The causes of visual impairment in children in a school for the blind in Johannesburg – a cross sectional study

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A dissertation submitted to the Faculty of Health Sciences, University of the Witwatersrand, Johannesburg, in fulfillment of the requirements for the degree of Master of Medicine

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DECLARATION

I, Nira Esra, declare that this dissertation is my own unaided work. It is being submitted for the Degree of Master of Medicine in Surgery at the University of the Witwatersrand, Johannesburg, South Africa. It has not been submitted before for any other degree or examination at any other University.

_____Day of _____2017 in Johannesburg

ABSTRACT

Background: More than 1.4 million children are blind throughout the world. This is of significance due to the social, emotional and economic implications of childhood visual impairment, which are endured throughout a life time of "blind years". Information regarding the epidemiology and risk factors relating to childhood visual impairment is essential for the development and implementation of targeted interventions, in order to reduce childhood blindness.

Objectives: To identify the causes of childhood blindness in a school for the blind in Johannesburg, South Africa, as a representation of trends in our urban population, and to compare these findings with those of a similar study conducted in 1996, in order to inform health policy decision making.

Methods: All learners attending a school for the blind in Johannesburg were evaluated. Information obtained was recorded using the World Health Organisation's Programme for the Prevention of Blindness (WHO/ PBL) method and reporting form.

Results: One hundred and eighty nine learners were examined, of which, 110 (58%) had severe visual impairment or blindness. The major affected anatomical sites were the retina (43%), whole globe (16%), optic nerve (10%), cornea (10%), uvea (6%) and lens related conditions (4%). Retinopathy of prematurity was the most common retinal condition (n=26, 14%). This has increased 11 fold ($p<0.005$) when compared to the findings in 1996. Hereditary and neonatal factors were responsible for visual impairment in 28% and 14% of learners respectively. Aetiology was indeterminate in 45% of learners. Avoidable causes accounted for 29% of learners with visual impairment which was significantly lower than findings from the previous study ($p=0.016$).

Conclusion: There has been a substantial change in the disease pattern of childhood blindness, in this study population, compared to the findings of the previous study. While many advances have been made regarding immunisation, vitamin supplementation and ophthalmic management, the implementation of further measures are still required in order to overcome preventable causes of childhood visual impairment.

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Special mention must be made to the following people:

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LIST OF ABBREVIATIONS

WHO: World Health Organisation

WHO/ PBL: World Health Organisation's Programme for the Prevention of Blindness

SA: South Africa

ROP: Retinopathy of Prematurity

OCA: Oculocutaneous albinism

EPI- SA: Expanded Programme on Immunisation in SA

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CHAPTER 1

INTRODUCTION

Background

It has been estimated that 1.4 million children are blind globally, three quarters of which are from developing countries.[1] The World Health Organisation's (WHO) VISION 20/20- The Right to Sight Programme has highlighted the importance of the management and control of visual impairment in childhood. This is for a number of a reasons; (1) individuals who are born blind or become blind during their childhood endure a lifetime of "blind years" with their accompanying social, emotional and economic implications, (2) many causes of visual impairment in childhood are preventable or curable, particularly in developing countries where over 30% of childhood blindness has been found to be avoidable and (3) several of these causes also lead to child mortality and therefore their management is associated with improved child survival.[2]

In order for the implementation of targeted interventions, more information is needed regarding the epidemiology and risk factors relating to childhood visual impairment.[3] These are affected by a variety of factors including, age, geographic location, level of socio-economic development and healthcare accessibility.[4] Genetic or hereditary diseases are the main cause of childhood blindness in developed countries.[5] In developing countries, the main etiologies have been found to be related to infections (congenital rubella or acquired measles infection) or nutritional deficiencies (vitamin A deficiency).[5]

South Africa (SA) has been classified as an upper-middle-income economy, the largest in Africa.[6] Despite this, poverty and inequality continue to soar.[6] Since the establishment of democracy, unemployment has been exceptionally high, worsening between 1994 and 2003, thereby altering the population's access to health care.[6] Despite the disparity in access to health care in SA, there have been major improvements in the last 21 years with regards to measles immunisation, vitamin A supplementation, antenatal and neonatal care.[7]
The most recent data available for the causes of childhood blindness in SA was collected in a nationwide study of blind schools in 1996, which found that 39% of childhood visual impairment was avoidable. Retinal disease featured prominently, with dystrophies and albinism accounting for the majority of cases in this disease spectrum. Retinopathy of prematurity (ROP) was found to be an emerging and preventable aetiology of blindness in

white and Indian communities.[7] More than half of the children included in this study had a best corrected visual acuity greater than or equal to 6/60 and the need for possible integration of these children into main stream schooling was identified.[7]

Objectives

The aim of this study was to identify the causes of childhood blindness in a school for the blind in Johannesburg, South Africa, as a representation of trends in our urban population and to compare these findings with those from 1996 in order to inform health policy decision making.

CHAPTER 2

METHODS

1. Patient selection

This was a cross- sectional study of all 189 learners attending Sibonile School in the South of Johannesburg, South Africa, that caters for the education of blind and partially sighted learners, including those with multiple disabilities.

2. Data acquisition

The 189 learners enrolled in the school were examined by an ophthalmic registrar at St John Eye Hospital from 1 September 2017 to 15 September 2017, with assessments confirmed by two ophthalmic consultants.

Each learner was examined in the presence of his or her teacher. Data were extracted from previous medical records, where available. Uni-ocular visual acuity was measured, where possible, using Snellen charts and Sheridan- Gardner test cards. A torch or slit lamp were used to examine the anterior segment. An indirect ophthalmoscope was used for posterior segment evaluation, following mydriasis. B-scan ultrasonography was performed when indicated. Examinations were conducted using the World Health Organisation's Programme for the Prevention of Blindness (WHO/ PBL) method and reporting form, a standardised assessment tool for reporting of the causes of visual loss.[8]

The cause of visual impairment was documented using the anatomical and etiological classifications in the form. Where indicated, learners were scheduled for further assessment, surgery and refraction.

3. Ethical approval

Ethical approval was obtained from the University of the Witwatersrand Human Research Ethics Committee (Medical) (clearance number M170211) and from the both the hospital management and Department of Education.

4. Statistical analyses

Results were entered onto an Excel spreadsheet (2011, Microsoft, USA). With the consult of a biostatistician, data analysis was carried out using STATA® (v 12.0). These results were documented and displayed graphically by means of tables.

CHAPTER 3

RESULTS

One hundred and eighty nine learners were included in the study. There were 121 (64%) males, 68 (36%) females, all of black ethnicity. The mean age of the learners was 11.3 years (Standard Deviation 3.2 years) with a range of 5-20 years. Additional disabilities, including mental retardation, physical handicap and epilepsy were found in 37 (20%) cases.

