etiology may be gonococcal or non-gonococcal, Chlamydia trachomatis being the most important cause in the latter group. The risks of gonococcal and chlamydial ophthalmia in infants born to infected mothers may be up to 30% and 50%, respectively. Gonococcal ophthalmia, if untreated, may progress rapidly to corneal ulceration, perforation, and eventually blindness. Chlamydial ophthalmia is generally milder. Ophthalmia neonatorum can be prevented by: 1) the parents' avoidance of risky sexual behavior that could lead to sexually transmitted infections; 2) routine screening for Chlamydia and gonococcal infections in antenatal clinics followed by appropriate treatment; and 3) disinfection of the infant's conjunctivae at birth.[40]

3.0 Control of blindness in children

3.1 The role of the primary health care physician.

Reducing visual loss in children poses particular challenges which are different from the challenges of controlling adult blindness. Efforts must be concerted between the eye care workers and the other primary health care providers if impact is to be made. The assessment of vision and examination of the eyes poses particular difficulties, which require time and experience on the part of the examiner.[3, 4]

Primary eye care (PEC) is a broad concept, encompassing the prevention of potentially blinding eye diseases through primary health care (PHC). PEC includes the identification, with treatment or referral, of individuals with treatable causes of blindness; and the diagnosis and treatment of

common eye diseases, particularly those causing an acute red eye. This is a very important activity of primary eye care, as the wrong diagnosis can lead to delay in providing the right treatment, which may have adverse long term consequences.[25]

The principles of PHC (i.e., fair distribution; community involvement; focus on prevention; appropriate technology; multi-sectorial approach) should all apply in primary eye care. If many of the eight essential elements of PHC are applied, this would contribute significantly to the prevention of eye diseases and blindness.[25]

Different cadres of workers can be involved; many of whom already have many duties and responsibilities.[25]

Pediatrics, due to its importance in primary care of the child plays an important role in preventing blindness. It should be noted that most systemic diseases occur with any type of eye involvement and therefore its necessary that every doctor has basic knowledge of eye health, which enable them to diagnose and treat simple eye disorders as well as refer to the specialist for eye examination when necessary.[26]

This applies particularly to developing countries, where a high proportion of blindness in children is due to preventable conditions acquired during childhoods. The inadequate distribution of ophthalmologists in different regions of the country to pediatricians thus transfers large portion of the initial care of children with eye illnesses to the pediatricians.[27]

Through careful evaluation of the ocular system, retinal abnormalities, cataracts, glaucoma, retinoblastoma, strabismus, and neurologic disorders can be identified, and prompt treatment of these conditions can save a child's vision or even life.[28] However because children do not complain of visual difficulties, visual acuity measurement (vision screening) is an important part of complete pediatric eye care.

The American Academy of pediatricians (AAP) recommends that examination of the eyes should be performed beginning in the newborn period and at all well-child visits. Visual acuity measurement should be performed at the earliest possible age that is practical (usually at approximately 3 years of age). [28] Consequently infants and children at high risk of eye problems

should be referred for specialized eye examination by an ophthalmologist experienced in treating children.[28]

This includes children who are very premature; those with family histories of congenital cataracts, retinoblastoma, and metabolic or genetic diseases; those who have significant developmental delay or neurologic difficulties; and those with systemic disease associated with eye abnormalities.[28]

In recognition of the burden of childhood illness and the challenges posed by lack of awareness among the public and other health care workers, the ministry of public health and sanitation and the ministry of medical services in Kenya in collaboration with the W.H.O has come up with guidelines entitled "preventing blindness in children: information for medical and health workers" to aid other health care workers in diagnosis management and appropriate referral of children with o ocular illnesses. It covers VAD, ophthalmia neonatorum and red eye, cataract in children, retinoblastoma, glaucoma ROP, refractive errors and squints among others. Cardinal signs and symptoms are illustrated and further instructions on management availed.[39] In addition the ministry of medical services has incorporated a section on eye examination in the mother and child health booklet.[39]

3.2 Literature review on K.A.P by pediatricians on eye disease in children.

A pediatrician's daily routine involves managing various illnesses among children. It's thus imperative that they be knowledgeable about common illnesses which affect the eyes of these children. All pediatricians and other providers of health care to children should be familiar with guidelines such as those provided by the joint eye examination guidelines of the American Association for Pediatric Ophthalmology and Strabismus, the American Academy of Ophthalmology, and the AAP.[28] If such guidelines are diligently applied it would provide a critical avenue of capturing eye disorders in children in the early stages before they become debilitating. Because of this responsibility on pediatricians, there is a concern among ophthalmologists regarding the level of knowledge and awareness of pediatricians in this area.[27]

However literature shows that not many studies have been done to assess the knowledge attitude and practice among pediatricians on childhood ocular illnesses and a few that have been done are mostly based on preschool vision screening practices.

A Study done in Brazil by Michel Broilo et al[27] on what pediatricians know about childhood ocular illnesses revealed that 28(20%) of respondents did not know the best age to start treatment of visual impairment. Only 74(53%) knew the correct time of ophthalmologic evaluation in retinopathy of prematurity while 50(36%) did not know the initial management in congenital cataract and 105(75%) could not inform the families of their patients about the prognosis of the treatment of this disease.

In the same study 88(63%) did not remember that retinoblastoma, retinopathy of prematurity and exudative retinal diseases are causes of Leucocoria and 14(10%) did not know that retinoblastoma is malignant. A further 73 (52%) did not know that the classic symptom triad of congenital glaucoma is photophobia; lacrimation and blepharospasm and 21(15%) of respondents did not know the proper management of children with strabismus.

Another study done by S. R. Sathjamohanraj et al on awareness of retinopathy of prematurity among pediatricians in a tier two city of South India[29] showed Only 54 (65.1%) pediatricians were aware of ROP, while 29 (34.9%) were not aware of the disease. Thirty-three respondents (39.8%) answered that ROP is preventable, while 24 (28.9%) responded that ROP is not preventable.

In the same study 34(41%) pediatricians had no idea as to which part of the eye is affected in ROP, while 38 (45.8%) did not know when ROP screening should be started. Only 43 (51.8%) pediatricians were sure that ROP is treatable. The study also revealed that Pediatricians in private hospitals were more aware of ROP compared to their counterparts in government hospitals (P = 0.006).

In the US a study on the Compliance With Vision-Screening Guidelines provided by AAP among a National Sample of Pediatricians was carried out and concluded that many pediatricians do not follow AAP guidelines for vision screening and referral, especially in younger children.[16]

In this survey two thirds of pediatricians did not begin visual acuity testing at age 3 years as recommended, and about one fifth did not test until age 5 years. In addition, one fourth did not perform cover tests or stereopsis testing at any age. Although most pediatricians (95%) in the sample reported screening for red reflexes in their patients, many pediatricians did not repeat the test as recommended at each health supervision visit.[16]

A similar survey was carried out in the state of Illinois USA by John F and Sharon C.[34] It showed that Sixty percent of physicians tested visual acuity of children 5 years and older, and half of this group tested children 2 to 4 years old. The most common reasons for not testing visual acuity were inadequate time (42%), children too young (18%), or that screening would be done at school (18%). The majority (88%) refer to an ophthalmologist after a single vision screening failure, while about half perform the cover-uncover test on infants and children. The results suggested many Illinois pediatricians do not perform vision screening of preschool children, though screening does occur at other sites.[34]

Another survey on preschool vision screening in pediatric practice was conducted by Alex R. Kemper et al where a national sample of pediatricians was surveyed to evaluate preschool vision screening practices. The rate of acuity screening for 3-year-old children was low (35%), but increased for 4- (73%) and 5-year-old children (66%). Few used photo screening or auto refraction (8%). Common barriers to vision screening were that screening is too time-consuming and children are uncooperative 49%. In the same survey few pediatricians (3%) reported that screening is unnecessary because vision problems would be identified elsewhere (e.g., by the family).[31]

In the United Kingdom routine examinations to identify eye problems during the neonatal period and again at 6–8 weeks of age, are an established component of child health surveillance in Britain. A survey of pediatricians' practice and training in routine infant eye examination in the U.K was done by Jugno S Rahi et al.[30]

Among the 365 (73%) pediatricians who returned completed questionnaires (205 consultants, 102 hospital pediatric trainees, and 58 CMOs) ,a fifth of all respondents (75) and a third (32) of hospital pediatric trainees reported receiving no training in the ophthalmological examination of infants. Of those reporting some training, 57% had received this only as postgraduates and 16% only while undergraduates. Overall 71% (248) of all responding pediatricians (57% of consultants, 81% of hospital trainees and CMOs) considered they would benefit from further training by an ophthalmologist.[30]

4.0 STUDY JUSTIFICATION.

Childhood blindness is an important cause of blindness globally. Many of the causes are either preventable or treatable with early diagnosis and treatment. However delays in detection of childhood eye disease can often lead to debilitating outcomes. There's inadequate distribution of ophthalmologists in different regions of the country compared to pediatricians transferring large portion of the initial care of children with eye diseases to pediatricians. Therefore even though the ophthalmologist could provide specialized care for the children, early detection and appropriate referral to an ophthalmologist largely depends on the primary care physician, pediatricians in this case. Pediatricians therefore should play an important role in preventing blindness in children through routine vision screening evaluations, typically performed at well child visits. This would be both beneficial and cost-effective means to identify children that require care from an eye specialist.[28]

However, previous studies, which have focused primarily on preschool children, have revealed deficiencies in vision-screening and referral practices in pediatric practice settings.[34, 35.] This study seeks to determine whether pediatricians recognize the important role they ought to play in preventing and managing blindness in children and also identify the attitudes, practices and beliefs of these care givers that contribute to the late detection or non-detection of ocular illnesses in children.

Lastly, there are no studies of this kind reported in Kenya or Africa and very few around the world and hence the information acquired will add to the data available.

5.0 BROAD OBJECTIVE

To assess the knowledge, attitude and practice of childhood eye disease among pediatricians in Kenya

5.1 Specific objectives:

- To assess the knowledge on childhood eye disease among pediatricians in Kenya.
- To assess the participant's practice of eye examination, treatment and referral of children with various eye diseases.

- To describe their attitude towards eye diseases in children and treatment of children and subsequent referral to ophthalmologists.

6.0 STUDY METHODOLOGY

6.1 Study design

Cross- sectional descriptive study

6.2 Study population

This study included pediatricians practicing in hospitals and clinics in Kenya i.e. any medical doctor with postgraduate training in pediatrics (Masters and above).

