BMJ Open

Prevalence of Cataract and Associated Factors among Adults Aged 40 Years and Above in Durame Town, Southern Ethiopia, 2023

Journal:	*BMJ Open*
Manuscript ID	bmjopen-2024-089741
Article Type:	Original research
Date Submitted by the Author:	07-Jun-2024
Complete List of Authors:	Latebo, Ashenafi ; Bule Hora University, Optometry Assefa, Natnael ; University of Gondar, Department of Optometry Ferede, Tarekegn ; University of Gondar, Department of Ophthalmology Bekele, Matiyas; University of Gondar, Department of Optometry Demilew, Ketemaw Zewdu; University of Gondar, Department of Optometry
Keywords:	Prevalence, Cataract and refractive surgery < OPHTHALMOLOGY, Myopia

I, the Submitting Author has the right to grant and does grant on behalf of all authors of the Work (as defined in the below author licence), an exclusive licence and/or a non-exclusive licence for contributions from authors who are: i) UK Crown employees; ii) where BMJ has agreed a CC-BY licence shall apply, and/or iii) in accordance with the terms applicable for US Federal Government officers or employees acting as part of their official duties; on a worldwide, perpetual, irrevocable, royalty-free basis to BMJ Publishing Group Ltd ("BMJ") its licensees and where the relevant Journal is co-owned by BMJ to the co-owners of the Journal, to publish the Work in this journal and any other BMJ products and to exploit all rights, as set out in our licence.

The Submitting Author accepts and understands that any supply made under these terms is made by BMJ to the Submitting Author unless you are acting as an employee on behalf of your employer or a postgraduate student of an affiliated institution which is paying any applicable article publishing charge ("APC") for Open Access articles. Where the Submitting Author wishes to make the Work available on an Open Access basis (and intends to pay the relevant APC), the terms of reuse of such Open Access shall be governed by a Creative Commons licence – details of these licences and which Creative Commons licence will apply to this Work are set out in our licence referred to above.

Other than as permitted in any relevant BMJ Author's Self Archiving Policies, I confirm this Work has not been accepted for publication elsewhere, is not being considered for publication elsewhere and does not duplicate material already published. I confirm all authors consent to publication of this Work and authorise the granting of this licence.

Prevalence of Cataract and Associated Factors among Adults Aged 40 Years and Above in Durame Town, Southern Ethiopia, 2023

Ashenafi Abebe Latebo[1], Natnael Lakachew Assefa[2], Dr.Tarekegn Wuletaw Ferede[3], Matiyas Mamo Bekele[2], Ketemaw Zewdu Demilew[2]

[1]Institute of health, Bule Hora University Ethiopia

[2]Department of Optometry, College of Medicine and Health Sciences, Comprehensive Specialized Hospital, University of Gondar, Gondar, Ethiopia

[3]Department of Ophthalmology, College of Medicine and Health Sciences, Comprehensive Specialized Hospital, University of Gondar, Gondar, Ethiopia

Corresponding author- Matiyas Mamo Bekele

Department of Optometry, College of Medicine and Health Sciences, Comprehensive Specialized Hospital, University of Gondar, Gondar, Ethiopia

Email: matthiasm2013@gmail.com

Cell Phone: +251939417464

P.O.Box:196

Abstract

Objective: This study aimed to assess the prevalence of cataract and associated factors among adults aged 40 years and above in Durame town, Southern Ethiopia.

Design: A community-based cross-sectional study was conducted using a systematic random sampling method.

Setting: The study was conducted in Durame town, Southern Ethiopia.

Participants: The study included 734 adults with aged ≥40 years who lived in Durame town for more than 6 months.

Main outcome measures: Data were collected using face to face interview completed by an interviewer and ophthalmic examinations.

Results: A total of 734 study participants aged 40 years and above were involved. The prevalence of cataract was 29.16% (95%, CI: 25.89-32.59). Factors associated with the prevalence of cataract were older age of 70-95 years (AOR=8.60, 95% CI: 3.09-23.90), being diabetic (AOR= 2.27, 95% CI: 1.37-3.74), exposure to sunlight (AOR= 2.83, 95% CI: 1.45- 5.53), trauma to eye (AOR= 2.39, 95% CI: 1.19-4.81), hypertension (AOR= 1.86, 95% CI:1.16-2.99), and glaucoma (AOR=5.36,95% CI: 3.13-9.18).

Conclusion: The prevalence of cataract was lower than previous national survey result. Old age, known history of trauma to eye, hypertension, diabetes, exposure to sunlight and glaucoma had statistically significant association with cataract.

Keywords: Prevalence, Cataract, Adults, Durame town, Southern Ethiopia

Strengths and limitations of the study

- This study presents updated evidence on the magnitude and associated factors of cataract to reduce visual impairment in patients with cataract in Durame town, Southern Ethiopia.
- As this study demonstrates the temporal association of predictors with cataract rather than identifying the actual cause.
- Since the study mainly focuses on quantitative data, it provides limited information on the qualitative aspects and their impact relationship.

Introduction

Cataract is a condition where the eye's lens becomes cloudy, leading to blurred vision and possibly blindness.[1] Opacification occurring on or inside the lens can impede the amount of light entering the retina, causing a reduction in vision that correlates with the degree of opacification. Cataracts can be either congenital or acquired, with the latter resulting from various factors such as aging, metabolic disorders, trauma, intraocular inflammation, and ocular or systemic conditions.[2] Cataracts are most common in elderly individuals, with age-related cataracts being the most prevalent.[3]

Globally, cataracts are the leading cause of blindness and the second leading cause of moderate and severe visual impairment. Over 100 million people worldwide are affected by cataracts, with 17 million cases resulting in blindness.[4] Nearly 70 million people worldwide experience bilateral blindness or moderate to severe visual impairment due to cataracts.[5] As the aging population grows, cataract-related blindness is increasing, putting more pressure on healthcare systems.[6] The number of people who are blind due to cataracts is increasing as a result of population growth and longer lifespans.[7] In 2020, there were an estimated 15.2 million blind people aged 50 and over, and an additional 78.8 million individuals with moderate and severe visual impairment due to cataracts worldwide.[8] However, individuals living in low-income countries face a higher burden of cataracts due to limited access to cataract surgery.[9]

Cataract-related blindness is widespread in developing countries due to high service costs and limited access to surgery. We must act to ensure equal healthcare access for everyone.[10] Access to relatively simple and cost-effective treatment for cataracts is limited in low- and middle-income countries, where over 90% of people with visual impairment due to cataracts reside.[11] Cataract surgery is currently the only treatment available that can effectively address all types of cataracts.[12] Due to limited eye care facilities, high user fees, and transportation costs, many people have poor access to eye care services.[11]

The prevalence of cataracts in people aged 40 and older ranges from 11.8% to 18.8%.[5, 9] Cataracts are a major public health concern in Sub-Saharan Africa, accounting for

over 46% of blindness cases, and 52.4% and 70.6% of moderate and severe visual impairments due to cataracts, respectively.[13, 14] The 2005/2006 national survey on blindness and low vision in Ethiopia identified cataracts as the leading cause of blindness (49.9%) and low vision (42.3%).[15] Cataracts in adults over 40 can lead to secondary glaucoma and uveitis, increased dependency and decreased mobility, economic loss, mortality, decreased quality of life, and increased risk of failure.[2, 16, 17] Evidence has shown several risk factors associated with cataract, including smoking,[18, 19] marital status,[20] educational status,[21] diabetes,[22] sunlight exposure,[23] high body mass index,[24] steroid use,[25] increasing age,[26, 27] and female gender.[28]

Cataract is currently the primary cause of blindness and visual impairment in Ethiopia.[15] Studies conducted in communities and institutions show that in Ethiopia, the prevalence of cataracts ranges from 20.1% to 57%.[29, 30] There is a wide range of results among various studies on the prevalence of cataracts and the factors associated with them in patients aged 40 years and above. There is also little information about the magnitude of cataracts in Ethiopia, and no study has been conducted in the Durame town area. Understanding the prevalence of cataracts and the associated factors in the population can help prevent visual impairment and support the successful implementation of the VISION 2030 program in Ethiopia. This study aims to investigate the prevalence of cataracts and their associated factors in adults aged 40 years and above in Durame town.

Method and Materials

Study Design, Period and Area

A community based cross-sectional study was conducted in Durame town, located in southeastern Ethiopia, between April 25, 2023, and May 30, 2023. Durame is the administrative center of the Kembata Tembaro Zone and is situated 112km away from Hawassa, the capital of Sidama regional state, and 280 km away from Addis Ababa, the capital of Ethiopia. The town has a latitude and longitude of 7°14′N 37°53′E and an elevation of 2,101 meters above sea level. The average temperature in Durame ranges from 16.5-29.8°C. According to the Durame town health office, the town has three kebeles, which are the smallest administrative units in Ethiopia: Lalo, Kasha, and Zeraro. The current total population of Durame is 65,852, with 31,367 being males and 34,485 being females. Adults aged 40 years and above account for 21,257 of the total population. The town has 10,248 households distributed across the three kebeles. Despite the presence of enough health facilities in the town, there is only one eye-care center that does not provide cataract surgery services (obtained from Durame town health office unpublished source).

Study Population and Eligible Criteria

All adults aged ≥ 40 years who lived in Durame town for more than 6 months and available during the data collection period were included in the study. However, Adults who have bilateral pseudophakia, Phthitic (enucleated) eyes and bilateral corneal opacity which prevent to visualize crystalline lens were excluded from the study.

Sample Size Determination and Sampling Procedures

The sample size was determined using single population proportion formula n = $\frac{(Z\,\alpha/_2)^2 x\ P\ (1-P)}{d^2}$ with the following consideration (n=sample size, Z- the value of z statistic at 95% confidence level = 1.96, P= the estimated proportion of cataract from previous study = 20.1%,[30] d = margin of error of ±3%, and 10% non-response rate. The final sample size was determined to be 755. There were three kebeles (the smallest administrative unit) found in Durame town. A systematic random sampling technique was applied to select the required study participants from those three kebeles. The households were selected after calculating the sampling interval (K-value). The calculated sampling interval was 13 (k = 10248/755=13.57). The first household was chosen using a simple random sampling method (lottery method). Then, one adult aged 40 years and above was recruited in every 13th household. If more than one adult of age 40 years and above were found adults in one household, lottery method was used to select one. An immediate next-door household was included in the interview when there was no eligible person who fulfilled the inclusion criteria at the selected household.

Patient and public involvement

Patients and/or the public were not involved in the study design, conduct of the study or plan to disseminate the result of this study to the study participants.

Operational definitions

Cataract: A clouding or loss of transparency of the lens with in the posterior capsule, nucleus and/or cortex of the eye which is revealed with slit lamp examination of the crystalline lens.[29]

Visual impairment : Functional limitation of eyes or visual system due to visual disorder or disease that can result in a visual disability or a visual hand cap with a presenting visual acuity of <6/12.[31]

Cigarette Smoking: Individuals considered as smokers if the smoke > 100 sticks of cigarettes in his/her life time and non-smoker if he/she smoke < 100 sticks cigarettes in their life time without current history of smoking.[32]

Sunlight exposure: Participants who exposed to sunlight for 6 hours or more per day are considered exposed whereas those with sunlight exposed less than 6 hours per day are considered as non-exposed.[32]

Sleeping duration: Participants who considered as exposed if the individual sleeps for more than 6 hours and non- exposed if the individual sleeps for 6 hours or less per day.[32]

Diabetic mellitus : If the individual has/had a known diagnosed diabetic mellitus or undergoing antidiabetic therapy.[33]

Systemic Hypertension: If the individual has/had a known diagnosed hypertension or undergoing antihypertensive therapy.[34]

Glaucoma : If the individual has/had known diagnosed glaucoma or undergoing antiglaucoma therapy.[35]

Myopia: If the individual has/had a known diagnosed myopia.[33]

Trauma: If the individual has/had a known previous history of eye injury.[2]

Data collection tool and procedure

The eligible participants were interviewed through an interviewer-administered questionnaire after taking informed written consent. The questionnaire covered sociodemographics and other relevant variables. The questionnaire was adapted from various literature and administered by a trained ophthalmic nurse practitioner. Two optometrists conducted an examination using Snellen's visual acuity chart, portable slit lamp bio-microscope, and direct ophthalmoscopes. The data collection process was supervised by the principal investigator. The principal investigator provided one day of training to the data collectors on data collection techniques, instrument use, and how to maintain ethical standards. A pretest was conducted on 5% (37) of the sample size in Angacha before the actual data collection to check for completeness, appropriateness, and common understanding. Modifications were made accordingly. To ensure the quality of the data, the PI closely supervised the data collection procedure on a daily basis. A review was conducted in the field to check the completeness of the questionnaire, and any corrections were made in the field. The data was then coded for data management. Data cleaning and cross-checking were also done before data analysis.

Statistical Analysis

The data collected was exported to Stata version 14 for analysis. Descriptive statistics, such as frequency and percentage, were used to summarize the data. To check the multicollinearity of variables, the variance inflation factor and the tolerance test were used. To determine the factors associated with cataract, binary logistic regression was applied. Variables with a P value of less than 0.2 in the bivariable analysis were included in the multivariable regression analysis. The goodness of the model fit was tested using the Hosmer–Lemeshow test. Variables with a P value of less than 0.05 in the multivariable logistic regression analysis were considered statistically significant at the 95% confidence interval.

Result

Sociodemographic data of study participants

A total of 734 study participants were involved in this study giving a response rate of 97.2%. The mean age of the study participants was 58.6 years with ±12.4 standard deviation.

From the total study participants, 390 (53.13%) were males. About 484 (65.94%) were married. About 158 (21.53) were unable to read and write and 198 (26.98%) study participants were government employees (**Table 1**).

Health related data of adult participants

About 143 (19.48%) of study participants had a family history of cataract, 171 (23.30%) had diabetes mellitus, 271(36.92) had systemic hypertension, and 156 (21.25%) had glaucoma (**Table 2**).

Health behavior and environmental factors of participants

Of the total study participants 37 (5.04%) were cigarette smokers and 156 (21.25%) had a history of eye trauma (**Table 3**).

