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Early Detection of Warning Signs of Visual Impairment among Children in Primary Schools, Central Kenya

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Author's contribution

The sole author designed, analyzed and interpreted and prepared the manuscript.

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ABSTRACT

Aim: Visual impairments are known to influence school children's academic performance as well as their quality of life. On a positive note, visual impairments can be well managed if they are identified early through visual screening. In Kenya, many primary school children presenting with early signs of visual impairment are usually unnoticed and unsupported. The aim of this study was to screen school-children for early signs of visual impairments and to find out the constraints the teachers encounter in identifying children who are at risk.
Study Design: Descriptive survey research design.
Place and Duration of the Study: The study was carried out in Central Kenya between January 2013 and April 2013 in 12 primary schools.
Methodology: The study involved 240 school children from lower primary (class two and class three, 120 boys and 120 girls) and 24 teachers. Data collection instruments included visual problem identification checklists, Snellen chart and interview schedules.
Results: The study indicated that some children presented with early signs of visual impairments: Unwillingness to engage in reading tasks (37%), following line with finger when reading (36%),

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difficulty reading from chalkboard (33%), holding book close when reading (30%), frequent blinking of eyes (26%), tendency to move near or away from light (25%), omission of letters and words when reading (24%), moving head instead of eyes when reading (23%), screwing up face or frowning when trying to see (20%), eye strains or headaches (18%), blurred or double vision (16%) and stumbling on objects when walking (6%). Another sign of early visual loss in this study was visual acuity of 6/12 or worse in one or both eyes which represented 8.75% of the children. Teachers experienced various challenges in identifying children at risk: lack of visual screening programs in the schools, lack of specialist training, lack of the skilled personnel and facilities.

Conclusion: School children showing early signs of visual impairments can be identified early for appropriate interventions. This can be enhanced through training specialist teachers and introducing visual screening services in schools.

Keywords: Visual problems; visual loss; visual acuity; school children; primary school; visual screening; county.

1. INTRODUCTION

Monitoring the magnitude of visual impairment is essential for developing educational policies aiming at management and support. Globally, about 285 million people have visual impairment although 80% of the visual impairment is preventable or treatable [1]. In Africa, there are 35 million people with visual impairments even though it represents only 11% of the global population [2]. Every year, an estimated 2000 children across Africa develop visual impairments [3]. In Kenya, the census statistics of 2009 indicated that the population of people with disabilities was about 1.3 million, with 25% having visual impairments [4].

The major challenge in preventing visual loss in Africa is mainly delayed detection [5]. Other factors include lack of awareness about visual problems and their potential effects at personal, family, school as well as community level; non-availability of and/or inability to afford services for testing, and misconceptions about visual problems [6]. The International Council for Education of People with Visual Impairments (ICEVI) [7] has showed that millions of school children remain at risk of visual loss due to under-identification. To counter this, visual screening programmes have been recommended as a prerequisite towards prevention of visual loss in children [7-10] Since visual cues are key to how children learn and function, vision problems can affect all aspects of a child' s development by potentially limiting the range and types of information and experiences the child possesses [11]. Studies have documented that early identification of visual problems decreases the risk of visual impairments [12,13,14].

Kenya has a population of 9.4 million children in primary schools [4]. Despite this high enrolment, detection of school children with visual problems has remained a major challenge. Thomson [15] and (Bailey, Indian, Zhang, Geiss, Duenas & Saaddine, [16] have noted that early detection of children with vision problems pose major challenges to educators because often, signs of vision problems are not discovered until children have suffered through many years of poor school performance, repeated discipline problems and feelings of poor self-worth. The American Optometric Association [17] points out that because 80 percent of a child's learning relies on visual acuity, early detection and support are needed. It has also recommended that children should have routine eye exam every year beginning at age 5. According to a study by Mwangi [18], specialist teachers in special education are inadequate which has led to stagnation in detection of early visual impairments among children in primary schools. The purpose of this study was to screen school-children for early signs of visual impairments and to find out the challenges that the teachers encountered in identifying children who were at risk.

2. MATERIALS AND METHODS

Descriptive survey research design aimed at detecting early warning signs of visual impairment in children of both sexes (boys and girls) enrolled in class two and class three in public primary schools in four counties (regions) of Central Kenya ie Nyeri County, Kirinyaga County, Murang'a County and Kiambu County. Twelve schools were randomly selected (four from each county). From each school, 20 children were randomly selected (5 girls and 5 boys from class 2 and 5 boys and 5 girls from class 3) and their class teachers. The study sample comprised of 240 school children and 24

class teachers. Classes 2 and 3 were selected because the study was concerned with early detection of warning signs of visual impairment in primary school children. The choice of these classes was based on the fact that the children are still in their early years of primary school learning and they can express their visual problems with ease. Additionally, children have already achieved full visual maturity, allowing for early detection of low VA (VA lower than or equal to 6/12 in one or both eyes). Moreover, it is expected that class 2 and 3 learners have already mastered reading, which makes it easier to perform the examination using the Snellen chart. The instruments used included self constructed visual problem identification checklists and Snellen chart for the learners and interview schedules for the teachers. The instruments had been given to experts in the field of special education to ensure face and content validity. Data gathered concentrated around three main areas: presence of warning signs of visual impairments among school children, teacher demographics and factors hindering early detection of children with early signs of visual impairments.

