

Refractive Error and or Visual Impairment and Their Impact on Quality of Life Among School-age Children in Sub-saharan Africa; A Protocol of a Systematic Review

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Abstract

Background

Refractive error (RE) is a leading cause of visual impairment (VI) in children, the most common cause of childhood handicaps, and the second leading cause of childhood blindness globally. Refractive error and/or VI limits the ability of a child to perform well at school, in most sporting activities which require good vision, and negatively affects the socio-economical security of an individual. These two conditions have also reported to impact quality of life (QoL). The epidemiological evidence about the prevalence and distribution of RE and VI, as well their impact on the QoL of school-going children in Sub-Saharan Africa (SSA), will assist policymakers and stakeholders involved in child eye care in channelling resources appropriately. The main objective of this scoping review study therefore is to map available evidence on RE and or VI and their impact on QoL of school-going children in SSA.

Methods

This systematic review study will follow the five steps outlined in a framework proposed by Arksey and O'Malley (2005). The literature search will be conducted using the following databases, EBSCOhost: CINAHL, Academic search complete, Health-Consumer and Health-Nursing, Google Scholar, Science direct and PubMed. The period of the literature will be from January 1998 to 31 December 2020, all suitable studies will be exported to a Mendeley library and in cases of outstanding articles the authors will be contacted directly. The title screening will be done by the principal investigator (PI), then the study will employ two independent reviewers which will have access to the Mendeley library to do abstract screening (AS) and a full article screening (FAS). Following FAS, data extraction will be done by PI. The quality index of all included studies will be determined using the Mixed Method Appraisal Tool (MMAT). The results will be reported using the Preferred Reporting Items for systematic reviews and Meta-Analyses (PRISMA).

Discussion

The evidence of this scoping review will guide policy makers and all stakeholders in planning intervention strategies to address this global issue. Furthermore, the results of this review will be published in a peer reviewed journal and will be used to guide future research in this and related areas.

Systemic review registration: Submitted (PROSPERO) 27/04/2021

Background

Normal vision is essential in the general development of a child and serves as a major sensory modality in humans.(1) Any disturbance to vision therefore can affect the development and the learning of an individual negatively, worse so if the visual deficit exists at birth or in an early stage of life.(2) Refractive error is currently a leading cause of visual impairment (VI) in children, the most common cause of

childhood handicaps, and the second leading cause of childhood blindness.(3,4) Refractive error and/or VI limits the ability of a child to perform well at school as it is known that 85% of learning depends on vision. Moreover, affected children cannot participate in most sporting activities which require good vision. The ultimate negative effect however is on the socio-economic security of affected individuals.(5) (6) Thus, not surprisingly, refractive error (RE) and or VI has been reported to impact the quality of life (QoL). (5) Furthermore, managing the impact of VI and blindness from uncorrected RE (URE) is costlier and puts more pressure on the global economy than managing RE itself. (7) Globally there are around 19 million visually impaired children (8) of which 12.8 million are due to uncorrected or inappropriately corrected RE with eight million children being classified as blind due to URE.(9) Ninety percent of children with VI were found to reside in the developing countries.(10,11)

The impact of RE and VI onset before or during school-going age is significantly greater as compared to onset in adulthood, considering the greater number of years that they will likely carry these conditions in the case of the former.(1) The World Health Organization (WHO) developed a policy more than two decades ago in 1998 called the "WHO global school initiative: Helping schools to become 'Health-Promoting Schools' " and management of VI was included.(12) Two years later at the global meeting convened by the WHO in London, the recommendation that further information was required on the prevalence, incidence, and causes of VI among school-going children especially in the developing countries, emanated.(13) Further, in the initiation of 'VISION 20/20 RIGHT TO GOOD SIGHT' by the WHO and other non-government organizations (NGOs), the management of RE and VI in children was prioritized.(14) Knowledge of the magnitude and prevalence of RE and/or VI among school-going children therefore is vital for the proper channeling of resources for the management of these conditions. Moreover, it has been reported that RE and VI differ according to ethnic groups.(15,16) There is therefore a need for further research to be conducted to improve on the current knowledge and understanding of the epidemiology of these conditions which could facilitate future strategies to minimize the risks and manage it.

