

PREVALENCE AND RISK FACTORS OF CATARACTS, GLAUCOMA AND DIABETIC
RETINOPATHY IN PEOPLE AGED 50 YEARS AND ABOVE IN MASHONALAND
CENTRAL.

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APPROVAL FORM

The undersigned certify that they have read and recommend to Bindura University of Science Education for acceptance, a dissertation entitled “Prevalence and risk factors of Cataracts, Glaucoma and Diabetic Retinopathy in people aged 50 years and above in Mashonaland central.” submitted by Tafadzwa Taruvinga, Pauline Marime and Prince Chipungu in partial fulfillment of the requirements for the degree of Bachelor of Science Honours Degree in Optometry (HBScOpt).

Supervisor's Name:

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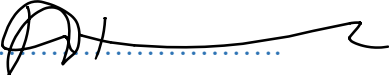
Optometry Department Chairperson's signature



Declaration

Supervisor's Statement of approval

I, Dr. A Mashoko, agree that I supervised this study conducted by Tafadzwa Taruvinga, Pauline Marime and Prince Chipungu and confirm that the project meets the standards for submission in partial fulfillment of the Bachelor of Science Honors Degree in Optometry (HBScOpt) at the Bindura University of Science Education.

Signature.....

Date...06\10\25.....

Student's declaration

We, Tafadzwa Taruvinga, Pauline Marime and Prince Chipungu do hereby declare that this study is our work, done under my supervisor's guidance, submitted in partial fulfillment of the requirements for the Bachelor of Science Honor's Degree in Optometry at the Bindura University of Science Education.

Signature.....

Date

Dedications

This work is dedicated to my fellow university mates and family.

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Abstract

Background:

Age-related ocular diseases such as Glaucoma, Cataracts, and Diabetic Retinopathy (DR) are among the leading causes of visual impairment and blindness globally, especially in populations aged 50 years and above. In Zimbabwe, limited data exists on the prevalence and contributing risk factors of these conditions in rural and semi-urban settings such as Mashonaland Central.

Objective:

This study aimed to determine the prevalence and identify associated risk factors of Glaucoma, Cataracts, and Diabetic Retinopathy among patients aged 50 years and above attending hospitals in Mashonaland Central.

Methods:

A cross-sectional study was conducted involving 60 participants aged 50 years and above. Data on demographics, medical history, lifestyle behaviors, and clinical eye examination findings were collected. Statistical analysis, including Chi-square tests, was performed to determine associations between ocular diseases and potential risk factors such as age, gender, smoking, alcohol intake, diabetes, hypertension, BMI, and exercise habits.

Results:

Cataracts emerged as the most prevalent condition, followed by Glaucoma and Diabetic Retinopathy. Significant associations were observed between cataracts and gender ($p = 0.005$), smoking ($p = 0.0086$), alcohol intake ($p = 0.0008$), diabetes ($p = 0.0046$), age ($p = 0$), BMI ($p = 0$), and duration of diabetes ($p = 0$). Diabetic Retinopathy showed a strong association with age and duration of diabetes, while Glaucoma showed fewer significant associations.

Conclusion:

The study highlights a high burden of cataracts and a notable presence of Glaucoma and Diabetic Retinopathy among the elderly population in Mashonaland Central. Age, lifestyle factors, and chronic conditions such as diabetes significantly influence ocular disease prevalence. These findings underscore the need for targeted screening programs, public education, and early intervention strategies to prevent avoidable blindness in aging populations.

CHAPTER 1

1.1 Introduction

As the global population ages, the burden of age-related ocular diseases has become increasingly significant. In particular, Glaucoma, Cataracts, and Diabetic Retinopathy (DR) stand out as the leading causes of visual impairment and blindness among individuals aged 50 years and above. These conditions not only impair vision but also limit independence, reduce quality of life, and increase the risk of injuries, depression, and economic hardship.

In Zimbabwe's Mashonaland Central Province, there remains a considerable knowledge gap regarding the prevalence of these conditions and their associated risk factors. While anecdotal evidence and fragmented clinical records suggest that cases of age-related eye diseases are on the rise, there is limited systematic data to inform clinical and public health strategies. This study aims to address that gap by investigating the prevalence and risk factors of glaucoma, cataract, and diabetic retinopathy among patients aged 50 years and older attending selected hospitals in the region.

1.2 Background of the Study

Cataracts are the leading cause of blindness globally, accounting for approximately 51% of all cases of blindness and 33% of visual impairment worldwide (Mohammed et al., 2023). Although cataract surgery is a cost-effective intervention, access remains limited in many low- and middle-income countries, including Zimbabwe. Cataracts typically progress gradually, making early detection and timely surgery essential for preserving vision.

Glaucoma, often called the "silent thief of sight," is a group of optic neuropathies characterized by progressive damage to the optic nerve, usually associated with elevated intraocular pressure. It often develops without symptoms until significant vision loss has occurred, and once vision is lost, it cannot be recovered.

Diabetic Retinopathy (DR), a microvascular complication of diabetes, is another major cause of vision impairment. It affects approximately 3.4% of the global population, and of those with the disease, nearly one-fourth have vision-threatening stages (American Academy of Ophthalmology, 2008). DR remains the leading cause of blindness among working-age adults (20–64 years) in many parts of the world, and its burden is expected to grow in tandem with increasing diabetes prevalence.

Despite the clinical and public health relevance of these conditions, there is limited research on their prevalence and risk factors in older adults in Mashonaland Central, Zimbabwe. Understanding local patterns is critical for designing targeted interventions and guiding resource allocation in eye health services.

1.3 Problem Statement

Older adults are inherently at a higher risk for developing age-related eye diseases such as glaucoma, cataract, and diabetic retinopathy. However, in Mashonaland Central Province,

there is a lack of comprehensive, population-based data on the prevalence and risk factors associated with these diseases in individuals aged 50 years and above.

Without this information, healthcare providers and policymakers may be unable to develop effective screening programs, allocate resources efficiently, or implement evidence-based interventions. This gap not only limits healthcare planning but may also contribute to delayed diagnosis and poor visual outcomes in this vulnerable population.

1.4 Aims

The aim of this study is to determine the prevalence and risk factors of glaucoma, cataracts, and diabetic retinopathy among patients aged 50 years and above attending hospitals in Mashonaland Central Province.

1.5 Significance of the Study

This study is expected to generate essential epidemiological data that can inform clinical practice, public health policies, and eye care programs. Specifically, the study will:

- Provide local prevalence estimates for three major vision-threatening diseases.
- Identify modifiable and non-modifiable risk factors.
- Help guide early screening, intervention strategies, and resource allocation in hospital eye care units.
- Contribute to academic literature on ocular health in older populations in Zimbabwe, where such data is sparse.
- Ultimately improve the quality of life of older adults by supporting timely prevention and management.

The findings will be useful for eye care professionals, health administrators, public health planners, and policymakers, particularly in developing cost-effective community eye health programs.