3.1 Categories of visual impairment

The distribution of visual impairment according to the WHO categories are shown in Table 3.1. Twenty seven learners (15%) were found to have mild or no visual impairment (equal to 6/18 or better), 47 (26%) moderate visual impairment (6/18- 6/60) and 110 (59%) learners were blind (less than 3/60). Learners who were classified blind had 3/60 to light perception in 43% (n=80) and no light perception in 16% (n=30). Due to multiple disabilities, the degree of visual impairment could not be assessed in 5 learners.

Table 3.1: Distribution of visual impairment

WHO category	Level of vision	N=184 (%)
0: Normal vision or mild impairment	Equal to 6/18 or better	27 (15)
1: Moderate visual impairment	6/18 – 6/60	47 (26)
2: Severe visual impairment	6/60 – 3/60	0
3: Blindness	Counting fingers at 1m	26 (14)
4: Blindness	Light perception	54 (29)
5: Blindness	No light perception	30 (16)

WHO, World Health Organisation

3.2 Anatomical site of visual abnormality

The anatomical sites of abnormality in the learners are shown in Table 3.2.
Retinal conditions were the most common cause of visual impairment. Of the 82 (43%) learners with retinal pathologies, 28 (15%) had oculocutaneous albinism(OCA), while ROP and retinal detachments accounted for 14% (n=26) and 3% (n=6) respectively. Seven learners had retinal dystrophies including Retinitis Pigmentosa (n=3), Bardet-Biedl (n=3)

and Best's disease (n=1). Three learners had a history of retinoblastoma, all of whom had previously undergone bilateral enucleation.

Abnormalities of the whole globe were the second most frequent anatomical site, with glaucoma present in 7% (n=14) and microphthalmos in 5% (n=10). All 4 learners that had 1 eye removed had glaucoma as their underlying pathology.

Twenty eight learners had normal ocular examinations and included visual impairment attributed to cortical abnormalities in 10% (n=18), amblyopia 3% (n=5) and refractive errors 2% (n=3).

Visual impairment in 12 learners (6%) was due to optic nerve atrophy. The causes of optic atrophy included hydrocephalus in 0.05% (n=1), neoplasm 2% (n=4) (craniopharyngiomas n=2, Burkitt's lymphoma n=1, medulloblastoma n=1) and of indeterminate cause in 4% (n=7). Six learners (3%) had optic nerve hypoplasia.

Corneal scarring accounted for 10% (n=19) of visual impairment. Causative factors identified include measles keratitis in 1 case and ophthalmia neonatorum in 1 other. Uveal conditions were found in 12 (6%) learners, 7 (4%) of which had previous uveitis and 4 (2%) aniridia. Cataract was the current cause for visual impairment in 4% of learners (n=8), however 17 learners (9%) had already undergone cataract surgery at the time of the study.

Table 3.2: Anatomical sites of abnormality resulting in visual impairment

Aetiology	N (%)
Retina	82 (43)
Whole globe	31 (16)
Normal globe	28 (15)
Optic nerve	19 (10)
Cornea	19 (10)
Uvea	12 (6)
Lens	8 (4)

3.3 Aetiology of visual loss

Fifty-two learners (28%) were found to have visual impairment due to hereditary conditions. More than half of which was autosomal recessive in pattern. Perinatal causes (predominantly due to cerebral hypoxia) accounted for 22% (n=42) of visual impairment, while neonatal causes (ROP) accounted for 14% (n=26). Childhood causes were found in 14 learners (7%) and were mostly due to childhood infections and neoplasm. The majority (n=76) of learners were found to have visual impairment secondary to causes that could not be determined.

Table 3.3: Aetiological causes of childhood visual impairment

Aetiology	N (%)
Hereditary	52 (28)
Intrauterine	3 (2)
Perinatal	42 (22)
Postnatal	14 (7)
Indeterminate	76 (46)

3.4 Avoidable causes

Visual impairment that would have been amenable to prevention or treatment are shown in table 3.4. Fifty-five learners (29%) had underlying causes of visual impairment that could have been avoided. This includes 4% (n=7) of learners that had conditions amenable to primary prevention and 25% (n=48) secondary to treatable conditions (secondary prevention).

Table 3.4: Avoidable causes of childhood visual impairment

Causes	N (%)
Avoidable	55 (29)
Preventable	7 (4)
Congenital Rubella	3 (2)

Ophthalmia Neonatorum	1 (1)
Measles Keratitis	1 (1)
Trauma	2 (1)
Treatable	48 (25)
ROP	26 (14)
Cataract	6 (3)
Glaucoma	14 (7)

CHAPTER 4

DISCUSSION

Our study suggests a change in disease pattern in comparison findings of O'Sullivan et al.[7] We found pathology of the whole globe and retina to be significantly more prevalent in our population, whereas pathologies of the optic nerve and retina had previously predominated. The number of learners with visual impairment due to cortical conditions has also increased. Our population reveals a reduction in visual impairment due to avoidable causes. This applies specifically to visual impairment that could have been prevented.

Visual impairment due to indeterminate causes accounts for a large proportion of the selected population, mirroring previous findings. This could possibly be reduced with extensive genetic testing but would be of limited clinical significance. Learners who were found to have retinal degenerations that may have been caused by genetic mutations were identified and registered with Retina SA.

While the retina remains the most common site of visual impairment, the distribution of retinal pathology, within our study population, has changed substantially when compared to the findings of 1996. An overall increase in ROP was found. In 1996 the most common retinal conditions were retinal dystrophies and albinism. ROP was found in 11% of learners, of whom only 1% were black. This can possibly be attributed to the infant mortality rate, which was noted to be up to 54,3/1000 births in the black population at that time.[8] When considering only black learners in the study by O'Sullivan et al,[7] we have found a large increase in visual impairment due to ROP, consistent with trends mirrored in other developing countries in Eastern Europe and Latin America.[10] This is in contrast to highly developed countries in which ROP is now an uncommon cause of visual impairment.[10] The increased rate of ROP in our population is the result of a high rate of preterm birth and improved infant survival (infant mortality rate now 32/1000 live births[11]), coupled with suboptimal oxygen monitoring in neonatal facilities and poorly established ROP screening protocols.[12] While 85% of learners with ROP had severe visual impairment (equal to 3/60 or less), none of them had gone on to require enucleation. Of note, one third of learners with ROP were aged between 5-9 years old, while the remaining two thirds were 10 years or older. Since the learners included in this study were mainly from urban areas, this may reflect the improvements in and success of ROP prevention, screening and treatment programs, in these areas, over the last 10 years.