Epidemiological evidence about the prevalence and distribution of RE and VI, as well as their impact on the QoL of school-going children in Sub-Saharan Africa, will assist policymakers and stakeholders involved in child eye care in channeling resources appropriately. The objective of this scoping review study therefore is to map available evidence on RE and or VI and their impact on the QoL of school-age children in Sub-Sahara African (SSA).

Research question

What is the prevalence and distribution of RE and VI in school-age children in SSA, and the impact of these on their QoL?

Methodology

This review will map available evidence for SSA on RE and VI, as well as their impact on the QoL of school-age children. This systematic scoping review will follow five steps outlined in a framework

proposed by Arksey and O'Malley.(17) The steps are as follows (1) Identify the research question, (2) Identify relevant studies, (3) Study selection, (4) Charting the data, and (5) Collating, summarizing and reporting the results.

- **Identifying the research question**

The research question has been identified as: "What is the prevalence and distribution of RE and VI in school-age children in SSA?"

Sub-Question: What impact do these have on QoL?

Eligibility criteria

Studies to be included:

- Studies reporting on RE
- Studies reporting on VI
- Studies showing evidence on the impact of RE on QoL
- Studies showing evidence on the impact of VI on QoL
- Those with participants from ages 5 to 20 years of age
- Subjects being children of school age
- Studies conducted on the SSA countries
- Peer-reviewed black literature
- Peer-reviewed grey literature
- Studies published in the period 1998 to 2020

Exclusion criteria:

All studies not published in English, all qualitative studies and all studies that are not primary studies, will be excluded.

The Population Concept Context (PCC) framework will be employed in this study (Table 1).

TABLE 1: Population Concept Context framework

PCC	Detailed
Population	school-going children/ learners/pupil
Concept	Refractive error OR visual impairment AND quality of life
Context	Sub-Sahara Africa

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Identifying relevant studies

All peer-reviewed literature and any grey literature accessible online will be included in this systematic review. This review will focus on four main areas of interest, which are RE, VI, QoL and school-going children, however not all authors refer to them in these aforementioned terms, therefore we will then use Medical subject heading (MeSH) terms as follows “Refractive error OR Visual impairment OR Ametropia AND Quality of Life AND School going children OR Learner OR Scholar OR Pupil”. To identify relevant studies, an electronic search will be conducted in various databases using the keyword search

((("Refractive error OR Visual impairment OR Ametropia AND Quality of life AND school going children OR learner OR scholar OR pupils AND sub-Saharan Africa")))

This study search will be conducted using the following databases:

- Google Scholar
- Science direct
- PubMed
- EBSCOhost: CINAHL, Academic search complete, Health-Consumer and Health-Nursing.

The articles found will be exported to a Mendeley library especially created for this study. Thereafter, duplicates will be removed. Table 2 indicates the results of a pilot search. Figure 1 show the screenshot of pilot study done using Science Direct search engine as an example.

TABLE 2: Results of pilot search

Keywords searched	Date of search	Search engine used	Number of retrieved publications
(((“Refractive error OR Visual impairment OR Ametropia AND Quality of life AND school going children OR learner OR scholar OR pupils AND Sub-Saharan Africa”)))	24 November 2020	Google scholar	667
		Science direct	31561
		PubMed	21
		EBSCOhost	441 570

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Study selection

Suitable studies that are aligned with the inclusion criteria will be exported to a Mendeley library specifically created for this study done by The Principal investigator (PI), after which all duplicates will be removed. This will be followed by abstract screening (AS), conducted independently by two reviewers,

using a tool developed and piloted for this study (Table 3). Full article screening (FAS) will follow, also conducted independently by two independent reviewers using a tool as (Table 4).