1.6 Conclusion

Visual impairment and blindness due to age-related eye diseases represent a growing concern in Zimbabwe's healthcare system, particularly in aging populations. In the absence of robust local data, health systems may remain ill-prepared to handle the increasing burden of glaucoma, cataract, and diabetic retinopathy. This study seeks to fill that gap by assessing prevalence and identifying risk factors among individuals aged 50 and above in Mashonaland Central. The results are expected to have far-reaching implications for eye health policy, service delivery, and preventive care strategies in the region.

CHAPTER 2

2.1 Literature Review

This chapter addresses a comprehensive review of the literature in search of glaucoma, cataract, and diabetic retinopathy incidence and risk factors. Public health depends on an awareness of these disorders as, especially in elderly populations, they seriously affect the quality of life.

2.2 World Review:

2.2.1 Cataracts

About 51% of all occurrences of visual handicap globally are cataracts, which remain the major cause of blindness worldwide (Mahomed et al., 2023). According to estimates by the World Health Organization, cataracts blind around 20 million people worldwide, which emphasizes the need of effective surgical treatments and preventive measures to solve this public health concern. Given the rising frequency of cataracts, which are usually linked to aging, it is necessary to raise knowledge of treatment possibilities.

Hashemi et al. (2020) undertook a thorough systematic review and meta-analysis to project the worldwide and local frequency of age-related cataracts. This thorough investigation examined 45 papers with a noteworthy 161,947 participant sample size spanning several demographics. For any kind of cataract, the age-standardized pooled prevalence estimate (ASPPE) came out to be 17.20% (95% CI: 13.39–21.01). Further investigation identified particular forms of cataracts with different frequency rates: cortical cataracts accounted for roughly 8.05% (95% CI: 4.79-11.31), nuclear cataracts for 8.22% (95% CI: 4.93-11.52), and posterior subcapsular cataracts for 2.24% (95% CI: 1.41-3.07). With most occurrences occurring in persons over 60 years, the study underlined notable variation in frequency depending on WHO regions and age demographics, clearly showing the link between aging and cataract development.

Risk Factors for Cataracts

- **Age:** With frequency especially rising in those over 50 years, age is a major predictor (Hashemi et al., 2020). The total impacts of oxidative stress and other age-related modifications in the lens explain this age-related rise.
- **Lifestyle:** Richardson et al., 2020 have found that bad diet, lack of exercise, and smoking all help to increase a cataract risk.

Prolonged UV radiation exposure is a well-documented risk factor that can raise cataract development likelihood (Richardson et al., 2020). One can find advantages in protective actions like sunglasses.

- **Family History:** Indicating that family history might be a significant risk factor, genetic predispositions significantly influence cataract sensitivity (Hashemi et al., 2020).

- **Diabetes:** Diabetic people are more likely to develop cataracts at a younger age, therefore this well-known risk factor can aggravate cataract formation (American Academy of Ophthalmology, 2008).

Specific to posterior subcapsular cataracts (PSCs), ionizing radiation can cause oxidative stress in lens epithelial cells (LECs), therefore fostering cataract development (Richardson et al., 2020). For those in medical environments who are radiologically exposed, this is especially pertinent.

- **Chronic Inflammation:** Particularly in patients with diseases like uveitis or those having a vitrectomy, chronic inflammation helps PSCs advance (Richardson et al., 2020). Knowing the inflammatory pathways involved might provide directions for treatment approaches.

Richardson et al. (2020) propose PSCs have a two-stage etiology. In Stage I, risk factors aggravate oxidative stress and interfere with ion pumps, so damaging lens fibres and generating abnormal LEC growth. Stage II, following a latent phase, consists in aging-related processes and chronic inflammation that forward PSC development. This all-encompassing view of risk factors—including aging, diabetes, and ionizing radiation—allows one to pinpoint focused treatments meant to lower the PSC incidence.

2.2.3 Retinopathy in Diabetics

A major side effect of diabetes, diabetic retinopathy (DR) causes eye problems and blindness. It affects roughly 3.4% of the general population, with rates much higher among diabetics; about half of diabetics over the age of fifty are affected (American Academy of Ophthalmology, 2008). The growing worldwide prevalence of diabetes calls for an emphasis on knowledge of DR and its risk factors to enhance management and results.

Risk Factors for Diabetic Retinopathy

- **Duration of Diabetes:** Longer diabetes duration increases the risk of developing DR, which emphasizes the need of early identification and treatment (American Academy of Ophthalmology, 2008). Timeliness of intervention depends on regular monitoring.
- **Hypertension:** Hypertension greatly increases the risk for diabetic retinopathy, so clearly linking cardiovascular health with eye health (American Academy of Ophthalmology, 2008).
- **Poor Glycemic Control:** Emphasizing the requirement of efficient diabetes management techniques, higher blood sugar levels increase a risk of DR (American Academy of Ophthalmology, 2008). Better glycemic management may result from continuous glucose monitoring.
- **Lifestyle:** Poor nutrition and lack of exercise help to control diabetes generally and can aggravate the risk of DR development (American Academy of Ophthalmology, 2008). Encouragement of sensible living is absolutely vital.

2.2.4 Glaucoma

Often referred to as the "silent thief of sight," glaucoma is a primary cause of blindness affecting approximately 76 million people worldwide; estimates suggest that by 2040 this figure could reach 112 million. Usually, the sneaky character of the disease results in notable visual disability prior to patient awareness of its existence.

Glaucoma Risk Variables

- **Age:** A major risk factor for glaucoma is age; prevalence of the condition rises in those over 50 (American Academy of Ophthalmology, 2008).
- **Family History:** Particularly in some groups, genetic predispositions clearly influence the chance of glaucoma development (American Academy of Ophthalmology, 2008).
- **Ethnicity:** Some ethnic groups are more likely to get glaucoma, which implies that these people should receive particular screening (American Academy of Ophthalmology, 2008).
- **Medical Conditions:** Conditions such as hypertension and diabetes also enhance the risk of getting glaucoma (American Academy of Ophthalmology, 2008). Reducing general risk depends on controlling several comorbidities.

2.3 African Review

2.3.1 Cataracts

Research across various African nations highlights the prevalence of cataracts and their impact on public health. A systematic review of studies is needed to better understand local prevalence and management strategies, as well as to address the barriers to accessing care.

Risk factors for African cataracts

- **Access to Healthcare:** Timeliness of treatment is affected by limited resources and healthcare infrastructure, hence increasing rates of preventable blindness (Burgess et al., 2013).
- **Nutrition:** Malnutrition can increase vulnerability to cataracts, stressing the necessity of public health measures focused on improving nutritional status (Burgess et al., 2013).
- **Education:** Awareness of eye health is generally low, contributing to the late presentation of cataracts and other eye problems (Burgess et al., 2013). Educational initiatives can raise awareness.

2.3.2 Retinopathy Associated with Diabetes

Burgess et al. (2013) conducted a systematic review including data on diabetic retinopathy prevalence and incidence throughout Africa, revealing notable variances depending on study approaches. The study underlined the need of big, community-based research to better grasp the factors influencing diabetic retinopathy in African settings.

African Diabetic Retinopathy Risk Factors

- **Diabetes Prevalence:** High rates of diabetes contribute to higher incidence of DR, so stressing the importance of efficient diabetes management programmes (Burgess et al., 2013).