Of 1911 newborns screened at St John Eye Hospital by Kana et al, from 2013- 2015, 1% required treatment.[12] A similar incidence of newborns with ROP requiring treatment has been reported in high income countries such as Switzerland.[13] However, according to the experience of the senior staff at St John Eye Hospital, ROP continues to be a major problem in outlying areas in SA, where neonatal high care facilities are available in the absence of an on-site ophthalmology department. Therefore, emphasis needs to be placed on improving oxygen saturation monitoring of neonates receiving supplemental oxygen in these facilities as well as formalisation of a referral protocol into the bigger centres for ROP screening and management.

The reduction in childhood visual impairment secondary to avoidable causes may reflect the growth and success of paediatric ophthalmology referral centres in the management of cataract, glaucoma and uveitis. It also may reflect the successful implementation of large scale primary health care campaigns, that have resulted in the wide scale distribution of measles and rubella immunisation through the Expanded Programme on Immunization in SA (EPI-SA), initiated in 1995, as well as the administration of newborn ocular prophylaxis and vitamin A supplementation.[14] However, due to lack of immunisation stock or of awareness and/or attendance by mothers, the level of immunisation coverage, particularly in rural areas, has been noted to be considerably lower than government targets.[15,16] Thus further improvements are required in order to ensure adequate and consistent provision of basic primary health care in SA.[16]

In this study, Oculocutaneous Albinism was found in 15% of learners (n=28). Of these, 27 learners had mild or no visual impairment. In 1996, 9% of black learners attending blind schools were reported to have OCA, while it was found in only 1% of white learners.[7] This is likely a reflection of social and cultural attitudes towards albinism in the community, founded on myth, superstition and fear.[17] As a result of this, acceptance and integration remain problematic and continued efforts to counter such attitudes, in the form of education and destigmatisation, are still required allow individuals with OCA to succeed and contribute to their communities.

O' Sullivan et al[7] reported that more than half of the learners attending blind schools in SA had a visual acuity of 6/60 or better in their best eye. This is likely due to poor home social circumstances, in which the board and lodging as well as care and concern provided by

schools for the blind may be taken advantage of. Although our study revealed that this finding had decreased by about 10% over the last 20 years, this figure remains unacceptably high and calls for major improvement in and regulation of blind school admission assessments as well as dialogue with both teachers and parents as to whether these learners could be integrated into the mainstream schooling system.

This is a relatively small study, in a chosen population and is therefore subject to selection bias. The results obtained from 1 school have been compared to another study, previously conducted on a national level, with differing methodology.
All learners assessed in this study are from an urban area. The pattern of childhood visual impairment within SA may vary according to region, especially in rural areas, and therefore the findings of this study may not reflect the overall trend of childhood visual impairment in SA as a whole.

Advantages of this study include many learners examined for causes of childhood visual impairment, by few examiners, employing standard methodology.

CHAPTER 5

CONCLUSION

This study has suggested a change in the disease pattern of childhood blindness, in the population examined, over the last 21 years.

Avoidable blindness has been reduced due to improved immunisation and vitamin supplementation programs.

ROP remains a major cause of childhood visual impairment. Emphasis should be placed on improving prevention, screening and management programs in peripheral facilities, where its incidence is still high.

Fifteen percent of learners had normal or mild visual impairment. Their placement in a special needs school is most commonly due to the social stigma surrounding OCA.

Education of the community as well as improved admission processes are required in order to maximize mainstream level education where possible and reduce the burden on the blind school system.

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APPENDIX 1: Approved Protocol

Title

The Causes of Visual Impairment in Children in a school for the blind in Johannesburg - a Cross Sectional Study

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1. Introduction

It has been estimated that there are 1.4 million blind children globally, three quarters of which are from developing countries.[1] The 2010 World Health Organisation definition of visual impairment encompasses different levels of visual function (table 1).[2]

Table 1. Revision of categories of visual impairment (ICD-10), Version for 2010

Category 0	Normal vision or mild impairment	Equal to 6/18 or better
Category 1	Moderate visual impairment	6/18 – 6/60
Category 2	Severe visual impairment	6/60 – 3/60
Category 3	Blindness	Counting fingers at 1m
Category 4	Blindness	Light perception
Category 5	Blindness	No light perception

The World Health Organisation's VISION 20/20- The Right to Sight programme has highlighted the importance of the management and control of visual impairment in childhood. This is for a number of a reasons. Individuals who are born blind or become blind during their childhood endure a lifetime of "blind years" with their accompanying social, emotional and economic implications. Many causes of visual impairment in childhood are preventable or curable, particularly in developing countries where over 30% of childhood blindness has been found to be avoidable. Several of these causes also lead to child mortality and therefore their management is associated with improved child survival. [3]

In order for successful programs to be designed and implemented to prevent childhood blindness and visual impairment, information regarding the causes is required.[4] These vary according to a variety of factors, for example the geographic location and level of socio-economic development.[5] In developing countries, corneal scaring secondary to vitamin A deficiency and measles keratitis has been thought to be of high significance. High income countries on the other hand, have a predominance of central nervous system lesions. Middle income regions reveal a mixture of the two, with the emergence of retinopathy of prematurity (ROP) and cataracts as important causes.

2. Literature Review

Of the 107 children examined from the Royal Blind School in Edinburgh in 2000, 72 children were found to be blind according to the WHO category 3-5. Twenty-two of these children had some visual function while 20 had none at all. Two children fell into category 0, however were found to have severe perceptual visual dysfunction. Central nervous system (CNS) or optic nerve pathology was found in 50% of children. Thirty-six percent of children were found to have retinal disease, 49% of which were due to complications of retinopathy of prematurity (ROP).[7] By 2010 34% of childhood blindness and visual impairment in England and Wales was attributed to CNS and optic nerve disorders. Hereditary retinal disorders accounted for 16.7%, up from 13.1% in 2000, and 21.2% as a result of congenital globe anomalies.[8] One quarter of childhood blindness in the UK was potentially avoidable. Interestingly, insults that caused isolated blindness primarily occurred in the prenatal period, while those that caused comorbid non ophthalmic disabilities were found to occur in the perinatal, neonatal and childhood periods. This finding is imperative in developing an effective treatment and prevention strategy as well as when considering service design and delivery.[9]

A study of the evolving trends of the aetiologies of childhood blindness in Turkey, an upper middle income country, from 2002-2014 found a significant rise in cortical visual impairment with a decreased incidence of avoidable causes of childhood blindness. Of those, 20.3% had ROP, others were associated with asphyxia, genetic syndromes, metabolic disorders and infections.

