

**FACTORS ASSOCIATED WITH VISUAL IMPAIRMENT AMONG
INDIVIDUALS REPORTING AT MULAGO HOSPITAL EYE CLINIC IN
UGANDA**

BY

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BY KING CEASOR UNIVERSITY



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DECLARATION

I, hereby declare that the work submitted in this report is my original work and a result of my efforts. This report had not been submitted for another degree award in this or any other University or institute.

Signature: K Allen

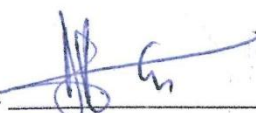
Date: 15/02/2024



KYARIMPA MARGRET ALLEN

APPROVAL

As the research supervisor for the above-named student, I certify that I have read Margret's Dissertation and have approved the changes required. I hereby recommend the dissertation for examination.

Signed: 

Date: 15/02/2024

DR. AMOS RONALD KALUKUSU

(SUPERVISOR)



DEDICATION

My special dedication goes to the Almighty God who has enabled me throughout of this study.

I dedicate this work to my beloved mother and my children and Pastor Faith, and Dr. Ampaire Anna for encouraging me their guidance and encouragement have played a pivotal role in shaping my journey, and I am deeply grateful for their presence in my life.

Additionally, I extend my heartfelt appreciation to my friends for their genuine affection and continuous encouragement in my pursuit of knowledge and personal growth.

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LIST OF ACRONYMS AND ABBREVIATIONS

CSR Cataract Surgical Rate

IPNO: In- Patient Number AMD: Age Related Macular Degeneration

OA: Ophthalmic Assistant

OCO: Ophthalmic clinical officer

UK: United Kingdom

US: United States.

V/A LE: Visual Acuity Left Eye

V/A RE: Visual Acuity Right Eye

VI: Visual Impairment

WHO: World Health Organization

OPERATIONAL DEFINITIONS

Blindness: This was considered when best corrected visual acuity was less than 3/60 in the better eye or visual field no greater than 100 in the better eye

Cataract surgical rate (CSR): This was defined as the number of cataract operations done per million population per year

Low Vision: Visual acuity of less than 6/18 but equal to or better than 3/60 in the better eye with best possible correction (ICD-10 visual impairment categories 1 and 2).

Ophthalmologist: A medical doctor with special training in diagnosis and treatment of all eye diseases, eye surgery and prescribes and fits eye glasses and contact lenses.

Utilization of eye care services: This was defined as the timely ability to see an eye care professional or a qualified health professional when in need of eye care service or had an episode of eye condition that requires treatment in a 5-year period.

Visual impairment: This was considered as reduced vision not corrected by spectacles or contact lenses. It combines both Blindness and Low Vision (ICD-10 visual impairment categories 1–5).

Visual Acuity: measure of the acuteness of vision; the finest of the detail that the eye can distinguish.

Visual system is one of our most important sensory systems which are an essential means of integration between individual and the external environment.

ABSTRACT

The study investigated about visual impairment among individuals reporting at Mulago hospital eye clinic in Uganda the objectives included; - Determining the prevalence of visual impairment ,assessing the socio-demographic factors associated with visual impairment and ascertaining the clinical factors associated with visual impairment among individuals. The study employed a cross-sectional study design employing quantitative data collection methods with data collected from 384 respondents. The study findings revealed that regarding the prevalence of visual impairment among respondents undergoing visual acuity testing have implications for screening practices, healthcare resource allocation, quality of life considerations, and public health interventions aimed at addressing visual health issues within the studied population.

The findings related to smoking and alcohol consumption highlight health behavior patterns among the respondents. The high proportion of respondents who reported not smoking or consuming alcohol may suggest healthier lifestyle choices, which could positively impact overall health, including eye health.

The type of fuel used for cooking also shows a significant association with visual impairment. This finding may be linked to indoor air pollution resulting from the combustion of certain fuels, which can contribute to eye health issues such as irritation, dryness, or exacerbation of existing eye conditions

The study drew the following conclusions that visual impairment was high among the older individuals (>54 years) compared to the younger individuals (18-25 years).

Using kerosene as the main source of fuel for cooking was found to have a positive association with visual impairment.

The study recommended that; - the government of Uganda should focus on effective, efficient, comprehensive eye health care services by integrating with the national health system to prevent avoidable visual impairment among patients.

The risk factor analysis demonstrated that drinking alcohol and having certain chronic diseases rendered an individual more likely to suffer from the onset of visual impairment, which suggests that changes in lifestyle and behaviors and the aggressive prevention, diagnosis, and treatment of systemic diseases are likely to reduce the burden of visual impairment.

CHAPTER ONE: INTRODUCTION

1.0 Introduction

The study is about visual impairment among individuals reporting at Mulago hospital eye clinic in Uganda. This research topic was selected because there are several cases of visual challenges being reported at MNRH and mostly they have been among the children, elderly and among other.

1.1 Background of the Study

The WHO shows that about 285 million people in the world are visually impaired from various causes and of these, 39 million people are blind and 246 million have low vision. The main cause of moderate and severe visual impairment is uncorrected refractive errors whereas cataracts remain the leading cause of blindness in middle- and low-income countries. Eighty percent (80%) of all visual impairment can be prevented or cured (WHO 2019).

In 1999, the WHO and non-governmental organizations (NGOs) launched the Vision 2020: the Right to Sight, which is a global initiative for elimination of avoidable blindness by the year 2020. Cataract, trachoma, onchocerciasis, childhood blindness, refractive errors and low vision were identified as immediate priorities within the framework of Vision 2020. The choice of these anomalies was based on the burden of visual impairment they presented and the feasibility and affordability of intervention to prevent and treat them (WHO 2019). Most people with visual impairment are elderly people aged 50 years and older and children below age 15 years old (WHO 2019).

In developing countries, there is variation of VI among adults aged 40 years and above in the South Indian State of Andhra Pradesh was 14.3% (Marmamula et al, 2018).

In Saudi among adults aged ≥ 18 years (23.5%), in East Delhi district among adults aged ≥ 40 years and above was 11.4% (Gupta, et al, 2015) and in rural area of Coastal Karnataka state among adults aged ≥ 18 years was 25.7% (McLean et al, 2019). Based on the presenting visual acuity (PVA) prevalence of VI was different in African countries. In Ghana among Cocoa Farmers aged

≥ 40 years was 22.7% (Boadi-Kusi et al, 2017).

Broman et al. (2017) found that visual impairment was associated with a decrease in quality of life in most domains among the Mexican-American persons aged 40 or more. Subjects with uncorrected refractive error, cataract, diabetic retinopathy, and glaucoma had associated decrements in quality of life. In a study to assess the impact of visual impairment on health-related quality of life (HRQOL) in an older population of the Blue Mountains region, west of Sydney in Australia and comparing it with the impact of major medical conditions; it was reported that uncorrectable visual impairment was associated with reduced functional status and well-being, with a magnitude comparable to major medical conditions (Chia et al. 2019). Coleman et al. (2016) showed that correction of refractive error among older people, improved the vision specific quality of life of community-dwelling older person of Los Angeles County, California.

In a national guideline for the prevention of blindness in South Africa, the Department of Health reported a 0.75% prevalence of blindness in the South African population. Eighty percent of blindness was reported avoidable and 80% of blind people live in the rural areas (Department of Health 2017). Also, the Department of Health (2019) reported a severe lack of epidemiological data on the magnitude of uncorrected visually disabling refractive errors in South Africa.

In Uganda, MoH (2019) reported that visual impairment among different categories of people has increased and statistics shows

Despite the devastation childhood visual impairment CVI can cause and the noticeable increase in the number of patients presenting with visual impairment in Mulago National Referral Hospital over recent years, the condition has not been given due attention. There is paucity of literature regarding the burden of visual impairment in Uganda. Our study is aimed at assessing factors associated with an increase in visual impairment among individuals reporting at Mulago hospital eye clinic in Uganda.

1.2 Problem Statement

VI remains to be a major public health problem especially in low- and middle-income countries which was estimated to be four times higher than in high-income countries (Bourne et al, 2017).

Despite considerable efforts in many developing countries through national blindness prevention programs, the global number of blind and visually disabled seems to be growing, mainly as an effect of increase population and aging.

Visual impairment affects a large proportion of people worldwide irrespective of the age, sex and race. The magnitude of this varies from community to community. Delays in seeking medical attention due to lack of awareness of the silent but visually disabling conditions and their impact on vision will result in hampering one's performance, thereby impairing the quality of one's life. VI affects the quality of life and socio-economic characteristics of the people like mobility, social participation and find a job (Grayson, 2016). Hence, their ability to find employment and support themselves and provide for their families is diminished (Harrabi et al, 2019).

The exact situation of visual impairment among patients attending Mulago National referral hospital is not known as the data available has not yet been analyzed.

Therefore, purpose of this study was to determine the factors associated with visual impairment among individuals reporting at Mulago hospital eye clinic in Uganda.

1.3 Objectives of the Study

1.3.1 General Objective

To assess the factors associated with in visual impairment among individuals reporting at Mulago hospital eye clinic in Uganda.

1.3.2 Specific Objectives

- i. To determine the prevalence of visual impairment among individuals reporting at Mulago hospital eye clinic in Uganda.

- ii. To assess the Socio-demographic factors associated with visual impairment among individuals reporting at Mulago hospital eye clinic in Uganda
- iii. To ascertain the clinical factors associated with visual impairment among individuals reporting at Mulago hospital eye clinic in Uganda

1.4 Research Questions

- i. What is the prevalence of visual impairment among individuals reporting at Mulago hospital eye clinic in Uganda?
- ii. What are the socio-demographic factors associated with visual impairment among individuals reporting at Mulago hospital eye clinic in Uganda?
- iii. What are the clinical factors associated with visual impairment among individuals reporting at Mulago hospital eye clinic in Uganda?

1.5 Significance of the Study

There are many low vision and blind people worldwide, and there is considerable amount of data available on the prevalence of low vision and blindness in many parts of the world. This data, however, varies significantly from one continent to another. This study will therefore contribute to the statistics on the common causes of poor vision in Uganda.

The findings from this study will give some insight into the magnitude of the burden of visual impairment in Uganda and highlight key areas in reducing preventable causes of blindness in children

This study will also add to the existing body of knowledge on visual impairment in Kampala.

It is hoped that the findings of the study will offer valuable contributions from both a theoretical and practical standpoint.