TABLE 3: Abstract Screening tool

1. Author and date:
2. Title:
3. Does this article bear evidence on refractive error/ visual impairment? Yes/No/ Can't tell
4. Does this article bear evidence on school age children/learners (aged 5-20)? Yes/No/ Can't tell
5. Was the study done in Sub-Saharan Africa? Yes/NO/Can't tell
6. Screener – Initials:

TABLE 4: Full Article screening tool

1. Author and date:
2. Title:
3. Does this article bear evidence on refractive error/ visual impairment? Yes/No
4. Does this article bear evidence on school age children/learners (aged 5-20)? Yes/No
1. Was the study done in Sub-Saharan Africa? Yes/No
6. Screener – Initials:

All discrepancies will be resolved by the two screeners meeting to reconcile and agree on those studies they initially differed upon. The University of KwaZulu-Natal (UKZN) library will be the primary source for retrieving articles should the authors not respond to such requests. The process of article selection will be reported using the Preferred Reporting Items for Systematic reviews and Meta-Analyses (PRISMA), as per Figure 2. Following finalizing of articles, the PI will conduct data extraction on all included articles.

Quality assurance of the study

The quality index of all included studies will be determined using the Mixed Method Appraisal Tool (MMAT). This study will employ the 2018 MMAT tool in conjunction with the 2011 version of MMAT tool. The 2018 tool does not provide actual score yet advises that qualitative analysis be provided rather. However, since this does not have absolute values, the scoring section from the 2011 tool will be adopted with five criteria from 2018 tool to grade the studies. The scoring ranges from 100% being a good area of study and 20% being low quality. Two independent reviewers will grade the quality of each study's aim, design, methodology and statistical analysis

- **Charting the data**

An electronic data collection tool to chart evidence that seeks to answer the research question, as shown in Table 5 will be utilized. This tool will extract the necessary information based on prevalence of RE and or VI, distribution of RE and or VI and any impact of RE and or VI on the quality of life. This electronic screening tool will be updated as the need arises during the course of the study.

TABLE 5:Data Electronic collection tool

1. Author & Date
2. Article title
3. Country of study
4. Region of study
5. Total sample size
6. Age
7. No of male participants
8. No of female participants
9. No. of participants with V/A of 6/9 and worse in the Re
10. No. of participants with V/A of 6/9 and worse in the Le
11. No. of participants with V/A of 6/12 to 6/18 in one or both eye
12. No. of participants with V/A worse than 6/18 to 6/60 in one or both eyes
13. No. of participants with V/A worse than 6/60 to 3.60 in one or both eyes
14. No. of participants with V/A worse than 3/60 or Visual field loss of 10 degrees or less (Blindness)
15. No. of participants with Visual field loss of 20 degrees to >10 degrees
16. Causes of VI
17. No. of participants with RE
18. No. of participants with Myopia
19. No. of participants with Hyperopia
20. No. of participants with Astigmatism
21. No. of male participants with of RE
22. No. of female participants with RE
23. No. of male participants with myopia
24. No. of female participants with myopia
25. No. of male participants with hyperopia
26. No. of female participants with hyperopia
27. No. of male participants with astigmatism
28. No. of female participants with astigmatism
29. Any evidence on the quality of life (QoL)?

No. = number, V/A = visual acuity, RE = refractive error, Re = right eye, VI = visual impairment, QoL = quality of life

- **Collating, summarizing and reporting the results**

The findings of this systematic scoping review will be captured onto Microsoft Excel and analysed with the help of a statistician. They will thereafter be published in peer-review journals.

Discussion

The sudden increase in the prevalence of RE in school-going children has been noted recently, especially with the introduction of Edu-comp smart classes in school increasing the use of laptops, as well as increased indoor activities like watching television, using computers and playing mobile phone games. (19) This is the age group that carries the burden of RE and VI for a longtime as compared to older age groups and they are affected socially and economically.(20) As highlighted earlier, out of 19 million visually impaired children globally, 90% are residing within the developing countries.(21) Sub-Saharan Africa was selected for this review because it consists of the majority of developing countries globally. (21) Therefore, the evidence of this scoping review will guide policy makers and all stakeholders in planning intervention strategies to address this public health concern in low to middle income countries within SSA. To the best of my knowledge, no systematic review or scoping review studies on RE and VI, as well as their impact on the QoL of school-going children in SSA, has been conducted previously.