6.3 Sample size

The following formula with finite population correction was applied (Daniel, 1999)

$$n' = \frac{NZ^2P(1-P)}{d^2(N-1) + Z^2P(1-P)}$$

n' = sample size with finite population correction
N = size of population =240 (according to Kenya pediatric association registry)

Z = statistic for 95% level of confidence = 1.96

P = 50%

d = margin of error = ±5%

148 pediatricians

6.4 Sampling method

Participants were enrolled through consecutive sampling.

6.5 Inclusion criteria

Any pediatricians who consented to participate in the study were included.

6.6 Exclusion criteria

Those Pediatricians who were no longer in practice

6.7 Study setting

The study was done in the Republic of Kenya which is a country in East Africa that lies on the equator. With the Indian Ocean to its south-east, it is bordered by Tanzania to the south, Uganda to the west, South Sudan to the north-west, Ethiopia to the north and Somalia to the north-east.

Kenya has a land area of 580,000 km^2 and a population of a little over 43 million residents. It has a warm and humid climate along its coastline on the Indian Ocean, which changes to wildlife-rich savannah grasslands moving inland towards the capital-Nairobi.

Medical care is provided by both public and private hospitals and the various privately owned clinics throughout the country. In the public sector the health services are multilevel. Pediatricians are found in the health facilities from level 4 to level 6. Level 4 are also called district and sub-district hospitals; level 5 facilities are also called regional provincial hospitals while level 6 hospitals are the national referral hospitals. The latter category comprises the Kenyatta National hospital and The Moi teaching and referral hospital. Some specialists practice both in the public and private hospitals or clinics.

6.8 Study period

January 1st 2013 to January 30th, 2014

6.9 Materials

Questionnaire (appendix 1)

The questionnaire (appendix 1) was semi-structured and was self administered. It had four sections.

The first section required answers about the participants' demographics; age, sex, nature of practice, and number of years of practice as a pediatrician.

The section with questions addressing the knowledge levels of the participants came next. They were required to give appropriate answers to a series of open ended questions on a series of topics including retinoblastoma, congenital cataract, painful red eye, retinopathy of prematurity, squints, refractive errors and ophthalmia neonatorum: their common presenting signs, symptoms and treatment available.

The third part of the questionnaire had ten questions asking about their practices; mainly about what they do with children they suspect to be having various eye diseases.

Finally, the questionnaire ended with eleven questions assessing attitudes towards various eye diseases and the adequacy of ophthalmology training in Medical school was also assessed in this section.

6.10 Data collection.

The questionnaires were hand delivered to all the participants by the principal investigator assisted by 4 trained study assistants. Participants were first approached at the annual scientific conference which was held in Mombasa under the auspices of the Kenya Pediatric association. Thereafter those who did not attend the conference were subsequently approached as follows. Those in the public hospitals were sought in their places of work .These were the level 4, 5 and 6 hospitals. The pediatricians in the private practice were approached in the various private hospitals in Nairobi and other major towns and the various faith based facilities in the country. Participants exclusively in private clinics were traced using contacts as enlisted in the various professional directories on the internet i.e. cybonetics.com, kenyamed.com, linked in and the yellow pages.

6.11 Analysis

Collected data was cleaned and entered in a computer's Microsoft excel data base. Open ended questions were coded according to the emerging categories. The section on knowledge was scored with each correct response scoring one mark and each wrong response scoring a zero. The cumulative scores were converted into percentages. For further assessment, original Bloom's cut off points (appendix V) were used to categorize level of knowledge as follows: 80 – 100% - Good Knowledge; 60- 79% - Moderate Knowledge and<60% - Poor Knowledge. The first two categories were summed together as "satisfactory knowledge" in the analysis (Adopted from study by Rajiv Khandekar et al.)[43]

Analysis was done using STATA. Descriptive statistics such as frequency, percentage, mean, median and standard deviation were used to summarize and describe the data.

Stepwise logistic regression was done to assess individual independent variable in relation to the knowledge attitude and practice. An alpha level of 0.05 was used for all significance tests.

7.0 ETHICAL CONSIDERATIONS

Approval of the study was obtained from the KNH/UON ethics committee.

Participation in the study was voluntary. The participants were requested to sign a written consent with a detailed explanation of the study. The questionnaires did not require the identity of the participants and data collection and analysis was done with confidentiality maintained. Information gathered will only be used for purposes of improving health delivery services and for academic purposes. Hence the results of this study will be shared only with the relevant stake-holders including the University of Nairobi, division of ophthalmic services and the division of child health in the ministry of health of Kenya so as to improve service delivery. Information will not be used for any other purpose other than the one stated.

After data is extracted the raw questionnaires will be securely destroyed by shredding and burning.