1.6 Conceptual Framework

Independent variables

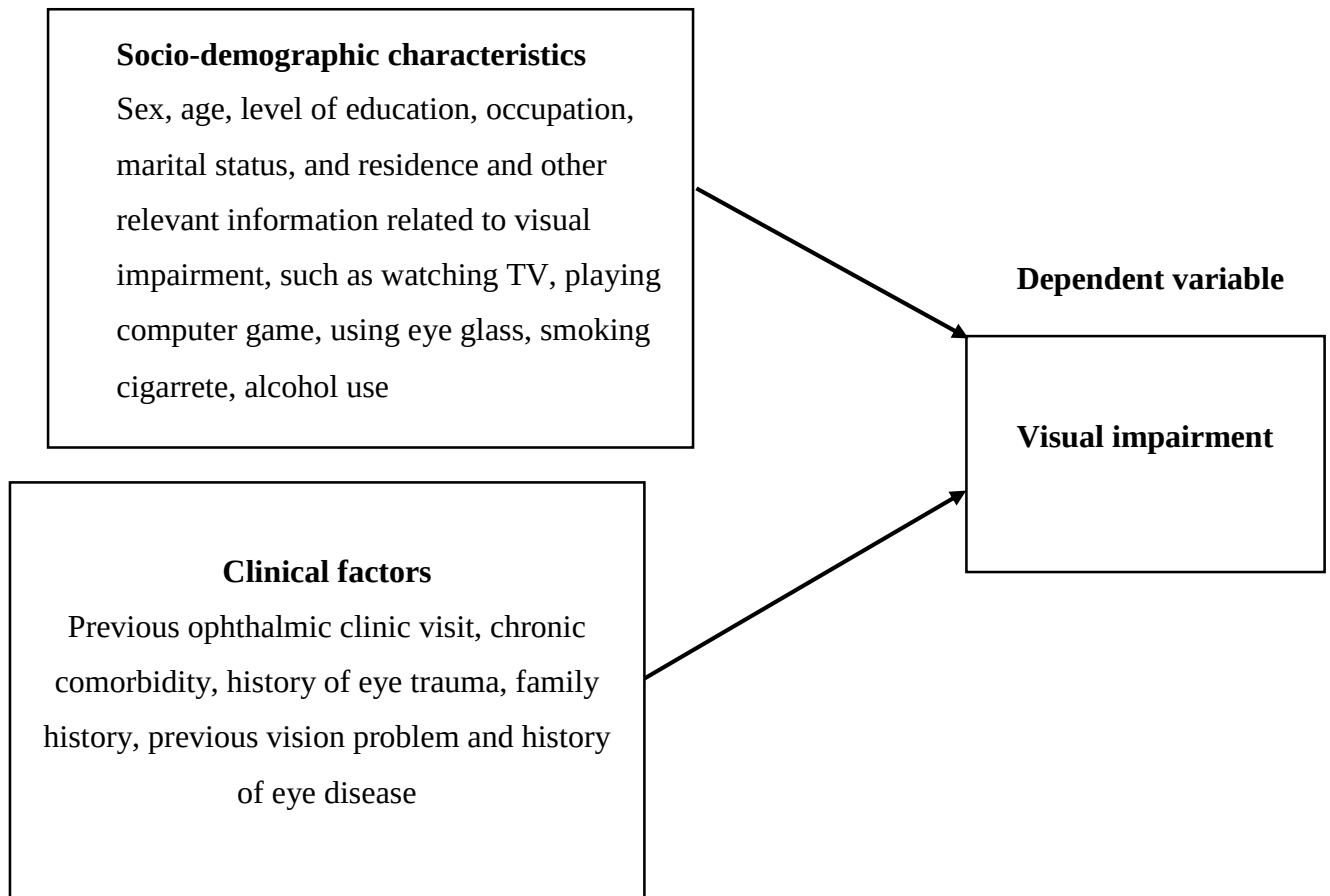


Figure 1: Conceptual framework of the study

Narrative of the conceptual framework

This is an illustration of the relationships between the independent and the dependent variables identified for the study. The conceptual framework diagrammatically elaborates the factors associated with visual impairment. In this study, the independent variables are the factors associated with visual impairment namely: socio-demographic and clinical factors.

CHAPTER TWO: LITERATURE REVIEW

2.0 Introduction

This chapter is a review of findings and facts from previously written literature relevant to the specific problems to be investigated. The literature was obtained from research published journals and dissertations, online publication articles in Google, CINAHL, Google Scholar, CDC, WHO, and PubMed.

2.1 Prevalence of Visual Impairment

Globally, there are approximately 1.5 million children who are blind and around three quarters live in developing countries (Clare, 2017). Although the actual number of children who are blind is much smaller than the number of adults blind for instance due to cataract, the number of years lived with blindness is almost the same as the total number of blind years due to age related cataract. The high number of blind years resulting from blindness during childhood is one of the reasons why the control of childhood blindness is a priority of the WHO/IAPB Vision 2020 Programme (Clare, 2017). Of the people who are blind in the world today, 64% are female (Courtright and Lewallan, 2017).

In a study to estimate the number of individuals aged 12 years or older who have impaired distance vision due to uncorrected refractive error in the United States of America (USA); Vitale et al. (2016) found that out of the 1,190 study participants who had visual impairment, 83.3% could achieve good visual acuity with correction (95% confidence interval CI, 80.9% - 85.8%). Extrapolating the findings to the general USA population, it was estimated that approximately 14 million individuals aged 12 years and older have visual impairment and of those, more than 11 million individuals could have their vision improved to 6/12 or better with refractive corrections. In a population-based data study to determine the prevalence and causes of visual impairment among children and adults aged 1 – 91 years old in Botucatu, Brazil, Schellini et al. (2019) reported a prevalence of presenting low vision and blindness of 5.2% (95% CI: 4.3 – 6.1) and 2.2% (95%

CI: 1.6 – 2.8) of the population respectively. The main causes of visual impairment (low vision and blindness) were uncorrected refractive errors, cataract and retinal diseases. In a study to investigate the prevalence and causes of vision impairment or blindness in older adults (≥ 50 years) in a lower-middle income area of São Paulo in Brazil; Salomão et al. (2017) reported that the prevalence of visual impairment ($< 6/19$ to $\geq 6/60$ in the better eye) was 4.74% (95% CI: 3.97 to 5.53) and 2.00% (95% CI: 1.52 to 2.49) with best correction. The prevalence of subjects presenting with bilateral blindness ($< 6/60$) was 1.51% (95% CI: 1.20 – 1.82) and 1.07% (95% CI: 0.79 – 1.35) with best correction. Retinal disorders (35.3%) and cataract (28.3%) were the most common causes of blindness. Cataract (33.2%), refractive errors (32.3%) and retinal disorders (20.3%) were the main causes of visual impairment (vision $< 6/19$ to $\geq 6/60$).

The global estimate of visual impairment by WHO regions in 2017 were 18 % for the African region, 7 % for the region of the Americas, 11 % for Eastern Mediterranean region, 7 % for the European region, 32 % for the South-east Asia region and 25 % for the West Pacific region. In USA, the prevalence of visual impairment in children is estimated to be 5-10% (Murthy, 2016). In a hospital-based cross-sectional study of all patients less than 16 years of age at the eye clinic of Obafemi Awolowo University teaching hospital complex, the prevalence.

A survey to determine the magnitude and etiology of visual and ocular handicaps amongst Standard one primary school children in Nairobi, Kenya, found that 330 out of 3,206 children had visual impairment which accounted for 10% of the study respondents (Musa, 1998). No such study has been carried out in Kitale Municipality within TransNzoia West District, Kenya. In another community-based survey on the magnitude and pattern of eye diseases in Korogocho slum, Nairobi, the prevalence of severe visual impairment and blindness was 1.8 % and 0.7 % respectively (Nyaga et al., 2017).

In Papua New Guinea, the prevalence of vision impairment among the elderly (≥ 50 years old); the presenting VA less than 6/18 in the better eye was 29.2% (95% CI: 27.6 – 35.1, Design Effect

deff = 2.3). The prevalence of functional blindness (presenting visual acuity $< 6/60$ in the better eye) was 8.9% (95% CI: 8.4 – 12.0, deff = 1.2) and for blindness (PVA $< 3/60$ in the better eye) was 3.9% (95% CI: 3.4 – 6.1, deff = 1.0). Uncorrected refractive errors and cataract were the leading causes of vision impairment (Garap et al. 2016). Among the Chinese adults (≥ 50 years old) living in the urban area of Southern China, the prevalence of blindness and low vision based on the presenting visual acuity (PVA) was 0.6% (95% confidence interval CI: 0.2 to 1.0) and 10.1% (95% CI: 8.5 to 11.7), respectively. These values were reduced to 0.5% and 3.1% respectively when best corrected VA was considered. The main causes for blindness based on presenting VA were cataract (39.6%), glaucoma (11.0%) and myopic maculopathy (6.6%). Majority of low vision cases were caused by cataract (45.3%) and uncorrected refractive errors accounted for 43.9% (Haung et al. 2019).

In an eye study conducted in Tehran (Iran) by Fotouhi et al. (2019); the prevalence of visual impairment on the basis of best corrected and presenting visual acuity were 1.39% (95% CI: 1.07 – 1.71) and 2.52% (95% CI: 2.07 – 2.97) respectively. The causes of visual impairment according to the best corrected vision were cataract (36.0%), macular degeneration (20.0%) and amblyopia (10.7%) respectively. However, according to presenting vision, uncorrected refractive errors were the most frequent primary cause (33.6%) and cataract (25.4%), macular degeneration (12.7%) and amblyopia (8.2%). Haq et al. (2019) reported that the prevalence of visual impairment, low vision and blindness among the adult population (≥ 20 years) of Aligarh in India based on presenting visual acuity were 13.0%, 7.8% and 5.3% respectively. The main causes of visual impairment were cataract, refractive error, glaucoma and corneal opacities.

Dineen et al. (2017) reported that in Pakistan among adults aged ≥ 30 years old, cataract was the most common cause of blindness (51.5%, based on PVA $< 3/60$ in the better eye) followed by corneal opacity (11.8%), uncorrected aphakia (8.6%) and glaucoma (7.1%). Refractive error was the cause of 43% of moderately visually impaired ($< 6/18$ to $\geq 6/60$), followed by cataract (42%).

Refractive error as a cause of severe visual impairment or blindness was significantly higher in rural area than in the urban (odds ratio OR: 3.5, 95% CI: 1.1 – 11.7).

Ramke et al. (2017) found that among the people aged ≥ 40 years in Timor-Leste; the age, gender and domicile-adjusted prevalence of functional blindness (presenting vision worse than 6/60 in the better eye) was 7.4% (95% CI: 6.1 – 8.8) and for blindness at 3/60 was 4.1% (95% CI: 3.1 – 5.1). The adjusted prevalence of low vision ($< 6/18 - 6/60$) was 17.7% (95% CI: 15.7 – 19.7). Cataract accounted for 72.9% of blindness and 17.8% of low vision. Uncorrected refractive errors were responsible for 81.3% of low vision.