Prevalence of Cataract

The prevalence of cataract among study participants of aged 40 years and above in Durame town was 29.16 % (95%, CI: 25.89-32.59).

Prevalence of different type of lens opacity

Of the total number of participants 8.86% had posterior sub-capsular opacity, 0.27% had nuclear opacity, 11.99% had cortical opacity and the remaining had combination of the above.

Factors associated with cataract

In bivariable binary logistic regression factors: Age, occupation, marital status, educational status, monthly income, smoking, eye trauma, diabetes mellitus, Hypertension, glaucoma, steroid medication, myopia, and sunlight exposure were associated with cataract at a p-value of < 0.25. Then, multivariable binary logistic regression was used to assess the relative effect of the independent variables on the outcome variable. In multivariable analysis factors such as age, known history of trauma

to the eye, diabetic mellitus, hypertension, exposure to sunlight and glaucoma had significant association with cataract.

The odds of having cataract among study participants aged 70-95 years was 8.60 (AOR=8.60, 95% CI: 3.09-23.90) times higher compared to participants aged 40-49 years. On the other-hand the odds of having cataract in adults aged 50-59 years was 2.74 (AOR=2.74, 95%CI: 1.16-6.48) times higher compared to aged 40-49 years.

The odds of having cataract was 2.27 (AOR= 2.27, 95% CI: 1.37-3.74) times higher among diabetic participants when compared to participants who didn't have diabetic mellitus. In adults who spend ≥ 6 hours per day on average sunlight, the odds of having cataract was 2.83 (AOR= 2.83, 95% CI: 1.45- 5.53) times higher compared to those adults who spend less than 6 hours per day. The odds of having cataract in adults who had known history of trauma to the eye in their life time was 2.39 (AOR= 2.39, 95% CI: 1.19-4.81) times higher compared to those who didn't have a history of trauma to the eye in their life time.

The odds of having cataract in adults with systemic hypertension was 1.86 (AOR= 1.86, 95% CI: 1.16-2.99) times higher than adults who didn't have systemic hypertension. In adults who had glaucoma, the odds of having cataract was 5.36 (AOR=5.36, 95% CI: 3.13-9.18) times higher when compared to adults without glaucoma history (Table 4).

Discussion

The finding of this study showed that prevalence of cataract among adults was 29.16% (95%, CI: 25.89-32.59) which was in line with the a study conducted in Malaysia 26.8%.[36] This might be due to similarities in study population which was done in older populations, study design and ocular examination of study participants.

However, this study finding was much lower than the studies conducted in Debre Markos 57%,[29] Malawi 46.2%,[37] Ghana 48.9%,[38] South Africa 44%,[39] in India 65.7%,[33] in Spain 67.2%,[17] and in Korea 87.8%.[40] This discrepancy might be due to Methodological differences, geographical variations, age inconsistencies and population differences among the study participants. For instance, the study design employed in Debre Markos, Ethiopia,[29] and Malawi[37] was an institutional-based unlike this study. The study population in studies conducted in Northern India,[33] Spain,[17] and Korea [40] was among adults aged ≥ 50 years which is older than study population in this study. One of the most significant risk factors for cataracts is old age, as indicated by various studies. However, a study conducted in Northern India focused on diabetic populations. The increased prevalence of cataracts in the Northern Indian study could be attributed to diabetes mellitus, which was not a factor in the other study.

The prevalence of cataract in this study was higher compared to studies conducted in Ethiopia 20.1%,[30] Nigeria 19.8%,[40] Southwestern Nigeria 2%,[41] South Africans 4.4%,[42] Poland 12.10%,[35] Korea 25.2%,[40] USA 0.167%,[43] and Los Angeles Latino Eye Study 1.92%.[44] The differences could be attributed to a variety of factors such as socioeconomic status, geography, climate, lifestyle, and healthcare disparities between the study locations.

The difference in the prevalence of cataracts across different regions of the world may be attributed to variations in age groups studied, definitions used, sociodemographic, economic, lifestyle, and health-related factors, as well as methodological differences.

In this study older age was significantly associated with cataract. This finding was similar with studies conducted in Whagmira, Ethiopia,[30] Ghana,[38] Nigeria,[40] Southwestern Nigeria,[41] India,[45] Cuenca Spain,[17] China,[46] Korea,[16] and in Maryland.[47]

As people age, the cell membranes, including the lens epithelial cells, which are responsible for maintaining the balance of ions and metabolism of the entire lens, may become damaged. This can lead to an accumulation of fluid inside the lens. Additionally, abnormal differentiation of lens fibers and the formation of protein aggregates can occur, both of which contribute to the development of cataracts.[2]

This study found a significant association between exposure to sunlight and cataract, which is consistent with a study done in Korea.[16] This is because exposure to ultraviolet radiation can harm lens proteins and cells, leading to cataract formation due to oxidative stress damage.[48]

Having history of diabetic mellitus was significantly associated with cataract in this study. There was similar evidence in studies conducted in South Africa,[39] Southern India,[49] Sankara Nethralayia India,[33] Singapore,[36] Poland,[35] and Chinese population.[50] This could be due to high blood sugar (blood glucose) levels can create an imbalance of water content in the crystalline lens that can accelerate the development of cataracts.[33]

In this study, known systemic hypertension was associated with cataract. This result is consistent with finding of Korean study [16] and Los Angeles Latino Eye Study.[44] Cataract development is closely related to systemic inflammation and hypertension. Inflammatory mechanism can lead to conformational changes in proteins in the lens capsules, exacerbating cataract formation. Certain antihypertensive medications can also induce cataracts.[34]

In this study, having a history of glaucoma was significantly associated with cataract. This similar association was observed in study conducted in Lodz, Poland.[35] There is no direct link between cataracts and glaucoma, although treatment of glaucoma can accelerate cataract formation in certain situations.[51]

History of trauma to the eye in the life time of the adult was significantly associated with cataract. This association is consistent with a study conducted in Whagmira, Ethiopia.[30] The possible reason might be that trauma to the eye can disrupt the normal physiological condition of the crystalline lens. This can be caused by damage to the epithelial membrane, leading to an increase in fluid influx into the lens. As a result, the lens fibers become swollen and thickened, ultimately leading to the development of

cataracts. If the trauma is caused by an electric shock, cataracts may result from the coagulation of proteins and osmotic changes that occur in the crystalline lens.[52]

Conclusion

In this study, the prevalence of cataract was lower than previous national survey result. Besides, older age, known history of trauma to eye, hypertension, diabetes, exposure to sunlight and glaucoma had statistically significant association with cataract.

Declarations

Ethics approval

This study was conducted in accordance of accordance with the Declaration of Helsinki. Ethical approval was obtained from the Ethical Review Committee at University of Gondar, College of Medicine and Health Sciences, Comprehensive and Specialized Hospital, and School of Medicine. A letter of support was provided by the administration of Durame town. Written informed consent was obtained from all participants after detailed explanation of the purpose of the study. Written informed consent was approved by the ethical review committee at University of Gondar, and the ethical approval number was 622/05/2023. All included participants were informed of their right to withdraw from the study at any time during the interview. No risk was taken for the selected study participants. Confidentiality was maintained by not using personal identifiers in the data collection tools and by password-protecting the data on a computer.

Consent for publication

Not applicable.

Funding

The authors have not declared a specific grant for this research from any funding agency in the public, commercial or not-for-profit sectors.

Conflict of interests

All authors declared that there is no conflict of interest in this research work.

Data availability of statement

All data are relevant to the study are included in the article or uploaded as supplemental information.

Authors' contributions

AAL conceptualised the research design, formulated the research questions, takes full responsibility for the work, designed and implemented the research methodology, and conducted extensive reviewers of the manuscript. NLA and KZD contributed to refining the research objectives and conceptualization of the study, conducted statistical analyses and interpreted the results. NLA, KZD and TWF assisted in refining the methodological approach and methodological decisions, led the data collection efforts, organized and managed datasets, and ensured data quality and integrity. AAL, MMB and KZD conducted statistical analyses, interpreted the results, drafted the initial manuscript, outlining the research background, methodology and results, and reviewed the manuscript.

Acknowledgments

We would like to express our appreciation to the study participants for their willingness to participate in this study. Authors would also like to acknowledge the dedicated data collectors.

References

1. Nizami AA, Gulani AC, Redmond SB. Cataract (Nursing). 2021.
2. Bobrow J, Beardsley T, Jick S, Rosenburg L, Wiggins M, Reich E, et al. Lens and cataract, basic and clinical science course. American Academy of Ophthalmology. 2012;2013:39-41.
3. Delbarre M, Froussart-Maille F. Signs, symptoms, and clinical forms of cataract in adults. Journal Francais D'ophtalmologie. 2020;43(7):653-9.
4. Burton MJ, Ramke J, Marques AP, Bourne RR, Congdon N, Jones I, et al. The Lancet global health Commission on global eye health: vision beyond 2020. The Lancet Global Health. 2021;9(4):e489-e551.
5. Baltussen R, Sylla M, Mariotti SP. Cost-effectiveness analysis of cataract surgery: a global and regional analysis. Bulletin of the World Health Organization. 2004;82(5):338-45.
6. Brian G, Taylor H. Cataract blindness: challenges for the 21st century. Bulletin of the World Health Organization. 2001;79:249-56.
7. Vision 2020: the cataract challenge. Community eye health. 2000;13(34):17-9.
8. Pesudovs K, Lansingh VC, Kempen JH, Steinmetz JD, Briant PS, Varma R, et al. Cataract-related blindness and vision impairment in 2020 and trends over time in relation to VISION 2020: the Right to Sight: an analysis for the Global Burden of Disease Study. Investigative Ophthalmology & Visual Science. 2021;62(8):3523-.
9. Fang R, Yu Y-F, Li E-J, Lv N-X, Liu Z-C, Zhou H-G, et al. Global, regional, national burden and gender disparity of cataract: findings from the global burden of disease study 2019. BMC Public Health. 2022;22(1):2068.
10. Lee CM, Afshari NA. The global state of cataract blindness. Current opinion in ophthalmology. 2017;28(1):98-103.
11. Jolley E, Virendrakumar B, Pente V, Baldwin M, Mailu E, Schmidt E. Evidence on cataract in low-and middle-income countries: an updated review of reviews using the evidence gap maps approach. International Health. 2022;14(Supplement_1):i68-i83.
12. Anbesse DH, Bizuneh ZY, Girum W, Mengistu MA. Vision Related Quality of Life among Cataract Patients Attending Cataract Surgery Campaigns in Ethiopia: A Dual Centre Study. Journal of Clinical and Experimental Ophthalmology. 2022;13(3):1-6.

13. Xulu-Kasaba ZN, Kalinda C. Prevalence of blindness and its major causes in sub-Saharan Africa in 2020: A systematic review and meta-analysis. British Journal of Visual Impairment. 2022;40(3):563-77.

14. Habiyakire C, Kabona G, Courtright P, Lewallen S. Rapid assessment of avoidable blindness and cataract surgical services in Kilimanjaro region, Tanzania. Ophthalmic epidemiology. 2010;17(2):90-4.

15. Berhane Y, Worku A, Bejiga A, Adamu L, Alemayehu W, Bedri A, et al. Prevalence and causes of blindness and low vision in Ethiopia. Ethiopian Journal of Health Development. 2007;21(3):204-10.

16. Borges LdL, Santos FPVd, Pagotto V, Menezes RLd. Functional disability in community-dwelling elderly: the role of cataracts and contextual factors. Fisioterapia em Movimento. 2014;27:189-200.

17. Navarro Esteban J, Gutierrez Leiva J, Valero Caracena N, Buendia Bermejo J, Calle Puron M, Martinez Vizcaino V. Prevalence and risk factors of lens opacities in the elderly in Cuenca, Spain. European journal of ophthalmology. 2007;17(1):29-37.

18. Hiller R, Sperduto RD, Podgor MJ, Wilson PW, Ferris FL, Colton T, et al. Cigarette smoking and the risk of development of lens opacities: the Framingham studies. Archives of ophthalmology. 1997;115(9):1113-8.

19. Lindblad BE, Håkansson N, Svensson H, Philipson B, Wolk A. Intensity of smoking and smoking cessation in relation to risk of cataract extraction: a prospective study of women. American journal of epidemiology. 2005;162(1):73-9.

20. Ackuaku-Dogbe E, Yawson A, Biritwum R. Cataract surgical uptake among older adults in Ghana. Ghana medical journal. 2015;49(2):84-9.

21. Klein R, Klein BE, Jensen SC, Moss SE, Cruickshanks KJ. The relation of socioeconomic factors to age-related cataract, maculopathy, and impaired vision: the Beaver Dam Eye Study. Ophthalmology. 1994;101(12):1969-79.

22. Klein BE, Klein R, Lee KE. Diabetes, cardiovascular disease, selected cardiovascular disease risk factors, and the 5-year incidence of age-related cataract and progression of lens opacities: the Beaver Dam Eye Study. American journal of ophthalmology. 1998;126(6):782-90.

23. West SK, Duncan DD, Muñoz B, Rubin GS, Fried LP, Bandeen-Roche K, et al. Sunlight exposure and risk of lens opacities in a population-based study: the Salisbury Eye Evaluation project. Jama. 1998;280(8):714-8.

24. Hiller R, Podgor MJ, Sperduto RD, Nowroozi L, Wilson PW, D'Agostino RB, et al. A longitudinal study of body mass index and lens opacities: the Framingham Studies. Ophthalmology. 1998;105(7):1244-50.

25. Wang JJ, Rochtchina E, Tan AG, Cumming RG, Leeder SR, Mitchell P. Use of inhaled and oral corticosteroids and the long-term risk of cataract. Ophthalmology. 2009;116(4):652-7.

26. Sasaki H, Jonasson F, Kojima M, Katoh N, Ono M, Takahashi N, et al. The Reykjavik Eye Study–prevalence of lens opacification with reference to identical Japanese studies. Ophthalmologica. 2000;214(6):412-20.

27. Xu L, Cui T, Zhang S, Sun B, Zheng Y, Hu A, et al. Prevalence and risk factors of lens opacities in urban and rural Chinese in Beijing. Ophthalmology. 2006;113(5):747-55.