A reduction of 30% in the frequency of ROP was reported despite the increased frequency of premature births occurring owing to assisted reproduction techniques and progress in neonatology, which have improved survival rates of more immature neonates. This was deemed to be due to the implementation of meticulous screening programs and appropriate intervention.[10]

In the Republic of Suriname, a middle income country in South America, 58.5% of children examined were found to be blind, in categories 3-5 and 41.5% had severe visual impairment. Retinal pathology was found in 33.8% of children. Of this, ROP was the most common cause, occurring in 12.3% of children, followed by retinal dystrophies (9.2%). Retinoblastoma, albinism and other non-specific causes accounted for the remaining 12.3% of retinal pathology.

Cataract accounted for 15.4%. Corneal scarring was found in 3.1% of children. This suggests eradication of vitamin A deficiency as well as effective immunization against measles. It also motivates for improvement in ROP screening and management.[11]

The above findings in high income and upper middle income countries differ greatly from that of lower income/ developing countries. In Nigeria, 95.8% of the 136 children examined were blind. Refraction improved 3.5% of children from category 4 to 2 and 0.7% from category 3 to 2, mostly as a result of aphakia. The single commonest aetiology of visual impairment (31.4%) was due to cataract, whether congenital or acquired. This was as a result of the failure of intervention and instead the enrollment of these children into special education facilities. This highlights the need to effectively and timeously screen potentially blind children early and certainly before admission to blind schools.[12] Corneal pathologies were the cause of 21.4% of childhood blindness in Nigeria in 1999. In 2011, the cornea accounted for 21.8%, however there was a decreased frequency in corneal associated visual impairment in children 15 years or under. This supports the efficacy of the measures taken to eradicate vitamin A deficiency and measles in the preceding 10 years.[13]

Botswana, a middle income country, however with insufficient access to ophthalmic care reported a substantial proportion of childhood blindness secondary to avoidable causes. These cases were found to be mostly due to uncorrected refractive errors as well as cataracts. This is most likely due to the scarcity of routine vision screening and access to refractive facilities. It would be easily tackled with suitable training of primary health care providers and teachers to carry out screening. Cataract related impairment is much more complicated to confront due to late presentation and therefore deprivation amblyopia, fears regarding surgical intervention and anaesthesia, lack of knowledge of local health professionals as well as the need for post-surgical follow up. [14]

South Africa has been classified as an upper-middle-income economy, the largest in Africa, and rated 34th worldwide. Despite this, poverty and inequality continue to soar. Since the establishment of democracy, unemployment has been exceptionally high. The overall unemployment rate was found to have worsened between 1994 and 2003, thereby further limiting the population's access to health care. [15]
In a nationwide study of blind schools conducted in South Africa in 1996, 30.4% of the 1311 children examined were blind according to the WHO categories 3-5, 12.6% were in

category 2, 42.3% were in category 1 and 12% were in category 0. Retinal pathology was the most prevalent cause of visual impairment (38.5%). Optic nerve pathology was the next most common aetiology (15.2%) and corneal conditions comprised 11.2%. ROP accounted for 10.6% of childhood blindness. This may be suggestive of the higher socio- economic progress as compared to other Sub-Saharan African countries.[16]

3. Research Question

What are the causes of childhood visual impairment in the population of Johannesburg post 1994?

4. Hypothesis

With improved access to healthcare there has been a change in the trend of causes of childhood blindness in South Africa since 1994.

5. Study Aims

This study aims to identify the causes of childhood blindness in a blind school in Johannesburg.

6. Study Objectives

Identifying the causes of childhood blindness in one school for the blind in Johannesburg as representation of trends in our urban population.

7. Research Method

7.1 Design

This will be a cross-sectional observational study.

7.2 Method

This cross-sectional study will take place at St John Eye Hospital - Chris Hani Baragwanath Academic Hospital. All learners attending Sibonile School will be examined to determine the cause of their blindness. Sibonile School which means "we have seen" is an institute for the visually impaired, established in 1995. The school caters for the education of blind and partially sighted learners, including those with multiple disabilities. It is situated 45km South of Johannesburg in Kliprivier. There are currently 186 students enrolled and 78 staff members. Learners from this school are frequently referred to St John Eye Hospital for assessment. Thus formalizing a screening program is not purely for research purposes and will benefit learners in the future. Staff members, teachers and teacher's aids, will accompany learners to St John Eye Hospital during normal school hours. The schedule for the visits coincides with quieter days in the clinic. There is a designated examination area for screening large numbers of patients which will be utilised to minimise any disruption to the clinic.

Learners will be transported by a transport service, 40-50 at a time over 3-4 trips/visits. They will be accompanied by staff from Sibonile school. Transport of the learners will be sponsored by Retina South Africa. Indemnity forms will be made available to parents/ guardians regarding the transport (Appendix A).

RetinaSA is a registered Non-Profit Organisation and Public Benefit Organisation which was originally established in 1980 as the South African Retinitis Pigmentosa Society. It is a patient driven action group that has branches in all the major cities in South Africa. Their main aims include patient support including education, referral and intervention as well as facilitation of genetic testing in order to identify those who will benefit from clinical trials.

Once at St John Eye Hospital, each learner will be examined by me and another registrar using the WHO standard method and reporting form. (Appendix B)

Visual acuity will be measured separately in each eye, with spectacle correction if worn. Ability to count fingers, perceive hand movements or light will be checked in all learners unable to see 3/60. Refraction will be done where appropriate using a streak retinoscope. External eye and fundus examination will be undertaken with a direct ophthalmoscope, indirect ophthalmoscope or slit lamp biomicroscope.

The need for special equipment as mentioned above to properly assess learners precludes a school visit. Refreshments for learners and school staff will be provided.

Causes of blindness will be classified according to an anatomical classification and aetiological categories, as seen in the tables below.

Table 2. Aetiological causes of severe visual impairment (SVI)/ blindness

Aetiology	**Number**	**%**
Hereditary		
Intrauterine		
Perinatal		
Postnatal		
Indeterminate		
Total		

Table 3. Anatomical sites of abnormality causing SVI/ blindness

Anatomical site	**Number**	**%**
Whole globe		
Cornea		
Lens		
Retina		
Optic nerve		
Other (cortical)		
Total		

7.3 Inclusion Criteria

All learners attending the Sibonile school for the blind. This will include all ages and ethnic groups. It is anticipated that 186 learners will take part in this study.

7.4 Exclusion Criteria

Anyone who is not a registered learner at the Sibonile School will be excluded from this study.