A cross-sectional school-based study in a rural district in Kenya found the prevalence of visual impairment was 5.6%. The main cause of visual impairment was refractive error, with a prevalence of 5.2 %. This accounted for 92.6 % of all cases of visual impairment. Hypermetropia, myopia and astigmatism were responsible for 62.67%, 32.00% and 5.33% of all cases of refractive errors, respectively (Muma et al., 2017). In another study, the prevalence of visual impairment and blindness in a Nairobi urban population at Kibera was found to be 6.2% and 0.6% respectively (Ndegwa et al., 2016).

2.2 Socio-demographic Factors Associated With Visual Impairment

As reported by Maberley (Maberley et al. 2015) the main causes of poor vision in Canada were cataract (29.9%), AMD (13%) followed by visual pathway disorders (12%) and other retinal diseases (12%). According to (Buhrmann 2017), the most common cause of low vision is age-related macular degeneration (AMD), followed by glaucoma and cataract. In another study by WHO, the largest proportion of blindness is necessarily related to ageing. Although cataract is not a major cause of blindness in developed countries, globally it is still the leading cause, accounting for almost half of all cases, despite improved delivery of cataract surgical services in many parts of the world.

Oduntan (AO Oduntan 2015) reported that the common causes of low vision varied from one

continent to another. In America and Canada, Diabetes, cataract, and age-related macular degeneration were the common causes of low vision. In East Mediterranean and Asia Pacific, Cataract, corneal opacities (nontrachomatous), infection (trachomatous and nontrachomatous), retinitis pigmentosa, age-related macular degeneration, diabetic retinopathy, glaucoma, optic atrophy were the common causes of poor vision. In Europe, Age-related macular degeneration, glaucoma, cataract, diabetic retinopathy, hereditary retinal dystrophies, optic atrophy accounted for visual impairment. In Oceania Age-related macular degeneration, diabetic retinopathy, cataracts were the common causes of poor vision. In Africa Senile cataract, glaucoma, corneal opacity (non-trachomatous), uncorrected aphakia, infections and diseases (onchocerciasis, trachomatous and nontrachomatous) xerophthalmia, trauma, macula degeneration are the common causes

Gender was significantly associated with visual impairment. Women represented two-thirds of those with blinding eye disease, even after controlling for women's longer life spans. (<http://www.ncbi.nlm.nih.gov>) Studies consistently indicated that females in every region of the world and at all ages had a significantly higher risk for being visually impaired than males, mostly because of their longer life expectancy and, in poorer societies, because of their lack of access to services.(WHO 2017). Serge (2019) estimated that the number of women with visual impairment, as estimated from the available studies was higher than that in men even after adjustment for age. Female to male prevalence ratios indicated that women were more likely to have visual impairment than men in every region of the world: the ratios ranged from 1.5 to 2.2. Around 60% of Africa's blind are women (Lewallen and Courtright. Blindness in Africa: present situation and future needs).

In Nigeria, Abdull et al. (2019) found among adults aged ≥ 40 years that in 84% of people examined, blindness was avoidable. Uncorrected refractive errors were responsible for 57.1% of moderate ($< 6/18 - 6/60$) visual impairment. Cataract (43%) was the commonest cause of

blindness ($< 3/60$). Prevalence of cataract-related blindness was 1.8% (95% CI: 1.57 – 2.05) and glaucoma-related blindness was 0.7% (95% CI: 0.55 – 0.88).

Patrick-Ferife et al. (2015), found that among the adults in Ozoro, a rural community in Delta State of Nigeria, the prevalence of blindness (VA $< 3/60$ in the better eye) for people of 40 years and above was 6.3% (95% CI: 4.6 – 8.0) and low vision (VA 6/24 to 3/60 in the better eye) was 25.2%. The estimated prevalence of bilateral blindness for all ages was 1.3% and low vision was 5.0%. The main causes of blindness and low vision were cataract, posterior segment diseases, glaucoma, uncorrected aphakia, and globe abnormalities. Refractive error was the second major cause of low vision accounting for 22.0%. The rate of blindness and low vision increased with increasing age.

2.3 Clinical Factors Associated With Increase In Visual Impairment

Visually disabling refractive error affects significant proportions of the global population, occurring in both genders, in all ages and ethnic groups. The most common cause of visual impairment and the second leading cause of treatable blindness is uncorrected refractive error. This has severe social and economic effects on individuals and communities. It restricts educational and employment opportunities of otherwise healthy people. Refractive error can account for twice as many blind-person years compared to cataract, due to the earlier age of onset. Refractive error is responsible for VI in 55% of children in Chile and 83% in urban India (Brien, 2017). In a study on VI and refractive errors in children in Shun Yi District of China, refractive error was responsible for 89.5% of the cases, Amblyopia 5%, other causes 1.5% and unexplained causes 4% (Zhao et al., 2016).

In a clinic-based survey of blindness in Kenya at Lighthouse for Christ eye Centre involving all age groups, age related cataract was the greatest single cause of treatable blindness (Jerry et al., 2017). Most glaucoma patients were first seen when they sought help because of vision loss, often very profound. Injuries were a major cause of unilateral blindness, especially among younger

patients (Jerry et al., 2017). In a survey to determine the magnitude and aetiology of visual and ocular handicaps amongst Standard one primary school pupils in Nairobi, it was found that 4.8% of the study subjects had reduced VA, which improved with pinhole test hence indicating refractive error as a cause of impairment (Musa, 1998). In another study in Kibera slum of Nairobi among a population aged two years and above, refractive error was the cause of VI in 58.1% of the cases, while cataract accounted for 35.5%. For blindness, cataract was responsible for 37.5% and refractive error for 25.0% of cases (Ndegwa et al., 2016).

A study done in Nepal to assess the prevalence of refractive error and related VI in school aged children showed that refractive error was the cause in 56% of the 2016 eyes with reduced uncorrected vision and amblyopia, 9%. (Pokharel and Munoz, 2016). Retinopathy of prematurity is an important cause of avoidable childhood blindness in industrialized countries (Andrea, 2017). It is also emerging as a problem in economically developing parts of the world because of the ever-increasing survival of low and very low birth weight infants especially in urban settings. Retinopathy of prematurity has been reported to be responsible for 4.1–38% of severe VI and blindness in Latin America (Andrea, 2017). Countries with intermediate mortality rates (10-60 per 1000 live births) seem to have the highest proportion of childhood blindness due to ROP (Andrea, 2017).

In a refractive error and visual impairment study among the population in Durban, South Africa, Naidoo et al. (2018) found that the prevalence of uncorrected, presenting and best-corrected visual acuity of 6/12 or worse in the better eye were 1.4%, 1.2% and 0.32%, respectively. Refractive error was the cause in 63.6% of the 191 eyes with reduced vision, amblyopia in 7.3%, retinal disorders in 9.9%, corneal opacities in 3.7%, other causes in 3.1% and unexplained causes in the remaining 12.0%.

Astigmatism is caused by irregularity on the surface of the cornea where some meridians on the corneal surface become steeper than others. Corneal toxicity astigmatism accounts for most of

astigmatism in the eye. The vertical meridian and the horizontal meridian has different steepness. If the vertical meridian is steeper than the horizontal meridian this is called astigmatism “with the rule”. If the horizontal meridian is steeper than the vertical meridian it is known as astigmatism “against the rule”. The same difference in steepness of the meridian could happen obliquely (Vaughan and Asbury, 2018).

CHAPTER THREE: METHODOLOGY

3.0 Introduction

This chapter consists of the methods that was used in the research study such as research design, study area, study population, sample size, sampling technique and eligibility criteria. The methodology also covered variables, sources of data, data collection instruments and tools, data collection technique, plan for data analysis, quality control issues, ethical consideration, and finally plan for dissemination of study findings.

3.1 Study Design

The study employed a cross-sectional study design employing quantitative data collection methods. Interviews were conducted using a structured questionnaire for collecting data from respondents. In a cross-sectional study, the investigator measures the outcome and the exposures in the study participants at the same time. This rationale for choosing the study design is because the method has an advantage of being quick and cheap to conduct since data is collected once and multiple outcomes can be studied therefore requiring fewer resources to conduct the whole study.

3.2 Study Area

The study was done in Mulago hospital. Mulago National Specialised Hospital, also known as Mulago National Referral Hospital, is a component of Mulago Hospital Complex, the teaching facility of Makerere University College of Health Sciences. It is the largest public hospital in Uganda. The hospital is on Mulago Hill in the northern part of the city of Kampala, immediately west of the Makerere University College of Health Sciences. It is approximately 5 kilometres (3 mi), by road, north-east of Kampala's central business district. The geographical coordinates of the hospital are 0°20'16.0"N, 32°34'32.0"E (Latitude: 0.337786; Longitude: 32.575550). This hospital, together with adjacent, affiliated hospitals and institutions constitute Mulago Hospital Complex, the teaching facility of the Makerere University College of

Health Sciences. The hospital offers services in most medical and surgical subspecialties including eye clinic services, in addition to dentistry, emergency medicine, pediatrics, and intensive care.

3.2 Sources of Data

Primary data was collected on uptake and drivers for visual impairment from the patients attending eye clinic in Mulago hospital in Kampala.

3.3 Study Population

This comprised of patients attending eye clinic in Mulago hospital aged from 18 years and above who were meet the inclusion criteria.

3.4 Eligibility Criteria

3.4.1 Inclusion Criteria

All patients who were at least 18 years of age, in Mulago hospital was eligible for inclusion in the study. Those who were who willing to participate were included in the study were included in the study.

3.4.2 Exclusion Criteria

Those who meet the inclusion criteria above but were found to have unsound mind or very sick was excluded from the study.

3.5 Sample Size Calculation

The sample size was determined by using a statistical formula for cross-sectional studies as outlined by Kirkwood and Sterne (Jonathan 2018).

$$n = \frac{z^2 \times p \times (1-p)}{d^2}$$

$$d^2$$

n=required sample size

z= confidence level at 95% (standard value of 1.96)

p =proposed percentage of visual impairment among patient attending eye clinic in Mulago the study used 50% rate by convention.

d = margin of error at 5% (standard value of 0.05).

$$n = \frac{1.96^2 \times 0.50 (1-0.50)}{0.05^2} = 384$$

Therefore, the sample size of respondents were 384 respondents

3.6 Sampling Procedures

The study utilized non-probability convenience sampling procedures. Participants were assigned take any respondents who met the inclusion criteria and are willing to participants at the time of data collection until the sample size is obtained.