28. McCarty CA, Mukesh B, Fu CL, Taylor HR. The epidemiology of cataract in Australia. American journal of ophthalmology. 1999;128(4):446-65.

29. Wale MZ, Derbew M, Tilahun M, Terefe M. Cataract and associated factors among adults visiting ophthalmic clinic at Debre Markos comprehensive specialized hospital, northwest Ethiopia, 2020. SAGE Open Medicine. 2021;9:2050312121989636.

30. Ahmed M, Beletew B, Mengesha A, Markos M. Prevalence of cataract and its associated factors among adults aged 40 years and above in Waghimra zone, Amhara, Northeast Ethiopia: A Community based cross-sectional study. 2020.

31. Organization WH. World report on vision. ISBN: 9789241516570. 2019.

32. Na K-S, Park Y-G, Han K, Mok JW, Joo C-K. Prevalence of and risk factors for age-related and anterior polar cataracts in a Korean population. PLoS One. 2014;9(6):e96461.

33. Raman R, Pal SS, Adams JSK, Rani PK, Vaitheeswaran K, Sharma T. Prevalence and risk factors for cataract in diabetes: Sankara Nethralaya Diabetic Retinopathy Epidemiology and Molecular Genetics Study, report no. 17. Investigative Ophthalmology & Visual Science. 2010;51(12):6253-61.

34. Yu X, Lyu D, Dong X, He J, Yao K. Hypertension and risk of cataract: a meta-analysis. PloS one. 2014;9(12):e114012.

35. Nowak MS, Smigielski J. The prevalence of age-related eye diseases and cataract surgery among older adults in the city of Lodz, Poland. Journal of ophthalmology. 2015;2015.

36. Yap JF, Ng QX, Wai YZ, Isahak M, Salowi MA, Moy FM. Prevalence of cataract and factors associated with cataract surgery uptake among older persons in Malaysia: A cross-sectional study from the National Eye Survey II. Tropical Doctor. 2022;52(2):325-30.

37. Msamati B, Igbigbi P, Batumba N. Prevalence of lens opacity at Queen Elizabeth Central Hospital in Blantyre, Malawi. East African medical journal. 2000;77(11).

38. Yawson AE, Ackuaku-Dogbe EM, Seneadza NAH, Mensah G, Minicuci N, Naidoo N, et al. Self-reported cataracts in older adults in Ghana: sociodemographic and health related factors. BMC public health. 2014;14(1):1-8.

39. Khoza LB, Tshivhase S, Pfungwa M, Ramakuela N, Manganye B. Survey on prevalence of cataract in selected communities in Limpopo Province of South Africa.

40. Mahdi AM, Rabiu M, Gilbert C, Sivasubramaniam S, Murthy GV, Ezelum C, et al. Prevalence and risk factors for lens opacities in Nigeria: results of the national blindness and low vision survey. Investigative ophthalmology & visual science. 2014;55(4):2642-51.

41. Komolafe O, Ashaye A, Ajayi B, Bekibele C. Visual impairment from age-related cataract among an indigenous African population. Eye. 2010;24(1):53-8.

42. Phaswana-Mafuya N, Peltzer K, Crampin A, Ahame E, Sokhela Z. Prevalence of self-reported diagnosed cataract and associated risk factors among elderly South Africans. International journal of environmental research and public health. 2017;14(12):1523.

43. Dawson CR, Schwab IR. Epidemiology of cataract—a major cause of preventable blindness. Bulletin of the World Health Organization. 1981;59(4):493.

44. Richter GM, Chung J, Azen SP, Varma R, Group LALES. Prevalence of visually significant cataract and factors associated with unmet need for cataract surgery: Los Angeles Latino Eye Study. Ophthalmology. 2009;116(12):2327-35.

45. Vashist P, Talwar B, Gogoi M, Maraini G, Camparini M, Ravindran RD, et al. Prevalence of Cataract in an Older Population in India.

46. Tang Y, Ji Y, Ye X, Wang X, Cai L, Xu J, et al. The association of outdoor activity and age-related cataract in a rural population of Taizhou Eye Study: phase 1 report. PLoS One. 2015;10(8):e0135870.

47. Research A-REDS. Risk factors associated with age-related nuclear and cortical cataract: A case-control study in the Age-Related Eye Disease Study, AREDS Report No. 5. Ophthalmology. 2001;108(8):1400-8.

48. national eye institute. New Research Sheds Light on How UV Rays May Contribute to Cataract. 2014.

49. Nirmalan P, Robin A, Katz J, Tielsch J, Thulasiraj R, Krishnadas R, et al. Risk factors for age related cataract in a rural population of southern India: the Aravind Comprehensive Eye Study. British journal of ophthalmology. 2004;88(8):989-94.

50. Jonas J, Xu L, Cui T, Zhang S, Sun B, Zheng Y, et al. Prevalence and risk factors of lens opacities in urban and rural chinese in Beijing. Acta Ophthalmologica Scandinavica. 2007;85.

51. Thapa SS, Berg RV, Khanal S, Paudyal I, Pandey P, Maharjan N, et al. Prevalence of visual impairment, cataract surgery and awareness of cataract and glaucoma in Bhaktapur district of Nepal: The Bhaktapur Glaucoma Study. BMC ophthalmology. 2011;11(1):1-9.

52. Weingeist T, Liesegang TJ, Grand MG. Basic and clinical science course: American Academy of Ophthalmology; 1998.

Table 1: Sociodemographic and economic characteristics of study participants aged 40 years and above in Durame town, Southern Ethiopia, 2023 (n=734)

Variables	Catagories	Frequency	Percent (%)
Age	40-49	174	23.71
	50-59	229	31.20
	60-69	205	27.93
	70-95 years	126	17.16
Sex	Male	390	53.13
	Female	344	46.87
Occupation	Farmer	123	16.76
	Daily laborer	56	7.63
	Government employee	198	26.98
	Merchant	179	24.39
	House wife	178	24.25
Marital status	Never married	66	8.99
	Married	484	65.94
	Divorced or separated	48	6.54
	Widowed	136	18.53
Educational status	Unable to read and write	158	21.52
	Primary school	115	15.67
	Secondary school	253	34.47
	College and above	208	28.34
Health insurance	Yes	339	46.19
	No	395	53.81
Monthly income	< 2000	371	50.54
	2000-5999	166	22.62
	≥ 6000	197	26.84

Table 2: Health related data of the study participants aged 40 years and above in Durame town, Southern Ethiopia, 2023 (n=734).

Variables	Categories	Frequency	Percentage (%)
Family history of cataract	Yes	143	19.48
	No	591	80.52
Diabetes mellitus	Yes	171	23.30
	No	563	76.70
Systemic hypertension	Yes	271	36.92
	No	463	63.08
Glaucoma	Yes	156	21.25
	No	578	78.75
Myopia	Yes	175	23.84
	No	559	76.16
Steroid use	Yes	139	18.94
	No	595	81.06
Visual impairment	Normal	377	51.36
	Mild	85	11.58
	Moderate	106	14.44
	Severe	92	12.53

Table 3: Health behavior/life style and environmental factors among study participants aged 40 years and above in Durame town, Southern Ethiopia, 2023 (n=734).

Variables	Categories	Frequency	Percentage (%)
Smoking cigarette	Yes	37	5.04
	No	697	94.96
Sleep duration	Exposed	113	15.40
	Non exposed	621	84.60
Exposure to sunlight	Non exposed	147	20.03
	exposed	587	79.97
Trauma	Yes	156	21.25
	No	578	78.75

n= sample size

Table 4: Factors associated with cataract among study participants aged 40 years and above in Durame town, Southern Ethiopia, 2023 (n=734)

Variable	Cataract		COR (95% CI)	AOR (95%CI)	p-value
	Yes	No			
Age					
40-49	11	163	1	1	
50-59	40	189	3.14 (1.56-6.31)	2.74 (1.16-6.48)	0.022
60-69	83	122	10.08 (5.15-19.73)	5.65 (2.37-13.46)	<0.0001
70-95 years	80	46	25.77 (12.67-52.43)	8.60(3.09-23.90)	<0.0001
Occupation					
Farmer	63	60	1	1	
Daily laborer	12	44	0.26 (0.13-0.54)	0.93 (0.36-2.40)	0.885
Government employee	48	150	0.30 (0.19-0.49)	0.40 (0.12-1.26)	0.118
Merchant	21	158	0.13 (0.39-0.98)	0.51 (0.22-1.20)	0.123
Housewife	70	108	0.62 (0.39-0.98)	1.31 (0.70-2.46)	0.402
Marital status					
Never married	5	61	1	1	
Married	135	349	4.72 (1.86-12.00)	0.64 (0.19-2.15)	0.475
Divorced or Separated	12	36	4.07 (1.32-12.48)	0.57(0.13-2.42)	0.445
Widowed	62	74	10.22 (3.87-27.02)	0.57 (0.15-2.13)	0.403
Education status					

Unable to read and write	83	75	1	1	
Primary school	40	75	0.48 (0.29-0.79)	0.81 (0.41-1.61)	0.548
Secondary school	41	212	0.17 (0.11-0.28)	0.53 (0.24-1.18)	0.121
College and above	50	158	0.29 (0.18-0.45)	1.05 (0.29-3.79)	0.938
Smoking cigarette					
No	205	492	1	1	
Yes	9	28	0.77 (0.36-1.66)	1.46 (0.54-3.95)	0.452
Eye trauma					
No	133	445	1	1	
Yes	81	75	3.61 (2.50-5.23)	2.39 (1.19-4.81)	0.014
Diabetes mellitus					
No	118	445	1	1	
Yes	96	75	4.83 (3.35-6.94)	2.27 (1.37-3.74)	0.001
Systemic hypertension					
No	84	379	1	1	
Yes	130	141	4..16 (2.97-5.82)	1.86 (1.16-2.99)	0.011
Glaucoma					
No	112	44	1	1	
Yes	102	476	11.88 (7.89-17.88)	5.36 (3.13-9.18)	<0.0001
Steroid use					

No	176	419	1	1	
yes	38	101	0.90 (0.59-1.35)	0.85 (0.40-1.81)	0.680
Myopia					
No	118	441	1	1	
Yes	96	79	3.01 (2.15-4.20)	1.52 (0.93-2.49)	0.093
Sunlight exposure					
Non-exposed	60	87	1	1	
Exposed	154	433	0.52 (0.35-0.75)	2.83 (1.45- 5.53)	0.002
Monthly income					
< 2000	115	256	1.25 (0.85-1.84)	0.74 (0.23-2.38)	0.615
2000-5999	47	119	1.10 (0.69-1.75)	1.27 (0.50-3.22)	0.619
≥ 6000	52	145	1	1	

Note: n-sample size, COR-Crude odds ratio, AOA-Adjusted odds ratio and CI-Confidence interval

BMJ Open

Prevalence of Cataract and Its Associated Factors among Adults Aged 40 Years and Above Living in Durame Town, Southern Ethiopia, 2023: Community based Cross-Sectional Study

Journal:	*BMJ Open*
Manuscript ID	bmjopen-2024-089741.R1
Article Type:	Original research
Date Submitted by the Author:	22-Oct-2024
Complete List of Authors:	Latebo, Ashenafi ; Bule Hora University, Optometry Assefa, Natnael ; University of Gondar, Department of Optometry Ferede, Tarekegn ; University of Gondar, Department of Ophthalmology Bekele, Matiyas; University of Gondar, Department of Optometry Demilew, Ketemaw Zewdu; University of Gondar, Department of Optometry
Primary Subject Heading:	Ophthalmology
Secondary Subject Heading:	Ophthalmology
Keywords:	Prevalence, Cataract and refractive surgery < OPHTHALMOLOGY, Myopia

I, the Submitting Author has the right to grant and does grant on behalf of all authors of the Work (as defined in the below author licence), an exclusive licence and/or a non-exclusive licence for contributions from authors who are: i) UK Crown employees; ii) where BMJ has agreed a CC-BY licence shall apply, and/or iii) in accordance with the terms applicable for US Federal Government officers or employees acting as part of their official duties; on a worldwide, perpetual, irrevocable, royalty-free basis to BMJ Publishing Group Ltd ("BMJ") its licensees and where the relevant Journal is co-owned by BMJ to the co-owners of the Journal, to publish the Work in this journal and any other BMJ products and to exploit all rights, as set out in our licence.

The Submitting Author accepts and understands that any supply made under these terms is made by BMJ to the Submitting Author unless you are acting as an employee on behalf of your employer or a postgraduate student of an affiliated institution which is paying any applicable article publishing charge ("APC") for Open Access articles. Where the Submitting Author wishes to make the Work available on an Open Access basis (and intends to pay the relevant APC), the terms of reuse of such Open Access shall be governed by a Creative Commons licence – details of these licences and which Creative Commons licence will apply to this Work are set out in our licence referred to above.

Other than as permitted in any relevant BMJ Author's Self Archiving Policies, I confirm this Work has not been accepted for publication elsewhere, is not being considered for publication elsewhere and does not duplicate material already published. I confirm all authors consent to publication of this Work and authorise the granting of this licence.

Prevalence of Cataract and Its Associated Factors among Adults Aged 40 Years and Above Living in Durame Town, Southern Ethiopia, 2023: Community based Cross-Sectional Study

Ashenafi Abebe Latebo[1], Natnael Lakachew Assefa[2], Dr.Tarekegn Wuletaw Ferede[3], Matiyas Mamo Bekele[2], Ketemaw Zewdu Demilew[2]

[1]Institute of health, Bule Hora University Ethiopia

[2]Department of Optometry, College of Medicine and Health Sciences, Comprehensive Specialized Hospital, University of Gondar, Gondar, Ethiopia

[3]Department of Ophthalmology, College of Medicine and Health Sciences, Comprehensive Specialized Hospital, University of Gondar, Gondar, Ethiopia

Corresponding author- Matiyas Mamo Bekele

Department of Optometry, College of Medicine and Health Sciences, Comprehensive Specialized Hospital, University of Gondar, Gondar, Ethiopia

Email: matthiasm2013@gmail.com

Cell Phone: +251939417464

P.O.Box:196

Abstract

Objective: This study aimed to assess the prevalence of cataract and associated factors among adults aged 40 years and above in Durame town, Southern Ethiopia.

