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PREVALENCE AND LEVEL OF VISION IMPAIRMENT OF PUPILS ATTENDING SPECIAL AND INCLUSIVE SCHOOLS IN KAKAMEGA COUNTY, KENYA

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Abstract:
Background: Vision Impairment (VI) in children is considered a severe public health problem since its high prevalence affects the well-being of the individuals, their families and the social welfare of entire nations. This study aimed to determine the prevalence and level of Vision Impairment of pupils attending special and inclusive schools. **Methods:** The study participants were 134 pupils randomly sampled from Special and Inclusive schools in Kakamega County. They went through Visual Acuity testing followed by Vision Impairment classification according to WHO guidelines. Socio-demographic and economic data was collected through guided questionnaires. **Results:** The overall prevalence of Vision Impairment among pupils attending special and inclusive schools in Kakamega County was 3.0% with the largest proportion having mild Vision Impairment. **Conclusion:** More studies expanding socio-demographic and economic factors of pupils attending special and inclusive schools should be conducted.

Keywords: pupils, vision impairment, prevalence, special schools, inclusive schools, vision impairment classification

1. Introduction

Vision impairment (VI) is a condition where the visual system, structures, and functions are affected by diseases leading to reduced visual acuity (VA) – the measure of how well a person can see (WHO, 2004). The International Classification of Diseases 11 (2018) further classifies VI into mild, moderate, and severe impairment using presenting VA and VF. Presenting VA is defined as the "*acuity obtained with the currently available*

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refractive correction" (WHO, 2004). Mild VI ranges from presenting VA ranging from 6/12 to 6/18, moderate VI 6/18 to 6/60, severe VI is defined by presenting VA of 6/60 to 3/60. For blindness the presenting VA is 3/60 to no light perception (WHO, 2010).

Approximately 36 million people were blind in 2015 VA worse than 3/60), 217 million had moderate to severe VI (VA 6/18 but 3/30 or better), and 188 million people had mild VI (VA worse than 6/12 but 6/18 or better). It was projected that a predictable 38.5 million people would be blind in 2020 (with a total global population of 7.75 billion) while 114.6 million people will be blind in 2050 (with a worldwide population of 9.95 billion). Comprehensively, 1.3 billion people globally have some form of VI (Bourne et al., 2017b). One individual becomes blind every minute, and a child becomes blind every 5 minutes (Darge et al., 2017). Of the 1.8 billion children (ages 0-14 years) in the world in 2010, approximately 19 million had VI, and 1.42 million were blind. In Africa, there was a total estimated population of 805 million, and 26.2 million were visually impaired. This corresponded to 9.2% of Africa's population. The leading WHO region was China, with 26.5% of its 75.5 million populations being visually impaired (Stevens et al., 2013).

A study done in Puducherry, South India, among 10-14-year-old school students revealed a VI prevalence of 6.37% among the study participants, with male students leading with 6.6% and their female counterparts with 6%. This study also showed higher prevalence in students who did not engage in playing outdoor games and instead took part in near work activities for more than 3 hours in a day. Also, a higher number of children with VI were below average in their academic performance as compared to their peers without VI (Vishnuprasad et al., 2017). Other studies done in India have reported similar prevalence of VI among school-going children (Murthy et al., 2014; Thulasiraj et al., 2003).

About 90% of people with VI live in developing countries (Stevens et al., 2013) and three quarters of the world's blind population is found in Africa and Asia. More than half of the world's children's population is found in the poorest regions of the world, Africa and Asia (C. Gilbert & Foster, 2001). In developing countries, 7%–31% of childhood blindness and VI is avoidable, 10%–58% treatable, and 3% to 28% preventable (Kong et al., 2012). With 1.4 million blind children worldwide, an estimated 300,000 live in Africa (Darge et al., 2017). In Tanzania, a study revealed a prevalence of 0.7% of bilateral impaired VA, which is VA worse than 6/12 in the better eye among primary school students (Wedner et al., 2000). In Ethiopia, there was a prevalence of 7.24% visually impaired school-going children (Bezabih et al., 2017).

A survey to investigate the magnitude and etiology of visual and ocular handicaps amongst Standard one primary school children in Nairobi, Kenya, about 330 out of 3,206 children had VI, which is 10% of the study respondents (Barasa et al., 2013). These findings were further supported by a research study in Korogocho slum, Nairobi, where the prevalence of severe VI and blindness was roughly 1.8 % and 0.7 % respectively (Nyaga et al., 2007). A cross-sectional school-based study in a rural district in Kenya found the prevalence of VI was 5.6%, proving quite a huge difference in prevalence and distribution of VI between Kenyan urban and rural areas. In a different study, the

prevalence of VI and blindness in Kibera, Nairobi, was 6.2% and 0.6% respectively (Ndegwa et al., 2006).