3.7 Study Variables

Dependent Variable

This was visual impairment. Visual impairment was defined according to the revised World Health Organization International Classification of Disease (ICD)-10; 2016 definitions of VI criteria.

Normal vision: A presenting VA of $> 6/18$ in the better eye

Visual impairment: - A visual acuity of less than $6/18$ in the better eye.

Moderate visual impairment ($PVA < 6/18-6/60$)

Severe visual impairment ($PVA < 6/60-3/60$)

Blindness: A visual acuity of less than $3/60$ in the better eye.

Low vision: Presenting visual acuity $6/18$ but not less than $3/60$ in better eye.

Independent Variables

The independent factors in this study include the socio-demographic factors and clinical factors associated with visual impairment.

3.8 Data Collection Techniques

The study used researcher administered structured interviews to collect data from the patients attending eye clinic Mulago hospital. A semi-structured questionnaire was administered to respondents by a research assistant to collect data regarding factors influencing Luganda among

the patients attending eye clinic in Mulago hospital. One of the methods that can do so is the structure interview given that it involves asking a respondent a question, supplemented with multiple choice questions from which they can choose the most appropriate in the study context. It can thus be said that with a structured interview, it was possible to obtain data that was used to answer all the four analytical type objectives that the study has. That is one of the reasons why it was chosen as the most suitable data collection method, in addition to the fact that it is fatigues respondents relatively less as compared to other data collection methods given its structured feature.

The questionnaire was written in English and a translation in Luganda was made available and applied during data collection process since all respondents understand Luganda language very well.

3.9 Data Collection Tools

As with the choice of data collection method, the type of data that this study has to collect required that the responses obtained from the patients attending eye clinic Mulago hospital are captured in a close ended format, that was later make the responses quantifiable and measured in scale, nominal or ordinal formats during analysis. That implies that the data collected using structured questionnaires was able to answer all four research questions, making it a suitable tool for this study.

Additionally, structured questionnaires have a merit of being quicker to administer compared to semi structured or open-ended tools, in addition to having more comprehensible items for all categories of study populations. Its use thus ensures that all data collected with it is accurate and more valid. The tool was designed with four sections A (socio-demographic factors) B (clinical factors), and C (visual impairment).

3.10 Plan for Data Analysis

A compilation of all the responses from the data collection techniques and tools including 384 responded to questionnaires were entered into epi data software and the entire data set exported to create an SPSS file for analysis.

Univariate analysis: data on respondent's age, sex, and visual impairment was tabulated and frequency tables, bar charts and pie charts generated to assess the statistical distribution followed by the study population. The rate of visual impairment was determined by dividing the number of those who visually impaired by the total number of participants interviewed and this was presented in a pie chart.

Bivariate analysis: cross tabulations as a standard measure for association of the two categorical variables under measure was made between the visual impairment and each of the respondent's independent variables. As a result of this comparison, the probability values (P) generated from each of these cross tabulations were determine the significance of the variables. All probability values $p < 0.05$ was considered significant from the cross tabulations and therefore considered as actual influencing factors for visual impairment.

Multivariate analysis: All the significant factors assessed to drivers for visual impairment ($p < 0.05$) was then further assessed in relation to the visual impairment using a regression equation and the factor with the highest regression co efficient was considered to have the highest influence on visual impairment.

3.11 Quality Control Issues

In order to adhere to the principle of validity and reliability, a specific day was set for pre-testing the questionnaires were done at Kisenyi Health Centre IV and this involved a total of 10 patients. The purpose of conducting this pretest was to ensure the highest degree to which the questionnaire is clearly understood by the respondents. This helped in identifying areas which call for modification and certainly corrections were undertaken, if need be, before the actual data

collection commences. Pretesting also familiarizes the research assistants to the data collection tools.

The data was collected by the researcher assisted by the research assistants. Two categories of the research assistants were recruited and trained on how to administer the questionnaire in order to minimize errors during data collection process. Strict supervision throughout the process of data collection was emphasized by the principal investigator to facilitate collection of quality data with minimal errors.

Considering consistency, all the filled questionnaires were rechecked on daily basis after data collection and pre-coding of the questionnaires containing closed ended questions were done. The data was then entered in epidata software and was then exported to SPSS version 26 where the data cleaning was effectively be conducted. For security reasons of the data, keeping data under key and lock strictly observed in order to deny access to data by unauthorized people.

Validity of the Data Collection Tool

Of the available forms of validity, content validity of the questionnaire was tested, as it could show the readiness of the questionnaire for data collection, among the children. Content validity of the tool was tested first, among other quality control measures because the next steps of quality control (training of assistants and pretesting) was have to be done using a valid tool. In measuring the validity of the tool, the content validity index was calculated, in a process that involved identifying four independent judges to rate the items in the questionnaire. Each of them was given the objectives of the study and a summary of the methods that was used in the study, so that their item ratings are done while in the know about the study as a whole. They were also requested to use a rating scale that was as follows; 4 for a very relevant item, 3 for a relevant item, 2 for a somewhat relevant item, and 1 for a non-relevant item. Each was independently given the questionnaire, and requested to rate.

Therefore, the content validity index was calculated using the formula;

$$CVI = \frac{\text{Number of items rated 3 or 4}}{\text{Total number of items in the tool}}$$

The tool was deemed as valid if the CVI will be found to be within the range of 0.7 to 0.9 (Cronbach, 1990), and at that point, it was used during the training of the research assistants

3.12 Ethical Issues

Approval: This study was conducted with due approval of King Caesar University after which the researcher obtained an introductory letter to go with to the field. Permission from Mulago Hospital was obtained before collection of data.

Consent: an official letter that explains the objectives, rationale and expected outcomes of the study was written to district authorities' office as well as health facilities from the University requesting cooperation. The principal investigator communicated to the hospital management' office and obtain written consent from the office as well as from households on which the study was conducted.

Confidentiality: The respondents were assured that the information they pass on was kept as confidential information, and that it was used in such a way that it was not traced back to a particular respondent. The respondents were also assured of maximum respect during the entire process of data collection

Respect for Respondents: in addition, the right to decide whether or not to participate in the study was explained. Similarly, the Researcher informed the respondents that they were free to choose not to answer particular questions that they feel they should not answer. Lastly, a consent/assent form were availed to the respondents for signing after an elaborative explanation of the subject matter in the research study.

Other ethical issues that were considered in this study include the fact that the participation in the study was voluntary. The privacy of the participants will be duly respected as they were not

compelled to respond to questions, which they were not comfortable with. The identities of the participants was made anonymous and collected data cannot be traced to any of them.

3.13 Plan for Dissemination of Findings

The report will be presented to King Ceasor University for partial fulfillment of the requirement for a ward of a Bachelors of Nursing Science at King Ceasor University.

Copies of the report will be disseminated to KCCA; all the sub-counties will be given a copy each.

The researcher will organize a community feedback sessions/meeting to the respective study participants to give them the finding from the study to the study participants and some other stakeholders.

CHAPTER FOUR: PRESENTATION OF RESULTS

4.0 Introduction

This chapter contains the results from the study. The study assessed factors associated with in visual impairment among individuals reporting at Mulago hospital eye clinic in Uganda. The respondents were 384 patients at Mulago hospital eye clinic yielding response rate of 100%. The results are presented below in accordance with the study objectives using tables, texts and graphs.

4.1 Prevalence of visual impairment

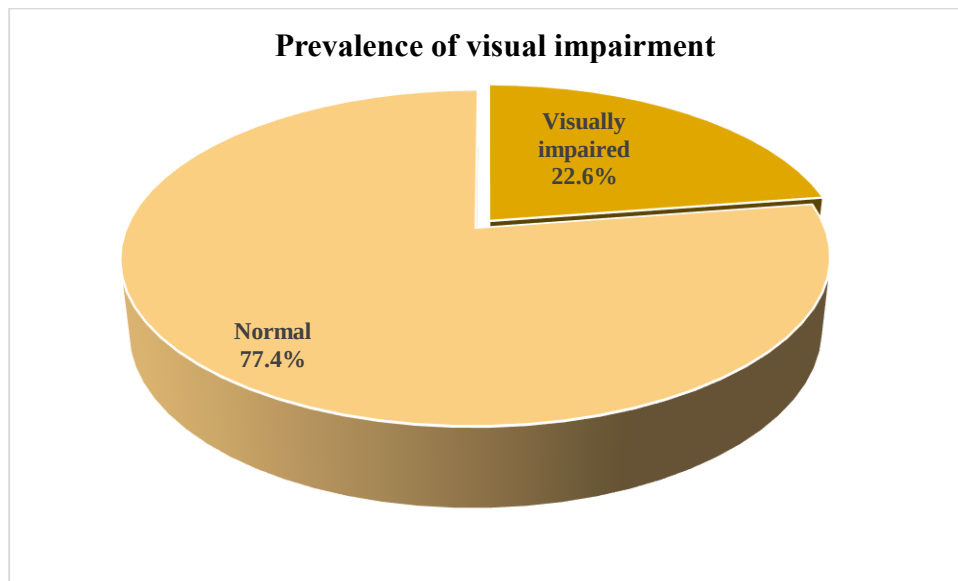


Figure 1: Showing the prevalence of visual impairment among the respondents

When the respondents were examined for visual acuity test, 22.4% were found to have some form of visual impairment while 77.4% had normal vision. This suggests that a significant proportion of the population being studied experiences difficulties with vision, which could range from mild to severe impairment. This majority indicates that a substantial portion of the population does not have significant visual impairments based on the parameters measured in the study. The study findings regarding the prevalence of visual impairment among respondents undergoing visual acuity testing have implications for screening practices, healthcare resource allocation, quality of life considerations, and public health interventions aimed at addressing visual health issues within the studied population.