Abbreviations

RE: Refractive Error

V/A: Visual Acuity

VI: Visual Impairment

V/F: Visual Field

QoL: Quality of Life

SSA: Sub-Sahara Africa

WHO: World Health Organisation

LMICs: Low-and Middle-Income Countries

PCC: Population Concept Context

MeSH: Medical Subject Heading

PRISMA: Preferred Reporting Items for Systematic Review and Meta-Analysis Protocols

MMAT: Mixed Method Appraisal Tool

UKZN: University of KwaZulu-Natal

Declarations

Ethical and dissemination

All the data to be used for this scoping review is currently available in the public domain, therefore there is no need for an ethical application or ethical approval.

Ethics approval and consent to participate

All the data to be used for this scoping review is currently available in the public domain, therefore there was no need for an ethical application or ethical approval neither participants consent.

Consent for publication

Not applicable

Availability of data and materials

Data is available from the corresponding author upon the request

Competing interest

The authors declares that the are no conflict of interests

Funding information

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Authors' contributions

TSS, ZNQ and R conceptualize the study, TSS drafted the protocol, ZNQ and R facilitate and edit the final manuscript, TSS act as the corresponding author and submit the manuscript for publication purpose.

Disclaimer

The expressed view on this manuscript are those of authors and not necessarily reflect the official policy of the University of KwaZulu-Natal.