8.0 RESULTS

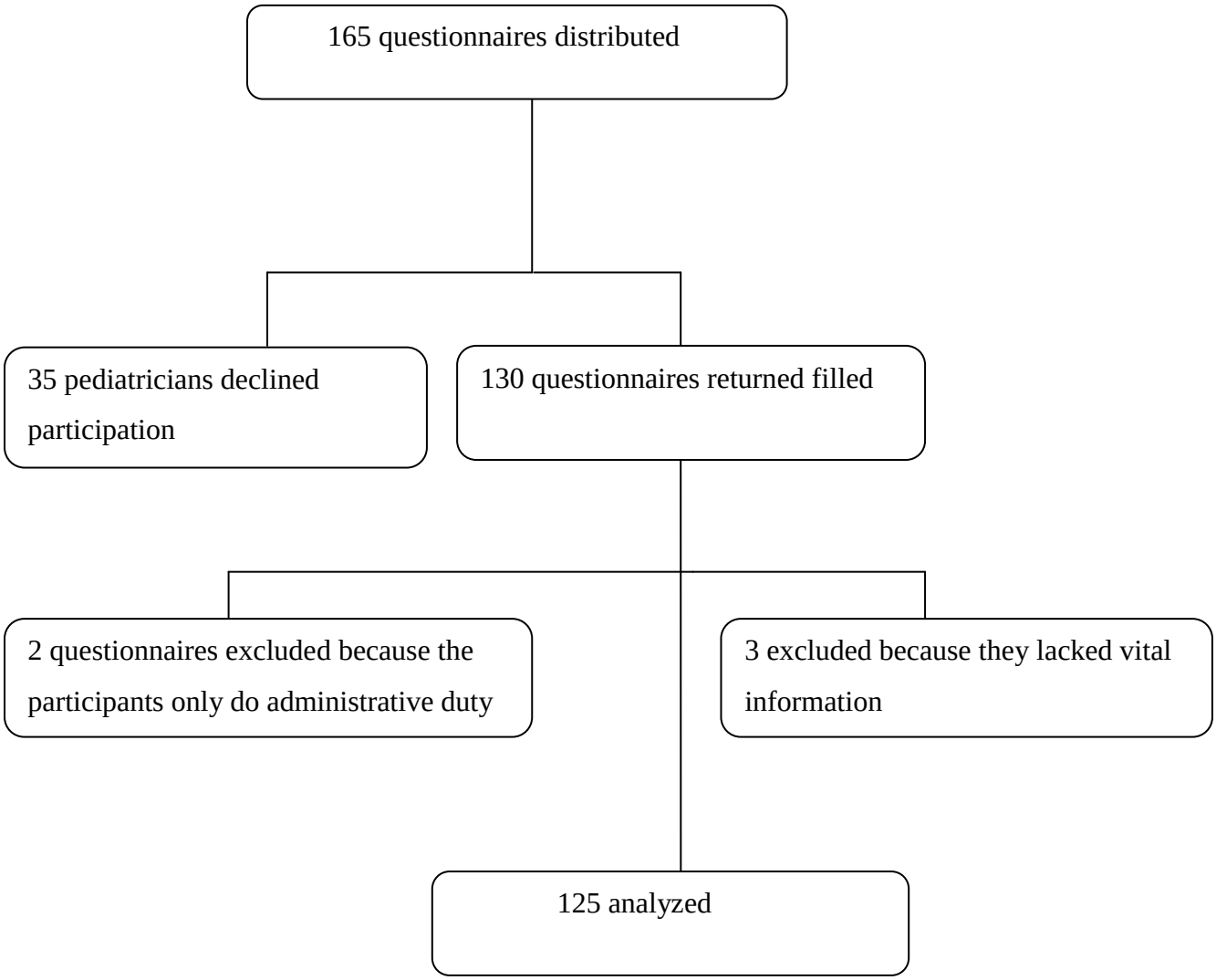


Figure 1: Flow chart of data collection

The response rate was78.79%

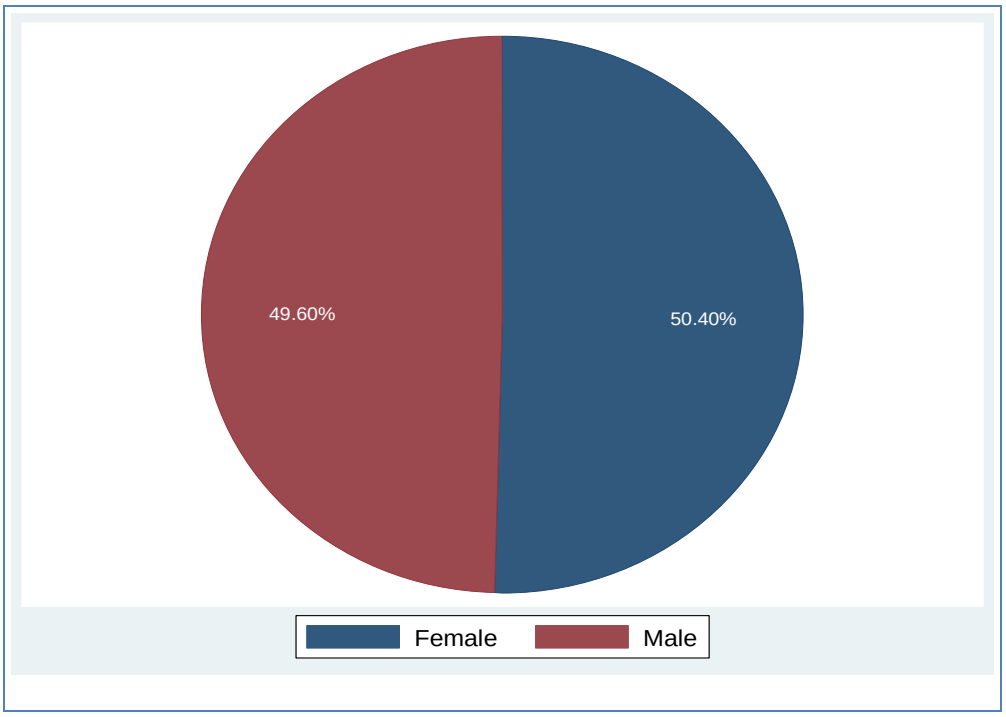


Figure 2: Distribution by sex

Male to Female ratio 1:1

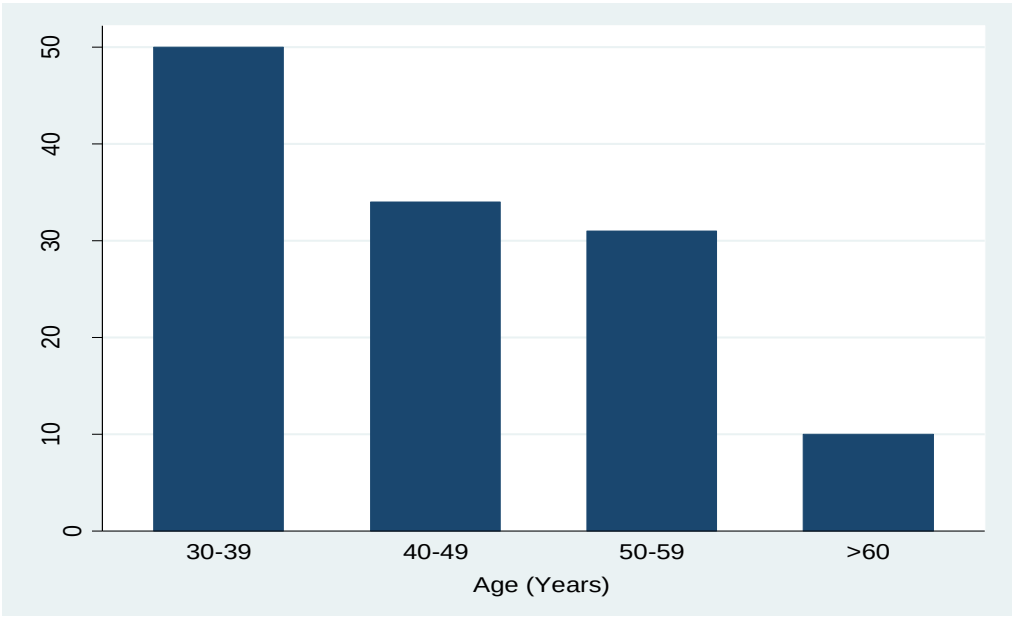


Figure 3: Distribution by age

Mean age was 43.87 years [95 % CI: 42.0 – 46.0; SD 10.32]; median was 40, range 30-79 years.

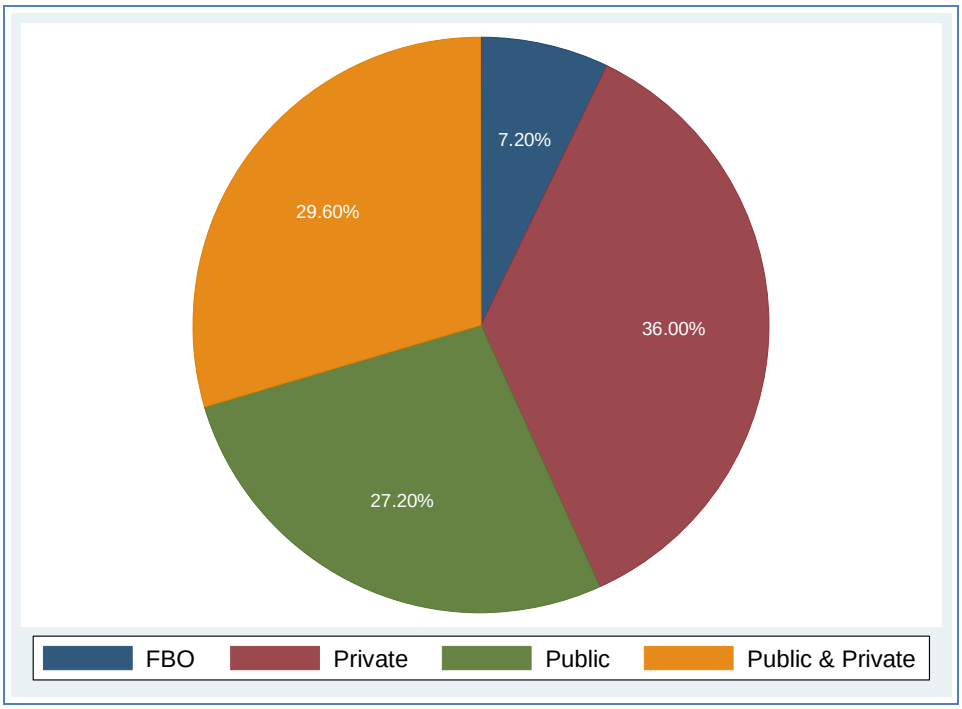


Figure 4: Type of practice

45 (36.00%) of participants were exclusively in private practice.

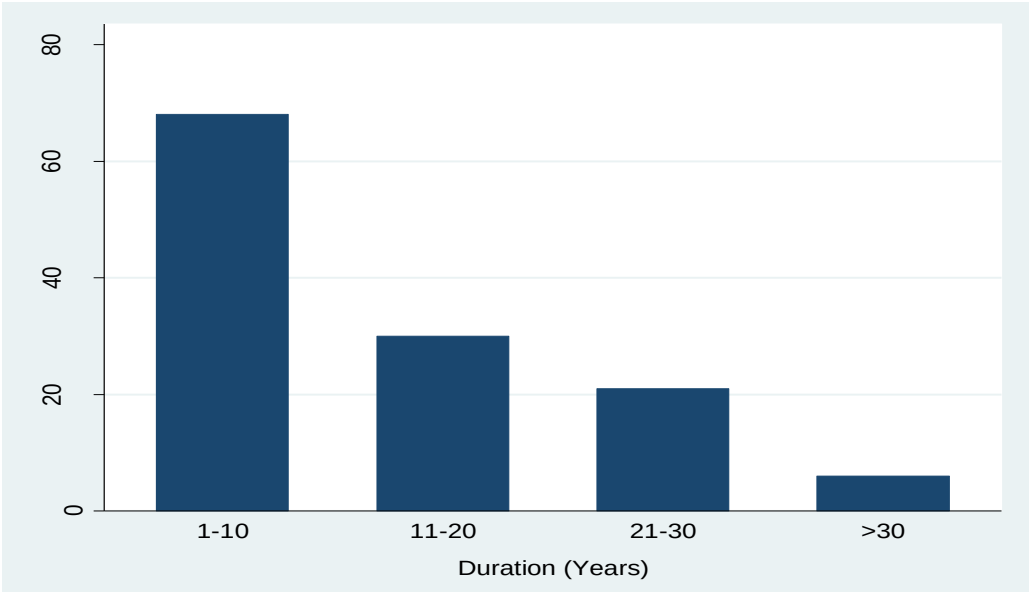


Figure 5: Duration of practice

The mean duration of practice was 10.99 years (SD 9.74 years); median=8 yrs; range 1-45years.

Table 1: Knowledge on retinoblastoma

Variable	n (%)
Causes of leucocoria n=117[a]	
Retinoblastoma	106 (90.60%)
Cataract	87 (74.36%)
ROP	21 (17.95%)
Toxocariasis	19 (16.24%)
Others[1]	28 (23.93%)
Definition of Retinoblastoma N=125	
Retinal/ocular malignancy or tumor	122 (97.60%)
Orbital tumor	3 (2.40%)
Signs of retinoblastoma n=122[b]	
White reflex	105 (86.07%)
Proptosis/swelling	66 (54.10%)
Poor vision	50 (40.98%)
Squint	25 (20.49%)
Redness	5 (4.10%)
Others[2]	11 (9.02%)
Is retinoblastoma treatable N=125	
Yes	118 (94.40%)
No	7 (5.60%)

[a]Does not include 8 missing values; there was possibility of multiple responses.

[b]Does not include 3 missing values; there was possibility of multiple responses.

Others[1] includes corneal scar (1), Coats disease (3), Coloboma (1), Glaucoma (4), PHPV (9), Retinal detachment (5), Uveitis (2), VAD (1), Vitreous hemorrhage (1) and Optic nerve abnormality (1).

Others[2] include Cellulitis (3), dilated pupil (2), Pain (4) and reduced eye movement (2)

105(86.07%) of respondents mentioned white reflex as a sign of retinoblastoma; 122(97.60%) of the respondents defined retinoblastoma as a either a retinal /ocular malignancy or tumor and only 7(5.6%) of respondents said retinoblastoma is not treatable.

Table 2: Knowledge on systemic illnesses in children associated with congenital cataracts.

Systemic illnesses n=119[a]	n (%)
Congenital rubella	78 (65.55%)
Toxoplasmosis	34 (28.57%)
D/M	34 (28.57%)
Galactosaemia	31 (26.05%)
TORCHES (non-specified)	18 (15.13%)
C.M.V	16 (13.45%)
Metabolic disorder(non-specified	10 (8.40%)
Syphilis	8 (6.72%)
Others[1]	21 (17.65%)

[a]Does not include 6 missing values; there was possibility of multiple responses.

Others[1] include Hypothyroidism (1), Cushing (1), Failure to thrive (2), genetic (2), HIV (2), Hypoglycemia (1), Leukemia (1), ROP (1), Stroke (1), Down syndrome (4), and Wilson disease (2) and HSV (2).

Majority (65.55%) of respondents mentioned congenital rubella as a systemic illness in children associated with cataracts.

Table 3: Knowledge on ROP

Variable	n(%)
ROP defined n=123[a]	
Oxygen damage to the retina	44 (35.77%)
Proliferation of abnormal vessels on the retina due to Oxygen exposure	41 (33.33%)
Blindness caused by oxygen damage to eye	33 (26.83%)
Don't know/ not sure	2 (1.63%)
Other[1]	3 (2.44%)
Risk factors for ROP n=123[b]	
Prematurity	93 (75.61%)
Exposure to high oxygen concentration	93 (75.61%)
Low birth weight	28 (22.76%)
Prolonged oxygen exposure	11 (8.94%)
Respiratory Distress syndrome	11 (8.94%)
Hypoxia	7 (5.70%)
Phototherapy	5 (4.07%)
Don't know/not sure	5 (4.07%)
Others[2]	9 (7.32%)
Is ROP treatable N=121[c]	
Yes	76 (62.81%)
No	34 (28.10%)
Not Sure	11 (9.09%)

[a]Does not include 2 missing values

[b]Does not include 2 missing values, there was possibility of multiple responses.