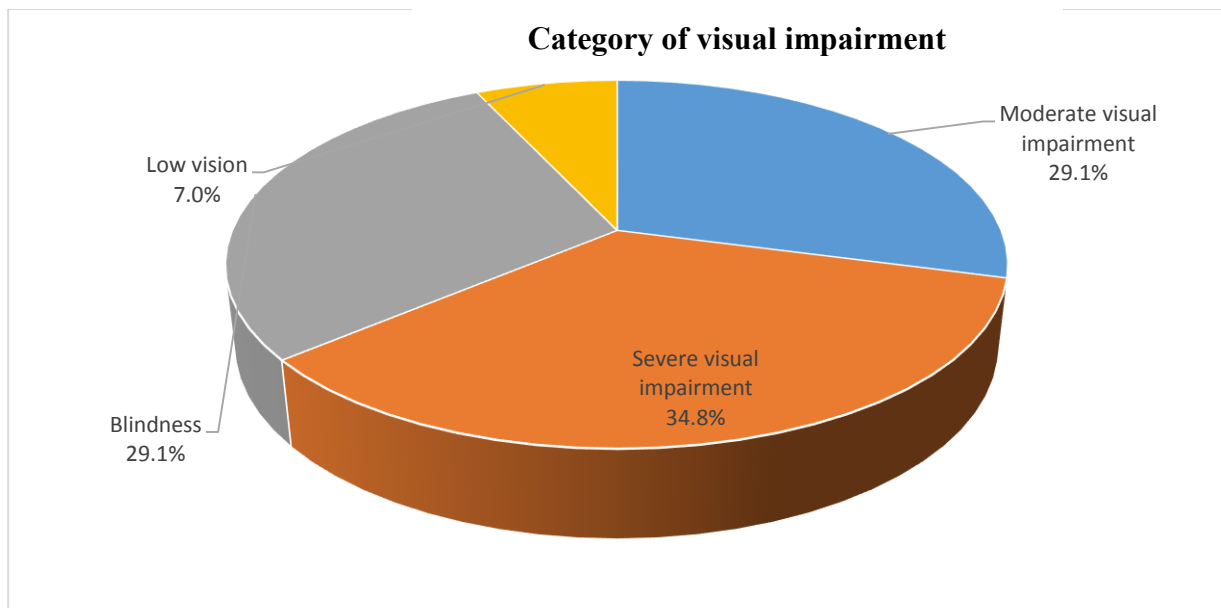


Figure 2: Showing the level/category of visual impairment among those with visual impairment

Figure 2 shows that 34.8% of the visually impaired had severe visual impairment, 29.1% had moderate visual impairment and blindness each and 7% had low vision. This breakdown provides insights into the spectrum of visual impairment severity within the studied population.

Understanding the distribution of visual impairment severity is crucial for healthcare planning and resource allocation. It helps healthcare providers and policymakers gauge the prevalence of different levels of impairment and tailor services accordingly. For instance, areas with a higher prevalence of severe visual impairment may require more specialized services and resources.

Overall, the findings from Figure 2 provide valuable insights into the distribution of visual impairment severity within the studied population, with implications for healthcare services, quality of life, preventive measures, research, and advocacy efforts.

4.2 Socio-demographic factors associated with visual impairment

Table 1: Univariate analysis of socio-demographic factors associated with visual impairment among individuals reporting at Mulago hospital eye clinic in Uganda

Variable	Category	Frequency n	Percentage %
Maternal age in complete year	18-24 years	66	17.2
	25-34 years	112	29.2
	35-44 years	81	21.1
	45-54 years	53	13.8
	>54 years	72	18.8
Mothers educational status	Not gone to school	99	25.8
	Primary	158	41.1
	Secondary	86	22.4
	Tertiary	41	10.7
Gender	Male	162	42.2
	Female	222	57.8
Marital status	Never married	107	27.9
	Married	197	51.3
	Widowed	80	20.8
Religion	Catholics	140	36.5
	Protestants	55	14.3
	Pentecostal	126	32.8
	Muslim	63	16.4
Occupation	Employed	120	21.3
	Unemployed	264	68.7
Number of people in the household including you	<5	123	32.0
	≥5	261	68.0
Type of house do you stay in	Permanent	138	35.9
	Semi-permanent	147	38.3
	Temporary	70	18.2
	Make-shift	29	7.6
Type of fuel do you use for cooking	Electricity and gas	110	28.6
	Firewood and charcoal	218	56.8
	Kerosene	56	14.6
Frequent do you watch TV	Frequently	207	53.9
	Occasionally	102	26.6
	Rarely	75	19.5
Frequent do you play computer game	Frequently	85	22.1
	Occasionally	54	14.1
	Rarely	65	16.9
	Never	180	46.9
Use eye glass	Yes	117	39.5
	No	267	69.5
Smoke cigarette	Yes	114	29.7
	No	270	70.3
Consume alcohol	Yes	100	26.0
	No	284	74.0

Table 1 shows that 29.2% of the respondents were in the age group of 25-34 years, while 41.1% had primary level of education. Regarding gender, majority 57.8% were female, slightly above half, (51.3%) of the respondents were married, 36.5% were Catholics by religion. Two hundred sixty-four, (68.7%) of the respondents were unemployed, 68.0% had ≥ 5 people living in their households, 38.3% of the respondents stay in a semi-permanent house structure.

Most, 56.8% of the respondents use firewood/charcoal as source of fuel for cooking, 53.9% of the respondents frequently watch TV, 46.9% of the respondents had never played computer games, nearly seven in every ten, (69.5%) of the respondents do not use eye glass, 70.3% do not smoke and 74.0% of the respondents do not consume alcohol.

The distribution of respondents across different demographic categories such as age, gender, marital status, and religion provides a snapshot of the sample population. For example, the majority of respondents were females, married, and within the age group of 25-34 years. Understanding these demographics helps in contextualizing the study findings and assessing their generalizability to the broader population.

Information about respondents' education level, employment status, household size, and housing structure offers insights into their socioeconomic status. For instance, a significant proportion had only primary education, were unemployed, and lived in households with five or more people. These socioeconomic factors can influence access to healthcare services, including eye care, and may impact the prevalence and management of visual impairments within the population.

The study also examines various lifestyle factors such as fuel use for cooking, TV watching habits, computer game participation, eyeglass usage, smoking, and alcohol consumption. These factors could have implications for eye health and visual impairment. For instance, exposure to smoke from firewood or charcoal may be associated with certain eye conditions, while regular use of eyeglasses could indicate existing visual impairments.

The findings related to smoking and alcohol consumption highlight health behavior patterns among the respondents. The high proportion of respondents who reported not smoking or consuming alcohol may suggest healthier lifestyle choices, which could positively impact overall health, including eye health.

Understanding the demographic and lifestyle characteristics of the population can inform targeted interventions aimed at promoting eye health and preventing visual impairments. For example, interventions focusing on improving access to eye care services, promoting eye health education, and addressing socioeconomic disparities in eye care utilization could be tailored based on the identified characteristics of the population.

Table 2: Univariate analysis of socio-demographic factors associated with visual impairment among individuals reporting at Mulago hospital eye clinic in Uganda

Variable	Category	Visually impaired		χ^2	p-value
		Yes (%)	No (%)		
Maternal age in complete year	18-24 years 25-34 years 35-44 years 45-54 years >54 years	25(37.9) 6(5.4) 22(27.2) 19(35.8) 14(19.4)	41(62.1) 106(94.6) 59(72.8) 34(64.2) 58(80.6)	34.750	<0.001*
Mothers educational status	Not gone to school Primary Secondary Tertiary	14(14.1) 41(25.9) 20(23.3) 11(26.8)	85(85.9) 117(74.1) 66(76.7) 30(73.2)	5.529	0.137
Gender	Male Female	44(27.2) 42(18.9)	118(72.8) 180(81.1)	3.660	0.056
Marital status	Never married Married Widowed	26(24.3) 46(23.4) 14(17.5)	81(75.7) 151(76.6) 66(82.5)	1.430	0.489
Religion	Catholics Protestants Pentecostal Muslim	18(12.9) 17(30.9) 28(22.2) 23(36.5)	122(87.1) 55(69.1) 98(77.8) 40(63.5)	16.844	0.001*
Occupation	Employed Unemployed	20(16.7) 66(25.0)	100(83.3) 198(75.0)	3.296	0.069
Number of people in the household including you	<5 ≥5	38(30.9) 48(18.4)	85(69.1) 213(81.6)	7.520	0.006*
Type of house do you stay in	Permanent Semi-permanent Temporary Make-shift	23(16.7) 20(13.6) 39(55.7) 4(13.8)	115(83.3) 127(86.4) 31(44.3) 25(86.2)	55.088	<0.001*
Type of fuel do you use for cooking	Electricity and gas Firewood and charcoal Kerosene	19(17.3) 46(21.1) 21(37.5)	91(82.7) 172(78.9) 35(62.5)	9.222	0.010*
Frequent do you watch TV	Frequently Occasionally Rarely	49(23.7) 33(32.4) 4(5.3)	158(76.3) 69(67.6) 71(94.7)	18.575	<0.001*
Frequent do you play computer game	Frequently Occasionally Rarely Never	12(14.1) 14(25.9) 17(26.2) 43(23.9)	73(85.9) 40(74.1) 48(73.8) 137(76.1)	4.498	0.212
Use eye glass	Yes No	25(21.4) 61(22.8)	92(78.6) 206(77.2)	0.102	0.749
Smoke cigarette	Yes No	44(38.6) 42(15.6)	70(61.4) 228(84.4)	24.484	<0.001*
Consume alcohol	Yes No	54(54.0) 32(11.3)	46(46.0) 252(88.7)	77.705	<0.001*

The respondents' age ($\chi^2=34.750$, p-value of <0.001), religion, ($\chi^2=16.844$, p-value of 0.001), number of people living in the household ($\chi^2=7.520$, P-value of 0.006), type of house ($\chi^2=55.088$, p-value of <0.001), type of fuel used for cooking ($\chi^2=9.222$, p-value of 0.010), frequency of watching TV ($\chi^2=18.575$, p-value of $<.000$), smoking cigarette ($\chi^2=24.484$, p-value of <0.001) and consuming alcohol ($\chi^2=77.705$, p-value of <0.001) were the significant socio-demographic factors influencing visual impairment among the respondent.

This suggests that as age increases, the likelihood of experiencing visual impairment also increases. This finding aligns with the well-established understanding that certain eye conditions and visual impairments become more prevalent with advancing age, such as cataracts, macular degeneration, and glaucoma.

The statistic and p-value suggest that religion is significantly associated with visual impairment among the respondents. This association might reflect differences in healthcare-seeking behaviors, cultural practices influencing eye health, or other socio-cultural factors that could impact visual health outcomes.

The statistic and p-value indicate a significant association between the number of people living in the household and visual impairment. Larger household sizes may indicate higher levels of crowding or socioeconomic factors that could affect access to healthcare services, including eye care.

The type of house (e.g., semi-permanent versus permanent structure) shows a significant association with visual impairment. This association could reflect differences in living conditions, environmental factors, or socioeconomic status that influence visual health outcomes.

The type of fuel used for cooking also shows a significant association with visual impairment. This finding may be linked to indoor air pollution resulting from the combustion of certain fuels, which can contribute to eye health issues such as irritation, dryness, or exacerbation of existing eye conditions.

These lifestyle factors watching TV, smoking, and alcohol consumption all show significant associations with visual impairment. Excessive TV watching might indicate sedentary behavior or prolonged screen exposure, which can affect eye health. Smoking and alcohol consumption have known associations with various health conditions, including those that can impact vision, such as macular degeneration and cataracts.