7.5 Materials and Study Procedures

Information such as history, previous examination and treatment will be recorded from patient files where available as many of these learners are already known patients at St John

Eye Hospital. Examination will be conducted using a Snellen visual acuity chart, direct ophthalmoscope, indirect ophthalmoscope or slit lamp biomicroscope.

Sample size

Sample size estimation is based on the key research question to be answered, in this case the estimation of proportions (e.g. the proportion of females in the study group). Based on worst-case (for sample size) estimates of 50%, 5% precision and the 95% confidence level, a sample sizes of 385 would be required. The anticipated actual sample size of 186 in this study corresponds to a precision of 7.2% (rather than 5.0%), which is acceptable for a study of this nature.

Sample size for prevalence was determined using the formula:

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

where n = sample size,

Z = Z-statistic for the chosen level of confidence,

P = expected prevalence or proportion

d = precision [18]

7.6 Data Collection

Information collected will include the following:

Personal Information: Age, gender, race, medical history and maternal obstetric history (from the patient file if available, the teachers and the children).

Ophthalmic examination and tests: Visual acuity, refraction, external eye and fundus examination.

It will then be entered in WHO/PBL form (Appendix B).

7.7 Data Management and Statistics

Descriptive analysis of the data will be carried out as follows:

Categorical variables will be summarised by frequency and percentage tabulation, and illustrated by means of bar charts.

Continuous variables will be summarised by the mean, standard deviation, median and interquartile range, and their distribution illustrated by means of histograms.

Data analysis will be carried out in STATISTICA.

7.8 Time Schedule

	Sept 2016	Oct 2016	Jan 2017	Feb 2017	Mar 2017	Apr 2017	May 2017	June 2017	July 2017
Ethics Submission									
Protocol Approval									
Protocol Amendments									
Ethics Approval									
Data Collection									
Data Analysis									
Report/ Submission									

7.9 Ethical Considerations

The protocol will be submitted to the University of the Witwatersrand Ethical Committee for clearance in order to perform research. Ethical considerations will adhere to the tenants of the Helsinki Declaration. Permission from the Head of Department of St John Eye Hospital, Chris Hani Baragwanath Academic Hospital, has already been granted (Appendix C). The principal and authorities in the Department of Education has been consulted for permission. Consent forms will also be made available to parents/guardians (Appendix E). Assent forms will be completed for children of 8 years or older (Appendix F). No names, hospital numbers or any other patient information that can breach patient confidentiality will be published. A study number will be assigned to each study participant.

8. Reporting Plans

- Submission as Masters in Medicine Dissertation – MMed (OPHTH.)
- Presentation of study findings at the Ophthalmic Society of South Africa annual congress

- Publish in a scientific journal

9. **Funding**

Transportation of the learners to St John's Eye Hospital will be funded by Retina SA. This will cost R 11 800 at a rate of R 2950 per trip. All administrative costs and that of the refreshments will be carried by the researcher.

10. **Limitations**

- The study will be limited to only one blind school in Gauteng and therefore represent a small sample size.
- Data collected by examining children in blind schools in subject to selection bias and interpretation of the findings should be done carefully as it may not necessarily representative of the general population.

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APPENDIX 2: WHO/ PBL Data Collection Form

WHO/PBL EYE EXAMINATION RECORD FOR CHILDREN WITH BLINDNESS AND LOW VISION

A.1 CENSUS - BLIND SCHOOL / HOSPITAL STUDIES

Country no ☐☐☐ (1-3) Sch/Hosp no ☐☐☐ (4-5) Child no. ☐☐☐☐☐ (6-8)

Sch/Hosp: _____ City/town:_____

OR

A.2 CENSUS - POPULATION BASED SURVEYS

Country No. ☐☐☐ (1-3) Cluster No. ☐☐☐ (4-6)

Household No. ☐☐☐ (7-9) Child No. ☐☐ (10-11)

B. PERSONAL DETAILS OF CHILD

Name: _____

Home Town/Village: _____

Ethnic group (optional): _____

Age: ☐☐ (12-13) In months (0-11 months)

☐☐ (14-15) In years (1-15yr olds)

Sex: ☐ Male ☐ Female (16)

Age at onset of visual loss: ☐☐ (17-18)

00 Since birth
88 First Year of life
01-15 in Years
99 Unknown

Family history:
Is there a family history of the same condition?
☐ Yes ☐ No ☐ Unknown (19)

If yes, who is similarly affected?
_____

Is there a history of consanguinity? ☐ Yes ☐ No ☐ Unknown (20)

If yes, relationship: _____

C. VISUAL ASSESSMENT

1) Distance Vision: With present glasses ☐ unaided ☐ (21)

Test each eye separately, then together.

	Right	Left	Right & Left
6/6 - 6/18	☐	☐	☐
less than 6/18 - 6/60	☐	☐	☐
less than 6/60 - 3/60	☐	☐	☐
less than 3/60 - PL	☐	☐	☐
No light perception	☐	☐	☐
Cannot be tested			
Believed sighted	☐	☐	
Believed blind	☐	☐	
	(22)	(23)	(24)

2) Functional Vision: Test with both eyes together

		Yes	No	Not Tested
Can see to walk around	(25)	☐	☐	☐
Can recognise faces	(26)	☐	☐	☐
Can see print	(27)	☐	☐	☐
Believed useful residual Vision	(28)	☐	☐	☐

3) Visual Fields: Test each eye separately

	Right	Left
Full field	☐	☐
Hemianopia	☐	☐
Constricted to less than 10°	☐	☐
Other field loss	☐	☐
Cannot test	☐	☐
Not tested	☐	☐
	(29)	(30)

Specify type of test _____

D. GENERAL ASSESSMENT

Additional disabilty — *Tick all that apply*

None	(31)	☐
Hearing loss	(32)	☐
Mental retardation	(33)	☐
Physical handicap	(34)	☐
Epilepsy	(35)	☐
Other	(36)	☐

Specify _____

E. PREVIOUS EYE SURGERY

Tick all that apply

		Right		Left
None	(37)	☐	(38)	☐
Glaucoma	(39)	☐	(40)	☐
Cataract	(41)	☐	(42)	☐
Corneal Graft	(43)	☐	(44)	☐
Optical Iridectomy	(45)	☐	(46)	☐
Removed	(47)	☐	(48)	☐
Surgery, type unknown	(49)	☐	(50)	☐
Other,	(51)	☐	(52)	☐

Specify _____

Please give full details including dates, if available,

Right eye _____ Left eye _____

F. EYE EXAMINATION - Site of ABNORMALITY leading to VISUAL LOSS

For each eye mark one major abnormality
And all others that contribute to visual loss