[c]Does not include 4 missing values

Others[1] include eye problems due phototherapy (1), no image perception (1) and retinal hemorrhage secondary to oxygen exposure (1).

Others[2] include anemia (2), Heart disease (1), NEC (2) and Sepsis (4)

3(2.44%) of respondents were either not sure of or did not know what ROP was; 93(75.61%) of respondents knew prematurity was a risk factor for ROP and 34 (28.10%) of respondents said ROP was not treatable.

Table 4: Knowledge on congenital glaucoma

Variable	n(%)
Congenital glaucoma defined n=117[a]	
Raised IOP	98 (83.76%)
Obstructed aqueous outflow	19 (16.24%)
Signs/symptoms of congenital glaucoma n= 122[b]	
Big eye	45 (36.89%)
Reduced vision	44 (36.07%)
Photophobia	23 (18.85%)
Excess tearing	23 (18.85%)
Blindness	16 (13.12%)
Pain	15 (12.30%)
Red eye	15 (12.30%)
Cloudy cornea	15 (12.30%)
Blepharospasm	10(8.20%)
Don't know	10 (18.85%)
Others[1]	9 (7.38%)
Is congenital glaucoma treatable n=124[c]	
Yes	109 (87.90%)
No	4 (3.23%)
Not Sure	11 (8.87%)

[a]Does not include 8 missing values.

[b]Does not include 3 missing values; there was possibility of multiple responses.

[c]Does not include 1 missing value.

Others[1] include: hard eye (1), headache (3), leucocoria (3) and nystagmus (2).

98(83.76%) of respondents defined congenital glaucoma as raised IOP; Photophobia, excessive tearing and blepharospasm were mentioned by 23(18.85%), 23(18.85%) and 10(8.20%) of respondents respectively as some of the signs and symptoms of congenital glaucoma.11 (8.87%) of respondents were not sure if congenital glaucoma was treatable.

Table 5: Knowledge on refractive errors

Variable	n(%)
Can children get refractive errors? N=125	
Yes	123 (98.40%)
No	1 (0.80%)
Not Sure	1 (0.80%)
How refractive errors are detected? N=125	
Don't know	44 (35.20%)
Visual acuity test	28 (22.40%)
Refraction/retinoscopy	24 (19.20%)
Noticing Poor vision	17 (13.60%)
Eye examination (not specified)	8 (6.40%)
Others[1]	4 (3.20%)

Others[1] include Fundoscopy (3) and Visual field test (1).

While almost all (98.40%) of respondents said that children could get refractive errors, only 24(19.20%) of respondents knew that refractive errors can be detected by refraction/ retinoscopy.

Table 6: Knowledge on squints

Variable	n (%)
Definition of Squint n=118[a]	
Deviated eye/ misdirected eye/cross eyes/strabismus	86 (72.88%)
Don't know	12 (10.17%)
Uncoordinated eye movement	12 (10.17%)
Corrective mechanism for refractive errors	5 (4.24%)
Other[1]	3 (2.46%)
Are squints treatable? n=124[b]	
Yes	116 (93.55%)
No	6 (4.84%)
Not Sure	2 (1.61%)

[a]Does not include 7 missing values. [b]Does not include one missing value

Others[1] include amblyopia (1), Poor fixation (1) and no convergence (1)

12(10.17%) of respondents said they did not know what a squint is, while 6(4.84%) of respondents said squints were not treatable.

Table 7: Knowledge on red eye in a child

Variable	n(%)
Causes of painful eye N=125[a]	
Trauma	79 (63.20%)
Infection	71 (56.80%)
Conjunctivitis(unspecified)	55 (44.00%)
Allergy	35 (28.00%)
Uveitis/iritis	24 (19.20%)
Foreign body	20 (16.00%)
Glaucoma	15 (12.00%)
Chemical injury	13 (10.40%)
Corneal ulcer	12 (9.60%)
Others[1]	13 (10.40%)
Definition of Ophthalmia neonatorum? n=122[b]	
Ocular Infection associated with discharge	95 (77.87%)
Ocular Inflammation associated with discharge	25 (20.49%)
Conjunctivitis in neonates	2 (0.82%)

[a]There was possibility of multiple responses. [b]Does not include 3 missing values.

Others[1] include corneal scar (1), Contact lens use (1), Cellulitis (4), Retinoblastoma (4), frequent eye drop use (2) and Subconjunctival hemorrhage (2)

79(63.20%) of respondents mentioned trauma as a cause of painful red eye and 95(77.87%) of respondents answered that ophthalmia neonatorum was ocular infection associated with discharge.

Table 8: Categorization of participants' knowledge level according to bloom's cut off points

Cut off point (N=125)	N (%)
Poor Knowledge (<60%)	87 (69.60%)
Moderate Knowledge (60-80%)	35 (28.0%)
Good Knowledge (80-100%)	3 (2.40%)

The average score was 54.82% (SD 10.73%

Most (69.60%) of participants had a poor level of knowledge.

Table 9: Practices of eye examination in children

Practice	n (%)
Do you do eye examination in children (N=125)	
Yes	87 (69.60%)
No	38 (30.40%)
If yes, how often (n=87)	
When caregiver reports child has eye problem.	38 (43.68%)
As a routine part of every child's examination	37 (42.53%)
At every MCH/FP visit	8 (9.20%)
Other[1]	4 (4.60%)
Which test do you do? (n=87)	
Visual Acuity	37 (42.53%)
Physical Exam using a torchlight	36 (28.80%)
Fundoscopy	29 (33.33%)
Pupilary light reflexes	20 (22.99%)
Eye movement examination	12 (13.79%)
Color test	2 (2.30%)
Others[2]	6 (6.90%)
Why not do examination? (n=38)	
Don't have enough time	15 (39.47%)
Don't know how to	12 (31.58%)
Children uncooperative	7 (18.42%)
No equipment	4 (10.53)

Others[1] include – when I notice child has a problem (2), screening for school enrollment (2).

Others[2] include-cover test (3), visual fields (2) and refraction (1)

87(69.60%) of respondents said they practice eye examination in children while the most cited reason for not examining was lack of enough time (39.47%)

Table 10: Practices of treatment and referral of various eye diseases in children

Practice	n (%)
How do you manage children with painful red eye? N=125	
Refer immediately to eye care worker	51 (40.80%)
Give eye drops and refer if no improvement	33 (26.40%)
Give eye drops	25 (20.00%)
Give eye drops and refer immediately to eye care worker	16 (12.80%)
How do you manage children with white pupilary reflex=125	
Refer to eye care worker immediately	125 (100%)
How do you manage children with squints? N=125	
Refer immediately to eye care worker	116 (92.80%)
Follow up and refer if it doesn't resolve	9 (7.20%)
What do you do with children who you suspect might be at risk of ROP? n=121[a]	
Refer to ophthalmologist	105 (86.77%)
Regulate oxygen concentration	23 (19.01%)
Early oxygen weaning	2 (1.65%)
Nothing	2 (1.65%)
Other[1]	4 (3.31%)
How do you manage children with ophthalmia neonatorum? N=125	
Give eye drops	56 (44.80%)
Give eye drops and refer if no improvement	24 (19.20%)
Give systemic antibiotics	21(16.80%)
Refer immediately to eye care worker	14 (11.20%)
Give eye drops and refer immediately to eye care worker	8 (6.40%)
Other (specify)-wash eyes frequently.	2(1.60)
How do you manage children you suspect have glaucoma? n=124[b]	
Refer to eye care worker immediately	123 (99.19%)
Give eye drops(not specified)	1 (0.81%)

[a]Does not include 4 missing values. [b]Does not include 1 missing value.Others[1] include good neonatal care (1), refer to neonatologist (1), Regulate phototherapy (1) and give Vitamin A (1)

Majority of participants refer children with eye diseases to eye care workers. All participants refer children with white reflex while majority (86.77%) refers children at risk for ROP.

Table 11: Practice of Eye drops prescribed

Variable	n(%)
Eye drops for painful red eye (n=74[a])	
Non specified	47(63.51%)
TEO	10(13.51%)
Chloramphenicol	7 (9.46%)
Gentamicin	5 (6.76%)
Antibiotic& steroid	3(4.05%)
Antihistamine	1 (1.35%)
Ciprofloxacin	1 (1.35%)
Antibiotics for ophthalmia neonatorum(n=109[b])	
Eye drops only	86(78.90%)
Systemic antibiotics only	17(15.60%)
Systemic + eye drops	6(5.50%)
Eye drops for ophthalmia neonatorum (n=92[c])	
Non-specified	34(36.96%)
TEO	30 (32.61%)
Chloramphenicol	9 (9.78%)
Gentamycin	9(9.78%)
Erythromycin	7 (7.61%)
TEO+Erythromycin	3(3.26%)
Systemic antibiotics for ophthalmia neonatorum(N=23[d])	
Ceftriaxone	14(60.86%)
Non specified	7 (30.43%)
Kanamycin	2 (8.69%)

[a]Includes only those who give eye drops for painful red eye.

[b]Includes only those who give antibiotics for ophthalmia neonatorum.

[c]Includes only those who give eye drops for ophthalmia neonatorum.
[d]Includes only those who give systemic antibiotics for ophthalmia neonatorum.