Design: A community-based cross-sectional study was conducted using a systematic random sampling method.

Setting: The study was conducted in Durame town, Southern Ethiopia.

Participants: The study included 734 adults with aged ≥40 years who lived in Durame town for more than 6 months.

Main outcome measures: Data were collected using face to face interview completed by an interviewer and ophthalmic examinations.

Results: A total of 734 study participants aged 40 years and above were involved. The prevalence of cataract was 29.16% (95%, CI: 25.89-32.59). Factors associated with the prevalence of cataract were older age of 70-95 years (AOR=8.60, 95% CI: 3.09-23.90), being diabetic (AOR= 2.27, 95% CI: 1.37-3.74), exposure to sunlight (AOR= 2.83, 95% CI: 1.45- 5.53), trauma to eye (AOR= 2.39, 95% CI: 1.19-4.81), hypertension (AOR= 1.86, 95% CI:1.16-2.99), and glaucoma (AOR=5.36,95% CI: 3.13-9.18).

Conclusion: The prevalence of cataract was lower than previous national survey result. Old age, known history of trauma to eye, hypertension, diabetes, exposure to sunlight and glaucoma had statistically significant association with cataract.

Keywords: Prevalence, Cataract, Adults, Durame town, Southern Ethiopia

Strengths and limitations of the study

- This study provided up-to-date evidence on proportion and associated factors of cataract among adults aged 40 years and above living in Durame Town, Southern Ethiopia. This information is crucial for raising awareness about cataracts and their risk factors within the community.
- This study demonstrates the temporal association between predictive factors and cataracts, not the actual causation.
- Since the study mainly focuses on quantitative data, it provides limited information on the qualitative aspects and their impact relationship.

Introduction

Cataract is a condition where the eye's lens becomes cloudy, leading to blurred vision and possibly blindness.[1] Opacification occurring on or inside the lens can impede the amount of light entering the retina, causing a reduction in vision that correlates with the degree of opacification.[2] Cataracts can be either congenital or acquired, with the latter resulting from various factors such as aging, metabolic disorders, trauma, intraocular inflammation, and ocular or systemic conditions.[3] Cataracts are most common in elderly individuals, with age-related cataracts being the most prevalent.[4]

Globally, cataracts are the leading cause of blindness and the second leading cause of moderate and severe visual impairment. Over 100 million people worldwide are affected by cataracts, with 17 million cases resulting in blindness.[5] Nearly 70 million people worldwide experience bilateral blindness or moderate to severe visual impairment due to cataracts.[6] As the aging population grows, cataract-related blindness is increasing, putting more pressure on healthcare systems.[7] The number of people who are blind due to cataracts is increasing as a result of population growth and longer lifespans.[8] In 2020, there were an estimated 15.2 million blind people aged 50 and over, and an additional 78.8 million individuals with moderate and severe visual impairment due to cataracts worldwide.[9] However, individuals living in low-income countries face a higher burden of cataracts due to limited access to cataract surgery.[10]

Cataract-related blindness is widespread in developing countries due to high service costs and limited access to surgery. We must act to ensure equal healthcare access for everyone.[11] Access to relatively simple and cost-effective treatment for cataracts is limited in low- and middle-income countries, where over 90% of people with visual impairment due to cataracts reside.[12] Cataract surgery is currently the only treatment available that can effectively address all types of cataracts.[13] Due to limited eye care facilities, high user fees, and transportation costs, many people have poor access to eye care services.[12]

The prevalence of cataracts in people aged 40 and older ranges from 11.8% to 18.8%.[10] Cataracts are a major public health concern in Sub-Saharan Africa, accounting for over

46% of blindness cases, and 52.4% and 70.6% of moderate and severe visual impairments due to cataracts, respectively.[14] The 2005/2006 national survey on blindness and low vision in Ethiopia identified cataracts as the leading cause of blindness (49.9%) and low vision (42.3%). Cataracts in adults over 40 can lead to secondary glaucoma and uveitis, increased dependency and decreased mobility, economic loss, mortality, decreased quality of life, and increased risk of failure.[15, 16]

Evidence has shown several risk factors associated with cataract, including smoking, marital status, educational status, diabetes, sunlight exposure, high body mass index, steroid use, increasing age, and female gender.[17]

Cataract is currently the primary cause of blindness and visual impairment in Ethiopia.[18] Despite existing studies on cataract prevalence in Ethiopia, most have been conducted in hospitals, with only one study being community-based. This highlights a significant gap in research, particularly regarding the prevalence of cataracts in southern Ethiopia, including the study area. This study aims to address this gap by assessing the proportions of cataracts and the factors associated with them in patients aged 40 years and above. Understanding the prevalence of cataracts and the related factors in the population is crucial for preventing visual impairment and effectively implementing the VISION 2030 program in Ethiopia.

Method and Materials

Study Design, Period and Area

A community based cross-sectional study was conducted in Durame town, located in southeastern Ethiopia, between April 25, 2023, and May 30, 2023. Durame is the administrative center of the Kembata Tembaro Zone and is situated 112km away from Hawassa, the capital of Sidama regional state, and 280 km away from Addis Ababa, the capital of Ethiopia. The town has a latitude and longitude of 7°14′N 37°53′E and an elevation of 2,101 meters above sea level. The average temperature in Durame ranges from 16.5-29.8°C. According to the Durame town health office, the town has three kebeles, which are the smallest administrative units in Ethiopia: Lalo, Kasha, and Zeraro. The current total population of Durame is 65,852, with 31,367 being males and 34,485 being females. Adults aged 40 years and above account for 21,257 of the total population. The town has 10,248 households distributed across the three kebeles. Despite the presence of enough health facilities in the town, there is only one eye-care center that does not provide cataract surgery services (obtained from Durame town health office unpublished source).

Study Population and Eligibility Criteria

All adults aged ≥ 40 years who lived in Durame town for more than 6 months and available during the data collection period were included in the study. However, Adults who have bilateral pseudophakia, Phthitic (enucleated) eyes and bilateral corneal opacity which prevent to visualize crystalline lens were excluded from the study.

Patient and public involvement

Patients and/or the public were not involved in the study design, conduct of the study or plan to disseminate the result of this study to the study participants.

Sample Size Determination and Sampling Procedures

The sample size was determined using single population proportion formula n = $\frac{(Z\,\alpha/_2)^2 x\ P\ (1-P)}{d^2}$ with the following consideration (n=sample size, Z- the value of z statistic at 95% confidence level = 1.96, P= the estimated proportion of cataract from previous study = 20.1%,[19] d = margin of error of ±3%, and 10% non-response rate. The final sample size was determined to be 755. There were three kebeles (the smallest administrative unit) found in Durame town. A systematic random sampling technique was applied to select the required study participants from those three kebeles. The households were selected after calculating the sampling interval (K-value). The calculated sampling interval was 13 (k = 10248/755=13.57). The first household was chosen using a simple random sampling method (lottery method). Then, one adult aged 40 years and above was recruited in every 13th household. If more than one adult of age 40 years and above were found adults in one household, lottery method was used to select one. An immediate next-door household was included in the interview when there was no eligible person who fulfilled the inclusion criteria at the selected household.

Operational definitions

Cataract: A clouding or loss of transparency of the lens with in the posterior capsule, nucleus and/or cortex of the eye which is revealed with slit lamp examination of the crystalline lens.[20]

Cataracts: A nuclear cataract (NC) was identified with a LOCS III score greater than 4 for nuclear opalescence (NO) or greater than 4 for nuclear cataract (NC). Similarly, a cortical cataract (CC) was indicated by a LOCS III score greater than 2 for CC, while a significant posterior subcapsular cataract (PSC) was identified with a LOCS III score greater than 2.[21]

Visual impairment : Functional limitation of eyes or visual system due to visual disorder or disease that can result in a visual disability or a visual hand cap with a presenting visual acuity of <6/12.[22]

Cigarette Smoking: Individuals considered as smokers if the smoke > 100 sticks of cigarettes in his/her life time and non-smoker if he/she smoke < 100 sticks cigarettes in their life time without current history of smoking.[23]

Sunlight exposure: Participants who exposed to sunlight for 6 hours or more per day are considered exposed whereas those with sunlight exposed less than 6 hours per day are considered as non-exposed.[23]

Sleeping duration: Participants who considered as exposed if the individual sleeps for more than 6 hours and non- exposed if the individual sleeps for 6 hours or less per day.[23]

Diabetic mellitus : If the individual has/had a known diagnosed diabetic mellitus or undergoing antidiabetic therapy.[24]

Systemic Hypertension: If the individual has/had a known diagnosed hypertension or undergoing antihypertensive therapy.[25]

Glaucoma : If the individual has/had known diagnosed glaucoma or undergoing antiglaucoma therapy.[26]

Myopia: If the individual has/had a known diagnosed myopia.[27]

Data collection tool and procedure

The eligible participants were interviewed through an interviewer-administered questionnaire after taking informed written consent. The questionnaire covered sociodemographics and other relevant variables. The questionnaire was adapted from various literatures and administered by a trained ophthalmic nurse practitioner. Two optometrists conducted an examination using Snellen's visual acuity chart, portable slit lamp bio-microscope, and direct ophthalmoscopes. The data collection process was supervised by the principal investigator. The principal investigator provided one day of training to the data collectors on data collection techniques, instrument use, and how to maintain ethical standards. A pretest was conducted on 5% (37) of the sample size in Angacha before the actual data collection to check for completeness, appropriateness, and common understanding. Modifications were made accordingly. To ensure the quality of the data, the PI closely supervised the data collection procedure on a daily basis. A review was conducted in the field to check the completeness of the questionnaire, and any corrections were made in the field. The data was then coded for data management. Data cleaning and cross-checking were also done before data analysis.

Grading of lens images

Lens opacities were assessed using the Lens Opacities Classification System III (LOCS III) by experienced optometrists. After dilating the pupils with tropicamide eye drops (1%), cataract grading was performed using a portable slit lamp bio-microscope, while referencing LOCS III standard photographs. The examiner identified specific lens opacities and assigned a severity grade. The severity of lens opacities was categorized into four main groups: nuclear opalescence (NO), nuclear cataract (NC), cortical cataract (CC), and posterior subcapsular cataract (PSC).

Statistical Analysis

The data collected was exported to Stata version 14 for analysis. Descriptive statistics, such as frequency and percentage, were used to summarize the data. To check the multicollinearity of variables, the variance inflation factor and the tolerance test were used. To determine the factors associated with cataract, binary logistic regression was applied. Variables with a P value of less than 0.2 in the bivariable analysis were included in the multivariable regression analysis. The goodness of the model fit was tested using the Hosmer–Lemeshow test. Variables with a P value of less than 0.05 in the multivariable logistic regression analysis were considered statistically significant at the 95% confidence interval.

Result

Sociodemographic data of study participants

A total of 734 study participants were involved in this study giving a response rate of 97.2%. The mean age of the study participants was 58.6 years with ±12.4 standard deviation.

From the total study participants, 390 (53.13%) were males. About 484 (65.94%) were married. About 158 (21.53) were unable to read and write and 198 (26.98%) study participants were government employees (**Table 1**).

Health related data of adult participants

About 143 (19.48%) of study participants had a family history of cataract, 171 (23.30%) had diabetes mellitus, 271(36.92) had systemic hypertension, and 156 (21.25%) had glaucoma (**Table 2**).

Health behavior and environmental factors of participants

Of the total study participants 37 (5.04%) were cigarette smokers and 156 (21.25%) had a history of eye trauma (**Table 3**).

Prevalence of Cataract

The prevalence of cataract among study participants of aged 40 years and above in Durame town was 29.16 % (95%, CI: 25.89-32.59).

Prevalence of different type of lens opacity

Of the total number of participants 8.86% had posterior sub-capsular opacity, 0.27% had nuclear opacity, 11.99% had cortical opacity and the remaining had combination of the above.

Factors associated with cataract

In bivariable binary logistic regression factors: Age, occupation, marital status, educational status, monthly income, smoking, eye trauma, diabetes mellitus, Hypertension, glaucoma, steroid medication, myopia, and sunlight exposure were associated with cataract at a p-value of < 0.25. Then, multivariable binary logistic regression was used to assess the relative effect of the independent variables on the outcome variable. In multivariable analysis factors such as age, known history of trauma

to the eye, diabetic mellitus, hypertension, exposure to sunlight and glaucoma had significant association with cataract.

The odds of having cataract among study participants aged 70-95 years was 8.60 (AOR=8.60, 95% CI: 3.09-23.90) times higher compared to participants aged 40-49 years. On the other-hand the odds of having cataract in adults aged 50-59 years was 2.74 (AOR=2.74, 95%CI: 1.16-6.48) times higher compared to aged 40-49 years.

The odds of having cataract was 2.27 (AOR= 2.27, 95% CI: 1.37-3.74) times higher among diabetic participants when compared to participants who didn't have diabetic mellitus. In adults who spend ≥ 6 hours per day on average sunlight, the odds of having cataract was 2.83 (AOR= 2.83, 95% CI: 1.45- 5.53) times higher compared to those adults who spend less than 6 hours per day. The odds of having cataract in adults who had known history of trauma to the eye in their life time was 2.39 (AOR= 2.39, 95% CI: 1.19-4.81) times higher compared to those who didn't have a history of trauma to the eye in their life time.

The odds of having cataract in adults with systemic hypertension was 1.86 (AOR= 1.86, 95% CI: 1.16-2.99) times higher than adults who didn't have systemic hypertension. In adults who had glaucoma, the odds of having cataract was 5.36 (AOR=5.36, 95% CI: 3.13-9.18) times higher when compared to adults without glaucoma history (Table 4).

Discussion

The finding of this study showed that prevalence of cataract among adults was 29.16% (95%, CI: 25.89-32.59) which was in line with the a study conducted in Malaysia 26.8%.[28] This might be due to similarities in study population which was done in older populations, study design and ocular examination of study participants.