A previously validated questionnaire/ vision problem checklist was used to detect the presence of warning signs of visual impairments among school children. This questionnaire comprised 12 statements describing early signs of visual loss/ visual problems. The reliability of the visual problem checklist was established using the split- half method and reliability coefficient of 0.88 was obtained. As shown in Table 1, each statement was rated in a three point likert scale (Never, Sometimes and Often) depending on the occurrence of the behaviour. The researcher explained the requirements of the questionnaire to the respondents, who participated in answering the questions where appropriate. The class teachers were purposely selected to assist in filling-in the questionnaire for each child in their class. Since the class teachers interacted with the children on a daily basis, they were able to describe the observed behaviours as required, that is, whether they occurred 'sometimes', 'often' or if they 'never' occurred. This study was interested with those children who presented the visual problems 'often', which indicated an early sign of visual impairment.

The standard Snellen chart was used to measure the visual acuity of both eyes, each at a time, so as to determine the extent of visual loss. Visual acuity measurements ranged from 6/6 to 6/60. Snellen's test provides an initial diagnosis of the child's visual status. Before carrying out the test, the researcher provided the learners with information about the test and carefully guided them on the procedure to be followed. The test was done in a room adequately prepared for the activity, at a distance of 6 metres from the Snellen chart. The results of the Visual Acuity tests were recorded. The study excluded the children wearing corrective lenses or glasses, with total visual impairment (blind) and those who did not belong to the predetermined (class 2 and 3). In line with the National Commission on Vision and health [19], this study considered normal VA measurements to be higher than 6/12 while visual acuity equal to or lower than 6/12 was considered to indicate visual loss [19], Hartman, [20]. Semi- structured interviews were administered to the teachers and comprised two sections. The first section gathered data on whether the teachers had received any special education training, and their areas of specialization. The second section looked at factors that hindered identification of children with early signs of visual impairments.

Statistical Package for Social Sciences (SPSS) version 18.0 for windows (SPSS Inc. Chicago, IL, 2008) was used for analysis of quantitative data from visual problem checklists and Visual acuity measurements which generated counts and percentages in form of tables and graphs. The counts and percentages were descriptively analyzed. The qualitative data from the interview schedules were put in two themes: Special education training and area of specialization and factors that hindered identification of children with early signs of visual impairments. The themes enhanced understanding of the issues under study and were descriptively analyzed through narrative passages.

3. RESULTS

3.1 Special Education Training and Specialization

The teachers were asked whether they had undertaken any special education training and their areas of specialization. Ninety two percent (n=22) had no special education training and only 8% (n=2) had trained in special education with a specialization in visual impairments. Based on these findings, majority of the teachers had not trained in special education.

3.2 Warning Signs of Visual Impairments Observed in Children

Early signs of visual impairments (visual problems) that were investigated among school-children in this study included stumbling on objects when walking, holding book too close when reading/ close one eye when reading, omission of letters and words when reading, frequent blinking of eyes, follows line with finger when reading, unwillingness to engage in reading tasks, tendency to move near or away from light, difficulty reading from chalkboard, screwing up face or frown when trying to see and moving head when reading instead of the eyes. This study considered the presence of visual problem only if it occurred 'often' as shown in Table 1. The findings of this study showed that the major visual problems exhibited included unwillingness to engage in reading tasks (37%), following line with fingers when reading (35%), difficulty reading from chalkboard (33%) and holding book closely/closing one eye when reading (30%). The survey revealed that the respondents showed early signs of visual loss.

To determine the extent of visual loss among the school children, visual acuity tests ((for both eyes) were performed and the results are shown in Table 2. The present study was more concerned with the respondents who had VA equal to or lower than 6/12 who comprised 9% (n=21). It is worthwhile noting that 3 (1%) of the respondents had significant visual loss, with a visual acuity of 6/60 in one eye which required thorough assessment and referral.

3.3 Factors Hindering Early Identification of Children with Visual Problems

The teachers reported various factors that hindered early identification of children with visual problems. Thirty eight percent (n=9) pointed out lack of relevant knowledge and skills about visual problems. Twenty five percent (n=6) mentioned lack of skilled personnel to help in identifying children with visual problems. Seventeen percent (n=4) indicated lack of openness on the part of school children in disclosing their visual difficulties while 20% (n=5) complained of large classes which minimized face to face contacts with children so as to notice any visual difficulties.

