

FACTORS CONTRIBUTING TO OPEN GLOBE INJURIES AMONG PATIENTS ATTENDING EYE CARE SERVICES AT MBALE REGIONAL REFERRAL HOSPITAL FROM AUGUST 2022 TO MARCH 2023. A CROSS-SECTIONAL STUDY.

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Page | 1

ABSTRACT

Background

Cases of open globe injuries are on the increase in various countries mainly as a result of occupation, accidents, and sharp instruments in children. Thus, this study determined the factors contributing to open globe eye injuries among patients attending the eye care services at Mbale Regional Referral Hospital.

Methodology

Used a cross-sectional design employing quantitative methods of data collection. 100 respondents who participated in the study were selected, where only patients with open globe injuries as well as caretakers were chosen among patients attending eye care services at MRRH.

Results

Regarding socio-demographic factors, the majority of the respondents (43%) who drank alcohol, (79%) agreed that open globe injuries are more common in children than adults, (52%) mentioned the cornea as the most affected part of the eye. According to individual-related factors, (70%) of the respondents agreed that social-economic status is associated with open globe injuries, (58%) said playing with sharp instruments/objects. Regarding environmental-related factors contributing to open globe injuries, the majority (47%) got injuries at home, (35%) said industry/construction jobs have high risks of open globe injuries.

Conclusions

Open globe injuries are more common at young age than the adults. Sharp objects like sticks are the most common cause of global injuries among individuals. The socioeconomic status of an individual is associated with global injuries

Recommendations

Health workers especially ophthalmologists, and ophthalmic clinical officers should sensitize the community and the whole public on risk factors, causes, and how to prevent global injuries. Parents should strictly monitor their children to prevent open globe injuries. Finally, industrial managers, construction engineers, and army commanding officers should procure protective gear and ensure that their workers take precautions like wearing protective gear while at work

Keywords: Open Globe Injuries, Eye Care Services, ophthalmologist

Submitted: 2023-11-23 Accepted: 2024-06-24

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BACKGROUND

Open globe injuries are traumatic breakdowns in the integrity of the walls of the eye (sclera or cornea). These conditions are commonly managed by an ophthalmologist for effective visual outcomes, (Jindal et al, 2014).

Two primary causes can disrupt the integrity of the globe lacerations/ruptures, penetration/perforation due to blunt objects or sharp objects. A penetrating injury is an injury where the object penetrates the eye, but it does not go through the eye causing intraocular foreign bodies which remain in the eye. For penetrating injuries, an object enters

and exits the eye leaving a wound in the eye. (AAO, 2016). The chance of blunt globe rupture also increases after ocular surgery such as large incision cataract removal, corneal transplant, glaucoma filtering procedures, or LASIK (laser-assisted in situ keratomileusis). In the United States, estimated cases of globe rupture are approximately 3% 100000 per population.

Globally, nearly 55 million eye injuries occur per year worldwide, causing decreased visual acuity for 19 million people and blindness for 1.6 million people. The global incidence of open globe injuries (OGI) is estimated to be 3.5

per 100,000 people. Certain demographic factors have been associated with increased risk for traumatic ophthalmic injuries, such as males, industrial occupations, and lower socioeconomic status. (Mayer et al., 2021). Open globe injuries (OGIs) account for about 44% of the ocular trauma within Australia. It is noted that 90% of the ocular trauma is prevented. However, there have been a few epidemiological studies that have identified groups at risk of OGIs specifically. This study aimed to review the epidemiology of OGIs presenting to a tertiary referral eye hospital (Pubmed,2017. Nader Beshay et al)

Across Africa, a study done by Hughes & Fahy (2020) established that cases of global injuries are on the increase in various countries mainly as a result of occupation, accidents, and sharp instruments in children. Open-globe injuries occur in many different ways and are classified based on the cause or mechanism of injury. Blunt injury causes changes in the rapid rise of intraocular pressure over the globe. With the anterior-posterior shortening of the eye, the eye wall undergoes excessive pressure and can rupture or burst at weak parts, (Li et al, 2015. In East Africa and specifically in Uganda, a survey at the eye clinic in Mulago National Referral Hospital established the following. The cornea and corneoscleral regions were the most common sites of injury due to the greater exposure of these structures to impact and more than half (53.3%) of the injuries resulted from sharp objects (metallic and non-metallic missiles like sticks, stones, sharp-edged instruments and accidents among others), (John. Meyeka, Ann M Ampair and Grace Ssalic). Open globe injuries remain a serious public health problem, resulting in significant vision loss. Thus, the purpose of this study was to determine the factors contributing to global eye injuries among patients attending the eye care services at Mbale Regional Referral Hospital.

METHODOLOGY

Study design

This was a cross-sectional study design employing both quantitative and qualitative methods of data collection. The study design was selected and it took a short period during data collection.