However, this study finding was much lower than the studies conducted in Debre Markos 57%,[20] Ghana 48.9%,[29] South Africa 44%,[30] Northern Indian,[31] and in Korea 87.8%.[32] The differences in results may be attributed to variations in study settings, geographical locations, and the characteristics of study populations among participants. For example, studies conducted in Debre Markos, Ethiopia,[20] and Ghana were institutional-based, which may lead to an overestimation of cataract prevalence. Additionally, the populations in the studies from Northern India,[31] and Korea [32] consisted of adults aged 50 years and older, which is older than the population in our study. Age is one of the most significant risk factors for cataracts, as indicated by various studies. Moreover, the research conducted in Northern India specifically focused on diabetic populations, contributing to a higher prevalence of cataracts in that study compared to ours.

The prevalence of cataract in this study was higher compared to studies conducted in Ethiopia 20.1%,[19] Nigeria 19.8%,[32] Southwestern Nigeria 2%,[33] Poland 12.10%,[26] and Korea 25.2%.[32] This discrepancy may stem from variations in sociodemographic characteristics of the study populations, as well as differences in study settings and the availability and accessibility of cataract surgical services in those areas.

In this study older age was significantly associated with cataract. This finding was similar with studies conducted in Whagmira, Ethiopia,[19] Ghana,[29] Nigeria,[32] India,[34] China,[35] and Korea.[15] As people age, the cell membranes, including the lens epithelial cells, which are responsible for maintaining the balance of ions and metabolism of the entire lens, may become damaged. This can lead to an accumulation of fluid inside the lens. Additionally, abnormal differentiation of lens fibers and the formation of protein aggregates can occur, both of which contribute to the development of cataracts.[36]

This study found a significant association between exposure to sunlight and cataract, which is consistent with a study done in Korea.[15] This is because exposure to ultraviolet radiation can harm lens proteins and cells, leading to cataract formation due to oxidative stress damage.[37]

Having history of diabetic mellitus was significantly associated with cataract in this study. There was similar evidence in studies conducted in South Africa,[30] Sankara Nethralayia India,[38] Singapore,[28] and Poland.[26] This could be due to high blood sugar (blood glucose) levels can create an imbalance of water content in the crystalline lens that can accelerate the development of cataracts.[39]

In this study, known systemic hypertension was associated with cataract. This result is consistent with finding of Korean study.[15] Cataract development is closely related to systemic inflammation and hypertension. Inflammatory mechanism can lead to conformational changes in proteins in the lens capsules, exacerbating cataract formation. Certain antihypertensive medications can also induce cataracts.[25]

In this study, having a history of glaucoma was significantly associated with cataract. This similar association was observed in study conducted in Lodz, Poland.[26] There is no direct link between cataracts and glaucoma, although treatment of glaucoma can accelerate cataract formation in certain situations.[40]

History of trauma to the eye in the life time of the adult was significantly associated with cataract. This association is consistent with a study conducted in Whagmira, Ethiopia.[19] The possible reason might be that trauma to the eye can disrupt the normal physiological condition of the crystalline lens. This can be caused by damage to the epithelial membrane, leading to an increase in fluid influx into the lens. As a result, the lens fibers become swollen and thickened, ultimately leading to the development of cataracts.[41] If the trauma is caused by an electric shock, cataracts may result from the coagulation of proteins and osmotic changes that occur in the crystalline lens.[42]

Strengths and limitations of the study

This study provided up-to-date evidence on proportion and associated factors of cataract among adults aged 40 years and above living in Durame Town, Southern Ethiopia. This is important to raise awareness about cataracts and their risk factors among the population. Understanding these factors can lead to early detection and treatment, potentially reducing the burden of visual impairment in the community. Being a cross-sectional study, this study demonstrates the temporal association between predictive factors and cataracts, not the actual causation. Since the study mainly focuses on quantitative data, it provides limited information on the qualitative aspects and their impact relationship.

Conclusion

In this study, the prevalence of cataract was lower than previous national survey result. Besides, older age, known history of trauma to eye, hypertension, diabetes, exposure to sunlight and glaucoma had statistically significant association with cataract.

Declarations

Ethics approval

This study was conducted in accordance of accordance with the Declaration of Helsinki. Ethical approval was obtained from the Ethical Review Committee at University of Gondar, College of Medicine and Health Sciences, Comprehensive and Specialized Hospital, and School of Medicine. A letter of support was provided by the administration of Durame town. Written informed consent was obtained from all participants after detailed explanation of the purpose of the study. Written informed consent was approved by the ethical review committee at University of Gondar, and the ethical approval number was 622/05/2023. All included participants were informed of their right to withdraw from the study at any time during the interview. No risk was taken for the selected study participants. Confidentiality was maintained by not using personal identifiers in the data collection tools and by password-protecting the data on a computer.

Consent for publication

Not applicable.

Funding

The authors have not declared a specific grant for this research from any funding agency in the public, commercial or not-for-profit sectors.

Conflict of interests

All authors declared that there is no conflict of interest in this research work.

Data availability of statement

All data are relevant to the study are included in the article or uploaded as supplemental information.

Authors' contributions

AAL conceptualised the research design, formulated the research questions, takes full responsibility for the work, designed and implemented the research methodology, and conducted extensive reviewers of the manuscript. NLA and KZD contributed to refining the research objectives and conceptualization of the study, conducted statistical analyses and interpreted the results. NLA, KZD and TWF assisted in refining the methodological approach and methodological decisions, led the data collection efforts, organized and managed datasets, and ensured data quality and integrity. AAL, MMB and KZD conducted statistical analyses, interpreted the results, drafted the initial manuscript, outlining the research background, methodology and results, and reviewed the manuscript. AAL act as a guarantor.

Acknowledgments

We would like to express our appreciation to the study participants for their willingness to participate in this study. Authors would also like to acknowledge the dedicated data collectors.

References

1. Nizami AA, Gulani AC, Redmond SB. Cataract (Nursing). 2021.
2. Grzybowski A, Markeviciute A, Zemaitiene R. A narrative review of intraocular lens opacifications: update 2020. Annals of Translational Medicine. 2020;8(22).
3. Heidar K. Cataracts in Children, Congenital and Acquired. American Academy of Ophthalmology. 2017.
4. Delbarre M, Froussart-Maille F. Signs, symptoms, and clinical forms of cataract in adults. Journal Francais D'ophtalmologie. 2020;43(7):653-9.
5. Burton MJ, Ramke J, Marques AP, Bourne RR, Congdon N, Jones I, et al. The Lancet global health Commission on global eye health: vision beyond 2020. The Lancet Global Health. 2021;9(4):e489-e551.
6. Correia M, Das T, Magno J, Pereira BM, Andrade V, Limburg H, et al. Prevalence and causes of blindness, visual impairment, and cataract surgery in Timor-Leste. Clinical Ophthalmology. 2017:2125-31.
7. Mencucci R, Stefanini S, Favuzza E, Cennamo M, De Vitto C, Mossello E. Beyond vision: Cataract and health status in old age, a narrative review. Frontiers in Medicine. 2023;10:1110383.
8. Arrigo A, Leveziel N, Briant PS, Vos T, Resnikoff S, Taylor HR, et al. Global estimates on the number of people blind or visually impaired by cataract: a meta-analysis from 2000 to 2020. diabetes. 2024;5(8):9.
9. Pesudovs K, Lansingh VC, Kempen JH, Steinmetz JD, Briant PS, Varma R, et al. Cataract-related blindness and vision impairment in 2020 and trends over time in relation to VISION 2020: the Right to Sight: an analysis for the Global Burden of Disease Study. Investigative Ophthalmology & Visual Science. 2021;62(8):3523-.
10. Fang R, Yu Y-F, Li E-J, Lv N-X, Liu Z-C, Zhou H-G, et al. Global, regional, national burden and gender disparity of cataract: findings from the global burden of disease study 2019. BMC Public Health. 2022;22(1):2068.
11. Lee CM, Afshari NA. The global state of cataract blindness. Current opinion in ophthalmology. 2017;28(1):98-103.

12. Jolley E, Virendrakumar B, Pente V, Baldwin M, Mailu E, Schmidt E. Evidence on cataract in low-and middle-income countries: an updated review of reviews using the evidence gap maps approach. International Health. 2022;14(Supplement_1):i68-i83.
13. Anbesse DH, Bizuneh ZY, Girum W, Mengistu MA. Vision Related Quality of Life among Cataract Patients Attending Cataract Surgery Campaigns in Ethiopia: A Dual Centre Study. Journal of Clinical and Experimental Ophthalmology. 2022;13(3):1-6.
14. Xulu-Kasaba ZN, Kalinda C. Prevalence of blindness and its major causes in sub-Saharan Africa in 2020: A systematic review and meta-analysis. British Journal of Visual Impairment. 2022;40(3):563-77.
15. Borges LdL, Santos FPVd, Pagotto V, Menezes RLd. Functional disability in community-dwelling elderly: the role of cataracts and contextual factors. Fisioterapia em Movimento. 2014;27:189-200.
16. Fang Z, Chen X-Y, Lou L-X, Yao K. Socio-economic disparity in visual impairment from cataract. International Journal of Ophthalmology. 2021;14(9):1310.
17. Kulkarni A, Banait S. Through the Smoke: An In-Depth Review on Cigarette Smoking and Its Impact on Ocular Health. Cureus. 2023;15(10).
18. Tegegn MT, Assaye AK, Belete GT, Munaw MB. Visually significant cataract and associated factors among older people attending a community ophthalmic service in central Gondar Zone, Northwest Ethiopia: a cross-sectional study. Journal of International Medical Research. 2022;50(6):03000605221104761.
19. Ahmed M, Beletew B, Mengesha A, Markos M. Prevalence of cataract and its associated factors among adults aged 40 years and above in Waghimra zone, Amhara, Northeast Ethiopia: A Community based cross-sectional study. 2020.
20. Wale MZ, Derbew M, Tilahun M, Terefe M. Cataract and associated factors among adults visiting ophthalmic clinic at Debre Markos comprehensive specialized hospital, northwest Ethiopia, 2020. SAGE Open Medicine. 2021;9:2050312121989636.
21. Singh S, Pardhan S, Kulothungan V, Swaminathan G, Ravichandran JS, Ganesan S, et al. The prevalence and risk factors for cataract in rural and urban India. Indian journal of ophthalmology. 2019;67(4):477-83.
22. Organization WH. World report on vision. ISBN: 9789241516570. 2019.

23. Na K-S, Park Y-G, Han K, Mok JW, Joo C-K. Prevalence of and risk factors for age-related and anterior polar cataracts in a Korean population. PLoS One. 2014;9(6):e96461.
24. Kiziltoprak H, Tekin K, Inanc M, Goker YS. Cataract in diabetes mellitus. World journal of diabetes. 2019;10(3):140.
25. Yu X, Lyu D, Dong X, He J, Yao K. Hypertension and risk of cataract: a meta-analysis. PloS one. 2014;9(12):e114012.
26. Nowak MS, Smigielski J. The prevalence of age-related eye diseases and cataract surgery among older adults in the city of Lodz, Poland. Journal of ophthalmology. 2015;2015.
27. Du Y, Meng J, He W, Lu Y, Zhu X. Challenges of refractive cataract surgery in the era of myopia epidemic: a mini-review. Frontiers in Medicine. 2023;10:1128818.
28. Yap JF, Ng QX, Wai YZ, Isahak M, Salowi MA, Moy FM. Prevalence of cataract and factors associated with cataract surgery uptake among older persons in Malaysia: A cross-sectional study from the National Eye Survey II. Tropical Doctor. 2022;52(2):325-30.
29. Yawson AE, Ackuaku-Dogbe EM, Seneadza NAH, Mensah G, Minicuci N, Naidoo N, et al. Self-reported cataracts in older adults in Ghana: sociodemographic and health related factors. BMC public health. 2014;14(1):1-8.
30. Khoza LB, Tshivhase S, Pfungwa M, Ramakuela N, Manganye B. Survey on prevalence of cataract in selected communities in Limpopo Province of South Africa.
31. Vashist P, Tandon R, Murthy G, Barua C, Deka D, Singh S, et al. Association of cataract and sun exposure in geographically diverse populations of India: the CASE study. First Report of the ICMR-EYE SEE Study Group. PLoS One. 2020;15(1):e0227868.
32. Mahdi AM, Rabiu M, Gilbert C, Sivasubramaniam S, Murthy GV, Ezelum C, et al. Prevalence and risk factors for lens opacities in Nigeria: results of the national blindness and low vision survey. Investigative ophthalmology & visual science. 2014;55(4):2642-51.
33. Phaswana-Mafuya N, Peltzer K, Crampin A, Ahame E, Sokhela Z. Prevalence of self-reported diagnosed cataract and associated risk factors among elderly South

Africans. International journal of environmental research and public health. 2017;14(12):1523.

34. Vashist P, Talwar B, Gogoi M, Maraini G, Camparini M, Ravindran RD, et al. Prevalence of Cataract in an Older Population in India.

35. Tang Y, Ji Y, Ye X, Wang X, Cai L, Xu J, et al. The association of outdoor activity and age-related cataract in a rural population of Taizhou Eye Study: phase 1 report. PLoS One. 2015;10(8):e0135870.

36. Wei Z, Gordon P, Hao C, Huangfu J, Fan E, Zhang X, et al. Aged Lens Epithelial Cells Suppress Proliferation and Epithelial–Mesenchymal Transition-Relevance for Posterior Capsule Opacification. Cells. 2022;11(13):2001.

37. National eye institute. New Research Sheds Light on How UV Rays May Contribute to Cataract. 2014.

38. Badrinath SS, Narayanan A, Hussaindeen JR, Surendran TS. The Sankara Nethralaya Community model-Technology and evidence based comprehensive quality eye care equally to all. Indian Journal of Ophthalmology. 2020;68(2):288-90.

39. Harahap J, Rania R. Cataracts Risk Factors and Comparison of Blood Glucose Levels in Diabetic and Non-Diabetic Patients towards the Occurrence of Cataracts. Open Access Macedonian Journal of Medical Sciences. 2019;7(20):3359.

40. Kyari F. Managing cataract surgery in patients with glaucoma. Community eye health. 2019;31(104):88.

41. Strenk LM, Guo S, Lu K, Werner L, Strenk SA. Force of lifelong crystalline lens growth: chronic traumatic mechanical insult to the choroid. Journal of Cataract & Refractive Surgery. 2022;48(3):342-8.