The fact that up to 50% of childhood blindness worldwide is avoidable means that there is an urgency in identifying risk factors and estimates of VI prevalence around the world, and especially in the most affected regions such as Africa, for the development of local, national and even global prevention strategies and programs (Bronsard et al., 2018). Many studies have focused on mainstream schools (Barasa et al., 2013; Lynch et al., 2011; Rono et al., 2018; Gilbert et al., 1995; Njuguna et al., 2009). Therefore, there is little evidence on the prevalence of VI among primary schools pupils attending special and inclusive schools. This study enabled the concerned programs by providing a more up-to-date database of prevalence. This information can then be streamlined to make them more effective, amend policies and allocate resources to reaching children with VI and their diverse needs.

Visual loss, at any level, can lead to functional impairments such as limiting and restricting the participation and performance in everyday activities, interfering with the individuals' independence, autonomy and quality of life (Bergstrom & Schall, 2014). Agreeably, vision is an afferent sense which can endorse integration with other sensory information. It is a continuous stimulus that aids self-directed and intentional motor conducts, critical to trace and identify distant objects that cannot be captured by other senses, understand spatial relations, the position of the body relative to space, capture effectively and quickly the environment in safe and confident manner, maintaining proper body posture, among other functions (Hale, 2012).

Activities ranging from independent mobility inside and outside the house, carrying out necessary and instrumental daily actions such as bathing, dressing, going to the grocery store or the bank, as well as to social activities, leisure and work, all of them may represent impairment in the daily life of the visually impaired (Mont, 2007). In view of this evidence-based fact, classification of people with visual impairment benefits in identification of needs and demands, involving their current health condition, interests, context, and expectations. Then, with the assistance of a multi-specialty team, they can be assisted with timely and complete support which can improve their performance in recreational as well as activities of daily living.

2. Methods

The aim of this study was to determine the prevalence and the levels of VI among pupils attending special and inclusive schools in Kakamega County, Kenya. Before collecting data, the research was presented to the relevant research review bodies that is, Masinde Muliro University of Science and Technology research Ethics Review Committee (EREC), license number: MMUST/IERC/112/20, for approval and the National Commission for Science, Technology and Innovation (NACOSTI), license number: NACOSTI/P/20/4867 for permission to conduct it since it involves human subjects.

Consent forms were distributed to parents and guardians through the schools and allowed 2 weeks to discuss with loved ones and to sign. It was made clear through the information documents that the pupils were under no obligation whatsoever to participate in the study and that if they consented, the children were allowed to withdraw from the research process at any time without any consequences.

134 pupils, selected through systematic random sampling of both special and inclusive schools, were involved in the study. Logmar charts were used to measure Visual Acuity (VA) Keller ® trans-illuminators were used to assess Light Perception (LP). From these details the study participants were classified into the various classifications of VI according to WHO (WHO, 2010). Guided questionnaires were then used to collect the socio-demographic data of the study participants.

3. Results

The overall prevalence of VI in special and inclusive schools in Kakamega County was 3.0%. Special schools had an exclusive prevalence of 4.4% while Inclusive schools had a prevalence of 16.5%.

In total, among the study participants, males (51.5%) were males, while about the age of the participants, 58.2 were between 11-17 years. Participants ranged between the ages of 5 to 17 years. Middle classes (class 4-6) (42.5%) had the largest percentage of participants while upper classes (class 7 & 8) (26.1%) had the least. The average family size among the participants was 4 people. The largest proportion of participants from special schools came from families that made between USD 0 to USD 46 (53.6%) in a month while the largest proportion of pupils from inclusive schools came from families that whose total monthly income was between USD 46 to USD 184 (45.3%). In terms of place of residence, the participants were grouped into 3 categories: those who came from urban, peri-urban and rural areas. Most participants (49.6%) came from peri-urban areas and when put into their respective school systems, 57.1% of those from special schools came from rural areas and 56.6% of participants from inclusive schools came from inclusive schools. The most popular religion was Christianity (85.2%).

Figure 1 below is a representation in percentages of the study participants in their respective levels of VI after classification. Most participants with mild VI were 13 years old and with blindness were 16 years old. 52% of those who were classified as blind came from families with between 7 to 9 people and their total monthly family income of between USD 46 to USD 184.