TEO was the most prescribed antibiotic for painful red eye and ophthalmia neonatorum at 10(13.51%) and 30(32.61%) respectively. The most prescribed systemic antibiotic for ophthalmia neonatorum was ceftriaxone 14(60.86%)

Table 12: Attitudes towards eye diseases in children (agree or disagree)

Variable (N=125)	n (%)
Eye exam in children should be done only when the caregiver complains	
Agree	2 (1.60%)
Disagree	123(98.40%)
Eye exams in children can only be done by an eye care worker.	
Agree	2 (1.60%)
Disagree	123(98.40%)
Children with white pupil reflex should be reviewed by an eye care worker.	
Agree	119(95.20%)
Disagree	6 (4.80%)
You can adequately inform caregivers on the consequences of squints in children.	
Agree	88 (70.40%)
Disagree	37 (29.60%)
Children can use spectacles effectively.	
Agree	100(80.00%)
Disagree	25 (20.00%)
Congenital glaucoma is an important issue in your pediatric practice.	
Agree	67 (53.60%)
Disagree	58 (46.40%)
Your training adequately equips you to diagnose manage and refer children with eye diseases.	
Agree	49 (39.20%)
Disagree	76 (60.80%)
Children with cataracts require a thorough systemic review by a pediatrician.	
Agree	124(99.20%)
Disagree	1 (0.80%)
Eye examination by a pediatrician could help in early detection of retinoblastoma.	
Agree	124(99.20%)
Disagree	1 (0.80%)
Retinopathy of prematurity is a big problem in your practice.	
Agree	39 (31.20%)
Disagree	86 (68.80%)
Good antenatal and immediate postnatal care can help reduce the burden of ON	
Agree	120(96.00%)
Disagree	5 (4.00%)

49(39.20%) of respondents say their training was adequate to manage eye disease in children.

Table 13: Univariate logistic regression assessing the association between satisfactory* knowledge on childhood eye diseases and socio-demographic factors.

Factor	Knowledge (N=125)			
	N	n (%)	OR (95% CI)	p-value
Gender				
Female	63	21 (33.33%)	**1.00 (Ref)**	
Male	62	17 (27.42%)	0.76 (0.35 – 1.62)	0.473
Age groups				
Above 60 years	10	1 (10.00%)	**1.00 (Ref)**	
30 – 39	50	18 (36.00%)	5.06 (0.59 – 43.25)	0.138
40 – 49	34	12 (35.29%)	4.91 (0.55 – 43.53)	0.153
50 – 59	31	7 (22.58%)	2.63 (0.28 – 24.44)	0.397
Years of practice				
More than 30 years	6	1 (16.67%)	**1.00 (Ref)**	
1 – 10 years	68	24 (35.29%)	2.73 (0.30 – 24.71)	0.372
11 – 20 years	30	10 (33.33%)	2.50 (0.26 – 24.38)	0.430
21 – 30 years	21	3 (14.29%)	0.83 (0.07 – 9.86)	0.885
Type of practice				
Public	34	13 (38.24%)	**1.00 (Ref)**	
FBO	9	5 (55.56%)	2.02 (0.46 – 8.92)	0.354
Private	45	8 (17.78%)	0.35 (0.12 – 0.98)	**0.045**
Public/ Private	37	12 (32.43%)	0.78 (0.29 – 2.06)	0.609

***Satisfactory = Good + Moderate knowledge**

Only type of practice had a statistically significant association with satisfactory knowledge.

Satisfactory knowledge was associated with private practice

Table 14: Univariate Logistic regression assessing the association between the practice of eye examination and socio-demographic factors

Factor	Practice (N=125)			
	N	**n (%)**	**OR (95% CI)**	**p-value**
Gender				
Female	63	49 (77.78%)	**1.00 (Ref)**	
Male	62	38 (61.29%)	0.45 (0.21 – 0.99)	**0.047**
Age groups				
Above 60 years	10	6 (60.00%)	**1.00 (Ref)**	
30 – 39	50	38 (76.00%)	2.11 (0.51 – 8.75)	0.224
40 – 49	34	22 (64.71%)	1.22 (0.29 – 5.20)	0.468
50 – 59	31	21 (67.74%)	1.40 (0.32 – 6.10)	0.213
Years of practice				
1 – 10 years	6	3 (50.00%)	**1.00 (Ref)**	
11 – 20 years	68	50 (73.53%)	2.78 (0.51 – 15.03)	0.236
21 – 30 years	30	19 (63.33%)	1.73 (0.30 – 10.08)	0.544
More than 30 years	21	15 (71.43%)	2.5 (0.39 – 16.05)	0.334
Type of practice				
Public	34	28 (82.35%)	**1.00 (Ref)**	
FBO	9	6 (66.67%)	0.43 (0.08 – 2.22)	0.312
Private	45	28 (62.22%)	0.35 (0.12 – 1.03)	0.056
Public/ Private	37	25 (67.57%)	0.45 (0.15 – 1.37)	0.158

Only gender had a statistically significant association with whether participants examined children's eyes or not. Males were less likely to do eye examinations than females.

9.0 DISCUSSION

Childhood blindness leaves an individual with a lifetime of morbidity. However with timely diagnosis and treatment most of the causes can be averted. This study sought to assess the knowledge, attitude and practice on childhood eye diseases among pediatricians practicing in Kenya to enhance understanding of the role they play in averting childhood blindness.

There are 240 registered pediatricians in Kenya according to the KPA register (which is the most comprehensive pediatricians register). Out of these we managed to contact 165 participants. The rest could not be contacted because of a variety of reasons chief among them being that some participants were no longer practicing at the addresses indicated on the KPA register or the various directories on the internet hence tracing them became a challenge. Out of the 165, 125 responded hence the response rate was 78.79 % with a male to female ratio of 1:1.The mean age of participants was 43.87 years, while the mean duration of practice was 10.99 years.

On possible causes of leucocoria, majority (90.60%) of the respondents mentioned retinoblastoma, which is much higher proportion than the 37% of respondents in a study done by Michel Brolio et al in Brazil.[27]This could be attributed to the recent media campaigns on retinoblastoma in our country and is commendable as it means more pediatricians were likely to refer affected children for specialist care. Other causes mentioned included cataract (74.36%), toxocariasis (16.24%) and ROP (17.95%) among others. Its notable that the proportion of respondents who mentioned ROP was comparatively lower than those in the Brazil study (37%).[27]This is possibly because the study in Brazil was done exclusively in a city setting (Porto-Allegre) where the health system could be well developed to support survival of children with ROP and hence practitioners as a whole were more likely to encounter children with this disease.

On knowledge about retinoblastoma, majority (97.60%) defined it as retinal/ocular malignancy or tumor. Most respondents remembered that leucocoria was a sign of retinoblastoma(86.07%),which is the most common presenting sign of retinoblastoma.[24]However squinting which is the second commonest presenting sign[24] was mentioned by only a fifth (20.49%) of the respondents. This unfortunately implies that four in five children presenting this way to a pediatrician may not be accorded the urgency that the disease merits. Moreover more than half (54.10%) of the respondents mentioned proptosis, which is usually a delayed

presentation.[24] Although poor vision was mentioned by 40.98% of participants good vision can usually be preserved until the disease is advanced, especially if the macular and optic nerve head are spared until late in the disease.

On Knowledge of systemic illnesses associated with congenital cataract, majority of participants (65.55%) mentioned congenital rubella. However toxoplasmosis (28.57%), diabetes (28.87%), galactosaemia (26.05%) and CMV (13.45%) were mentioned by less than a third of respondents. Knowledge on the relation of cataracts to systemic diseases is critical. While it's vital for the ophthalmologist to be wary of this relationship to adequately refer children to the pediatrician to rule out or manage these systemic illnesses, it's equally important that the pediatrician knows of the ocular diseases that may be present in children presenting to them primarily because of the systemic condition for appropriate referral.

Notably however, all the respondents in the study knew that children with cataracts ought to be referred immediately to eye care worker. This may be because cataracts present mostly with leucocoria which 86.07% of respondents mentioned as a sign of retinoblastoma. Thus most pediatricians may be referring such children so that retinoblastoma is ruled out. Unfortunately there are no published studies assessing knowledge of pediatricians on congenital cataracts.

Knowledge on ROP revealed that only a third of participants (33.33%) knew it as a disease leading to proliferation of abnormal retinal vessels associated with oxygen exposure in premature children. Others said it was blindness caused by oxygen damage to the eye (26.83%) without specifying which part of the eye was involved. Another 35.77% said it was oxygen damage to the retina without specifying the nature of the damage [table 4]. This shows that even though most participants did not know the accurate definition of the disease a significant majority were aware of the disease and its association to oxygen. This is a much higher proportion compared to the findings by Sathjamohanraj et al in India who found that only 65.1% were aware of ROP.[29]

The cardinal risk factors for ROP were mentioned as follows: prematurity by 75.61%; Low birth weight by 22.76%; high oxygen concentration by 75.61%.This is a large percentage compared to the findings of the study in India[29]whereby 42.2% of respondents were not aware of the risk factors of ROP, but much lower than the findings of another study in India by Padmaja Kumari Rani et al where 100% of respondents knew the risk factors of ROP.[41] However this latter study

was done among specialist neonatologist, who by virtue of dealing more with preterm children are likely to be more aware of the disease and its risk factors. 76(62.81%) said ROP was treatable. This is alarming as it may imply about 40%of pediatrician may not avidly refer such children for specialized treatment especially if they didn't think the children could be treated. Furthermore if they gave such inaccurate information to the caregivers they too would be reluctant to seek further medical attention

Knowledge on congenital glaucoma showed that majority of respondents knew what congenital glaucoma is with 83.76% defining it as raised intraocular pressure while 16.24% defined it as obstruction to aqueous outflow.

Though majority (87.90%) responded that congenital glaucoma was treatable, the classical symptoms triad of photophobia, excess tearing and blepharospasm were each reported by less than a fifth of the respondents [table5]. This lower than the findings in the Brazil study where at least 48% of participants mentioned the triad of symptoms.[27] In both settings however awareness of these symptoms remains low and this could be attributed to the relative rarity of this disease. Among the signs mentioned included big eye by 36.89% among others [table5]. This implies that almost two thirds of children presenting only with big eye were likely to be dismissed as having normal large eyes and hence delay in diagnosis.

On refractive errors almost all respondents (98.40%)) knew that children can get refractive errors but only a fifth (19.20%) knew that they can be detected by refraction or retinoscopy. Not knowing how a disease is detected can have significant bearing on the action a doctor takes in so far as referral and subsequent management and follow up is concerned. No published study has evaluated the KAP of pediatricians on refractive errors.

On squints 86(72.88%) defined the disease as a deviated, misdirected, crossed, or Strabismic eye. Another 12(10.17%) defined it as uncoordinated eye movement, while 12(10.17%) said they did not know. Notably, majority of respondents (93.55%) knew that squints are treatable. This compares with the findings in the Brazil study in which 85% knew the management of squints.[27]

Knowledge on red eye and ophthalmia neonatorum was generally good. All the respondents knew what ophthalmia neonatorum was and all of them knew it was preventable. This high level

of knowledge in our setting may stem from the fact that most pediatricians routinely give TEO to all children at birth to prevent the disease hence the high awareness.