4. DISCUSSION

Screening for early detection of early signs of visual impairment should occur as early as possible because the longer the delay, the smaller the chances of management and interventions for the problem and the greater the effects on academic outcomes. This study investigated visual problems exhibited by school children, teachers' special education qualifications and constraints that hindered early detection of school children with visual problems. Information gathered provided insight in identifying appropriate measures that can help in detecting early signs of visual impairment in children.

Table 1. Distribution of early signs of visual impairment in school-children

Early signs of visual impairment	N=240	
	Frequency	%
Stumbling on objects when walking	6	14
Holds book too close when reading/ close one eye when reading	71	30
Omission of letters and words when reading	59	24
Frequent blinking of eyes	61	26
Follows line with finger when reading	86	35
Unwillingness to engage in reading tasks	89	37
Tendency to move near or away from light	60	25
Difficulty reading from chalkboard	79	33
Screwing up face or frown when trying to see	48	20
Moving head when reading instead of the eyes	56	23
Complaining of blurred vision or double vision when reading	39	16
Complaining of eye strain or headaches when reading	46	19

Table 2. Distribution of children's Visual Acuity (VA) for each eye

Right eye visual acuity	Left eye visual acuity	N=240
6/6	6/6	97(40%)
6/6	6/9	36(15%)
6/6	6/18	1(.4%)
6/9	6/6	32(13%)
6/9	6/9	54(23%)
6/9	6/12	2(.8%)
6/9	6/18	3(1.3%)
6/12	6/9	2(.8%)
6/12	6/12	2(.8%)
6/12	6/18	2(.8%)
6/18	6/9	1(.4%)
6/18	6/12	1(.4%)
6/18	6/18	4(.6%)
6/18	6/60	1(.4%)
6/60	6/9	1(.4%)
6/60	6/18	1(.4%)

4.1 Special Education Training and Specialization

The teachers were asked whether they had been trained in special education and their area of specialization. The results of the study showed that 92% (n=22) of the respondents had no special education training and only 8% (n=2) had trained in special education with a specialization in visual impairments. Contrary to these findings, a study done in Uganda (Steve & Cathrine, [21]) using the same methodology indicated that more than 80% of the teachers had been trained in visual impairments although the study was conducted in schools with children with visual impairments.

The findings of the current study were a clear indication that public primary schools had a dire need for specialist teachers in special education. Specialist teachers in the area of visual impairments are necessary in promoting detection of early signs of visual impairments (Wendy, [22]; Groffman, [23]). Majority of the teachers lacked background knowledge about visual impairments and hence they were likely to encounter challenges in identifying children with early signs of visual impairments (Yalo & Indoshi, [24]). The main reason for the poor representation of special education teachers in primary schools is that pre- service training does not integrate special education needs in the pre-service training module as a subject. For their professional development in special education, teachers are expected to pay for their post-training courses which are relatively expensive to afford. However, more research is required to explore local barriers to training in special education.

4.2 Visual Problems Exhibited by School Children

The study findings revealed that some children in public primary schools showed signs of early visual impairments. The major visual problems exhibited included unwillingness to engage in reading tasks (37%), following line with fingers when reading (35%), difficulty reading from chalkboard (33%) and holding book closely/ closing one eye when reading (30%). These findings were similar to a study conducted by Adegbehingbe [25] that found out that undiagnosed visual problems in public schools accounted for 13.5%. In the present study, 9% of respondents had visual acuity of 6/12 or worse in one or both eyes. The results were in agreement with those of a similar study involving 5913 school children which revealed that (9.32%) of the respondents had visual acuity of 6/12 or worse in at least one eye (Mohammed, [26]). Similarly, an Iranian study of 215 respondents found that 18 (8.4%) recorded a visual acuity of 6/12 or worse in at least one eye (National Commission on Vision and health, [19]). These studies support early identification of visual problems. During the study, it was revealed that none of the public primary schools under study performed visual screenings on children.

4.3 Factors Hindering Early Identification of Children with Visual Problems

The major factor that hindered teachers from detecting children with visual problems was lack of relevant knowledge and skills about visual impairments. The reasons behind this as suggested by KIE [27] included haphazard or lack of capacity development of teachers in public schools; in-service training of teachers being hampered by irregular and unscheduled training, inadequate time and prohibitive costs of training. Other factors hindering early identification of children with visual problems included lack of skilled personnel and school children not opening-up to the teachers about their visual problems.

5. CONCLUSION

From the foregoing, school-children presented with early signs of visual impairment which had not been previously detected. Therefore, the study brought about awareness of visual problems and exposed the need for school visual screening programs. The study also revealed a huge deficit of special education teachers in primary schools and the need for teacher empowerment. This may be enhanced through professional development, pre- service training and professional induction, as well as in- service and post- experience special education training.

COMPETING INTERESTS

Author has declared that no competing interests exist.

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