42. Khadka S, Byanju R, Ranabhat S. Cataract following electric shock-Case report. Journal of Kathmandu Medical College. 2019:167-70.

Table 1: Sociodemographic and economic characteristics of study participants aged 40 years and above in Durame town, Southern Ethiopia, 2023 (n=734)

Variables	Catagories	Frequency	Percent (%)
Age	40-49	174	23.71
	50-59	229	31.20
	60-69	205	27.93
	70-95 years	126	17.16
Sex	Male	390	53.13
	Female	344	46.87
Occupation	Farmer	123	16.76
	Daily laborer	56	7.63
	Government employee	198	26.98
	Merchant	179	24.39
	House wife	178	24.25
Marital status	Never married	66	8.99
	Married	484	65.94
	Divorced or separated	48	6.54
	Widowed	136	18.53
Educational status	Unable to read and write	158	21.52
	Primary school	115	15.67
	Secondary school	253	34.47
	College and above	208	28.34
Health insurance	Yes	339	46.19
	No	395	53.81
Monthly income	< 2000	371	50.54
	2000-5999	166	22.62
	≥ 6000	197	26.84

Table 2: Health related data of the study participants aged 40 years and above in Durame town, Southern Ethiopia, 2023 (n=734).

Variables	Categories	Frequency	Percentage (%)
Family history of cataract	Yes	143	19.48
	No	591	80.52
Diabetes mellitus	Yes	171	23.30
	No	563	76.70
Systemic hypertension	Yes	271	36.92
	No	463	63.08
Glaucoma	Yes	156	21.25
	No	578	78.75
Myopia	Yes	175	23.84
	No	559	76.16
Steroid use	Yes	139	18.94
	No	595	81.06
Visual impairment	Normal	377	51.36
	Mild	85	11.58
	Moderate	106	14.44
	Severe	92	12.53

Table 3: Health behavior/life style and environmental factors among study participants aged 40 years and above in Durame town, Southern Ethiopia, 2023 (n=734).

Variables	Categories	Frequency	Percentage (%)
Smoking cigarette	Yes	37	5.04
	No	697	94.96
Sleep duration	Exposed	113	15.40
	Non exposed	621	84.60
Exposure to sunlight	Non exposed	147	20.03
	exposed	587	79.97
Trauma	Yes	156	21.25
	No	578	78.75

n= sample size

Table 4: Factors associated with cataract among study participants aged 40 years and above in Durame town, Southern Ethiopia, 2023 (n=734)

Variable	Cataract				
	Yes	No	COR (95% CI)	AOR(95%CI)	p-value
Age					
40-49	11	163	1	1	
50-59	40	189	3.14 (1.56-6.31)	2.74 (1.16-6.48)	0.022
60-69	83	122	10.08 (5.15-19.73)	5.65 (2.37-13.46)	<0.0001
70-95 years	80	46	25.77 (12.67-52.43)	8.60(3.09-23.90)	<0.0001
Occupation					
Farmer	63	60	1	1	
Daily laborer	12	44	0.26 (0.13-0.54)	0.93 (0.36-2.40)	0.885
Government employee	48	150	0.30 (0.19-0.49)	0.40 (0.12-1.26)	0.118
Merchant	21	158	0.13 (0.39-0.98)	0.51 (0.22-1.20)	0.123
Housewife	70	108	0.62 (0.39-0.98)	1.31 (0.70-2.46)	0.402
Marital status					
Never married	5	61	1	1	
Married	135	349	4.72 (1.86-12.00)	0.64 (0.19-2.15)	0.475
Divorced or Separated	12	36	4.07 (1.32-12.48)	0.57(0.13-2.42)	0.445
Widowed	62	74	10.22 (3.87-27.02)	0.57 (0.15-2.13)	0.403
Education status					
Unable to read and write	83	75	1	1	
Primary school	40	75	0.48 (0.29-0.79)	0.81 (0.41-1.61)	0.548
Secondary school	41	212	0.17 (0.11-0.28)	0.53 (0.24-1.18)	0.121
College and above	50	158	0.29 (0.18-0.45)	1.05 (0.29-3.79)	0.938
Smoking cigarette					
No	205	492	1	1	
Yes	9	28	0.77 (0.36-1.66)	1.46 (0.54-3.95)	0.452
Eye trauma					
No	133	445	1	1	
Yes	81	75	3.61 (2.50-5.23)	2.39 (1.19-4.81)	0.014
Diabetes mellitus					
No	118	445	1	1	
Yes	96	75	4.83 (3.35-6.94)	2.27 (1.37-3.74)	0.001
Systemic					

hypertension					
No	84	379	1	1	
Yes	130	141	4..16 (2.97-5.82)	1.86 (1.16-2.99)	0.011
Glaucoma					
No	112	44	1	1	
Yes	102	476	11.88 (7.89-17.88)	5.36 (3.13-9.18)	<0.0001
Steroid use					
No	176	419	1	1	
yes	38	101	0.90 (0.59-1.35)	0.85 (0.40-1.81)	0.680
Myopia					
No	118	441	1	1	
Yes	96	79	3.01 (2.15-4.20)	1.52 (0.93-2.49)	0.093
Sunlight exposure					
Non-exposed	60	87	1	1	
Exposed	154	433	0.52 (0.35-0.75)	2.83 (1.45- 5.53)	0.002
Monthly income					
< 2000	115	256	1.25 (0.85-1.84)	0.74 (0.23-2.38)	0.615
2000-5999	47	119	1.10 (0.69-1.75)	1.27 (0.50-3.22)	0.619
≥ 6000	52	145	1	1	

Note: n-sample size, COR-Crude odds ratio, AOA-Adjusted odds ratio and CI-Confidence interval

BMJ Open

Prevalence of Cataract and Its Associated Factors among Adults Aged 40 Years and Above Living in Durame Town, Southern Ethiopia, 2023: Community based Cross-Sectional Study

Journal:	*BMJ Open*
Manuscript ID	bmjopen-2024-089741.R2
Article Type:	Original research
Date Submitted by the Author:	02-Nov-2024
Complete List of Authors:	Latebo, Ashenafi ; Bule Hora University, Optometry Assefa, Natnael ; University of Gondar, Department of Optometry, College of Medicine and Health Sciences, Comprehensive Specialized Hospital, University of Gondar Ferede, Tarekegn ; University of Gondar, Department of Ophthalmology Bekele, Matiyas; University of Gondar, Department of Optometry, College of Medicine and Health Sciences, Comprehensive Specialized Hospital, University of Gondar Demilew, Ketemaw Zewdu; University of Gondar, Department of Optometry, College of Medicine and Health Sciences, Comprehensive Specialized Hospital, University of Gondar
Primary Subject Heading:	Ophthalmology
Secondary Subject Heading:	Ophthalmology
Keywords:	Prevalence, Cataract and refractive surgery < OPHTHALMOLOGY, Myopia

I, the Submitting Author has the right to grant and does grant on behalf of all authors of the Work (as defined in the below author licence), an exclusive licence and/or a non-exclusive licence for contributions from authors who are: i) UK Crown employees; ii) where BMJ has agreed a CC-BY licence shall apply, and/or iii) in accordance with the terms applicable for US Federal Government officers or employees acting as part of their official duties; on a worldwide, perpetual, irrevocable, royalty-free basis to BMJ Publishing Group Ltd ("BMJ") its licensees and where the relevant Journal is co-owned by BMJ to the co-owners of the Journal, to publish the Work in this journal and any other BMJ products and to exploit all rights, as set out in our licence.

The Submitting Author accepts and understands that any supply made under these terms is made by BMJ to the Submitting Author unless you are acting as an employee on behalf of your employer or a postgraduate student of an affiliated institution which is paying any applicable article publishing charge ("APC") for Open Access articles. Where the Submitting Author wishes to make the Work available on an Open Access basis (and intends to pay the relevant APC), the terms of reuse of such Open Access shall be governed by a Creative Commons licence – details of these licences and which Creative Commons licence will apply to this Work are set out in our licence referred to above.

Other than as permitted in any relevant BMJ Author's Self Archiving Policies, I confirm this Work has not been accepted for publication elsewhere, is not being considered for publication elsewhere and does not duplicate material already published. I confirm all authors consent to publication of this Work and authorise the granting of this licence.

Prevalence of Cataract and Its Associated Factors among Adults Aged 40 Years and Above Living in Durame Town, Southern Ethiopia, 2023: Community based Cross-Sectional Study

Ashenafi Abebe Latebo[1], Natnael Lakachew Assefa[2], Dr.Tarekegn Wuletaw Ferede[3], Matiyas Mamo Bekele[2], Ketemaw Zewdu Demilew[2]

[1]Institute of health, Bule Hora University Ethiopia

[2]Department of Optometry, College of Medicine and Health Sciences, Comprehensive Specialized Hospital, University of Gondar, Gondar, Ethiopia

[3]Department of Ophthalmology, College of Medicine and Health Sciences, Comprehensive Specialized Hospital, University of Gondar, Gondar, Ethiopia

Corresponding author- Matiyas Mamo Bekele

Department of Optometry, College of Medicine and Health Sciences, Comprehensive Specialized Hospital, University of Gondar, Gondar, Ethiopia

Email: matthiasm2013@gmail.com

Cell Phone: +251939417464

P.O.Box:196

Abstract

Objective: This study aimed to assess the prevalence of cataract and associated factors among adults aged 40 years and above in Durame town, Southern Ethiopia.

Design: A community-based cross-sectional study was conducted using a systematic random sampling method.

Setting: The study was conducted in Durame town, Southern Ethiopia.

Participants: The study included 734 adults with aged ≥40 years who lived in Durame town for more than 6 months.

Main outcome measures: Data were collected using face to face interview completed by an interviewer and ophthalmic examinations.

Results: A total of 734 study participants aged 40 years and above were involved. The prevalence of cataract was 29.16% (95%, CI: 25.89-32.59). Factors associated with the prevalence of cataract were older age of 70-95 years (AOR=8.60, 95% CI: 3.09-23.90), being diabetic (AOR= 2.27, 95% CI: 1.37-3.74), exposure to sunlight (AOR= 2.83, 95% CI: 1.45- 5.53), trauma to eye (AOR= 2.39, 95% CI: 1.19-4.81), hypertension (AOR= 1.86, 95% CI:1.16-2.99), and glaucoma (AOR=5.36,95% CI: 3.13-9.18).

Conclusion: The prevalence of cataract was lower than previous national survey result. Old age, known history of trauma to eye, hypertension, diabetes, exposure to sunlight and glaucoma had statistically significant association with cataract.

Keywords: Prevalence, Cataract, Adults, Durame town, Southern Ethiopia

Strengths and limitations of the study

- This study provided up-to-date evidence on magnitude and factors associated with cataract to reduce blindness in Southern Ethiopia.
- This study demonstrates the temporal association between predictive factors and cataracts, not the actual causation.
- Since the study mainly focuses on quantitative data, it provides limited information on the qualitative aspects and their impact relationship.

Introduction

Cataract is a condition where the eye's lens becomes cloudy, leading to blurred vision and possibly blindness.[1] Opacification occurring on or inside the lens can impede the amount of light entering the retina, causing a reduction in vision that correlates with the degree of opacification.[2] Cataracts can be either congenital or acquired, with the latter resulting from various factors such as aging, metabolic disorders, trauma, intraocular inflammation, and ocular or systemic conditions.[3] Cataracts are most common in elderly individuals, with age-related cataracts being the most prevalent.[4]

Globally, cataracts are the leading cause of blindness and the second leading cause of moderate and severe visual impairment. Over 100 million people worldwide are affected by cataracts, with 17 million cases resulting in blindness.[5] Nearly 70 million people worldwide experience bilateral blindness or moderate to severe visual impairment due to cataracts.[6] As the aging population grows, cataract-related blindness is increasing, putting more pressure on healthcare systems.[7] The number of people who are blind due to cataracts is increasing as a result of population growth and longer lifespans.[8] In 2020, there were an estimated 15.2 million blind people aged 50 and over, and an additional 78.8 million individuals with moderate and severe visual impairment due to cataracts worldwide.[9] However, individuals living in low-income countries face a higher burden of cataracts due to limited access to cataract surgery.[10]

Cataract-related blindness is widespread in developing countries due to high service costs and limited access to surgery. We must act to ensure equal healthcare access for everyone.[11] Access to relatively simple and cost-effective treatment for cataracts is limited in low- and middle-income countries, where over 90% of people with visual impairment due to cataracts reside.[12] Cataract surgery is currently the only treatment available that can effectively address all types of cataracts.[13] Due to limited eye care facilities, high user fees, and transportation costs, many people have poor access to eye care services.[12]

The prevalence of cataracts in people aged 40 and older ranges from 11.8% to 18.8%.[10] Cataracts are a major public health concern in Sub-Saharan Africa, accounting for over

46% of blindness cases, and 52.4% and 70.6% of moderate and severe visual impairments due to cataracts, respectively.[14] The 2005/2006 national survey on blindness and low vision in Ethiopia identified cataracts as the leading cause of blindness (49.9%) and low vision (42.3%). Cataracts in adults over 40 can lead to secondary glaucoma and uveitis, increased dependency and decreased mobility, economic loss, mortality, decreased quality of life, and increased risk of failure.[15, 16]

Evidence has shown several risk factors associated with cataract, including smoking, marital status, educational status, diabetes, sunlight exposure, high body mass index, steroid use, increasing age, and female gender.[17]

Cataract is currently the primary cause of blindness and visual impairment in Ethiopia.[18] Despite existing studies on cataract prevalence in Ethiopia, most have been conducted in hospitals, with only one study being community-based. This highlights a significant gap in research, particularly regarding the prevalence of cataracts in southern Ethiopia, including the study area. This study aims to address this gap by assessing the proportions of cataracts and the factors associated with them in patients aged 40 years and above. Understanding the prevalence of cataracts and the related factors in the population is crucial for preventing visual impairment and effectively implementing the VISION 2030 program in Ethiopia.