Knowledge on the causes of red eye was also good. The most mentioned cause was trauma 79(63.20%) followed by infection (56.80%) and conjunctivitis 55(44.00%) respectively among others [table8]. Red eye is an ophthalmological emergency and it's good that most pediatricians are versed with the common causes, some which need to be dealt with by the first contact person even before action to refer the patient for specialist care can be instigated. There's no published study on KAP on red eye among pediatricians.

When classified as per Bloom's original cut-off points, majority of respondents in our study (69.60%) had poor knowledge levels [table 9].The average score both in our study (54.82 %(SD 10.73) and in the study Michel Brolio[27] (58.00%) fall in the category of "poor knowledge" as per blooms cut of points. It's possible that the training of pediatricians in both settings places little emphasis on ophthalmological conditions. Logistic regression in our study revealed that participants in private practice were more likely to have satisfactory knowledge than the rest.

Assessment of participants' practices showed a satisfactory level of good practice among participants. 69.60% of participants reported doing eye examination in children. Of these however only 43.52% do it as a routine part of every child's examination, while an equal number (43.30%) only do eye examinations when the care giver reports the child has an eye problem. This is a disturbing finding as most of the common eye diseases are painless and children may not show the distress to alert the doctor or the untrained eyes of the guardians. These varied patterns in examination schedules attest to the possibility that most participants are not familiar with guidelines which requires eye exams at every well baby clinic visit plus whenever deemed appropriate.[39]

The most common test reportedly done is visual acuity testing (42.53%) followed by "physical examination using torch" (28.80%) and fundoscopy (33.33%) among others [table 22].However these responses could not be duly confirmed as this study did not include an observation schedule and the close ended nature of this particular question meant further clarity as to how these tests were carried out or availability of necessary equipment could not be established. The most common reasons cited by those who reported they don't do eye examination (30.40%) were

lack of enough time to do examination (39.47%) and not knowing how to do eye examination (31.58%).Lack of equipment and fact that children are uncooperative were mentioned by 10.53% and 8.42% of respondents respectively. In a study done in the US to evaluate screening for preschool children in pediatric practice[31] nearly all pediatricians (97%) reported including at least one component of the eye examination as part of their preschool well-child care. These included the red reflex test (83%), cover test (75%), and corneal light reflex test (77%). AAP has issued guidelines which the pediatricians in the US are expected to adhere to. In the same study the most commonly mentioned barrier to vision screenings were that screening is too time consuming and children are not cooperative, a trend that is replicated in our study.

Logistic regression showed that male respondents were less likely to do eye exams than their female counterparts [table 16].Similar findings were reported by Terry C et al.[16]

According to our study, majority of pediatricians when faced with a child with eye disease will refer to eye care personnel. Commendably, all the respondents said they would refer a child with white reflex immediately while 99.19 % of respondents would refer a child with congenital glaucoma immediately. However, while 92.80% said they would refer a child with a squint immediately it's noteworthy that 7.2% of respondents said they would follow up such patients and only refer if the condition didn't resolve. Such children are thus at risk of Strabismic amblyopia and other adverse outcomes in case they have more serious underlying conditions like retinoblastoma. This shows that there's still need for ophthalmologists to create awareness.

86.77% of participants said they refer children at risk of ROP to eye care worker while 19.01% regulate the concentration of oxygen administered. There is an increasing body of evidence that lower target oxygen saturations are protective and monitoring should aim to keep oxygen levels between 83 and 93% and not higher.[42] However, this does not negate the role of eye care programs in screening and treating such children

In so far as management of red eye is concerned 40.80% of respondents said they would refer immediately. The rest would give antibiotics and either refers immediately (40.80%) or when there's no improvement (26.40%) or take no further action (20.00%). The most commonly prescribed antibiotics were TEO (13.51%), Chloramphenicol (9.46%) and Gentamicin (6.76%)[table 24]. In the Brazilian study the most commonly prescribed antibiotics were

tobramycin (61%) and Chloramphenicol (31%).[27]The differences in antibiotic preference may be dictated by availability, cost among other factors that may be different in the two settings.

On ophthalmia neonatorum majority (44.80%) give antibiotics, 19.20% Give eye drops and refer if no improvement, 16.80 % give systemic antibiotics. Of those who give antibiotics only 5.5% give a combination of topical and systemic antibiotics. Even though topical antibiotics are integral, children affected by chlamydial or gonococcal conjunctivitis need additional systemic antibiotics to stave off possible concurrent complications such as pneumonitis and meningitis respectively. Again the most preferred antibiotic was TEO (32.61%) while the systemic antibiotic of choice was ceftriaxone (60.86%).Administration of TEO in all neonates immediately after birth is a public health requirement in Kenya and this could explain the preference for TEO.

The attitudes of the respondents in this study were generally positive. Majority (98.40%) disagreed with the statement that eye exam should only be done when care giver complains or that eye exam can only be done by eye care workers. In addition 99.20% agree that eye examination by pediatrician may help early detection of retinoblastoma. This shows the recognition among participants that they have a role in detection of eye problems in children and hence provides a good avenue for plugging the deficiencies in their knowledge and practice.

46.40% and 68.80% respectively disagree that congenital glaucoma and ROP are important in their practice. These may be informed by the relative rarity of these conditions in our setting. However even though refractive errors are relatively common, 20% disagree that children can use spectacles effectively. This shows there's still more work to be done to create awareness on refractive errors. Children and their guardians need encouragement by health workers to enforce the use of spectacles, hence positive attitudes on the part of practitioners are critical.

Only 60.80% agree that their training was adequate to diagnose, manage and refer children with eye diseases while only 70.40% agree they can advice patients on the consequences of squints. These latter statements show the need for an avenue to be created to plug this gap in knowledge.

There is no published study on attitudes on childhood eye diseases among pediatricians.

Conclusions

1) In general, participants had poor knowledge, 69.60% had scores classifiable as poor according to Blooms original cut-off points.
2) Even though participants exhibited good knowledge on definition and treatment of retinoblastoma, knowledge on signs was poor; squint was mentioned by only 20.49%
3) Participants' knowledge on congenital cataracts, refractive errors and congenital glaucoma was poor.
4) Knowledge on squints was good; 93.55% knew squints were treatable.
5) Knowledge on ROP and red eye was moderate; 62.81% knew ROP was treatable while 63.2% mentioned trauma as a cause of red eye in children.
6) Participants had good practice of eye examination and management and referral of various eye diseases. Almost 70% perform eye examination in children.
7) The attitude of participants towards eye diseases in children was generally positive.

Study limitations

1) Accessing all the intended participants was not easy because some of them had not updated their addresses in the various online directories and the KPA register.
2) The high non response rate which meant the minimum calculated sample size could not be reached making generalization of the study findings difficult.
3) Absenteeism in the hospitals especially public facilities also meant that it was not feasible to contact some participants, revisits in some cases notwithstanding.
4) Many unanswered questions, especially the open ended ones meant some insights could not be captured.
5) The self-administered nature of the questionnaire meant that responses could not be investigated further with follow up questions as would be the case of an interview.
6) Very few studies with which to compare these findings have been published.

Recommendations

1) Continuous medical education among pediatricians should include modules on eye diseases in children.

2) Post graduate students in pediatrics should have a rotation in ophthalmology which should be focused on common eye diseases in children.

3) More similar studies should be done in different regions of the world to give a better overall view of the situation.

References

1) Tadic V, Pring L, Dale N. Attentional processes in young children with congenital visual impairment.*Br J Dev psychol* 2009:27:311-330.
2) Jan JE. The visually impaired child and family. 3rd ed. London: Elsevier Saunders; 2005. Chapter 15, Pediatric ophthalmology and strabismus.
3) Clare G, Jungo R. Magnitude and causes of visual impairment and blindness in children. 3rd Ed. London: imperial college press2012; Chapter 14a, the epidemiology of eye disease.
4) Gilbert C, Foster A. childhood blindness in the context of vision 2020, the right to sight; bulletin World Health organization ,2001;79;227-232.
5) W.H.O. Global initiative for the elimination of avoidable blindness. Geneva, Report by World Health Organization,1998
6) Robert W Arnold. Towards worldwide amblyopia elimination-vision screening. *European Ophthalmic Review*, 2009,2(1):91-8
7) Gilbert CE,Rahi J,Quinn G. Prevalence of blindness and visual impairment in children—a review of available data. *Ophthalmic Epidemiology*, 1999, 6: 73–81.
8) W.H.O.Preventing blindness in children: report of a WHO/IAPB scientific meeting. Geneva, 2000. Available at: http://www.who.int/ncd/vision2020_actionplan/documents/WHO_P...
9) Allen Foster, Clare G .Epidemiology of childhood blindness; *Eye* (1992) 6, 173–176
10) Chopra M, Daviaud E, Pattinson R, et al. saving the lives of South African mothers, babies and children: can the health system deliver? *Lancet* 2009; 374:835-846.
11) Serge R, Donatella P et al. Global magnitude of visual impairment caused by uncorrected refractive errors WHO in 2004.Available at: http://www.who.int/bulletin/volumes/86/1/07-041210/en/index.
12) Robaei D, Huynh SC, Kifley A, et al. Correctable and non correctable visual impairment in a population based sample of 12 year old Australian children. *Am J ophthalmology* 2006; 142:112-118.
13) Lu Q, Zheng Y, Sun B, et al. A population based study of visual impairment among preschool children in Beijing: The Beijing study of visual impairment in children. *Am J ophthalmol* 2009; 147:1075-1081.

14) Salomao SR, Cinoto RW, Berezovsky et al. Prevalence and causes of visual impairment in low-middle income school children in sao paolo, Brazil. *Invest ophthal Vis sci*2008; 49:4308-4313…….

15) He M, Zeng J, Liu Y, et al .Refractive error and visual impairment in urban children in southern china.*Inves ophthalmol vis sci* 2004;45:793-799.

16) Terry C, Wendy M, Hughes E, et al. Compliance with Vision-Screening Guidelines among a National Sample of Pediatricians. *Ambul pediatr* 2002; 2(6): pp449-455.

17) J. J. Kanski, B. Bowling. Clinical Ophthalmology, a systemic approach, 7th edition. Elsevier Saunders, 2011**.**

18) Marrioti S, Pascolini D, Ross-Nussbaumer J. Trachoma: Global magnitude of preventable causes of blindness. *Br J ophthalmol* 2009; 93:563-568.