Restricted screening and therapy choices impede timely management of DR, hence causing avoidable vision loss (Burgess et al., 2013).

- **Education and Awareness:** Low levels of awareness regarding diabetes management further exacerbate the problem, hence focused educational initiatives are rather important (Burgess et al., 2013).

2.3.3 Glaucoma:

A 2021 study by Kyei et al. assessed the clinical and sociodemographic characteristics of glaucoma patients at a tertiary referral facility in Zimbabwe, therefore highlighting important information vital for local glaucoma care. Shapes of healthcare policies and resource distribution depend on this kind of study.

Risk Variables for African Glaucoma

- **Age:** Older groups show more prevalence rates, so regular glaucoma screening is advised in this group (Kyei et al., 2021).
- **Restricted Access to Care:** By the time patients seek treatment and management obstacles can cause advanced illness states (Kyei et al., 2021).
- **Socioeconomic Factors:** Access to eye care treatments is highly influenced by socioeconomic circumstances, therefore impacting general health outcomes (Kyei et al., 2021).

2.4 Public Welfare Consequences

Developing sensible public health plans depends on an awareness of the prevalence and risk factors connected with certain eye disorders. The scarcity of thorough data in Mashonaland Central highlights the need of focused interventions including awareness campaigns catered to local populations and senior screening programs. Promoting the value of frequent eye exams and controlling systemic disorders such diabetes and hypertension depends on educational initiatives.

All things considered, age, lifestyle choices, and the frequency of glaucoma, cataracts, and diabetic retinopathy clearly correlate. Given the great frequency of ocular problems among elderly people, especially in low-income environments, more study and public health campaigns are desperately needed. This study will give vital data for the policies and medical treatments in Mashonaland Central, so improving the quality of life for the elderly people.

Chapter 3

Prevalence and risk factors for Glaucoma, Cataracts and Diabetic retinopathy among patients aged 50 years and above in Mashonaland Central Hospitals.

Research methodology and design

3.1 Introduction

Research methodology refers to specific procedures or techniques by which the research will conduct their study. This chapter addresses the research design, setting, sampling procedure, research instruments, ethical considerations, data collection and analysis. All the procedures by which the study was conducted are explained in this chapter

3.2 Study design

A cross-sectional design was used for this investigation. Cross sectional study design is a type of research in which data is collected from many different individuals at a single point in time. This design allows data collection at a single point in time, making it efficient for identifying associations between risk factors and eye diseases.

3.3 Study period

The study was conducted from September 2024 to July 2025.

3.4 Study population

The study populations were patients aged 50 years and above attending out patient in Mashonaland Central Hospitals.

3.5 Research instruments and materials

Questionnaire, case records and clinical examination was used to collect social and demographic information for study participants by the research team. A six-meter Snellen acuity chart was used to assess the visual acuity for the participants. The assessment of visual acuity was done monocular by use of a trial frame and occlude lens. A tonopen tonometer was used to measure intraocular pressure for glaucoma screening. A handheld ophthalmoscopy was used to assess the retina and optic nerve for signs of diabetic retinopathy. Slit lamp biomicroscope was used to examine the lens and diagnose cataracts. Sanitization of the instruments including eye occluder and tonopen was performed before each testing procedure following World Health Organization (WHO) guidelines in light of infection control.

3.6 Validity and reliability of instruments

Participants' information was only accessed and asked by the researcher only to ensure confidentiality and privacy of participants. However, some participants could have given false responses, thus affecting validity of the research.

3.7 Sampling method

Random sampling method was used to pick the study sample from the patient's population.

3.8 Sample size

The required minimum number of participants was determined using the proportional equation below.

$$n = \frac{Z^2 \cdot p \cdot (1 - p)}{E^2}$$

N=required sample size

Z=Z-value (the number of standard deviations from the mean, corresponding to the desired confidence level e.g., 1.96 for 95% confidence)

P=estimated prevalence and risk factors of diabetic retinopathy, cataracts and glaucoma (as proportion 0.05 for 5%)

e=margin of error (as proportion e.g., 0.02 for $\pm 2\%$)

$$n = \frac{1.96^2 \cdot 0.05(1-0.05)}{0.03^2}$$

$$n=200$$

The study had a minimum target of 200 participants for the research.

3.9 Inclusion criteria

Patients aged 50 years and above.

3.10 Exclusion criteria

1. Patients with prior surgeries (except cataract surgery), systemic diseases affecting vision (e.g. uveitis), or those unable to provide informed consent.
2. Patients with cognitive impairments that prevent informed consent

3.11 Data Collection

Data was collected from three Mashonaland Central Hospitals which are Bindura Provincial Hospital, Mvurwi Hospital and Karanda Mission Hospital.

3.12 Case records

Medical records from the hospital database were reviewed to identify eligible participants (patients aged 50 years and above). Relevant data was extracted from medical records, including demographic information (age, sex, medical and ocular history, and any documented risk factors such as diabetes mellitus, hypertension, and family history of eye diseases. Specific attention was given to identification of previous screening or treatments related to glaucoma, cataracts and diabetic retinopathy.

3.13 Questionnaire

A five-section questionnaire was used to gather the data. The participants' demographic information was collected in the first part of the survey, which was also self-administered. The participants' reports of ocular and systematic health were collected in the second section, ocular

symptoms were asked in the third section. Social information was collected in the fourth chapter of the survey. Additional comments were given the last section of the survey.

3.14 Clinical examination

Comprehensive eye examination was done to the participants following examination protocol

The examination included

1. Case history
2. Visual acuity testing
3. Intraocular pressure measurement for assessment of glaucoma
4. Slit lamp examination for cataract evaluation
5. Fundoscopy to identify signs of diabetic retinopathy

3.15 Data analysis

The collected data was entered into google form and then transferred into the Statistical Package for Social Sciences (SPSS) software version 21 for analysis. The data entered into these packages was computed in frequencies, percentages, and proportions. The Chi-square test was performed to identify association between risk factors and glaucoma, cataracts, diabetic retinopathy

3.16 Ethical consideration

Ethical approval was obtained from the Bindura University of Science, Education Ethics Committee with approval number An authorization letter was also presented from the Hospitals. Participation in the study was not compulsory and participants were free to leave at any moment; the participants were given informed consent with all descriptions of the study. Confidentiality was maintained and assured by excluding participants' names from the data. All study participants were advised about the importance of regular ocular screening even in the absence of any visual symptoms or problems.

3.17 Budget

The expected budget includes printing costs of visual acuity charts and questionnaires, transport costs to the Hospitals for data collection. No funding was received for this project.

Chapter 4

4.1 Introduction

This chapter gives a report of the findings of the study of the prevalence and risk factors of Glaucoma, Cataracts and Diabetic Retinopathy among patients aged 50 years and above in Mashonaland Central hospitals. This chapter presents the demographic characteristics of the participant's prevalence, risk factors and degree of all the three diseases which are being studied as well as the distribution of these three diseases among the participant's gender. Statistical reports on the association of Glaucoma, Cataracts and Diabetic retinopathy (DR) and risk factors under investigation are also included in this chapter.