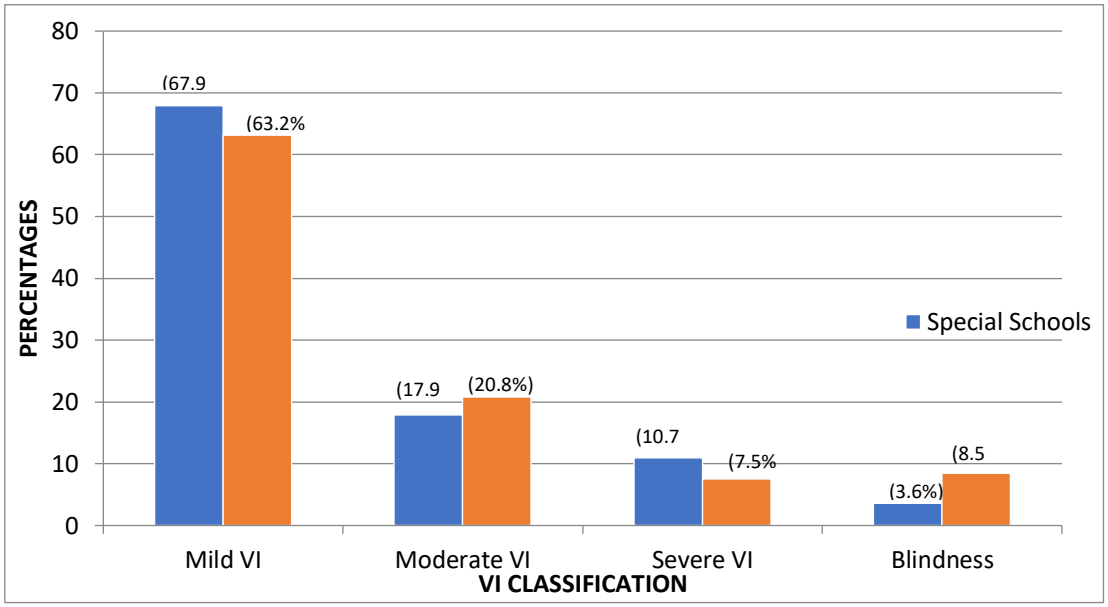

Figure 1: Level of VI in percentages in special and inclusive schools

4. Discussion

Overall prevalence of VI among pupils attending special and inclusive schools in Kakamega County was 3.0%. There is scarcity of evidences of previous studies published on the prevalence of VI among pupils in special and/or inclusive schools exclusively. In comparison to studies done in India and Ethiopia, this prevalence is relatively lower (Raju et al., 2004) of 4.32% and (Darge et al., 2017) of 3.7%. This could be contributed to the vigorous testing of children before they enter primary school as is required by the Ministry of Education. This helps identify children who require eye checkups early enough for timely diagnosis and management. However, this prevalence is higher compared to studies done in South Africa (Bourne et al., 2017a) and Sudan (Alrasheed et al., 2016). These differences in prevalence can be attributed to differences in study areas and study designs. Also, the differences in overall populations of these places could have played a role in varying prevalence rates.

Mild VI had the highest prevalence among the study respondents from both special (67.9%) and inclusive schools (63.2%) while blindness and severe VI had the lowest respectively. This is similar to the global study (Bourne et al., 2017a) done to determine magnitude, trends and projections of global prevalence of blindness where mild VI had the highest percentage prevalence and severe VI had the least. This could be because of the high magnitude of uncorrected refractive errors among school-going children (Naidoo et al., 2016). As their vision worsens, many pupils may have been compelled to drop out of school especially if their families cannot meet the cost of seeking medical attention. Also, since poor vision is associated with poor academic performance (Toledo et al., 2010) this could also explain the low percentages of pupils with severe VI and blindness because of the resulting frustration and delayed progression in school.

5. Conclusions

Determining the prevalence of VI among pupils in special and inclusive schools is prudent for proper allocation of resources for Persons With Disabilities (PWDs) while classification of persons with VI helps the relevant stakeholders such as teachers, parents/guardians, non-governmental organizations and policy makers to be able to specifically target the needs of an individual for example when distributing vision devices in order to improve their quality of life.

Participants' age ranged between 5-17 years. Usually primary school pupils are no older than 14 years but it was observed that the presence of VI, sometimes accompanied by other disabilities such as physical or intellectual disabilities, caused the pupils to delay in school mostly due to poor academic performance.

Competing Interests Statement
The authors have declared that no competing interests exist.

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