Method and Materials

Study Design, Period and Area

A community based cross-sectional study was conducted in Durame town, located in southeastern Ethiopia, between April 25, 2023, and May 30, 2023. Durame is the administrative center of the Kembata Tembaro Zone and is situated 112km away from Hawassa, the capital of Sidama regional state, and 280 km away from Addis Ababa, the capital of Ethiopia. The town has a latitude and longitude of 7°14′N 37°53′E and an elevation of 2,101 meters above sea level. The average temperature in Durame ranges from 16.5-29.8°C. According to the Durame town health office, the town has three kebeles, which are the smallest administrative units in Ethiopia: Lalo, Kasha, and Zeraro. The current total population of Durame is 65,852, with 31,367 being males and 34,485 being females. Adults aged 40 years and above account for 21,257 of the total population. The town has 10,248 households distributed across the three kebeles. Despite the presence of enough health facilities in the town, there is only one eye-care center that does not provide cataract surgery services (obtained from Durame town health office unpublished source).

Study Population and Eligibility Criteria

All adults aged ≥ 40 years who lived in Durame town for more than 6 months and available during the data collection period were included in the study. However, Adults who have bilateral pseudophakia, Phthitic (enucleated) eyes and bilateral corneal opacity which prevent to visualize crystalline lens were excluded from the study.

Patient and public involvement

Patients and/or the public were not involved in the study design, conduct of the study or plan to disseminate the result of this study to the study participants.

Sample Size Determination and Sampling Procedures

The sample size was determined using single population proportion formula n = $\frac{(Z\,\alpha/_2)^2 x\ P\ (1-P)}{d^2}$ with the following consideration (n=sample size, Z- the value of z statistic at 95% confidence level = 1.96, P= the estimated proportion of cataract from previous study = 20.1%,[19] d = margin of error of ±3%, and 10% non-response rate. The final sample size was determined to be 755. There were three kebeles (the smallest administrative unit) found in Durame town. A systematic random sampling technique was applied to select the required study participants from those three kebeles. The households were selected after calculating the sampling interval (K-value). The calculated sampling interval was 13 (k = 10248/755=13.57). The first household was chosen using a simple random sampling method (lottery method). Then, one adult aged 40 years and above was recruited in every 13th household. If more than one adult of age 40 years and above were found adults in one household, lottery method was used to select one. An immediate next-door household was included in the interview when there was no eligible person who fulfilled the inclusion criteria at the selected household.

Operational definitions

Cataract: A clouding or loss of transparency of the lens with in the posterior capsule, nucleus and/or cortex of the eye which is revealed with slit lamp examination of the crystalline lens.[20]

Cataracts: A nuclear cataract (NC) was identified with a LOCS III score greater than 4 for nuclear opalescence (NO) or greater than 4 for nuclear cataract (NC). Similarly, a cortical cataract (CC) was indicated by a LOCS III score greater than 2 for CC, while a significant posterior subcapsular cataract (PSC) was identified with a LOCS III score greater than 2.[21]

Visual impairment : Functional limitation of eyes or visual system due to visual disorder or disease that can result in a visual disability or a visual hand cap with a presenting visual acuity of <6/12.[22]

Cigarette Smoking: Individuals considered as smokers if the smoke > 100 sticks of cigarettes in his/her life time and non-smoker if he/she smoke < 100 sticks cigarettes in their life time without current history of smoking.[23]

Sunlight exposure: Participants who exposed to sunlight for 6 hours or more per day are considered exposed whereas those with sunlight exposed less than 6 hours per day are considered as non-exposed.[23]

Sleeping duration: Participants who considered as exposed if the individual sleeps for more than 6 hours and non- exposed if the individual sleeps for 6 hours or less per day.[23]

Diabetic mellitus : If the individual has/had a known diagnosed diabetic mellitus or undergoing antidiabetic therapy.[24]

Systemic Hypertension: If the individual has/had a known diagnosed hypertension or undergoing antihypertensive therapy.[25]

Glaucoma : If the individual has/had known diagnosed glaucoma or undergoing antiglaucoma therapy.[26]

Myopia: If the individual has/had a known diagnosed myopia.[27]

Data collection tool and procedure

The eligible participants were interviewed through an interviewer-administered questionnaire after taking informed written consent. The questionnaire covered sociodemographics and other relevant variables. The questionnaire was adapted from various literatures and administered by a trained ophthalmic nurse practitioner. Two optometrists conducted an examination using Snellen's visual acuity chart, portable slit lamp bio-microscope, and direct ophthalmoscopes. The data collection process was supervised by the principal investigator. The principal investigator provided one day of training to the data collectors on data collection techniques, instrument use, and how to maintain ethical standards. A pretest was conducted on 5% (37) of the sample size in Angacha before the actual data collection to check for completeness, appropriateness, and common understanding. Modifications were made accordingly. To ensure the quality of the data, the PI closely supervised the data collection procedure on a daily basis. A review was conducted in the field to check the completeness of the questionnaire, and any corrections were made in the field. The data was then coded for data management. Data cleaning and cross-checking were also done before data analysis.

Grading of lens images

Lens opacities were assessed using the Lens Opacities Classification System III (LOCS III) by experienced optometrists. After dilating the pupils with tropicamide eye drops (1%), cataract grading was performed using a portable slit lamp bio-microscope, while referencing LOCS III standard photographs. The examiner identified specific lens opacities and assigned a severity grade. The severity of lens opacities was categorized into four main groups: nuclear opalescence (NO), nuclear cataract (NC), cortical cataract (CC), and posterior subcapsular cataract (PSC).

Statistical Analysis

The data collected was exported to Stata version 14 for analysis. Descriptive statistics, such as frequency and percentage, were used to summarize the data. To check the multicollinearity of variables, the variance inflation factor and the tolerance test were used. To determine the factors associated with cataract, binary logistic regression was applied. Variables with a P value of less than 0.2 in the bivariable analysis were included in the multivariable regression analysis. The goodness of the model fit was tested using the Hosmer–Lemeshow test. Variables with a P value of less than 0.05 in the multivariable logistic regression analysis were considered statistically significant at the 95% confidence interval.

Result

Sociodemographic data of study participants

A total of 734 study participants were involved in this study giving a response rate of 97.2%. The mean age of the study participants was 58.6 years with ±12.4 standard deviation.

From the total study participants, 390 (53.13%) were males. About 484 (65.94%) were married. About 158 (21.53) were unable to read and write and 198 (26.98%) study participants were government employees (**Table 1**).

Health related data of adult participants

About 143 (19.48%) of study participants had a family history of cataract, 171 (23.30%) had diabetes mellitus, 271(36.92) had systemic hypertension, and 156 (21.25%) had glaucoma (**Table 2**).

Health behavior and environmental factors of participants

Of the total study participants 37 (5.04%) were cigarette smokers and 156 (21.25%) had a history of eye trauma (**Table 3**).

Prevalence of Cataract

The prevalence of cataract among study participants of aged 40 years and above in Durame town was 29.16 % (95%, CI: 25.89-32.59).

Prevalence of different type of lens opacity

Of the total number of participants 8.86% had posterior sub-capsular opacity, 0.27% had nuclear opacity, 11.99% had cortical opacity and the remaining had combination of the above.

Factors associated with cataract

In bivariable binary logistic regression factors: Age, marital status, educational status, monthly income, smoking, eye trauma, diabetes mellitus, Hypertension, glaucoma, steroid medication, myopia, and sunlight exposure were associated with cataract at a p-value of < 0.25. Then, multivariable binary logistic regression was used to assess the relative effect of the independent variables on the outcome variable. In multivariable analysis factors such as age, known history of trauma to the eye, diabetic mellitus,

hypertension, exposure to sunlight and glaucoma had significant association with cataract.

The odds of having cataract among study participants aged 70-95 years was 8.60 (AOR=8.60, 95% CI: 3.09-23.90) times higher compared to participants aged 40-49 years. On the other-hand the odds of having cataract in adults aged 50-59 years was 2.74 (AOR=2.74, 95%CI: 1.16-6.48) times higher compared to aged 40-49 years.

The odds of having cataract was 2.27 (AOR= 2.27, 95% CI: 1.37-3.74) times higher among diabetic participants when compared to participants who didn't have diabetic mellitus. In adults who spend ≥ 6 hours per day on average sunlight, the odds of having cataract was 2.83 (AOR= 2.83, 95% CI: 1.45- 5.53) times higher compared to those adults who spend less than 6 hours per day. The odds of having cataract in adults who had known history of trauma to the eye in their life time was 2.39 (AOR= 2.39, 95% CI: 1.19-4.81) times higher compared to those who didn't have a history of trauma to the eye in their life time.

The odds of having cataract in adults with systemic hypertension was 1.86 (AOR= 1.86, 95% CI: 1.16-2.99) times higher than adults who didn't have systemic hypertension. In adults who had glaucoma, the odds of having cataract was 5.36 (AOR=5.36, 95% CI: 3.13-9.18) times higher when compared to adults without glaucoma history (Table 4).

Discussion

The finding of this study showed that prevalence of cataract among adults was 29.16% (95%, CI: 25.89-32.59) which was in line with the a study conducted in Malaysia 26.8%.[28] This might be due to similarities in study population which was done in older populations, study design and ocular examination of study participants.

However, this study finding was much lower than the studies conducted in Debre Markos 57%,[20] Ghana 48.9%,[29] South Africa 44%,[30] Northern Indian,[31] and in Korea 87.8%.[32] The differences in results may be attributed to variations in study settings, geographical locations, and the characteristics of study populations among participants. For example, studies conducted in Debre Markos, Ethiopia,[20] and Ghana were institutional-based, which may lead to an overestimation of cataract prevalence. Additionally, the populations in the studies from Northern India,[31] and Korea [32] consisted of adults aged 50 years and older, which is older than the population in our study. Age is one of the most significant risk factors for cataracts, as indicated by various studies. Moreover, the research conducted in Northern India specifically focused on diabetic populations, contributing to a higher prevalence of cataracts in that study compared to ours.

The prevalence of cataract in this study was higher compared to studies conducted in Ethiopia 20.1%,[19] Nigeria 19.8%,[32] Southwestern Nigeria 2%,[33] Poland 12.10%,[26] and Korea 25.2%.[32] This discrepancy may stem from variations in sociodemographic characteristics of the study populations, as well as differences in study settings and the availability and accessibility of cataract surgical services in those areas.

In this study older age was significantly associated with cataract. This finding was similar with studies conducted in Whagmira, Ethiopia,[19] Ghana,[29] Nigeria,[32] India,[34] China,[35] and Korea.[15] As people age, the cell membranes, including the lens epithelial cells, which are responsible for maintaining the balance of ions and metabolism of the entire lens, may become damaged. This can lead to an accumulation of fluid inside the lens. Additionally, abnormal differentiation of lens fibers and the formation of protein aggregates can occur, both of which contribute to the development of cataracts.[36]

This study found a significant association between exposure to sunlight and cataract, which is consistent with a study done in Korea.[15] This is because exposure to ultraviolet radiation can harm lens proteins and cells, leading to cataract formation due to oxidative stress damage.[37]

Having history of diabetic mellitus was significantly associated with cataract in this study. There was similar evidence in studies conducted in South Africa,[30] Sankara Nethralayia India,[38] Singapore,[28] and Poland.[26] This could be due to high blood sugar (blood glucose) levels can create an imbalance of water content in the crystalline lens that can accelerate the development of cataracts.[39]

In this study, known systemic hypertension was associated with cataract. This result is consistent with finding of Korean study.[15] Cataract development is closely related to systemic inflammation and hypertension. Inflammatory mechanism can lead to conformational changes in proteins in the lens capsules, exacerbating cataract formation. Certain antihypertensive medications can also induce cataracts.[25]

In this study, having a history of glaucoma was significantly associated with cataract. This similar association was observed in study conducted in Lodz, Poland.[26] There is no direct link between cataracts and glaucoma, although treatment of glaucoma can accelerate cataract formation in certain situations.[40]

History of trauma to the eye in the life time of the adult was significantly associated with cataract. This association is consistent with a study conducted in Whagmira, Ethiopia.[19] The possible reason might be that trauma to the eye can disrupt the normal physiological condition of the crystalline lens. This can be caused by damage to the epithelial membrane, leading to an increase in fluid influx into the lens. As a result, the lens fibers become swollen and thickened, ultimately leading to the development of cataracts.[41] If the trauma is caused by an electric shock, cataracts may result from the coagulation of proteins and osmotic changes that occur in the crystalline lens.[42]

Strengths and limitations of the study

This study provided up-to-date evidence on proportion and associated factors of cataract among adults aged 40 years and above living in Durame Town, Southern Ethiopia. This is important to raise awareness about cataracts and their risk factors among the population. Understanding these factors can lead to early detection and treatment, potentially reducing the burden of visual impairment in the community. Being a cross-sectional study, this study demonstrates the temporal association between predictive factors and cataracts, not the actual causation. Since the study mainly focuses on quantitative data, it provides limited information on the qualitative aspects and their impact relationship.

Conclusion

In this study, the prevalence of cataract was lower than previous national survey result. Besides, older age, known history of trauma to eye, hypertension, diabetes, exposure to sunlight and glaucoma had statistically significant association with cataract.

Declarations

Ethics approval

This study was conducted in accordance of accordance with the Declaration of Helsinki. Ethical approval was obtained from the Ethical Review Committee at University of Gondar, College of Medicine and Health Sciences, Comprehensive and Specialized Hospital, and School of Medicine. A letter of support was provided by the administration of Durame town. Written informed consent was obtained from all participants after detailed explanation of the purpose of the study. Written informed consent was approved by the ethical review committee at University of Gondar, and the ethical approval number was 622/05/2023. All included participants were informed of their right to withdraw from the study at any time during the interview. No risk was taken for the selected study participants. Confidentiality was maintained by not using personal identifiers in the data collection tools and by password-protecting the data on a computer.

Consent for publication

Not applicable.

Funding

The authors have not declared a specific grant for this research from any funding agency in the public, commercial or not-for-profit sectors.

Conflict of interests

All authors declared that there is no conflict of interest in this research work.

Data availability of statement

All data are relevant to the study are included in the article or uploaded as supplemental information.