4.2 Demographic profiles

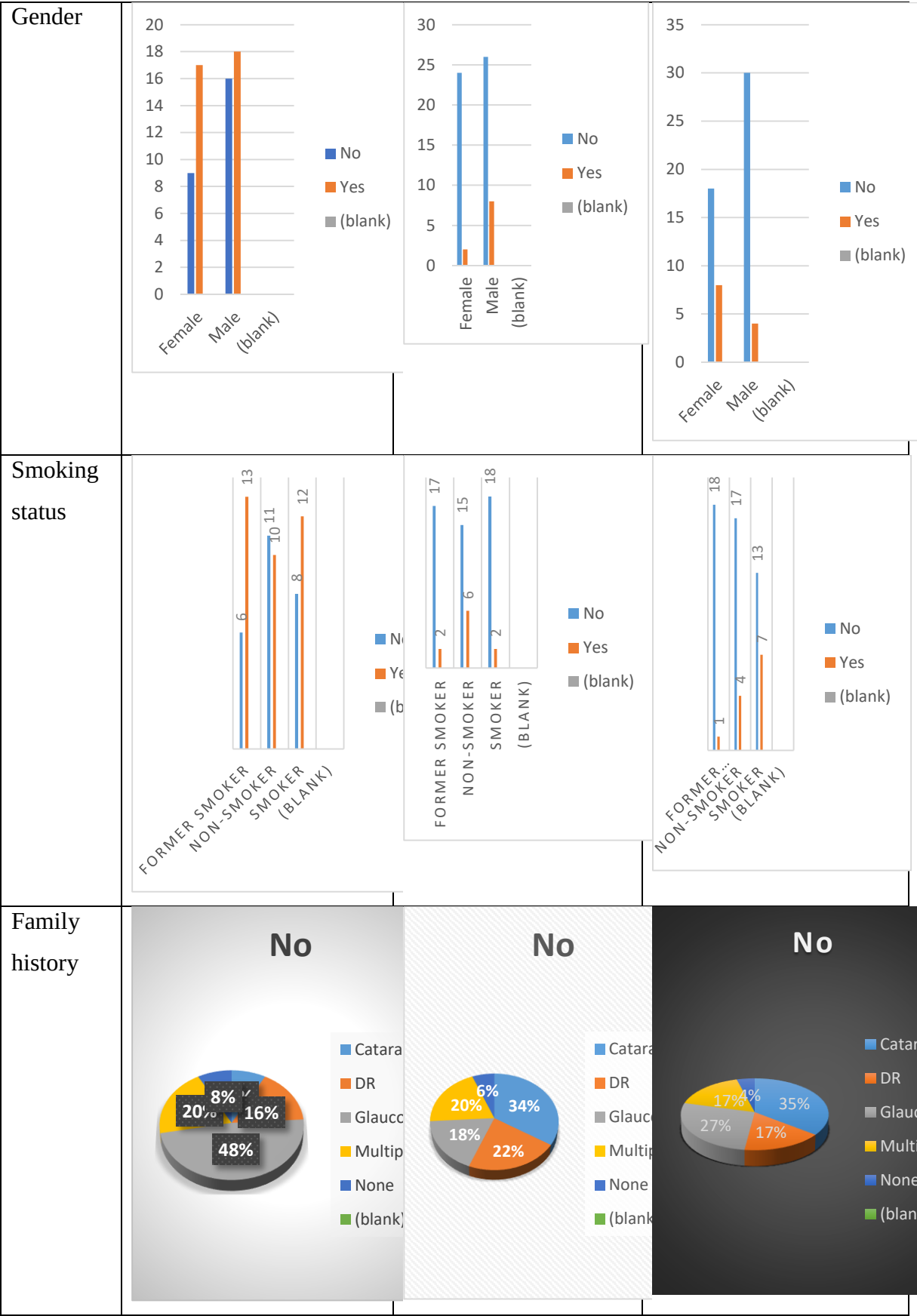
A total of 60 people took part in the study and were aged from 50 years and above. The mean age of participants is 68.7667 and a standard deviation of 11.9878. Table 4.1 provides a summary of participant's demographic information. 34 (56.7%) male participants outnumbered 26 (43.3%) female participants. Most participants 13 (21.67%) were from Rushinga and 11 (18.3%), 11 (18.3%), 10 (16.67%), 9 (15%) and 6 (10%) elderly people participated from Mt Darwin, Mazowe, Shamva, Bindura and Guruve respectively.

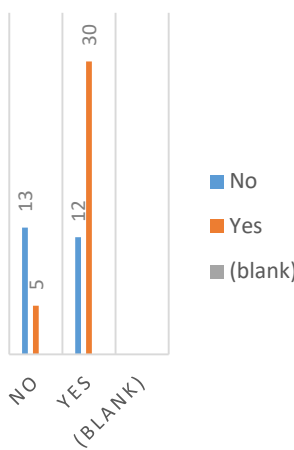
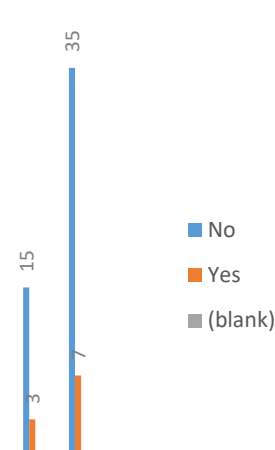
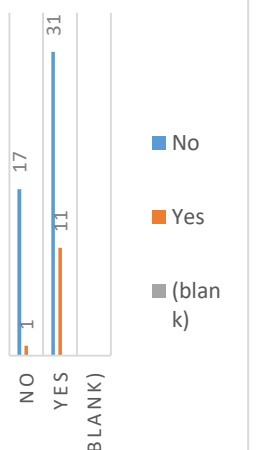
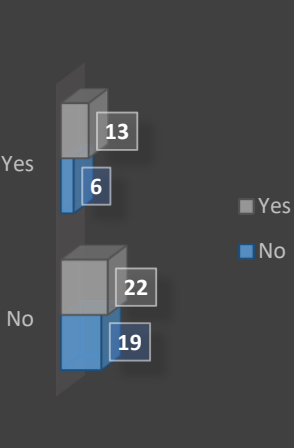
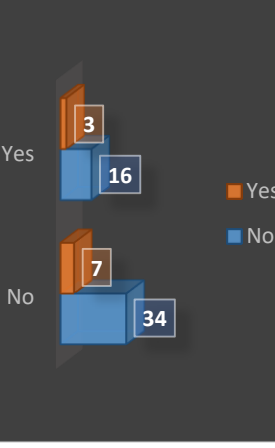
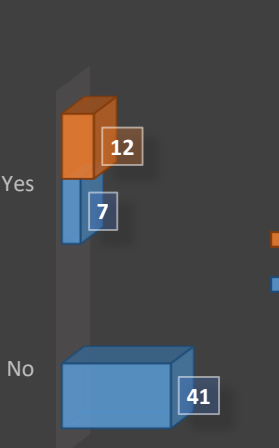
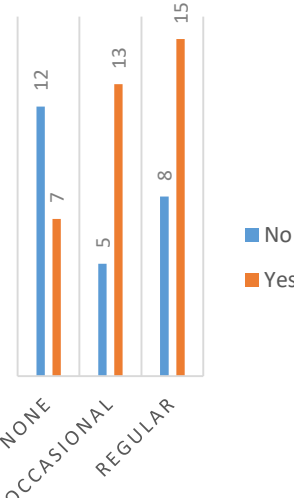
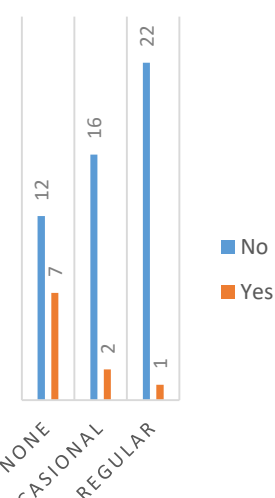
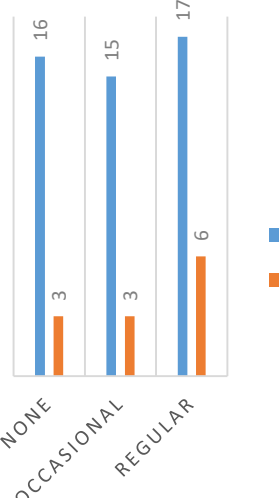
Table 4.1 Demographic information:

		Mean	Standard deviation	Frequency	Percentage %
			11.9878		
Sex	Female			26	43.3
	Male			34	56.7
Town/City	Rushinga			13	21.67
	Shamva			10	16.67
	Mt Darwin			11	18.3
	Mazowe			11	18.3
	Bindura			9	15
	Guruve			6	10

4.3 Prevalence of Cataracts, Glaucoma and Diabetic retinopathy (DR) by risk factors

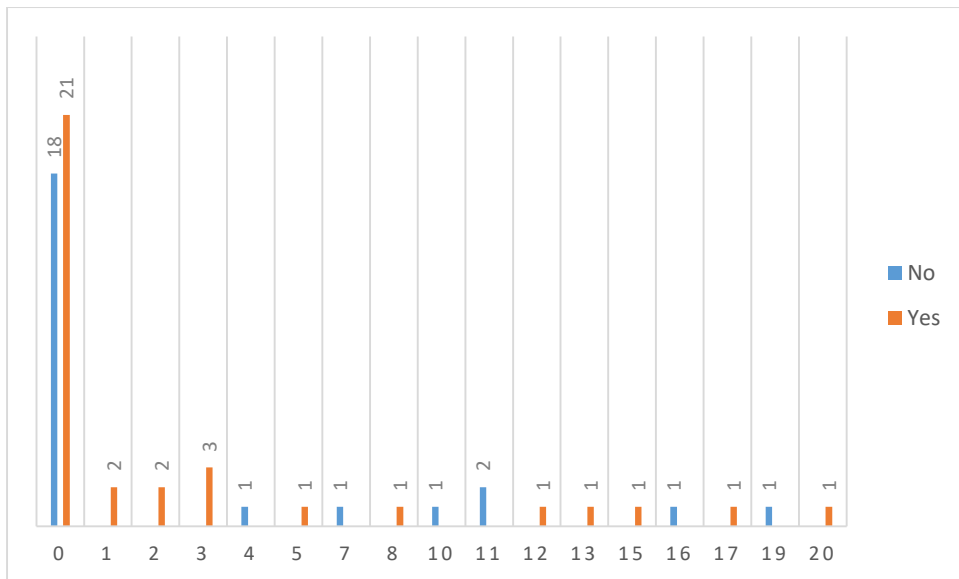
Risk factor	Associated with Cataract	Associated with Glaucoma	Associated with Diabetic Retinopathy (DR)
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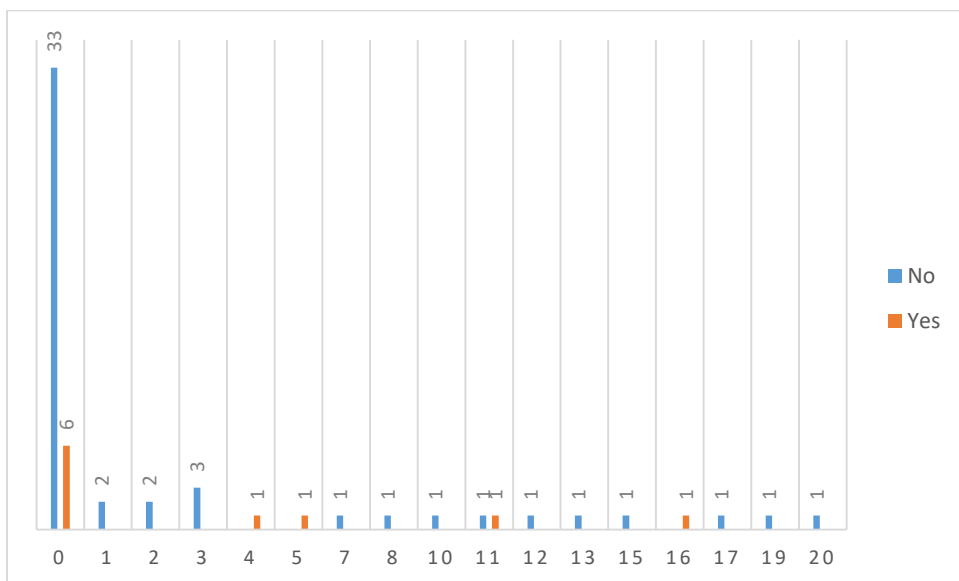
Hyperten sion	 <table><tr><th>Gender</th><th>No</th><th>Yes</th><th>(blank)</th></tr><tr><td>Male</td><td>13</td><td>5</td><td></td></tr><tr><td>Female</td><td>12</td><td>30</td><td></td></tr></table>	Gender	No	Yes	(blank)	Male	13	5		Female	12	30		 <table><tr><th>Gender</th><th>No</th><th>Yes</th><th>(blank)</th></tr><tr><td>Male</td><td>15</td><td>3</td><td></td></tr><tr><td>Female</td><td>35</td><td>7</td><td></td></tr></table>	Gender	No	Yes	(blank)	Male	15	3		Female	35	7		 <table><tr><th>Gender</th><th>No</th><th>Yes</th><th>(blank)</th></tr><tr><td>Male</td><td>17</td><td>1</td><td></td></tr><tr><td>Female</td><td>31</td><td>11</td><td></td></tr></table>	Gender	No	Yes	(blank)	Male	17	1		Female	31	11	
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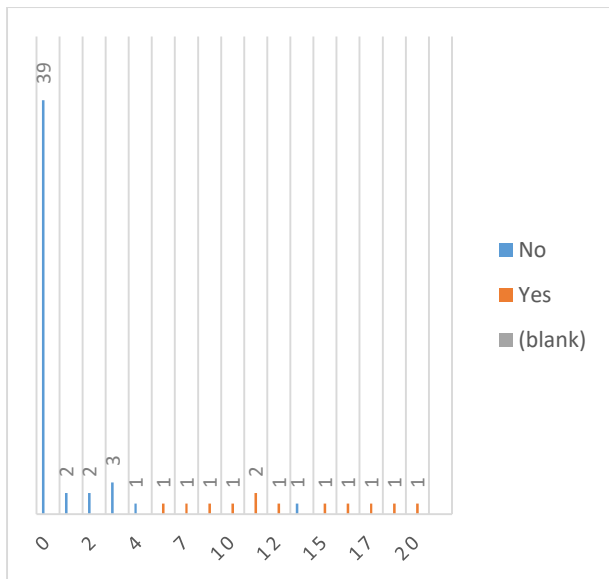
Duration of diabetes mellitus vs Cataracts