	Right Eye Major		Right Eye Others		Left Eye Major		Left Eye Others	
Whole globe:	☐	(53)	☐		☐	(89)	☐	
Phthisis	☐		☐	(54)	☐		☐	(90)
Anophthalmos	☐		☐	(55)	☐		☐	(91)
Microphthalmos	☐		☐	(56)	☐		☐	(92)
Buphthalmos	☐		☐	(57)	☐		☐	(93)
Glaucoma	☐		☐	(58)	☐		☐	(94)
Removed	☐		☐	(59)	☐		☐	(95)
Disorganised	☐		☐	(60)	☐		☐	(96)
Other	☐		☐	(61)	☐		☐	(97)
Cornea:								
Staphyloma	☐		☐	(62)	☐		☐	(98)
Scar	☐		☐	(63)	☐		☐	(99)
Keratoconus	☐		☐	(64)	☐		☐	(100)
Dystrophy	☐		☐	(65)	☐		☐	(101)
Other Opacity	☐		☐	(66)	☐		☐	(102)
Lens:								
Cataract	☐		☐	(67)	☐		☐	(103)
Aphakia	☐		☐	(68)	☐		☐	(104)
Other	☐		☐	(69)	☐		☐	(105)
Uvea:								
Aniridia	☐		☐	(70)	☐		☐	(106)
Coloboma	☐		☐	(71)	☐		☐	(107)
Uveitis	☐		☐	(72)	☐		☐	(108)
Other	☐		☐	(73)	☐		☐	(109)
Retina:								
Dystrophy	☐		☐	(74)	☐		☐	(110)
Albinism	☐		☐	(75)	☐		☐	(111)
ROP	☐		☐	(76)	☐		☐	(112)
Retinoblastoma	☐		☐	(77)	☐		☐	(113)
Other	☐		☐	(78)	☐		☐	(114)
Optic Nerve:								
Atrophy	☐		☐	(79)	☐		☐	(115)
Hypoplasia	☐		☐	(80)	☐		☐	(116)
Other	☐		☐	(81)	☐		☐	(117)
Other, not listed	☐		☐	(82)	☐		☐	(118)
Globe appears normal (complete after refraction see Section G								
Refractive error	☐		☐	(83)	☐		☐	(119)
Amblyopia	☐		☐	(84)	☐		☐	(120)
Cortical blindness	☐		☐	(85)	☐		☐	(121)
Idiopathic nystagmus	☐		☐	(86)	☐		☐	(122)
Normal vision	☐		☐	(87)	☐		☐	(123)
Not examined	☐		(88a)		☐		(88b)	

THE MAJOR SITE OF ABNORMALITY LEADING TO VISUAL LOSS FOR THE CHILD (124)

SELECT RIGHT **OR** LEFT EYE ☐ Right ☐ Left

G. REFRACTION/LOW VISION AID ASSESSMENT

	Yes	No	Not indicated	Not done
Vision improves with a pinhole	☐ (125)	☐	☐	☐
Refraction performed now	☐ (126)	☐		
Vision assessed with low vision aid	☐ (127)	☐	☐	

1) If refraction performed, visual acuity with corrective lenses

Distance: Test each eye separately, then together

	Right	Left	Right & Left
6/5 - 6/18	☐	☐	☐
Less than 6/18 - 6/60	☐	☐	☐
Less than 6/60 - 3/60	☐	☐	☐
Less than 3/60	☐	☐	☐
	(128)	(129)	(130)

Specify corrective lenses and visual acuity

Right eye _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ VA _ _ _ _ _ _

Left eye _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ VA _ _ _ _ _ _

Near: Test with both eyes together

	Yes	No
Can discern print/ symbols equal to Or smaller than 5mm (≤5mm)	(131) ☐	☐

☐ ○ △ Example of 5mm symbols

2) If assessed with low vision aid (LVA), visual acuity with LVA:

Distance:

Specify type of LVA and visual acuity

Right eye _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ VA _ _ _ _ _ _

Left eye _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ VA _ _ _ _ _ _

Near:

Specity type of LVA and near acuity

Right eye _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ VA _ _ _ _ _ _

Left eye _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ VA _ _ _ _ _ _

	Right	Left
Can discern print ≤5mm	☐	☐
Can discern print >5mm	☐	☐
Cannot discern print	☐	☐
	(132)	(133)

H. EYE EXAMINATION - AETIOLOGY OF VISUAL LOSS

Select one of the categories 1-5 for each eye

Tick all that apply within the selected category.

		Right eye Definite	Right eye Suspect	Left eye Definite	Left eye Suspect
1) Hereditary Disease:	Chromosomal	(134) ☐	☐	(135) ☐	☐
	Mitochondrial	(136) ☐	☐	(137) ☐	☐
	Autosomal dominant	(138) ☐	☐	(139) ☐	☐
	Autosomal recessive	(140) ☐	☐	(141) ☐	☐
	X-linked	(142) ☐	☐	(143) ☐	☐
	Cannot Specify	(144) ☐		(145) ☐	
2) Intrauterine factor:	Rubella	(146) ☐	☐	(147) ☐	☐
	Toxoplasmosis	(148) ☐	☐	(149) ☐	☐
	Drugs/alcohol	(150) ☐	☐	(151) ☐	☐
	Other, Specify _ _ _ _ _ _ _ _ _ _ _ _ _ _ _	(152) ☐	☐	(153) ☐	☐
3) Perinatal/ Neonatal factor:	Cerebral hypoxia/injury	(154) ☐	☐	(155) ☐	☐
	R.O.P	(156) ☐	☐	(157) ☐	☐
	Ophthalmia neonatorum	(158) ☐	☐	(159) ☐	☐
	Other, Specify _ _ _ _ _ _ _ _ _ _ _ _ _ _ _	(160) ☐	☐	(161) ☐	☐
4) Postnatal/ Infancy/ Childhood factor:	Vitamin A deficiency	(162) ☐	☐	(163) ☐	☐
	Measles	(164) ☐	☐	(165) ☐	☐
	Neoplasm	(166) ☐	☐	(167) ☐	☐
	Trauma	(168) ☐	☐	(169) ☐	☐
	Harmful Trad. Practices	(170) ☐	☐	(171) ☐	☐
	Other, Specify _ _ _ _ _ _ _ _ _ _ _ _ _ _ _	(172) ☐	☐	(173) ☐	☐
5) Cannot determine (unknown aetiology)	Cataract	(174) ☐		(175) ☐	
	Glaucoma/Buphthalmos	(176) ☐		(177) ☐	
	Retinoblastoma, no FH	(178) ☐		(179) ☐	
	Abnormality since birth	(180) ☐		(181) ☐	
	Specify _ _ _ _ _ _ _ _ _ _ _ _ _ _ _				
	Other, Specify _ _ _ _ _ _ _ _ _ _ _ _ _ _ _	(182) ☐		(183) ☐	