Study area

The study was carried out at the eye care unit of Mbale Regional Referral Hospital located in eastern Uganda. It is located 50 meters from Pallisa Road, near Busitema University School of Medicine opposite the psychiatric ward, it's also about 70 meters from Mbale city center and approximately 227km from Kampala Capital city. The hospital serves several patients from neighboring districts like Budaka, Sironko, Manafwa, Tororo, Kabuchorwa Bulambuli, Namisindwa, and others. Among the services provided include a major outpatient department and the

inpatient department, the eye care department has two areas which include the eye clinic and the eye ward.

Mbale Regional Referral Hospital has 15 wards which include the surgical male and female, medical male and female, maternity, Neonatal Intensive care unit, postnatal, gynecological, Special care unit, eye ward, urological, intensive care unit, malnutrition unit, tuberculosis, psychiatric and children's wards and others.

Study Population

The study population included all patients with ocular problems and caretakers attending eye care services at the eye clinic Unity in Mbale Regional Referral Hospital (MRRH) during the period of the study.

Sample size determination and rationale

The sample size was calculated using Kish and Leslie formula.

$$n = (z^2pq)/d^2$$

Where:

n=sample size

z= is the standard normal deviation estimated at 1.96 (adopted from z distribution table) at a 95% confidence interval

p= is the proportion of respondents with Open globe injury (target population groups). Since P is not known with certainty, we, therefore, estimate it at 7%=0.07, which is the maximum value

q=1-p (1-0.07) =0.93 (The probability of selecting respondents without Open globe injury

d=0.05, the maximum error

$$n = (1.96 \times 1.96 \times 0.07 \times 0.93) / 0.05 \times 0.05$$

$$n = 100.03$$

100 respondents will be considered for the study

Sampling technique

A simple random sampling method was used to obtain the respondents in the study, who filled out the questionnaire. The researcher had a box of 200 papers with 100 of them written 'GREEN' and the other 100 written 'BLUE' and every day the patients who attended the clinic and had diabetes were requested to pick a paper from the box those patients who picked papers written on BLUE were taken for the study.

Sampling procedure

A sampling technique was used to select the subjects whereby only respondents with open globe injuries and caretakers were selected among patients attending eye care services at MRRH

A simple random sampling technique was used to pick 100 respondents and all respondents had a chance of picking blue, 200 papers half written on 'GREEN' and the other half written on 'BLUE' and every day the patients who came to the eye clinic and had open globe injuries and accepted to

participate was requested to pick one of the papers those who picked papers with BLUE mark were considered for the study.

Using Button's (1965) formula to calculate the sample size, $m = GR/O$

Where m = Sample Size

G = Number of people interviewed per day

R = Maximum number of days for data collection

Maximum time the interviewer spends on each respondent

$G=5$, $R=10$, $O=0.5$

There $m = 5 \times 10 / 0.5 = 100$. Therefore, the sample size will be one hundred (100).

Data collection method

The researcher used the interview method using an interviewer guide with a self-administered questionnaire, and physical examination to collect data.

Data collection tools

The researcher formulated a questionnaire and interviews under supervision addressing the research questions. The questionnaire consisted of both open and closed-ended questions which were used to collect the data, interview patients, and photocopying papers.

Data collection procedure

After approval of the research proposal by the research committee of the Ophthalmic Clinical Officer Training School Jinja, an introductory letter was granted to the researcher which was then presented to the administrators of Mbale Regional Referral Hospital and permission was sought from the research committee of the hospital to carry out the study, using the questionnaire, the researcher fully explained the questions to the respondents. Questionnaires containing both open and close-ended questions were used to collect data. Each filled-in questionnaire was checked for accuracy and completeness and kept in a safe place by the researcher.

Definition of variables

Independent variables

The items that are changed or manipulated in a series of events to evaluate the effect on other items and in this study, they included age, marital status, education level gender, income levels and occupation, and Religion.

Individual-related factors contributing to open globe injuries include the task, workload, and working environment.

Environmental-related factors contributing to open globe injuries include physical, chemical, biological, and cultural.

Dependent variable

These included the outcomes measured to see the effect of the independent variables and it was global injuries

Data quality control

To keep data quality, standard questionnaires were set and the supervisor verified the pretest in the study setting protocol. Then the questions in the questionnaires were explained to the respondents and they were signed either by a thumbprint or by signatures to those who knew how to write and enough time was given for the respondents to answer the questions in the questionnaires. Afterward examination and investigations on every respondent according to the already verified checklist were done as required in the eye clinic and assessed for their clarity, understandability, flow consistency, and, completeness by the researcher to ensure that no data were missed out before respondents left.

Inclusion criteria

Only patients/caretakers of children with open globe injuries found at the eye clinic at Mbale Regional Referral Hospital (MRRH) who consented were included in the study.

Exclusion criteria

Patients with open globe injuries, who were referred from neighboring health facilities were excluded from the study.

Pre-testing

The study tool was tested on a few patients attending eye care services at Bugembe Health Center IV and necessary adjustments were made to ensure the validity and reliability of data.

Data Management

After collecting the data, it was processed and stored in a personal notebook, flash disk, and computer as a backup copy.

Data Analysis processing and presentation.

Data that were obtained were checked for consistency and completeness. After collecting the data, it was analyzed through tallying, pie charts, graphs, and tables. The results were presented in tables, figures, and statements using the Microsoft Excel computer program.