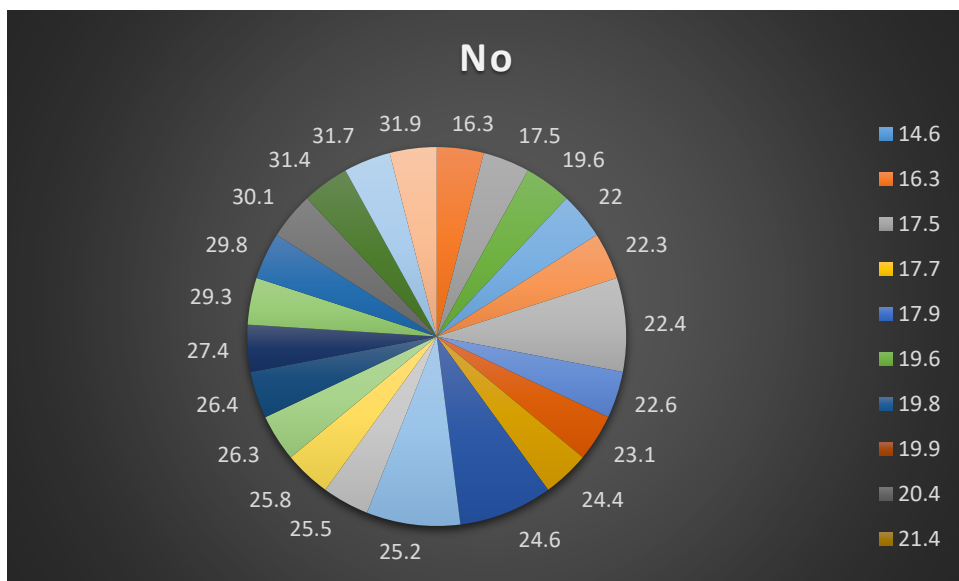
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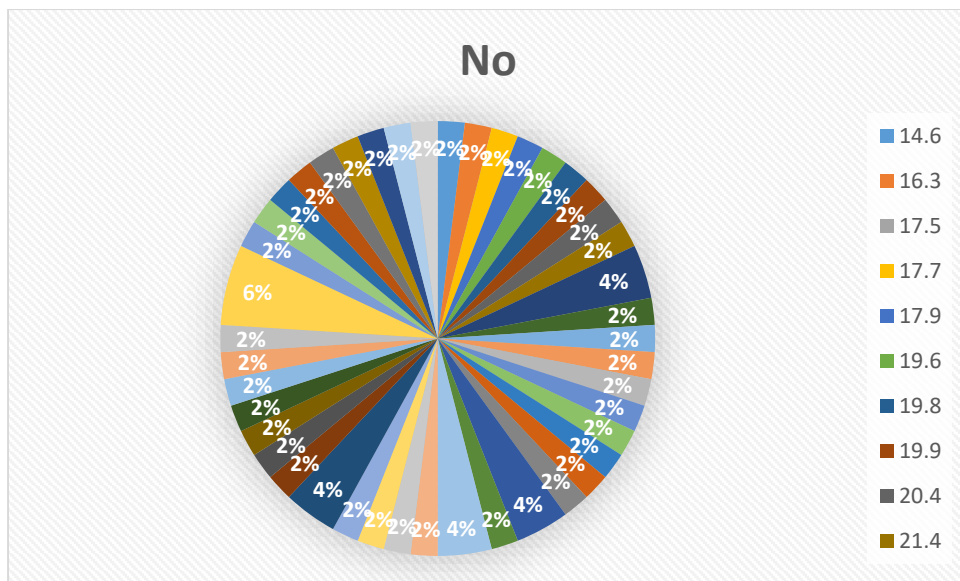
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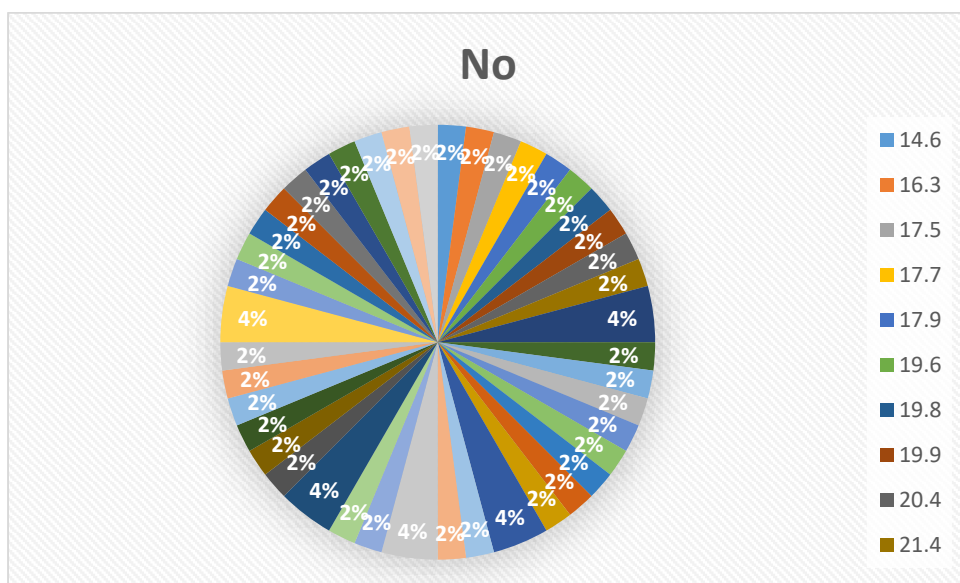
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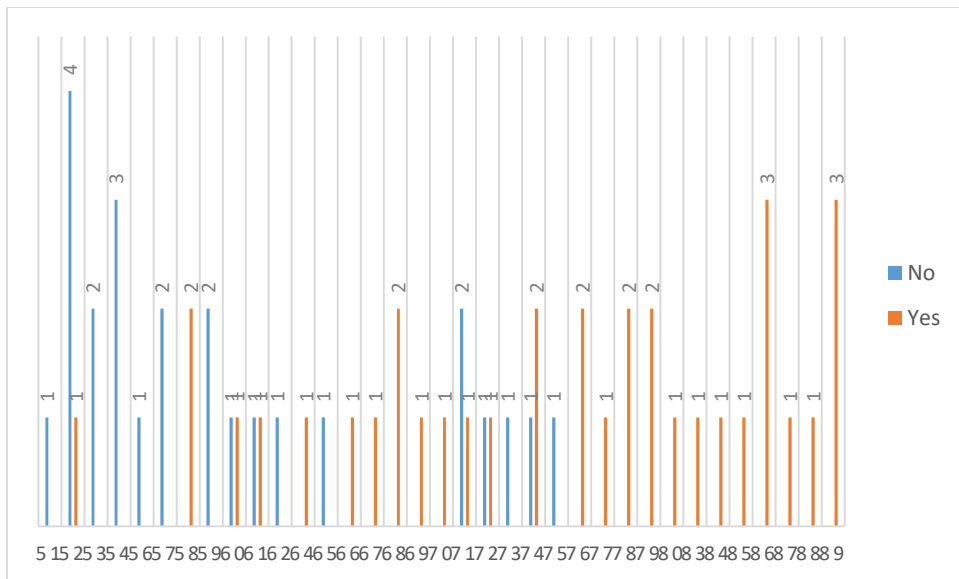
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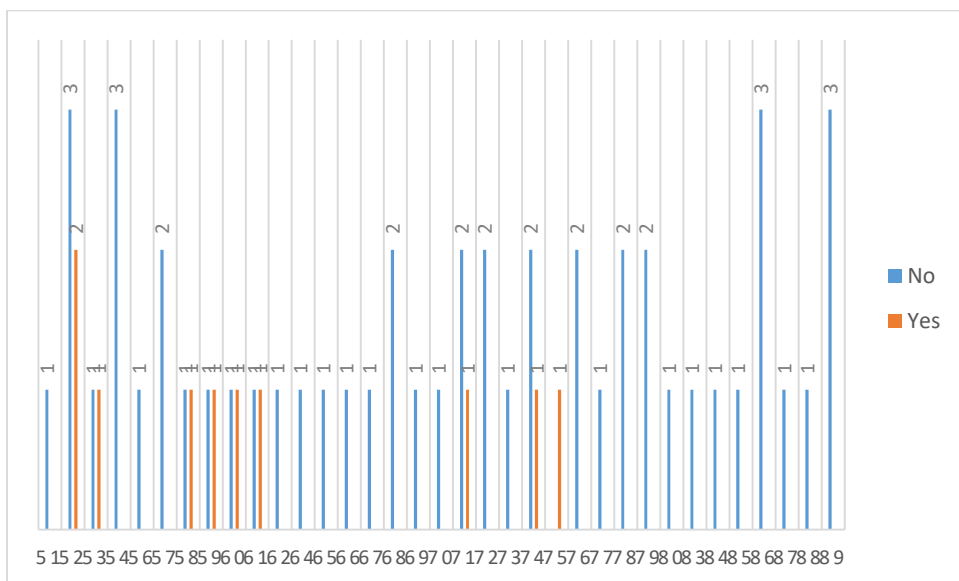
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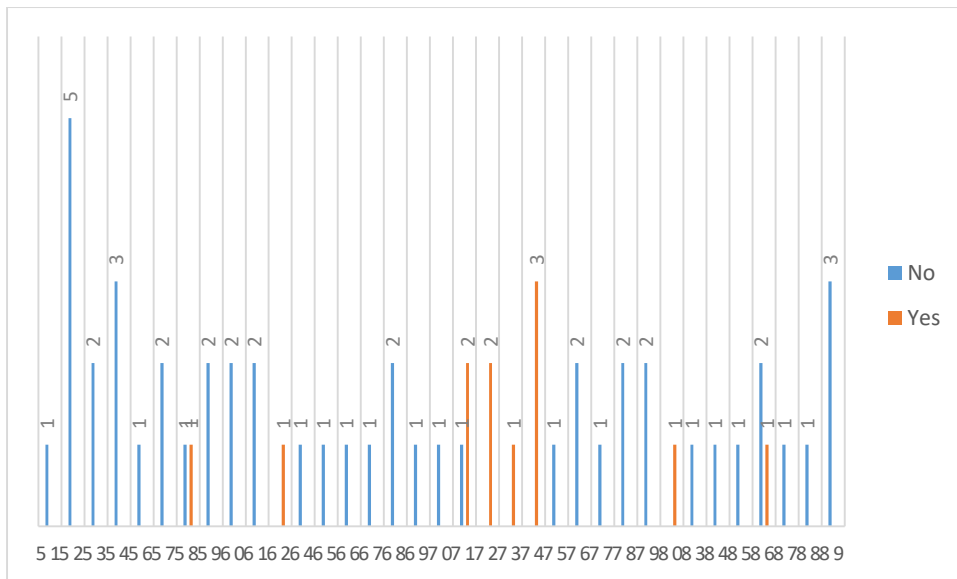
Age vs. Cataract