THE MAIN AETIOLOGY OF VISUAL LOSS FOR THE CHILD

SELECT **ONE** FROM POSTIONS 134-183 [_ _ _ _] (184)

1. ACTION NEEDED

1) Optical — *Tick all that apply*

None	(185) ☐
Refraction later	(186) ☐
Spectacles	(187) ☐
Low Vision Aid	(188) ☐

2) Medical/ Surgical — *Tick all that apply*

None	(189) ☐
Medication	(190) ☐
Surgery	(191) ☐
Specify _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _	
Other	(192)
Specify _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _	

J. PROGNOSIS FOR VISION

Tick one box only for each eye

	Right eye	Left eye
Could be improved	☐	☐
Likely to remain stable	☐	☐
Likely to deteriorate	☐	☐
	(193)	(194)

K. EDUCATION

1) Present Schooling — Tick one box only

Special school for the blind	☐
Special school for the multiple handicapped	☐
Integrated education	☐
None	☐
Other	☐
Specify _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _	(195)

2) Recommendations

	Yes	No
Change in schooling recommended	(196) ☐	☐
Specify _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _		

L. FULL DIAGNOSIS

Specify full anatomical and aetiological diagnosis:

Right eye:

_____

_____

_____

Left eye:

_____

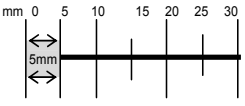
_____

M. EXAMINER:

Examined by

_____

Date (month) (year) (197-200)



APPENDIX 3: Learner Assent Form

Hi. My name is Nira Esra. I'm a doctor at St John Eye Hospital. I am trying to learn more about the causes of blindness and poor vision in childhood. I would like to ask you to help me by being in a study, but before I do, I want to explain what will happen if you decide to help me.

I will ask you to answer a few questions. There are no right or wrong answers to these questions and nothing bad will happen if you do not know any of the answers. Then I will ask that you let me examine your eyes in order to find out what is causing you to have poor vision. It will not be painful. If I find any problems with your eyes that we can help you with, I will make an appointment for you to come and see us again.

When I tell other people about my study, I will not use your name, and no one will be able to tell who I'm talking about.

Your parent/ guardian says it's okay for you to be in my study. But if you don't want to be in the study, you don't have to be. What you decide won't make any difference with your grades/ about how people think about you and no one else will be upset, if you don't want to be in the study. If you want to be in the study now but change your mind later, that's okay. You can stop at any time. If there is anything you don't understand you should tell me so I can explain it to you.

Do you have any questions for me now?

Would you like to be in my study?

Name of Child: _____

Parental Permission on File: ☐ Yes ☐ No

Child's Voluntary Response to Participation: ☐ Yes ☐ No

Signature of Researcher: _____

Date: _____

(Optional) Signature of Child: _____

APPENDIX 4: Parent Consent Form

Hello

I am asking for your permission to include your child in the research study: The Causes of Visual Impairment in Children in a school for the blind in Johannesburg - a Cross Sectional Study.

The study seeks to ascertain the causes of childhood blindness/ severe visual impairment in our population.
In this study we want to learn what the more common causes of childhood blindness in our population are. This will assist in determining the measures necessary in order to prevent childhood blindness.

This will involve history taking as well as an assessment of both eyes.
There are no risks involved.
Should we find that a participant could benefit from further evaluation or intervention, they will be given a follow up appointment date, which parents are encouraged to attend.

Any old files or documentation that you have which contain information regarding the participant's previous medical investigation will be helpful.

Transport will be provided for all learners to St John Eye Hospital, no costs will be incurred by the participant.

There will be no consequences of a participant's decision to withdraw from the research.

All efforts will be made to keep personal information confidential. No names, hospital numbers or any other patient information that can breach patient confidentiality will be published.

I _____the parent/guardian of

_____ hereby consent to his/her participation

in the above study.

Witness _____
Date_____

APPENDIX 5: Indemnity Form

I, …….....… (full name and surname) the

parent/guardian of …… (full name and surname of learner) hereby give permission for him/her to participate in the excursion planned to St John Eye Hospital. I understand that the staff will act in the best interest of my child and that all reasonable precautions will be taken to ensure the safety and welfare of my child.

Residential address of parent/guardian: ……

……..……

Tel number (cell): ……...Work: ……

…….. ….……...…

SIGNATURE **DATE**

APPENDIX 6: CEO/ Hospital Management Permission

GAUTENG PROVINCE
HEALTH
REPUBLIC OF SOUTH AFRICA

MEDICAL ADVISORY COMMITTEE
CHRIS HANI BARAGWANATH ACADEMIC HOSPITAL

PERMISSION TO CONDUCT RESEARCH

Date: 9 Dec 2016

TITLE OF PROJECT: Causes of visual impairment in children in a school for the blind in Johannesburg – a cross sectional study

UNIVERSITY: Witwatersrand

Principal Investigator: N Esra

Department: Ophthalomology

Supervisor (If relevant): I Mayet

Permission Head Department (where research conducted): Yes

Date of start of proposed study: Dec 2016
Date of completion of data collection: Dec 2018

The Medical Advisory Committee recommends that the said research be conducted at Chris Hani Baragwanath Hospital. The CEO /management of Chris Hani Baragwanath Hospital is accordingly informed and the study is subject to:-

- Permission having been granted by the Human Research Ethics Committee of the University of the Witwatersrand.
- the Hospital will not incur extra costs as a result of the research being conducted on its patients within the hospital
- the MAC will be informed of any serious adverse events as soon as they occur
- permission is granted for the duration of the Ethics Committee approval.

.....
Recommended
(On behalf of the MAC)
Date: 09 December 2016

.....
Approved/Not Approved
Hospital Management
Date: 13/12/16

APPENDIX 7: Head of Department Permission

Consent to Allow for Collection of Data for the Purposes of Research

To whom it may concern,

This document hereby serves as permission for Dr Nira Esra, student number 0602081J, to collect the relevant data needed to complete the research intended under the title:

Causes of Visual Impairment in Children - a Cross Sectional Study

Data will be collected by clerking and examining children from Sibonile school who will be transported to St John Eye Hospital as well as from any preexisting medical records.

Data that would be needed for this study include:

Personal Information: Age, gender, race, medical history and maternal obstetric history (from the patient file if available, the teachers and the children).

Ophthalmic examination and tests: Visual acuity, refraction, external eye and fundus examination.

As per the protocol submitted, all data will be collected and completed on the WHO/PBL form (Appendix A).