19) Frick KD, Hanson CL, Jacobson GA. Global burden of trachoma and economics of the disease. *Am J Trop med Hyg* 2005: 69:1-10.

20) Gilbert CE, Rahi JS, Quin GE. Visual impairment and blindness in children. 3rd ed. London: Imperial college press; 2012 chapter 14a, the epidemiology of eye disease.pp267-285.

21) Gilbert C.Worldwide causes of blindness in children. Heidelberg Germany: springer2009, chapter 5, Pediatric ophthalmology: current thought and a practical guide. pp47-60

22) Edward W, Rupal T. Cataract in children. 3rd ed. London: Imperial college press; 2012 Chapter 14e, the epidemiology of eye disease, Pp336……

23) Subhandra J, Graham Q. Retinopathy of prematurity. 3rd ed. London: Imperial college press; 2012 chapter14g, the epidemiology of eye disease pp353.

24) Helen D, Kahaki K, Elizabeth A, et al. Retinoblastoma. *Lancet* 2012; 379: 1436–46.

25) Clare G. Importance of primary eye care. *J of comm eye health* 1998; vol 11 issue 26.

26) Cardoso de Melo O. Minimum objectives of a course in ophthalmology at the undergraduate level. *Arch of braz ophthalmol* 1978; 37:213-8.

27) Michel B, Zelia Mary S, Italo M. What do pediatricians know about children's eye diseases? *Arch bras ophthalmol*; 2003:vol.66 no.4 São Paulo July / Aug.

28) American Academy of Pediatrics, Committee on Practice and Ambulatory Medicine. Recommendations for preventive pediatric health care. *Pediatrics.* 1995; 96:373–374

29) Sathjamohanraj SR, Parag K, Senthilkumar, et al. Awareness of retinopathy of prematurity among pediatricians in a tier two city of South India. *Oman J Ophthalmol*. 2011 May-Aug; 4(2): 77–80.
30) Jungo SR, Richard L. A survey of paediatricians' practice and training in routine infant eye examination. *Arch Dis Child* 1998;78:364-366
31) Alex R. K, Sarah J. Preschool Vision Screening in Pediatric Practices. *Clin Pediatr* 2006 April; 45(3): 263–266.
32) Kivela T. The epidemiological challenge of the most frequent eye cancer: retinoblastoma, an issue of birth and death. *Br J Ophthalmol* 2009; 93**:** 1129–31.
33) Nyamori JM, Kimani K, Njuguna MW, et al. The incidence and distribution of retinoblastoma in Kenya. *Br J Ophthalmol* (in press).
34) Wasserman RC, Croft CA, Brotherton SE. Preschool vision screening in pediatric practice: a study from the Pediatric Research in Office Settings (PROS) network. *Pediatrics.* 1992;89:834–838.
35) Marcinak JF, Werntz Yount SO. Evaluation of vision screening practices of Illinois pediatricians. *Clin Pediatr.* 1995;34:353–
36) Wikipedia. Kenya. en.wikipedia.org/wiki/Kenya.(accessed on 6/3/2013).
37) Mounir B. Retinopathy of prematurity. *Medscape.*Available at http://emedicine.medscape.com/article/1225022-overview
38) Jing C, Lois E. Retinopathy of prematurity. *Angiogenesis* (2007) 10:133–140 DOI 10.1007/s10456-007-9066-0
39) WHO. Preventing blindness in children, information for medical and health workers: Booklet by Ministry of public health and sanitation and ministry of medical services of Kenya and WHO.
40) [No authors listed].Ophthalmia neonatorum. *Afr Health.* 1995 Jul;17(5):30
41) .Padmaja KR, Subhadra J. Knowledge attitude practice study of retinopathy of prematurity among pediatricians attending a neonatal ventilation workshop in south India.*JP journals*-10020-1003
42) Chow LC, Wright KW, Sola A. CSMC Oxygen Administration Study Group. Can changes in clinical practice decrease the incidence of severe retinopathy of prematurity in very low birth weight infants?*Pediatric*s. 2003;111:339–45. [PubMed]

43) Rajiv Khandekar, Saleh Al Harby, Harith Al Harthy, et al. Knowledge, attitude and practice regarding eyecomplications and care among Omani persons with diabetes.*omajol.*2010;3(2).Available at http://www.ojoonline.org

APPENDICES

Appendix I: Questionnaire.

Section 1

1. Date:_____
2. Age _____
3. Gender: Male [ ] Female [ ]
4. How long have you been practicing as a pediatrician? _____
5. What's the nature of your practice?(e.g. private/public etc) _____
6. Do you know any causes of white pupilary reflex(leucocoria) in a child?(list)

   _____

   _____
7. What is retinoblastoma?_____
8. Do you know any ocular signs of retinoblastoma?(list) _____

   _____
9. Is retinoblastoma treatable? Yes[ ] no[ ] don't know[ ]
10. Do you know any systemic illnesses in children associated with congenital cataracts?(list)

    _____

    _____
11. When should a child with congenital cataract be referred to an eye care worker?

    A. When vision drops [ ] b] When the care giver requests for referral [ ]

    C. Immediately [ ]

    D] Other (specify)_____
12. What is Retinopathy of prematurity (ROP)?_____

    _____

13. What are the risk factors for ROP?(list) _____

_____

14. Is ROP treatable? Yes[ ] No[ ]

15. What is congenital glaucoma?_____

16. What are the signs of congenital glaucoma?(list)_____

_____

17. Is congenital glaucoma treatable? Yes[ ] No[ ]

18. Can children get refractive errors? Yes[ ] No[ ]

19. How are refractive errors detected? _____

20. What is a squint?_____

21. Are squints treatable? Yes[ ] No[ ]

22. What are the causes of painful red eye in a child?(list)_____

_____

23. What is ophthalmia neonatorum?_____

_____

24. Is ophthalmia neonatorum preventable? Yes[ ] No[ ]

Section 2.

1. Do you do eye examination in children? Yes[ ] No[ ]
2. If yes, how often? (If No go to question 4)

   (a) When caregiver reports child has eye problem.

   (b)At every MCH/FP visits.

   (c) As a routine part of every child's examination

   (d) Other specify _____

3. Which tests do you do?(list)_____

_____

4. If no, why?_____

(a) Don't have enough time [ ] (b) No equipment [ ]

(c)Don't know how to [ ] (d) children uncooperative [ ]

(e) Other (specify) _____

5. How do you manage children with painful red eye?

(a) Refer immediately to eye care worker [ ]

(b) Give eye drops [ ] (specify the eye drops) _____

(c) Give eye drops and refer immediately to eye care worker [ ]

(d) Give eye drops and refer if no improvement [ ]

(e) Other (specify)_____

6. How do you manage children with white pupilary reflex?

(a)Refer to eye care worker immediately [ ]

(b) Give eye drops [ ] (specify the eye drops)_____

(c) Follow up and refer if it doesn't resolve. [ ]

(d) Other (specify) _____

7. How do you manage children with squints?

(a)Refer immediately to eye care worker [ ]

(b) Give eye drops [ ] (specify the eye drop) _____

(c) Follow up and refer if it doesn't resolve. [ ]

(d) Other (specify) _____

8. What do you do with children who you suspect might be at risk of ROP?

   _____

9. How do you manage children with ophthalmia neonatorum?

   (a) Refer immediately to eye care worker [ ]

   (b) Give eye drops [ ] (specify eye drop)_____

   (c) Give eye drops and refer immediately to eye care worker [ ]

   (d) Give eye drops and refer if no improvement [ ]

   (e) Other (specify)_____

10. How do you manage children you suspect have glaucoma?

    (a)Refer to eye care worker immediately [ ]

    (b) Give eye drops [ ] (specify eye drop)_____

    (c) Follow up and refer if it doesn't resolve. [ ]

    (d) Other (specify)_____

For the next part indicate whether you agree or disagree with the statement provided.

	Statement	**Agree**	**Disagree**
1	Eye exam in children should be done only when the caregiver complains.		
2	Eye exams in children can only be done by an eye care worker.		
3	Children with white pupil reflex should be reviewed by an eye care worker.		
4	You can adequately inform caregivers on the consequences of squints in children.		
5	Children can use spectacles effectively.		
6	Congenital glaucoma is an important issue in your pediatric practice.		

	Statement	Agree	Disagree
7	Your training adequately equips you to diagnose manage and refer children with eye diseases.		
8	Children with cataracts require a thorough systemic review by t the pediatrician.		
9	Eye examination by a pediatrician could help in early detection of retinoblastoma.		
10	Retinopathy of prematurity is a big problem in your practice.		
11	Good antenatal and immediate postnatal care can help reduce the burden of ophthalmia neonatorum.		

Thank you for participating in this study.

Appendix II: Consent form

Title: Knowledge, Attitude and Practice of childhood eye diseases among pediatricians working in, Kenya.

Investigator: Dr Situma P.W

Supervisors: Dr S Marco

Dr. Kariuki M.M

Address: (University of Nairobi, P.O. BOX 30197, 00100, Nairobi)

I am a postgraduate student at the University of Nairobi, Kenya. I am conducting a study on the knowledge, attitudes and practices on eye diseases in children among pediatricians in Kenya through a brief questionnaire which I request you to fill. The information gathered will be kept confidential and used solely for academic and improvement of health services. Whatever information you shall give shall be regarded with strict confidentiality, and will not be used in any way to jeopardize your work or in any other way other than the stated purpose. You are free to participate or to decline to participate, even during the course of filling the questionnaire. If you are in agreement with the conditions above and are willing to participate in this study, kindly append your signature below. Thank you for your co-operation.