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Figures

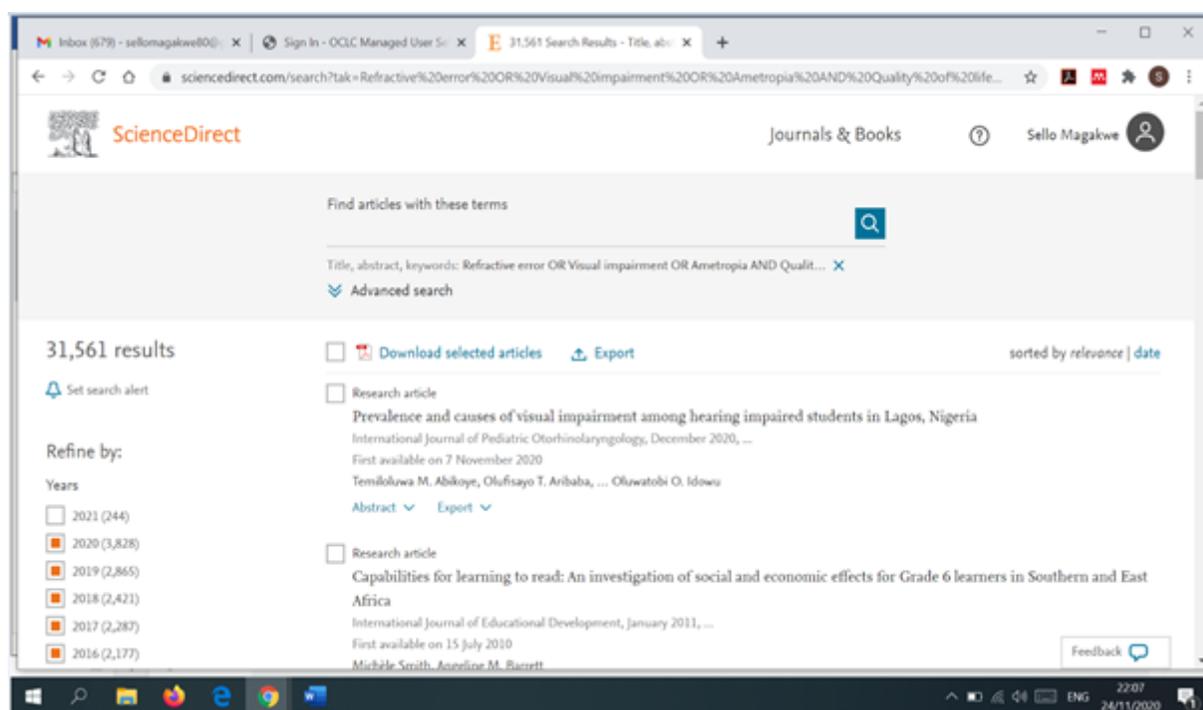


Figure 1

Screenshot of pilot study in Science Direct by the author

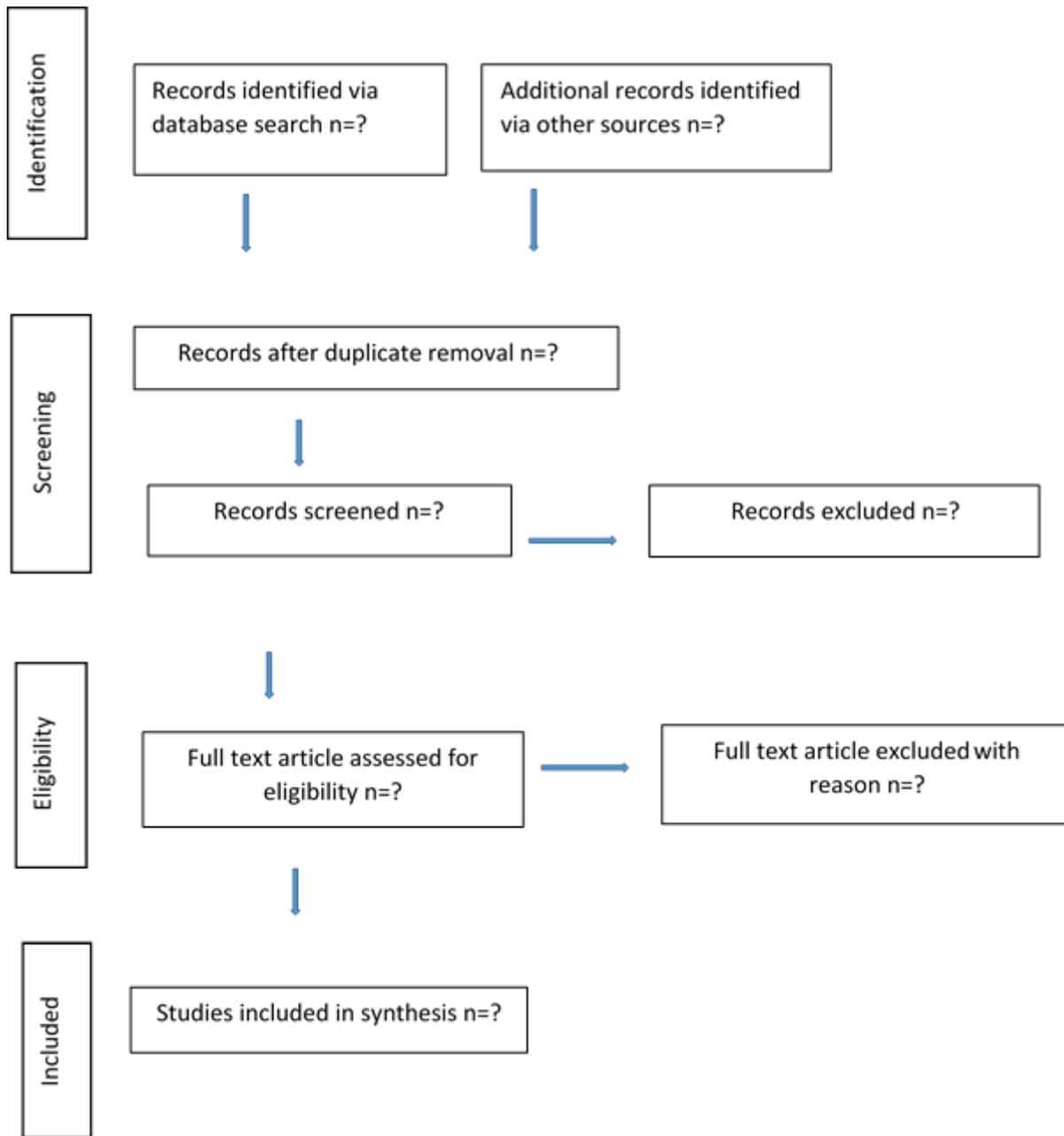


Figure 2

Preferred Reporting Items for Systematic Review and Meta-Analysis Protocols (PRISMA) flow diagram (Source adopted from (Moher et al., 2009). (n= number)

Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- [PRISMAPchecklistBMC2021.docx](#)