Age vs. Glaucoma



Age vs. Diabetic Retinopathy (DR)



4.4 Statistical analysis of associations

Variable compared	p-value	Significance
Cataract vs. gender	0.00523	Significant
Glaucoma vs. gender	3.0	Not significant
DR vs. gender	6.185	Not significant
Smoking status vs. Cataract	0.0086067	Significant
Smoking status vs. Glaucoma	4.50	Not significant
Smoking status vs. DR	2.203	Not significant
Alcohol intake vs. Cataracts	0.000836	Significant
Alcohol intake vs. Glaucoma	1.124	Not significant
Alcohol intake vs. DR	1.324	Not significant
Family history vs. Cataracts	0.05922	Not significant
Family history vs. Glaucoma	4.0891	Not significant
Family history vs. DR	1.547	Not significant
Hypertension vs. Cataracts	4.299	Not significant
Hypertension vs. Glaucoma	1.164	Not significant
Hypertension vs. DR	6.1	Not significant

Exercise vs. Cataract	0.15344	Not significant
Exercise vs. Glaucoma	1.374	Not significant
Exercise vs. DR	6.0249	Not significant
Diabetes vs. Cataract	0.0046231	Significant
Diabetes vs. Glaucoma	1.1544	Not significant
Diabetes vs. DR	4.103	Not significant
Duration of Diabetes vs. Cataract	0	Significant
Duration of Diabetes vs. Glaucoma	0	Significant
Duration of Diabetes vs. DR	0	Significant
BMI vs. Cataract	0	Significant
BMI vs. Glaucoma	1	Not significant
BMI vs. DR	0	
Type of diabetes vs. Cataract	5.784	Not significant
Type of Diabetes vs. Glaucoma	3.1184	Not significant
Type of Diabetes vs. DR	1.082	Not significant
Age vs. Cataracts	0	Significant
Age vs. Glaucoma	0.4027837	Not significant
Age vs. DR	0	Significant

4.5 Summary of the key insights from this chapter

- Cataracts were the most prevalent condition among the participants
- Old age and hypertension showed notable association with cataracts
- Diabetes had a significant association with Diabetic retinopathy
- Further analysis and interpretation of these results will be done in the next chapter.

CHAPTER 5

5.1 Introduction

Around the world glaucoma cataracts, and diabetic retinopathy are a widespread cause of visual impairment and are regarded as a significant public health concern. The chapter serves to discuss the findings of this research project and those from other similar studies conducted world wide.