Understanding these socio-demographic factors' associations with visual impairment can inform targeted interventions aimed at high-risk populations. For example, programs targeting older adults or individuals with specific lifestyle behaviors may focus on promoting regular eye exams and adopting healthier habits to preserve vision. The study's findings highlight the complex interplay between socio-demographic factors and visual impairment, providing valuable insights for targeted interventions and public health initiatives aimed at preserving and promoting eye health within the studied population.

4.3 Clinical factors associated with visual impairment

Table 3: Univariate analysis of clinical factors associated with visual impairment among individuals reporting at Mulago hospital eye clinic in Uganda

Variable	Category	Frequency n	Percentage %
Have family history of vision problem	Yes	105	27.3
	No	279	72.7
Have you had any previous ophthalmic clinic visit	Yes	149	38.8
	No	279	61.2
Have history of hypertension	Yes	94	24.5
	No	290	75.5
On an anti-hypertensive medication	Yes	63	75.0
	No	21	25.0
Diagnosis of Diabetic mellitus/DM	Yes	124	32.3
	No	260	67.7
On anti-Diabetic medication	Yes	71	61.2
	No	45	38.8
Have history of tuberculosis	Yes	21	5.5
	No	363	94.5
Had tuberculosis treatment	Yes	21	100
	No		
Have history of ocular trauma	Yes	122	31.8
	No	262	68.2

Table 3 indicates that most 72.7% of the respondents had no history of vision problem, 61.2% had history of ophthalmic clinic visits, 75.5% had no history of hypertension, 67.7% had not been

diagnosed with diabetes mellitus, 94.5% had no history of TB and 68.2% had no history of ocular trauma.

This suggests that a significant portion of the population studied has not experienced visual impairments or significant eye-related issues in the past. This finding is essential as it provides context for understanding the prevalence of visual impairments within the population and may indicate relatively good overall eye health among the respondents.

This finding suggests a relatively high level of engagement with eye care services among the population studied. Regular visits to ophthalmic clinics can facilitate early detection and management of eye conditions, contributing to better visual outcomes and overall eye health.

The findings regarding ophthalmic clinic visits indicate a relatively high level of engagement with eye care services among the population studied. This highlights the importance of promoting regular eye examinations and access to eye care services to maintain good eye health and detect visual impairments early.

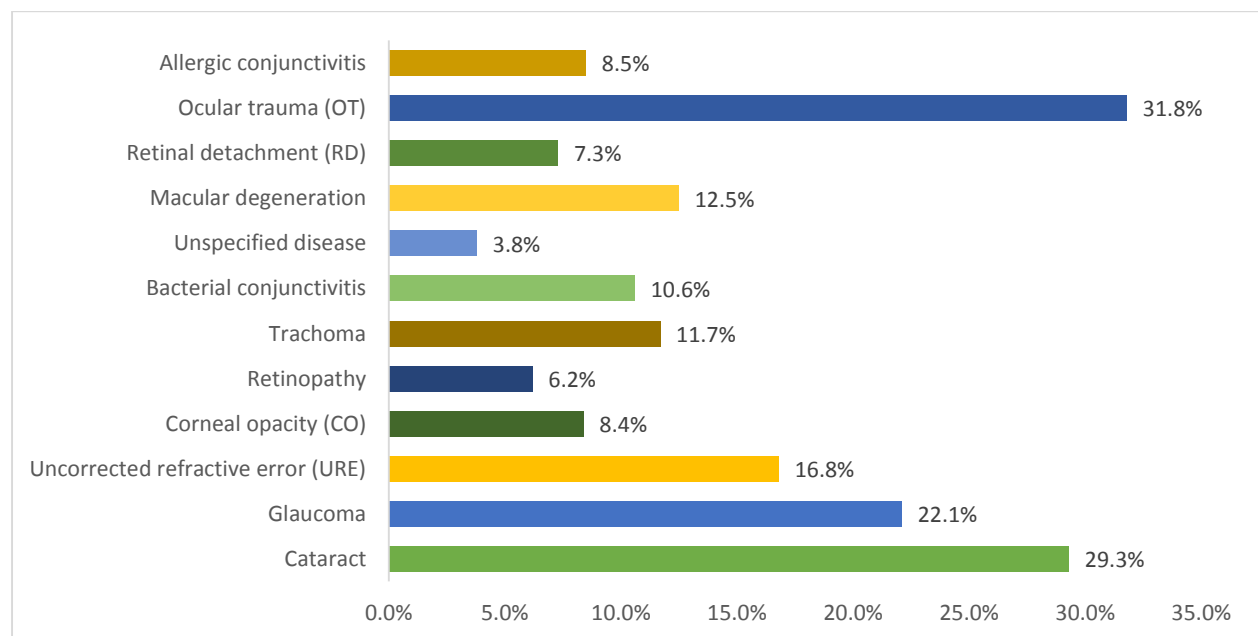


Figure 3: Showing the common eye conditions history among the respondents

Figure 3 shows that when the respondents were asked about the history of having any eye condition, 32.8% had ocular trauma, 29.3% had cataract, 22.1% had glaucoma, 16.8% had

uncorrected refractive error, 12.5% had macular degeneration, 11.7% had trachoma and 10.6% had bacterial conjunctivitis.

The findings from Figure 3 highlight the burden of various eye conditions within the population studied, emphasizing the need for comprehensive eye care services, including preventive measures, early detection, and access to treatment. Healthcare planning should prioritize resources for addressing the most prevalent eye conditions to reduce visual impairment and improve overall eye health outcomes. The findings from Figure 3 provide valuable insights into the prevalence of various eye conditions among the respondents, with implications for healthcare planning, education, research, and innovation aimed at promoting eye health and preventing visual impairment within the population studied.

Table 4: Bivariate analysis of clinical factors associated with visual impairment among individuals reporting at Mulago hospital eye clinic in Uganda

Variable	Category	Visually impaired		χ^2	p-value
		Yes (%)	No (%)		
Have family history of vision problem	Yes No	28(26.7) 58(20.8)	77(73.3) 221(79.2)	1.517	0.218
Have you had any previous ophthalmic clinic visit	Yes No	8(5.4) 78(33.2)	141(94.6) 157(66.8)	40.612	0.001*
Have history of hypertension	Yes No	10(10.6) 76(26.2)	84(89.4) 214(73.8)	9.900	0.002*
Diagnosis of Diabetic mellitus/DM	Yes No	16(12.9) 70(26.9)	108(87.1) 190(73.1)	9.495	0.002*
On anti-Diabetic medication	Yes No	4(5.6) 4(8.9)	67(94.4) 41(91.1)	0.455	0.500
Have history of tuberculosis	Yes No	16(76.2) 70(19.3)	5(23.8) 298(80.7)	36.989	<0.001*
Have history of ocular trauma	Yes No	8(6.6) 78(29.8)	114(93.4) 184(70.2)	25.809	<0.001*

As shown on table 4, previous ophthalmic clinic visit ($\chi^2=40.612$, p-value of 0.001), history of hypertension ($\chi^2=9.900$, P-value of 0.002), having been diagnosed with diabetes mellitus ($\chi^2=9.495$, p-value of 0.002), history of TB ($\chi^2=36.989$, p-value of <0.001) and history of ocular

trauma ($\chi^2=25.809$, p-value of <0.001) were significantly associated with visual impairment among the respondents.

The significant association between previous ophthalmic clinic visits and visual impairment suggests that individuals who have visited ophthalmic clinics in the past are more likely to have visual impairment. This finding underscores the importance of regular eye examinations and follow-up care in detecting and managing visual impairments. It also highlights the potential role of access to eye care services in addressing visual health issues within the population.

The association between a history of hypertension and visual impairment suggests that individuals with hypertension may be at increased risk of developing visual impairments. Hypertension can lead to hypertensive retinopathy, a condition characterized by damage to the blood vessels in the retina, which can result in visual disturbances or loss. This finding emphasizes the importance of managing hypertension effectively to prevent associated visual complications.

The significant association between being diagnosed with diabetes mellitus and visual impairment highlights the link between diabetes and eye health. Diabetic retinopathy, a common complication of diabetes, can lead to vision loss if left untreated. Regular eye examinations and appropriate management of diabetes are essential for preventing or minimizing the impact of diabetic eye complications on visual function.

The association between a history of TB and visual impairment suggests that individuals with a history of TB may be at increased risk of developing ocular complications associated with the disease. TB can affect various parts of the eye, leading to conditions such as uveitis or optic neuritis. This finding underscores the importance of comprehensive healthcare for individuals with a history of TB, including regular eye examinations to detect and manage ocular manifestations.

The significant association between a history of ocular trauma and visual impairment highlights the impact of traumatic eye injuries on visual health. Ocular trauma can lead to various eye conditions, including corneal injuries, retinal detachments, or traumatic cataracts, which can result

in visual impairment or loss. Preventive measures to reduce the risk of ocular trauma and prompt treatment of eye injuries are crucial for preserving visual function.

Early detection of risk factors and regular monitoring of eye health through routine eye examinations are crucial for preventing visual impairment. Healthcare providers should prioritize screening for conditions such as hypertension, diabetes mellitus, and ocular trauma among individuals at risk to facilitate early intervention and prevent visual complications.

Table 5: Multivariate analysis of clinical factors associated with visual impairment among individuals reporting at Mulago hospital eye clinic in Uganda

Variable	Category	AOR(95% CI)	p-value
Maternal age in complete year	18-24 years	1.0	
	25-34 years	1.547(0.694-3.447)	0.286
	35-44 years	0.803(0.328-1.967)	0.632
	45-54 years	1.341(0.547-3.289)	0.642
	>54 years	7.927(2.788-12.535)	<0.001*
Type of fuel do you use for cooking	Electricity and gas	1.0	
	Firewood and charcoal	1.114(0.470-2.638)	0.807
	Kerosene	2.289(1.042-3.209)	0.047*
Smoke cigarette	Yes	1.0	
	No	0.384(0.147-0.600)	0.042*
Diagnosis of Diabetic mellitus/DM	Yes	1.0	
	No	0.415(0.203-0.847)	0.016*
Have history of ocular trauma	Yes	1.0	
	No	0.260(0.112-0.603)	0.002*

When factors that were significant at bivariate level were adjusted for cofounding and interactions, visual impairment was high among respondents who were aged >54 years (AOR: 7.927; 95% CI: 2.788-12.535; $p<0.001$) compared to those who were aged 18-24 years and respondents who used kerosene as source of cooking fuel (AOR: 2.289; 95% CI: 1.042-3.209; $p=0.047$) compared to those who used electricity and gas. While low visual impairment was low among respondents who do not smoke cigarette (AOR: 0.384; 95% CI: 0.147-0.600; $p=0.042$), respondents who were diagnosed with diabetes mellitus (AOR: 0.415; 95% CI: 0.203-0.847; $p=0.016$) and respondents who had no history of ocular trauma (AOR: 0.260; 95% CI: 0.112-0.603; $p=0.002$)

The adjusted odds ratio (AOR) indicates that respondents aged over 54 years had a significantly higher likelihood of visual impairment compared to those aged 18-24 years. This finding suggests that older age is a significant risk factor for visual impairment, which aligns with the well-established understanding that certain eye conditions become more prevalent with advancing age. The implication here is the importance of targeted interventions and regular eye screenings for older adults to detect and manage visual impairments early.