Authors' contributions

AAL conceptualised the research design, formulated the research questions, takes full responsibility for the work, designed and implemented the research methodology, and conducted extensive reviewers of the manuscript. NLA and KZD contributed to refining the research objectives and conceptualization of the study, conducted statistical analyses and interpreted the results. NLA, KZD and TWF assisted in refining the methodological approach and methodological decisions, led the data collection efforts, organized and managed datasets, and ensured data quality and integrity. AAL, MMB and KZD conducted statistical analyses, interpreted the results, drafted the initial manuscript, outlining the research background, methodology and results, and reviewed the manuscript. AAL act as a guarantor.

Acknowledgments

We would like to express our appreciation to the study participants for their willingness to participate in this study. Authors would also like to acknowledge the dedicated data collectors.

References

1. Nizami AA, Gulani AC, Redmond SB. Cataract (Nursing). 2021.
2. Grzybowski A, Markeviciute A, Zemaitiene R. A narrative review of intraocular lens opacifications: update 2020. Annals of Translational Medicine. 2020;8(22).
3. Heidar K. Cataracts in Children, Congenital and Acquired. American Academy of Ophthalmology. 2017.
4. Delbarre M, Froussart-Maille F. Signs, symptoms, and clinical forms of cataract in adults. Journal Francais D'ophtalmologie. 2020;43(7):653-9.
5. Burton MJ, Ramke J, Marques AP, Bourne RR, Congdon N, Jones I, et al. The Lancet global health Commission on global eye health: vision beyond 2020. The Lancet Global Health. 2021;9(4):e489-e551.
6. Correia M, Das T, Magno J, Pereira BM, Andrade V, Limburg H, et al. Prevalence and causes of blindness, visual impairment, and cataract surgery in Timor-Leste. Clinical Ophthalmology. 2017:2125-31.
7. Mencucci R, Stefanini S, Favuzza E, Cennamo M, De Vitto C, Mossello E. Beyond vision: Cataract and health status in old age, a narrative review. Frontiers in Medicine. 2023;10:1110383.
8. Arrigo A, Leveziel N, Briant PS, Vos T, Resnikoff S, Taylor HR, et al. Global estimates on the number of people blind or visually impaired by cataract: a meta-analysis from 2000 to 2020. diabetes. 2024;5(8):9.
9. Pesudovs K, Lansingh VC, Kempen JH, Steinmetz JD, Briant PS, Varma R, et al. Cataract-related blindness and vision impairment in 2020 and trends over time in relation to VISION 2020: the Right to Sight: an analysis for the Global Burden of Disease Study. Investigative Ophthalmology & Visual Science. 2021;62(8):3523-.
10. Fang R, Yu Y-F, Li E-J, Lv N-X, Liu Z-C, Zhou H-G, et al. Global, regional, national burden and gender disparity of cataract: findings from the global burden of disease study 2019. BMC Public Health. 2022;22(1):2068.
11. Lee CM, Afshari NA. The global state of cataract blindness. Current opinion in ophthalmology. 2017;28(1):98-103.

12. Jolley E, Virendrakumar B, Pente V, Baldwin M, Mailu E, Schmidt E. Evidence on cataract in low-and middle-income countries: an updated review of reviews using the evidence gap maps approach. International Health. 2022;14(Supplement_1):i68-i83.
13. Anbesse DH, Bizuneh ZY, Girum W, Mengistu MA. Vision Related Quality of Life among Cataract Patients Attending Cataract Surgery Campaigns in Ethiopia: A Dual Centre Study. Journal of Clinical and Experimental Ophthalmology. 2022;13(3):1-6.
14. Xulu-Kasaba ZN, Kalinda C. Prevalence of blindness and its major causes in sub-Saharan Africa in 2020: A systematic review and meta-analysis. British Journal of Visual Impairment. 2022;40(3):563-77.
15. Borges LdL, Santos FPVd, Pagotto V, Menezes RLd. Functional disability in community-dwelling elderly: the role of cataracts and contextual factors. Fisioterapia em Movimento. 2014;27:189-200.
16. Fang Z, Chen X-Y, Lou L-X, Yao K. Socio-economic disparity in visual impairment from cataract. International Journal of Ophthalmology. 2021;14(9):1310.
17. Kulkarni A, Banait S. Through the Smoke: An In-Depth Review on Cigarette Smoking and Its Impact on Ocular Health. Cureus. 2023;15(10).
18. Tegegn MT, Assaye AK, Belete GT, Munaw MB. Visually significant cataract and associated factors among older people attending a community ophthalmic service in central Gondar Zone, Northwest Ethiopia: a cross-sectional study. Journal of International Medical Research. 2022;50(6):03000605221104761.
19. Ahmed M, Beletew B, Mengesha A, Markos M. Prevalence of cataract and its associated factors among adults aged 40 years and above in Waghimra zone, Amhara, Northeast Ethiopia: A Community based cross-sectional study. 2020.
20. Wale MZ, Derbew M, Tilahun M, Terefe M. Cataract and associated factors among adults visiting ophthalmic clinic at Debre Markos comprehensive specialized hospital, northwest Ethiopia, 2020. SAGE Open Medicine. 2021;9:2050312121989636.
21. Singh S, Pardhan S, Kulothungan V, Swaminathan G, Ravichandran JS, Ganesan S, et al. The prevalence and risk factors for cataract in rural and urban India. Indian journal of ophthalmology. 2019;67(4):477-83.
22. Organization WH. World report on vision. ISBN: 9789241516570. 2019.

23. Na K-S, Park Y-G, Han K, Mok JW, Joo C-K. Prevalence of and risk factors for age-related and anterior polar cataracts in a Korean population. PLoS One. 2014;9(6):e96461.
24. Kiziltoprak H, Tekin K, Inanc M, Goker YS. Cataract in diabetes mellitus. World journal of diabetes. 2019;10(3):140.
25. Yu X, Lyu D, Dong X, He J, Yao K. Hypertension and risk of cataract: a meta-analysis. PloS one. 2014;9(12):e114012.
26. Nowak MS, Smigielski J. The prevalence of age-related eye diseases and cataract surgery among older adults in the city of Lodz, Poland. Journal of ophthalmology. 2015;2015.
27. Du Y, Meng J, He W, Lu Y, Zhu X. Challenges of refractive cataract surgery in the era of myopia epidemic: a mini-review. Frontiers in Medicine. 2023;10:1128818.
28. Yap JF, Ng QX, Wai YZ, Isahak M, Salowi MA, Moy FM. Prevalence of cataract and factors associated with cataract surgery uptake among older persons in Malaysia: A cross-sectional study from the National Eye Survey II. Tropical Doctor. 2022;52(2):325-30.
29. Yawson AE, Ackuaku-Dogbe EM, Seneadza NAH, Mensah G, Minicuci N, Naidoo N, et al. Self-reported cataracts in older adults in Ghana: sociodemographic and health related factors. BMC public health. 2014;14(1):1-8.
30. Khoza LB, Tshivhase S, Pfungwa M, Ramakuela N, Manganye B. Survey on prevalence of cataract in selected communities in Limpopo Province of South Africa.
31. Vashist P, Tandon R, Murthy G, Barua C, Deka D, Singh S, et al. Association of cataract and sun exposure in geographically diverse populations of India: the CASE study. First Report of the ICMR-EYE SEE Study Group. PLoS One. 2020;15(1):e0227868.
32. Mahdi AM, Rabiu M, Gilbert C, Sivasubramaniam S, Murthy GV, Ezelum C, et al. Prevalence and risk factors for lens opacities in Nigeria: results of the national blindness and low vision survey. Investigative ophthalmology & visual science. 2014;55(4):2642-51.
33. Phaswana-Mafuya N, Peltzer K, Crampin A, Ahame E, Sokhela Z. Prevalence of self-reported diagnosed cataract and associated risk factors among elderly South

Africans. International journal of environmental research and public health. 2017;14(12):1523.

34. Vashist P, Talwar B, Gogoi M, Maraini G, Camparini M, Ravindran RD, et al. Prevalence of Cataract in an Older Population in India.

35. Tang Y, Ji Y, Ye X, Wang X, Cai L, Xu J, et al. The association of outdoor activity and age-related cataract in a rural population of Taizhou Eye Study: phase 1 report. PLoS One. 2015;10(8):e0135870.

36. Wei Z, Gordon P, Hao C, Huangfu J, Fan E, Zhang X, et al. Aged Lens Epithelial Cells Suppress Proliferation and Epithelial–Mesenchymal Transition-Relevance for Posterior Capsule Opacification. Cells. 2022;11(13):2001.

37. National eye institute. New Research Sheds Light on How UV Rays May Contribute to Cataract. 2014.

38. Badrinath SS, Narayanan A, Hussaindeen JR, Surendran TS. The Sankara Nethralaya Community model-Technology and evidence based comprehensive quality eye care equally to all. Indian Journal of Ophthalmology. 2020;68(2):288-90.

39. Harahap J, Rania R. Cataracts Risk Factors and Comparison of Blood Glucose Levels in Diabetic and Non-Diabetic Patients towards the Occurrence of Cataracts. Open Access Macedonian Journal of Medical Sciences. 2019;7(20):3359.

40. Kyari F. Managing cataract surgery in patients with glaucoma. Community eye health. 2019;31(104):88.

41. Strenk LM, Guo S, Lu K, Werner L, Strenk SA. Force of lifelong crystalline lens growth: chronic traumatic mechanical insult to the choroid. Journal of Cataract & Refractive Surgery. 2022;48(3):342-8.

42. Khadka S, Byanju R, Ranabhat S. Cataract following electric shock-Case report. Journal of Kathmandu Medical College. 2019:167-70.

Table 1: Sociodemographic and economic characteristics of study participants aged 40 years and above in Durame town, Southern Ethiopia, 2023 (n=734)

Variables	Catagories	Frequency	Percent (%)
Age	40-49	174	23.71
	50-59	229	31.20
	60-69	205	27.93
	70-95 years	126	17.16
Sex	Male	390	53.13
	Female	344	46.87
Marital status	Never married	66	8.99
	Married	484	65.94
	Divorced or separated	48	6.54
	Widowed	136	18.53
Educational status	Unable to read and write	158	21.52
	Primary school	115	15.67
	Secondary school	253	34.47
	College and above	208	28.34
Health insurance	Yes	339	46.19
	No	395	53.81
Monthly income	< 2000	371	50.54
	2000-5999	166	22.62
	≥ 6000	197	26.84

Table 2: Health related data of the study participants aged 40 years and above in Durame town, Southern Ethiopia, 2023 (n=734).

Variables	Categories	Frequency	Percentage (%)
Family history of cataract	Yes	143	19.48
	No	591	80.52
Diabetes mellitus	Yes	171	23.30
	No	563	76.70
Systemic hypertension	Yes	271	36.92
	No	463	63.08
Glaucoma	Yes	156	21.25
	No	578	78.75
Myopia	Yes	175	23.84
	No	559	76.16
Steroid use	Yes	139	18.94
	No	595	81.06
Visual impairment	Normal	377	51.36
	Mild	85	11.58
	Moderate	106	14.44
	Severe	92	12.53

Table 3: Health behavior/life style and environmental factors among study participants aged 40 years and above in Durame town, Southern Ethiopia, 2023 (n=734).

Variables	Categories	Frequency	Percentage (%)
Smoking cigarette	Yes	37	5.04
	No	697	94.96
Sleep duration	Exposed	113	15.40
	Non exposed	621	84.60
Exposure to sunlight	Non exposed	147	20.03
	exposed	587	79.97
Trauma	Yes	156	21.25
	No	578	78.75

n= sample size

Table 4: Factors associated with cataract among study participants aged 40 years and above in Durame town, Southern Ethiopia, 2023 (n=734)

Variable	Cataract		COR (95% CI)	AOR(95%CI)	p-value
	Yes	No			
Age					
40-49	11	163	1	1	
50-59	40	189	3.14 (1.56-6.31)	2.74 (1.16-6.48)	0.022
60-69	83	122	10.08 (5.15-19.73)	5.65 (2.37-13.46)	<0.0001
70-95 years	80	46	25.77 (12.67-52.43)	8.60(3.09-23.90)	<0.0001
Marital status					
Never married	5	61	1	1	
Married	135	349	4.72 (1.86-12.00)	0.64 (0.19-2.15)	0.475
Divorced or Separated	12	36	4.07 (1.32-12.48)	0.57(0.13-2.42)	0.445
Widowed	62	74	10.22 (3.87-27.02)	0.57 (0.15-2.13)	0.403
Education status					
Unable to read and write	83	75	1	1	
Primary school	40	75	0.48 (0.29-0.79)	0.81 (0.41-1.61)	0.548
Secondary school	41	212	0.17 (0.11-0.28)	0.53 (0.24-1.18)	0.121
College and above	50	158	0.29 (0.18-0.45)	1.05 (0.29-3.79)	0.938
Smoking cigarette					
No	205	492	1	1	
Yes	9	28	0.77 (0.36-1.66)	1.46 (0.54-3.95)	0.452
Eye trauma					
No	133	445	1	1	
Yes	81	75	3.61 (2.50-5.23)	2.39 (1.19-4.81)	0.014
Diabetes mellitus					
No	118	445	1	1	
Yes	96	75	4.83 (3.35-6.94)	2.27 (1.37-3.74)	0.001
Systemic hypertension					
No	84	379	1	1	
Yes	130	141	4..16 (2.97-5.82)	1.86 (1.16-2.99)	0.011
Glaucoma					
No	112	44	1	1	
Yes	102	476	11.88 (7.89-17.88)	5.36 (3.13-9.18)	<0.0001

Steroid use					
No	176	419	1	1	
yes	38	101	0.90 (0.59-1.35)	0.85 (0.40-1.81)	0.680
Myopia					
No	118	441	1	1	
Yes	96	79	3.01 (2.15-4.20)	1.52 (0.93-2.49)	0.093
Sunlight exposure					
Non-exposed	60	87	1	1	
Exposed	154	433	0.52 (0.35-0.75)	2.83 (1.45- 5.53)	0.002
Monthly income					
< 2000	115	256	1.25 (0.85-1.84)	0.74 (0.23-2.38)	0.615
2000-5999	47	119	1.10 (0.69-1.75)	1.27 (0.50-3.22)	0.619
≥ 6000	52	145	1	1	

Note: n-sample size, COR-Crude odds ratio, AOA-Adjusted odds ratio and CI-Confidence interval