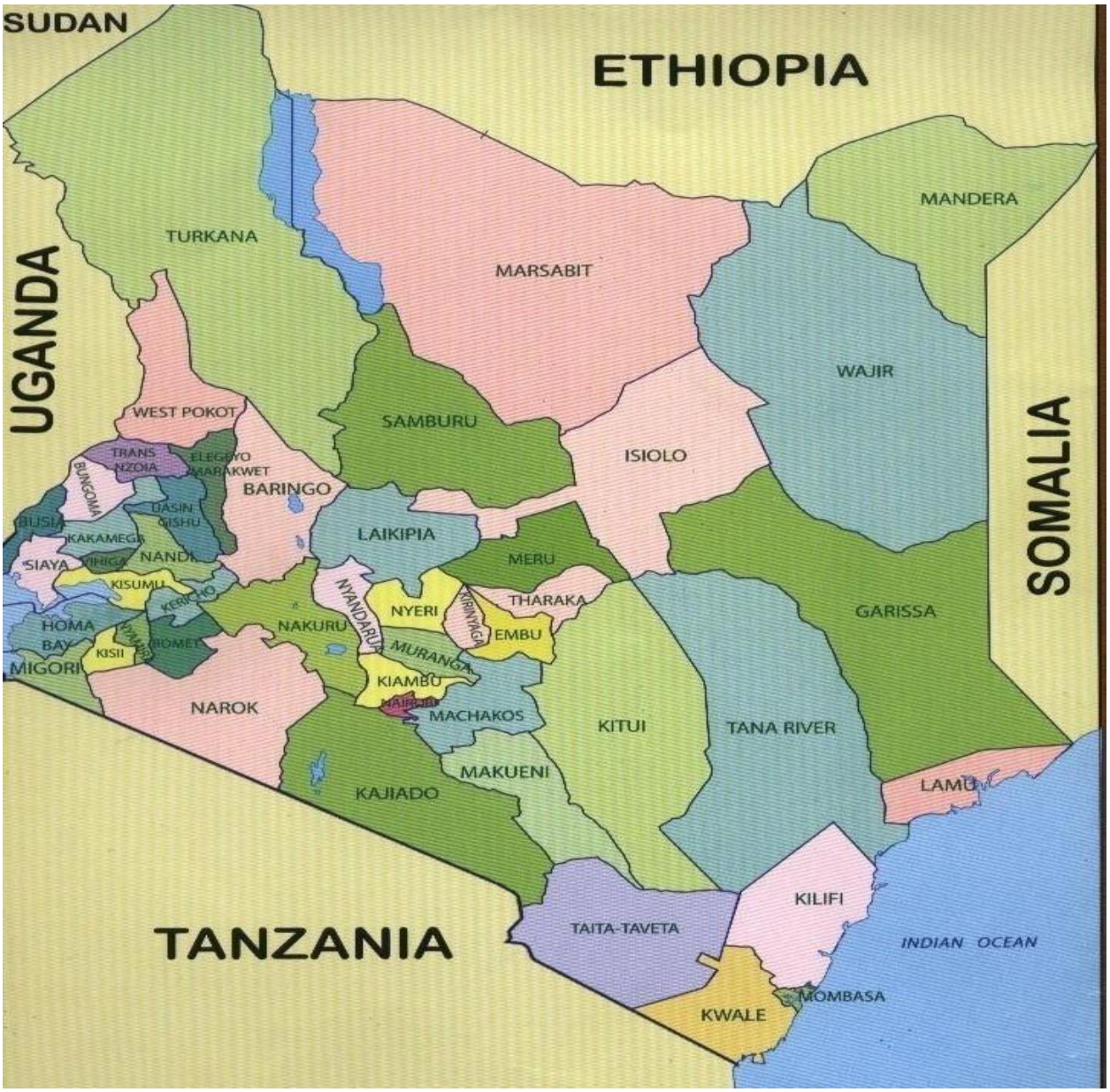
Declaration.

I accept that I have read and understood the above explanation and I am willing to participate in the study voluntarily.

Participant's signature_____ Date_____

Investigator's signature_____ Date_____

Appendix III: Map of Kenya showing the 47 counties.



Appendix IV: Budget

Proposed budget for study on knowledge, attitude and practice of pediatricians on childhood eye diseases in Kenya.

ITEM	QUANTITY	UNIT COST(Kshs)	TOTAL(Kshs)
Proposal			
Print 1st draft	40 pages	10 per page	400
Photocopy 1st draft	80 pages	2 per page	160
Print 2nd draft	40 pages	10 per page	400
Photocopy 2nd draft	120 pages	2 per page	240
Bind 2nd draft	3	150	450
Ethics fee	1	2000	2000
Subtotal			**3,650**
Site visits			
Travel costs to visit the various district and provincial hospitals.	For 28 days (plus possibility of second visits)	1500 per day	42,000
Meals	28 days	1000 per day	28,000
Boarding during the travels	28 days	1500 per day	42,000
Internet bundles	1	4000	4000
Air time	28 days	150 per day	4,200

Subtotal			**111,800**
Results			
Copy final book	2 prints/6 photocopy		3000
Bind book	8	250	2000
Subtotal			**5,000**
Contracted services			
Research assistants	3	10,000	30,000
Statistician	1	40,000	40,000
Subtotal			**70,000**
Grand total			**198,850**

Appendix V: Study Time Frame.

Activities	**JAN 2013**	**FEB 2013**	**MAR 2013**	**APR 2013**	**MAY 2013**	**JUN 2013**	**July**	**AUG 2013**	**SEP 2013**	**OCT 2013**	**NOV 2013**	**DEC 2013**	**JAN 2013**	
Proposal development														
Research and Ethical Committee approval														
Data collection														
Data analysis														
Report														

writing														
Dissemination of findings														

Appendix VI: Bloom's original cut off points
80 – 100% - Good Knowledge
60- 79% - Moderate Knowledge
<60% - Poor Knowledge

Appendix VI: Ethical approval

KENYATTA NATIONAL HOSPITAL APPROVED OCT 2013 ETHICS & RESEARCH COMMITTEE

UNIVERSITY OF NAIROBI
COLLEGE OF HEALTH SCIENCES
P O BOX 19676 Code 00202
Telegrams: varsity
(254-020) 2726300 Ext 44355

KNH/UON-ERC
Email: uonknh_erc@uonbi.ac.ke
Website: www.uonbi.ac.ke

KENYATTA NATIONAL HOSPITAL
P O BOX 20723 Code 00202
Tel: 726300-9
Fax: 725272
Telegrams: MEDSUP, Nairobi

Link:www.uonbi.ac.ke/activities/KNHUoN

Ref: KNH-ERC/A/339

27th October 2013

KENYATTA NATIONAL HOSPITAL APPROVED OCT 2013 ETHICS & RESEARCH COMMITTEE

Dr. Situma Peter Wanyama
Dept.of Ophthalmology
School of Medicine
University of Nairobi

Dear Dr. Wanyama

RESEARCH PROPOSAL: KNOWLEDGE, ATTITUDE AND PRACTICE OF EYE DISEASES IN CHILDREN AMONG PEDIATRICIANS IN KENYA (P266/05/2013)`

This is to inform you that the KNH/UoN-Ethics & Research Committee (KNH/UoN-ERC) has reviewed and **approved** your above proposal. The approval periods are 27th October 2013 to 26th October 2014.

This approval is subject to compliance with the following requirements:

a) Only approved documents (informed consents, study instruments, advertising materials etc) will be used.
b) All changes (amendments, deviations, violations etc) are submitted for review and approval by KNH/UoN ERC before implementation.
c) Death and l.
d) ife threatening problems and severe adverse events (SAEs) or unexpected adverse events whether related or unrelated to the study must be reported to the KNH/UoN ERC within 72 hours of notification.
e) Any changes, anticipated or otherwise that may increase the risks or affect safety or welfare of study participants and others or affect the integrity of the research must be reported to KNH/UoN ERC within 72 hours.
f) Submission of a request for renewal of approval at least 60 days prior to expiry of the approval period. (*Attach a comprehensive progress report to support the renewal*).
g) Clearance for export of biological specimens must be obtained from KNH/UoN-Ethics & Research Committee for each batch of shipment.
h) Submission of an *executive summary* report within 90 days upon completion of the study
This information will form part of the data base that will be consulted in future when processing related research studies so as to minimize chances of study duplication and/or plagiarism.

For more details consult the KNH/UoN ERC website **www.uonbi.ac.ke/activities/KNHUoN.**

Annex1: AAP Guidelines on vision screening.

TABLE. Vision Screening Guidelines*

Function	Recommended Tests	Referral Criteria	Comments
Ages 3–5 y			
Distance visual acuity	Snellen letters Snellen numbers Tumbling E HOTV Picture tests Allen figures LH test	1. <4 of 6 correct on 20-ft line with either eye tested at 10 ft monocularly (ie, <10/20 or 20/40) or 2. Two-line difference between eyes, even within the passing range (ie, 10/12.5 and 10/20 or 20/25 and 20/40)	1. Tests are listed in decreasing order of cognitive difficulty; the highest test that the child is capable of performing should be used; in general, the tumbling E or the HOTV test should be used for ages 3–5 y and Snellen letters or numbers for ages 6 y and older 2. Testing distance of 10 ft is recommended for all visual acuity tests 3. A line of figures is preferred over single figures 4. The nontested eye should be covered by an occluder held by the examiner or by an adhesive occluder patch applied to eye; the examiner must ensure that it is not possible to peek with the nontested eye
Ocular alignment	Unilateral cover test at 10 ft or 3 m or Random-dot-E stereo test at 40 cm (630 s of arc)	Any eye movement <4 of 6 correct	
Ages 6 y and older			
Distance visual acuity	Snellen letters Snellen numbers Tumbling E HOTV Picture tests Allen figures LH test	1. <4 of 6 correct on 15-ft line with either eye tested at 10 ft monocularly (ie, <10/15 or 20/30) or 2. Two-line difference between eyes, even within the passing range (ie, 10/10 and 10/15 or 20/20 and 20/30)	1. Tests are listed in decreasing order of cognitive difficulty; the highest test that the child is capable of performing should be used; in general, the tumbling E or the HOTV test should be used for ages 3–5 y and Snellen letters or numbers for ages 6 y and older 2. Testing distance of 10 ft is recommended for all visual acuity tests 3. A line of figures is preferred over single figures 4. The nontested eye should be covered by an occluder held by the examiner or by an adhesive occluder patch applied to the eye; the examiner must ensure that it is not possible to peek with the nontested eye
Ocular alignment	Unilateral cover test at 3 m or Random-dot-E stereo test at 40 cm (630 s of arc)	Any eye movement <4 of 6 correct	

* Vision screening guidelines were developed by the AAP Section on Ophthalmology Executive Committee, 1991–1992: Robert D. Gross, MBA, MD, Chairman; Walter M. Fierson, MD; Jane D. Kivlin, MD; I. Matthew Rabinowicz, MD; David R. Stager, MD; Mark S. Ruttum, MD, AAPOS; and Earl R. Crouch, Jr, MD, AAO.