The AOR suggests that respondents who used kerosene as a cooking fuel source had a higher likelihood of visual impairment compared to those using electricity and gas. This association may be related to indoor air pollution from kerosene combustion, which can contribute to eye health issues. Promoting cleaner cooking fuels and improving ventilation can help mitigate this risk and reduce the burden of visual impairment.

The AOR indicates that respondents who do not smoke cigarettes had a lower likelihood of low visual impairment compared to smokers. Smoking is a known risk factor for various eye conditions, including age-related macular degeneration, cataracts, and dry eye syndrome. Encouraging smoking cessation and adopting healthier lifestyle behaviors can help prevent visual impairment associated with smoking.

Respondents diagnosed with diabetes mellitus had a lower likelihood of low visual impairment. This finding may seem counterintuitive at first glance but could be explained by the likelihood of increased healthcare engagement and adherence to treatment among individuals diagnosed with diabetes. Regular eye examinations and effective management of diabetes-related eye complications are essential for preserving visual function in this population.

The AOR suggests that respondents with no history of ocular trauma had a lower likelihood of low visual impairment. Ocular trauma can lead to various eye conditions and complications, emphasizing the importance of preventive measures and prompt treatment of eye injuries to reduce the risk of visual impairment.

The findings imply that the importance of targeted interventions tailored to specific risk factors associated with visual impairment, such as older age, cooking fuel source, smoking behavior, diabetes mellitus, and ocular trauma history. These interventions may include health education campaigns, lifestyle modifications, and access to appropriate healthcare services.

Healthcare providers should prioritize screening for visual impairment and associated risk factors, especially among older adults and individuals with diabetes mellitus or a history of ocular trauma. Early detection and effective management of these risk factors are essential for preventing visual impairment and preserving eye health.

CHAPTER FIVE: DISCUSSION OF RESULTS

5.0 Introduction

This chapter provides the related literature in line with the study objectives.

5.1 Prevalence of Visual Impairment

In the present study, the prevalence of visual impairment was at 22.6% among patients attending eye clinic at Mulago hospital. This is probably because the respondents were already got at the hospital setting seeking help on their eye problems. This was which is higher than other studies done in South Sudan (11.8%) (Ngondi et al, 2016), Cape Town South Africa (7.2%) (Cockburn et al, 2017), Sokoto state of Nigeria (11%) (Muhammad et al, 2017), Atakunmosa, South Western Nigeria (7.4%) (Onakpoya et al, 2017), Bangladesh (9.3%) (Dineen et al, 2018), Malaysia (9.2%) (Rozhan et al, 2019), South Korea (4.3%) (Tyler et al, 2021), East Delhi district of India (11.4%) (Gupta et al, 2015), Mahabubnagar district of India (8.4%) (Mactaggart et al, 2018), Iran (1.39%) (Fotouhi et al, 2021) and Botucato, Brazil (7.4%) (Schellini et al, 2019). The global estimate of visual impairment by WHO regions in 2017 were 18 % for the African region, 7 % for the region of the Americas, 11 % for Eastern Mediterranean region, 7 % for the European region, 32 % for the South-east Asia region and 25 % for the West Pacific region. In USA, the prevalence of visual impairment in children is estimated to be 5-10% (Murthy, 2016). In a hospital-based cross-sectional study of all patients less than 16 years of age at the eye clinic of Obafemi Awolowo University teaching hospital complex, the prevalence. The studies in South Sudan, Sokoto and Atakunmosa, Nigerian state, Brazil, Bangladesh, Mahabubnagar district of Indian and Malaysian were done by better eye presenting visual acuity which means they considered bilateral VI only. If one eye was visually impaired and the other was not impaired, they considered as no VI which under estimate the magnitude of VI compared to the present study which considered the visual acuity of either eye. The lower prevalence of VI in Cape Town South Africa might be caused by differences in socioeconomic variables and access of eye care services. The Iran and Korean

studies were based on best corrected better eye visual acuity which might under estimate the burden of VI.

The study revealed that 32.8% had ocular trauma, 29.3% had cataract, 22.1% had glaucoma, 16.8% had uncorrected refractive error, This is similar to Schellini et al. (2019) who reported a prevalence of presenting low vision and blindness of 5.2% (95% CI: 4.3 – 6.1) and 2.2% (95% CI: 1.6 – 2.8) of the population respectively. This is supported by Salomão et al. (2017) who reported that the prevalence of visual impairment ($< 6/19$ to $\geq 6/60$ in the better eye) was 4.74% (95% CI: 3.97 to 5.53) and 2.00% (95% CI: 1.52 to 2.49) with best correction. The prevalence of subjects presenting with bilateral blindness ($< 6/60$) was 1.51% (95% CI: 1.20 – 1.82) and 1.07% (95% CI: 0.79 – 1.35) with best correction. Retinal disorders (35.3%) and cataract (28.3%) were the most common causes of blindness. Cataract (33.2%), refractive errors (32.3%) and retinal disorders (20.3%) were the main causes of visual impairment (vision $< 6/19$ to $\geq 6/60$).

The study found that 34.8% of the visually impaired had severe visual impairment, 29.1% had moderate visual impairment and blindness each and 7% had low vision. This is similar to studies that shown that prevalence of vision impairment among the elderly (≥ 50 years old); the presenting VA less than 6/18 in the better eye was 29.2% (95% CI: 27.6 – 35.1, Design Effect deff = 2.3). The prevalence of functional blindness (presenting visual acuity $< 6/60$ in the better eye) was 8.9% (95% CI: 8.4 – 12.0, deff = 1.2) and for blindness (PVA $< 3/60$ in the better eye) was 3.9% (95% CI: 3.4 – 6.1, deff = 1.0). Uncorrected refractive errors and cataract were the leading causes of vision impairment (Garap et al. 2016). Among the Chinese adults (≥ 50 years old) living in the urban area of Southern China, the prevalence of blindness and low vision based on the presenting visual acuity (PVA) was 0.6% (95% confidence interval CI: 0.2 to 1.0) and 10.1% (95% CI: 8.5 to 11.7), respectively. These values were reduced to 0.5% and 3.1% respectively when best corrected VA was considered. The main causes for blindness based on presenting VA were cataract (39.6%), glaucoma (11.0%) and myopic maculopathy (6.6%). Majority of low vision

cases were caused by cataract (45.3%) and uncorrected refractive errors accounted for 43.9% (Haung et al. 2019).

The study found that 12.5% of the respondents had macular degeneration, 11.7% had trachoma and 10.6% had bacterial conjunctivitis. This is similar to Fotouhi et al. (2019) who found that causes of visual impairment according to the best corrected vision were cataract (36.0%), macular degeneration (20.0%) and amblyopia (10.7%) respectively. However, according to presenting vision, uncorrected refractive errors were the most frequent primary cause (33.6%) and cataract (25.4%), macular degeneration (12.7%) and amblyopia (8.2%). Haq et al. (2019) reported that the prevalence of visual impairment, low vision and blindness among the adult population (≥ 20 years) of Aligarh in India based on presenting visual acuity were 13.0%, 7.8% and 5.3% respectively. The main causes of visual impairment were cataract, refractive error, glaucoma and corneal opacities.

5.2 Socio-Demographic Factors Associated With Visual Impairment

The study found that visual impairment was high among the older individuals (>54 years) compared to the younger individuals (18-25 years). It is easy to understand that as people age, the probability of suffering from age-related ocular diseases that cause visual impairment, such as cataracts, glaucoma, and age-related macular degeneration, increases significantly. This was supported by studies done in Singapore (Wah et al, 2015), South Africa (Cockburn et al, 2017), China (Guo et al, 2017), South Korea (Onakpoya et al, 2017) Western Cameroon (Oye et al, 2017), Southern Mexico (Aida et al, 2015), and Nigeria (Tyler et al, 2014) that may be related to an increased prevalence of age related eye diseases and degenerations in these age groups (Bronson et al, 2019). Oduntan (2015) reported that the common causes of low vision varied from one continent to another. In America and Canada, Diabetes, cataract, and age-related macular degeneration were the common causes of low vision. Refractive error was the second major cause of low vision accounting for 22.0%. The rate of blindness and low vision increased with increasing

age.

5.3 Clinical Factors Associated With Increase In Visual Impairment

This study found that History of trauma to the eye had 4 times more likely to have VI which can be explained due to deterioration of the eye structure, functional loss and exposure to ocular infections following trauma. The study showed that individuals with some chronic diseases, especially diabetes, were more likely to have a visual impairment. Our findings further support those of other studies that have shown equivalent results with respect to different regions and ethnic groups (KO Et Al, 2017; Qin et al, 2021). For example, the population-based data from the National Health and Nutrition Examination Survey showed that individuals with diabetes have higher rates of visual impairment than those without. It is no coincidence that our finding is also consistent with Yonekawa's report that diabetes is independently associated with visual impairment (Yonekawa et al, 2017). The reason for visual impairment in diabetes is that individuals with diabetes are more prone to developing multiple ophthalmic conditions, including diabetic retinopathy, cataract, glaucoma, macular edema, and retinal vein occlusion.

CHAPTER SIX: CONCLUSIONS AND RECOMMENDATIONS

6.0 Introduction

This chapter deals with the brief summary of the steps taken in the study, conclusions, study findings and recommendations

6.1 Conclusions

Generally, the study found that the prevalence of visual impairment was high at 22.65.

The study found that visual impairment was high among the older individuals (>54 years) compared to the younger individuals (18-25 years).

Using kerosene as the main source of fuel for cooking was found to have a positive association with visual impairment.

Not having history of smoking, diabetes mellitus and no history of ocular trauma were associated with decreased chance of having visual impairment.

6.2 Recommendations

- i. The findings may help increase the awareness of visual impairment by general public and policy makers. Faced with such a stern fact of visual impairment, more efforts are warranted to enhance treatment and rehabilitation among people with eye disorders to prevent visual impairment and improve the lives of people with visual impairment.
- ii. The government of Uganda should focus on effective, efficient, comprehensive eye health care services by integrating with the national health system to prevent avoidable visual impairment among patients.
- iii. The risk factor analysis demonstrated that drinking alcohol and having certain chronic diseases rendered an individual more likely to suffer from the onset of visual impairment, which suggests that changes in lifestyle and behaviors and the aggressive prevention, diagnosis, and treatment of systemic diseases are likely to reduce the burden of visual impairment.