5.2 Discussion of findings

DISCUSSION OF FINDINGS

5.2.1 Prevalence of eye diseases

The result results from this study shows that cataracts were the most prevalent eye disease amongst the participant of our research who were aged 50 years and above in Mashonaland Central . This finding is also in relation with both the national and global trends. where cataracts continue to be one of the leading causes of blindness and visual impairment especially amongst elderly patients. The WORLD Health Organisations has consistently indicated cataracts as a primary contributor to avoidable blindness, especially in low- and middle-income countries where access to surgical intervention is limited.

There is a lower prevalence³ of glaucoma and Diabetic retinopathy in the study population , though clinically significant ,this suggest that while these conditions are present ,cataracts are more commonly observed ,commonly because of continual exposure to environmental factors like ultra violet light , nutritional deficiencies , and the natural aging process of the crystalline lens.^{5/2/2} Association with Demographic factors

Age showed to be a very strong risk factor for cataracts and diabetic retinopathy ($p=0$). This is consistent with physiological aging process that increase the chances of oxidative stress and metabolic deregulation. Aging affects the protein structure of the lens, causing it to become opaque and leading to cataract formation.

IN relation to gender , a significant association was observed between cataracts and gender ($p=0.00523$), with males being slightly more affected .While some global studies have reported higher rates of cataracts among females because of longer life expectancy and hormonal factors, cultural ,occupational ,or lifestyle exposures in Mashonaland Central might explain the reverse pattern seen here.

Interestingly, neither Glaucoma nor diabetic retinopathy showed statistically significant association with gender, which shows variability seen in previous studies conducted in similar socio –demographic settings.

5.2.3 Association with lifestyle factors

The study showed that smoking was significantly associated with cataracts ($p=0.0086$). This finding is supported by extensive literature that has studies confirming that tobacco smoke speeds up the development of nuclear cataracts through oxidative damage to lens protein. Similar drinking alcohol was shown to have a significant relationship with the development of cataracts. ($p=0.000836$), aligning with research that suggest excessive alcohol consumption interferes with antioxidant levels, promoting oxidative stress in ocular tissues.

Despite the known vascular impact smoking and alcohol, neither showed significant relationship with glaucoma or diabetic retinopathy in this study. This might possibly be due to the small sample size or underreporting of smoking and alcohol consumption, which are sometimes stigmatized behaviours. Especially in the rural populations

5.2.4 Association with medical risk factors

As expected, diabetes showed a significant association with cataract formation ($p=0,006$). People who are diabetic are known to be at a higher risk of developing cataracts due to osmotic stress on the lens induced hyperglycaemia. The duration of diabetes showed a strong association ($p=0$) with any of the three eye diseases studied. This is in agreement with the existing evidence that longer duration of diabetes increases exposure to micro vascular damage and metabolic derangements that impact ocular health.

While it is widely known as a risk factor for retinal vascular diseases, it did not show statistically significant association with any of the three eye diseases in this study. This could again be due to the limitations in diagnostic consistency or control of confounding factors during the collection of data.

Body Mass Index (BMI) also showed a significant association with cataract formation ($P=0$). Obesity is increasingly recognised as a risk factor for cataract, partly due to its link with metabolic syndrome, diabetes, and systemic inflammation.

It's seen that type of diabetes it was not highly associated with any of the eye disease, suggesting that the duration and control of diabetes may be more critical determinants of ocular complications than the type (Type 1 or Type 2) alone,

5.2.5 Comparison with Previous studies

These findings are consistent with previous studies in similar populations in Sub-Saharan Africa, where age, smoking, and diabetes have repeatedly been identified as primary risk factors for cataracts and diabetic retinopathy. For instance, a study in Kenya also found that diabetes and aging were predominant risk factors for diabetic eye disease, with lifestyle factors like smoking playing a secondary but important role.

The low statistical associations between risk factors and Glaucoma in this study mirror findings from some African settings, where primary open angle glaucoma progressed unnoticed until advanced stages making it difficult to establish statistical associations.

5.3 Conclusion

This study showed that cataracts are the most prevalent ocular disease among elderly individuals in Mashonaland Central, with significant associations with modifiable lifestyle factors (smoking alcohol, BMI) and non-modifiable factors (age, diabetes, duration of diabetes). These findings confirm the importance of early detection and targeted interventions, particularly among at-risk populations.

Although Glaucoma and Diabetic retinopathy were present, their lower prevalence and fewer significant links with risk factors underscore the need for improved screening and diagnostic services to detect these conditions early before irreversible damage occurs,

Ultimately, the study shows that many cases of blindness and visual impairment in this population are preventable if appropriate preventive, diagnostic, and management strategies are put implemented.

Chapter 6

6.1 Conclusion and Recommendation

In this cross sectional study, we determined the prevalence and risk factors of diabetic retinopathy, glaucoma and cataracts among patients who are 50 years and above in Mashonaland Central. The results from this study shows that cataracts were the most prevalent eye disease amongst participants of our study who were 50 years and above in Mashonaland central with significant association with non-modifiable lifestyle factors (smocking, alcohol ,BMI) and non-modifiable factors (age,diabetes,duration of diabetes). There is a lower prevalence of Glaucoma and Diabetic Retinopathy in the study population.

6.2 Study limitations

The sample size of the study is only a small proportion therefore the study has limited generalisability to entire Zimbabwe. Lack of resources to move around to various hospitals to test patients and some of the patients were not willing to participate.

6.3 Recommendations

6.3.1 Regular eye examinations

In order to ensure early diagnosis and improvement of vision impairment disorders, which can have a substantial effect on overall quality of life and day to day activities, it is advised that all 50 years and above patients should schedule for regular appointments for comprehensive eye examinations.

6.3.2 Diabetes Retinopathy

Blood sugar control

Patients with diabetes should maintain optimal blood glucose levels to slow the progression of diabetic retinopathy by choosing an appropriate diet, regular physical activities and adherence to prescribed medication, manage stress and lifestyle adjustments.

Blood pressure and cholesterol management

Keep blood pressure and cholesterol levels within the normal range to reduce risk of complications.

6.3.3 Cataracts

For patients with cataracts, recommendations include optimizing vision with updated prescription spectacles or contact lenses, utilising magnifying lenses, increasing light and wearing sunglasses. If these measures are insufficient, cataract surgery may be necessary.

6.3.4 Glaucoma

For patients with Glaucoma, it's crucial to adhere to prescribed medications and follow lifestyle recommendations like maintaining a healthy weight, and engaging in regular exercises. Additionally, protecting the eyes from injury. If medication is insufficient, surgical procedures may be necessary to improve fluid drainage.

6.4 Education health Education

Eye health education in hospitals and communities is important as it aims to raise awareness on diabetic retinopathy, cataracts and glaucoma .this includes educating individuals on the importance of regular eye exams, healthy lifestyle choices and protective measures against eye injuries and diseases. Patients' needs to attend outreach programs where they can get education about eye care

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Diabetic Retinopathy Preferred Practice Pattern. San Francisco: American Academy of Ophthalmology. <http://www.aao.org/ppp> 1.4 Aim of the Study

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