All data will remain strictly confidential to the author.

All data collection will be performed after the approval by the Human Research Committee of the University of the Witswatersrand.

The intended research will be funded by the applicant with regards to administrative costs. Transportation of the learners to St John Eye Hospital has been funded by Retina South Africa.

Head of Department of Ophthalmology- St John Eye Hospital, CHBAH

Name DR NICKY WELSH Date 30/8/2016.

Signature NDWelsh (FC)
(pp Prof G. McAren)

APPENDIX 8: Department of Education Approval

GAUTENG PROVI CE Department: Education

REPUBLIC OF SOUTH AFRICA 8/4/4/1/2

GDE RESEARCH APPROVAL LETTER 30 May 2017 **Date:**

Validity of Research Approval:	06 February 2017 29 September 2017
	2017/124
Name of Researcher:	Esra NY
Address of Researcher:	6 Scott Street
	Waverley
	2090
Telephone Number:	011 440 8919 0798773927
Email address:	nira.esra@gmail.com
Research Topic:	The Causes of Visual Impairment in Children in a school for the blind in Johannesburg - a Cross Sectional Study
Number and type of schools:	One Primary School and One Secondary School
District/s/HO	Johannesburg South

Re: A roval in Res ect of Re uest to Conduct Research

This letter serves to indicate that approval is hereby granted to the above-mentioned researcher to proceed with research in respect of the study indicated above. The onus rests with the researcher to negotiate appropriate and relevant time schedules with the school/s and/or offices involved to conduct the research. A separate copy of this letter must be presented to both the School (both Principal and SGB) and the District/Head Office Senior Manager confirming that permission has been granted for the research to be conducted.

30/05/2017

The following conditions apply to GDE research. The researcher may proceed with the above study subject to the conditions listed below being met. Approval may be withdrawn should any of the conditions listed below be flouted: 1

Office of the Director: Education Research and Knowledge Management
7th Floor, 17 Simmonds Street, Johannesburg, 2001
Tel: (011) 355 0488
Email: Faith.Tshabalala@gauteng.gov.za
Website: www.education.gpg.gov.za

1. *The District/Head Office Senior Manager/s concerned must be presented with a copy of this letter that would indicate that the said researcher/s has/have been granted permission from the Gauteng Department of Education to conduct the research study.*
2. *The District/Head Office Senior Manager/s must be approached separately, and in writing, for permission to involve District/Head Office Officials in the project.*
3. *A copy of this letter must be forwarded to the school principal and the chairperson of the School Governing Body (SGB) that would indicate that the researcher/s have been granted permission from the Gauteng Department of Education to conduct the research study.*
4. *A letter / document that outlines the purpose of the research and the anticipated outcomes of such research must be made available to the principals, SGBs and District/Head Office Senior Managers of the schools and districts/offices concerned, respectively.*
5. *The Researcher will make every effort obtain the goodwill and co-operation of all the GDE officials, principals, and chairpersons of the SGBs, teachers and learners involved. Persons who offer their co-operation will not receive additional remuneration from the Department while those that opt not to participate will not be penalised in any way.*
6. *Research may only be conducted after school hours so that the normal school programme is not interrupted. The Principal (if at a school) and/or Director (if at a district/head office) must be consulted about an appropriate time when the researcher/s may carry out their research at the sites that they manage.*
7. *Research may only commence from the second week of February and must be concluded before the beginning of the last quarter of the academic year. If incomplete, an amended Research Approval letter may be requested to conduct research in the following year.*
8. *Items 6 and 7 will not apply to any research effort being undertaken on behalf of the GDE. Such research will have been commissioned and be paid for by the Gauteng Department of Education.*
9. *It is the researcher's responsibility to obtain written parental consent of all learners that are expected to participate in the study.*
10. *The researcher is responsible for supplying and utilising his/her own research resources, such as stationery, photocopies, transport, faxes and telephones and should not depend on the goodwill of the institutions and/or the offices visited for supplying such resources.*
11. *The names of the GDE officials, schools, principals, parents, teachers and learners that participate in the study may not appear in the research report without the written consent of each of these individuals and/or organisations.*
12. *On completion of the study the researcher/s must supply the Director: Knowledge Management & Research with one Hard Cover bound and an electronic copy of the research.*
13. *The researcher may be expected to provide short presentations on the purpose, findings and recommendations of his/her research to both GDE officials and the schools concerned.*
14. *Should the researcher have been involved with research at a school and/or a district/head office level, the Director concerned must also be supplied with a brief summary of the purpose, findings and recommendations of the research study.*

The Gauteng Department of Education wishes you well in this important undertaking and looks forward to examining the findings of your research study

Kind regards

... .

Ms Faith Tshabalala
CES: Education Research and Knowledge Management

DATE: 30/05/2017 ....

Making education a societal priority

Office of the Director: Education Research and Knowledge Management

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APPENDIX 9: Ethics Clearance Certificate

R14/49 Dr Nira Yael Esra

HUMAN RESEARCH ETHICS COMMITTEE (MEDICAL)

CLEARANCE CERTIFICATE NO. M170211

NAME: (Principal Investigator)	Dr Nira Yael Esra
DEPARTMENT:	Ophthalmology/Division of Neurosciences St John Eye Hospital, Chris Hani Baragwanath Academic Hospital
PROJECT TITLE:	The Causes of Visual Impairment in Children in a School for the Blind in Johannesburg - A Cross Sectional Study
DATE CONSIDERED:	24/02/2017
DECISION:	Approved unconditionally
CONDITIONS:	
SUPERVISOR:	Prof Ismail Mayet
APPROVED BY:	Professor P. Cleaton-Jones, Chairperson, HREC (Medical)
DATE OF APPROVAL:	26/04/2017

This clearance certificate is valid for 5 years from date of approval. Extension may be applied for.

DECLARATION OF INVESTIGATORS

To be completed in duplicate and **ONE COPY** returned to the Research Office Secretary 3rd floor, Phillip Tobias Building, Parktown, University of the Witwatersrand. I/We fully understand the the conditions under which I am/we are authorised to carry out the above-mentioned research and I/we undertake to ensure compliance with these conditions. Should any departure be contemplated,from the research protocol as approved, I/we undertake to resubmit to the Committee. **I agree to submit a yearly progress report**. The date for annual re-certification will be one year after the date of convened meeting where the study was initially reviewed. in this case, the study was initially review in February and will therefore be due in the month of February each year. Unreported changes to the application may invalidate the clearance given by the HREC (Medical).

Principal Investigator Signature Date

PLEASE QUOTE THE PROTOCOL NUMBER IN ALL ENQUIRIES