6.3 Area for Further Study

Other than the diseases identified in this study, there could be other disease conditions with the potential to cause visual impairment and blindness that need to be studied in different geographic locations.

Additional studies with comprehensive ophthalmic examinations are needed to adequately characterize visual impairment and better understand the factors influencing it.

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APPENDIX 1: INFORMED CONSENT TO PARTICIPATE IN THE STUDY

Dear respondent,

I, Allen Kyarimpa, a student of King Caesar University pursuing a Bachelor's Degree in Nursing Sciences is carrying a study title "Factors associated with impairment among individuals reporting at Mulago hospital eye clinic in Uganda" as part of the requirements for the award of Bachelor's Degree in Nursing Sciences by the university.

You have been selected on merit for your legibility to provide necessary information required. However, any information that will be provided will be used mainly for academic purposes and will be treated with utmost confidentiality.

Your participation is entirely voluntary, you have rights to decline to participate, to withdraw any statement before analysis or discontinue your participation and this will not affect you in anyway. There will be no penalty or loss of benefits you are entitled to receive if you stop taking part in this study.

There are no physical benefits for participation in this study however these findings will help in coming up with strategies to improve of treatment and to reduce cases visual impairment.

If you have any questions, concerns or complaints about this study contact the researcher, Allen Kyarimpa, on Tel: +256 753 453315 or email: If you have questions about your rights as a participant in this study, general questions, or have complaints, concerns or issues you want to discuss with someone outside the research, call the supervisor on Tel:

Assessment of understanding

I hereby confirm that I understand the contents and nature of the document and therefore consent to be interviewed by this researcher carrying out the above mentioned study. I have been assured of total confidentiality, and that the results of this study shall not identify me anywhere in any way since my name is not needed and it shall not appear anywhere in this questionnaire. And in any case, my refusal to answer questions shall not affect me or any member of my family.

Signature/thumbprint of respondent

Signature of researcher

Date:

Date:

APPENDIX II: QUESTIONNAIRE

Introduction

Serial No.

Section A: Socio-demographic

s/n	Information	Possible options	Tick the appropriate response
1	Maternal age in complete year		
2	Mothers educational status	Not gone to school Primary Secondary Tertiary	
3	What is your gender?	Male Female	
4	Marital status	Never married Married Widowed	
5	Religion	Catholics Protestants Pentecostal Muslim	
6	Occupation	Employed Unemployed	
7	Number of people in the household including you	<5 ≥5	
8	Which type of house do you stay in?	Permanent Semi-permanent Temporary Make-shift	
9	Which type of fuel do you use for cooking?	Electricity and gas Firewood Kerosene	
	How frequent do you watch TV?	Frequently Occasionally Rarely	
	How frequent do you play computer game?	Frequently Occasionally Rarely Never	
	Do you use eye glass?	Yes No	
	Do you smoke cigarette?	Yes No	
	Do you consume alcohol	Yes No	

Section B: clinical factors

s/n	Information	Possible options	Code and remarks
10	Do you have family history of vision problem	Yes No	
11	Have you had any previous ophthalmic clinic visit	Yes No	
12	Do you have history of hypertension	Yes No	
13	Are you on an anti-hypertensive medication	Yes No	
14	Do you diagnosis of Diabetic mellitus/DM	Yes No	
15	Are you anti-Diabetic medication	Yes No	
16	Do you have history of tuberculosis	Yes No	
17	He you had tuberculosis treatment	Yes No	
18	Do you have history of ocular trauma	Yes No	
19	Do you have history of any of the following eye condition (Tick all that apply)	Cataract Glaucoma Uncorrected refractive error (URE) Corneal opacity (CO) Retinopathy Trachoma Bacterial conjunctivitis Unspecified disease Macular degeneration Retinal detachment (RD) Ocular trauma (OT) Allergic conjunctivitis	

Section C: Visual impairment

s/n	Information	Possible options	Code and remarks
20	Visual acuity test	Normal Visually impaired	
21	If impaired, what category	Moderate visual impairment (PVA < 6/18–6/60) Sever visual impairment (PVA < 6/60–3/60) Blindness: - A visual acuity of less than 3/60 in the better eye Low vision: - Presenting visual acuity 6/18 but not less than 3/60 in better eye	

Thank you.

APPENDIX III: PERMISSION LETTER

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FAX: +256-414-5325591
E-mail: admin@mulago.or.ug
Website: www.mulago.or.ug



MULAGO NATIONAL REFERRAL HOSPITAL
P. O. Box 7051
KAMPALA, UGANDA

IN ANY CORRESPONDENCE ON THIS
SUBJECT PLEASE QUOTE NO.....

21 November 2023.

Ms. Kyalimpa Allen Margaret
Principal Investigator
King Caesar University.

Dear Ms. Kyalimpa,

Re: Approval of Protocol MHREC 2658: "Factors Associated with Visual Impairment among Individuals Reporting at Mulago Hospital Eye Clinic in Uganda".

The Mulago Hospital Research and Ethics Committee reviewed your proposal referenced above and granted approval of this study on 21 November 2023. The conduct of this study will therefore run for a period of one (1) year from 21 November 2023 to 20 November 2024.

This approval covers the protocol and the accompanying documents listed below;

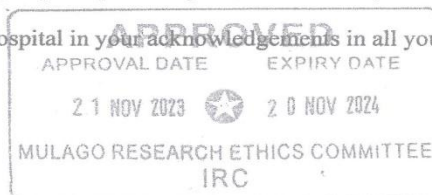
- Consent form
- Questionnaire.

This approval is subjected to the following conditions:

1. That the study site may be monitored by the Mulago Hospital Research and Ethics Committee at any time.
2. That you will abide by the regulations governing research in the country as set by the Ugandan National Council for Science and Technology including abiding to all reporting requirements for serious adverse events, unanticipated events and protocol violations.
3. That no changes to the protocol and study documents will be implemented until they are reviewed and approved by the Mulago Hospital Research and Ethics Committee.
4. That you provide quarterly progressive reports and request for renewal of approval at least 60 days before expiry of the current approval.
5. That you provide an end of study report upon completion of the study including a summary of the results and any publications.
6. That you will include Mulago Hospital in your acknowledgements in all your publications.

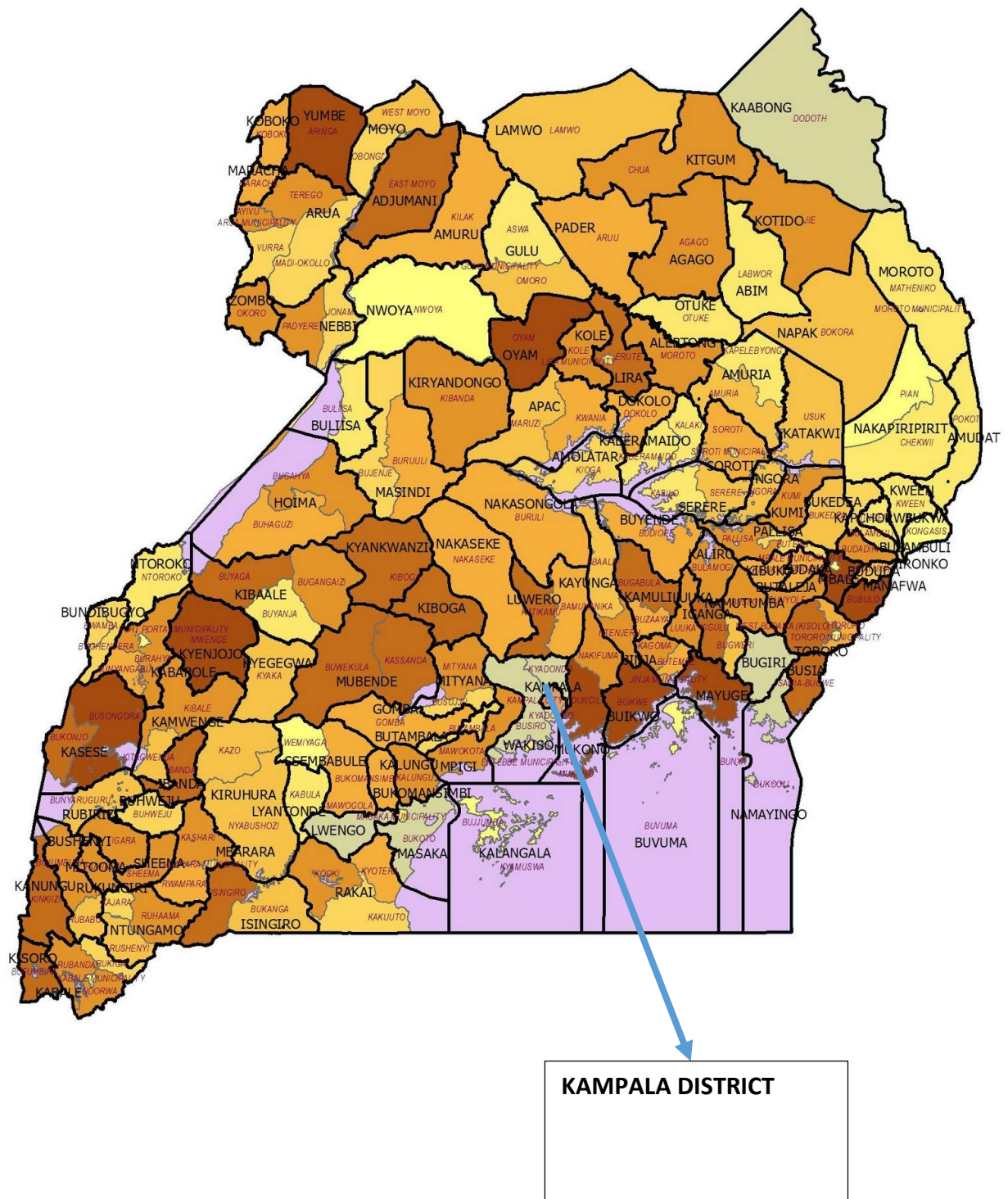
I wish you the best in this Endeavour.


DR. HELLEN T. AANYU
A.G. CHAIRPERSON- MULAGO HOSPITAL RESEARCH & ETHICS COMMITTEE.



Vision: "To be the leading centre of Health Care Services"

APPENDIX IV: MAP OF UGANDA SHOWING KAMPALA DISTRICT



APPENDIX VI: MAP OF MULAGO HOSPITAL