Ethical Consideration

On approval of the research proposal by the school research committee, a letter of introduction was provided by the Principal of the Ophthalmic Clinical Officers Training School and then it was taken to the hospital director of Mbale Regional Referral Hospital who introduced the researcher to the research committee MRRH then to the in-charges of the ophthalmic department. Who then introduced the researcher to the respondents to get their consent. The respondents were assured of total confidentiality by not using their names study.

RESULTS

Table: Showing Socio-demographic characteristics of the respondents (n=100)

Responses	Frequency (n=100)	Percentage %
Age		
20-30 years	50	50
31-40	35	35
41-50	15	15
50 years and above	-	-
Total	100	100
Tribe		
Mugisu	65	65
Muganda	21	21
Muteso	14	14
Total	100	100
Religion		
Protestant	40	40
Catholic	28	28
Moslem	20	20
Born Again	12	12
Total	100	100
Marital status		
Single	21	21
Married	66	66
Separated	13	13
Widow	-	-
Total	100	100
Education level		
Primary	48	48
Secondary	32	32
Tertiary	20	20
Total	100	100
Occupation		
Civil servant	7	7
Business person	45	45
Peasant	37	37
Housewife	11	11
Total	100	100

According to table 1; socio-demographic data of respondents on age, 50/100 (50%) of the respondents were between 20-30 years, 35/100(35%) were between 31-40 years while the minority 15/100 (15%) were 41-50 years.

On tribe, the majority 65/100 (65%) of the respondents were Bagisu, 21/100(21%) were Baganda, and the minority 14/100 (14%) were Iteso.

On religion, most of the respondents 40/100 (40%) were Protestants, 28/100(28%) were Catholics, 20/100(20%) were Muslims, and the least 12/100 (12%) were Born again.

Concerning marital status, the highest number 66/100 (66%) were married, 21/100(21%) while the minority 13/100 (13%) were separated.

Education level of the respondents established that 48/100 (48%) of the respondents were primary school dropouts, 32/100(32%) had attained a secondary school level of education and 20/100(20%) had attained a tertiary school level of education.

On occupation, most of the respondents 45/100 (45%) were business people, 37/100(37%) were peasants, 11/100 (11%) were housewives and 7/100(7%) were civil servants.

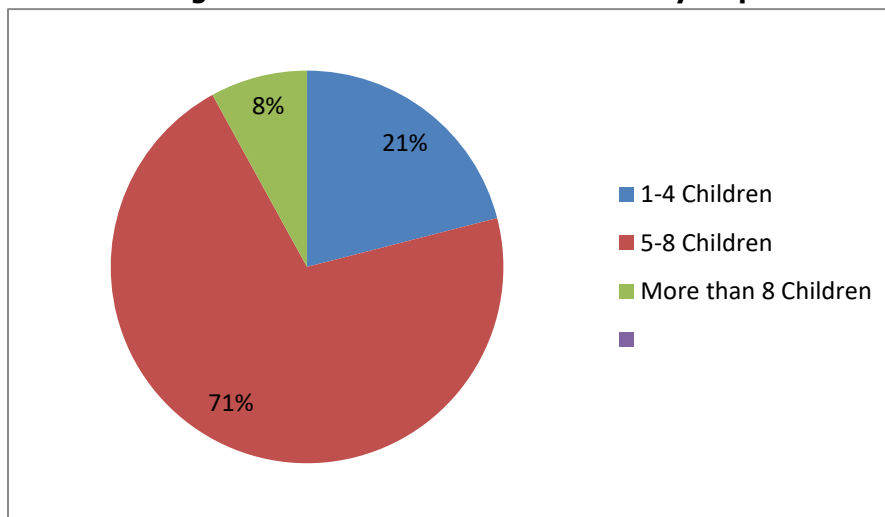
Table 2: Socio-demographic factors contributing to open globe injuries.

Responses	Frequency (n=100)	Percentage %
Do you drink alcohol?		
Yes	43	43
No	57	57
Total	100	100
In your view, are global injuries more common in children than adults		
Yes	79	79
No	21	21
Total	100	100
What part of the eye is more affected by open globe injuries?		
Cornea	52	52
Conjunctiva	13	13
The front part of the eye	25	25
The whole eye	10	10
Total	100	100

In Table 2, 43/100 (43%) of the respondents indicated that they drink alcohol while 57/100 (57%) of the respondents do not. The highest number of respondents 79 (79%) agreed that open globe injuries are more common in children than adults while the lowest number 21/100 (21%) disagreed.

Concerning the part of the eye which is more likely to be affected by open globe injuries, the majority of the respondents 52/100 (52%) mentioned the cornea, 25/100(25%) the front part of the eye, 10/100(10%) said the whole eye while 13/100(13%) conjunctiva.

Figure 1: Number of children owned by respondents.



According to the study findings in Figure, the majority of the respondents 71/100 (71%) indicated that they had several children between 5-8 children followed by 21/100 (21%) had 1-4 children while the least 8/100 (8%) had more than 8 children.

Figure 2: Common objects responsible for open globe injuries

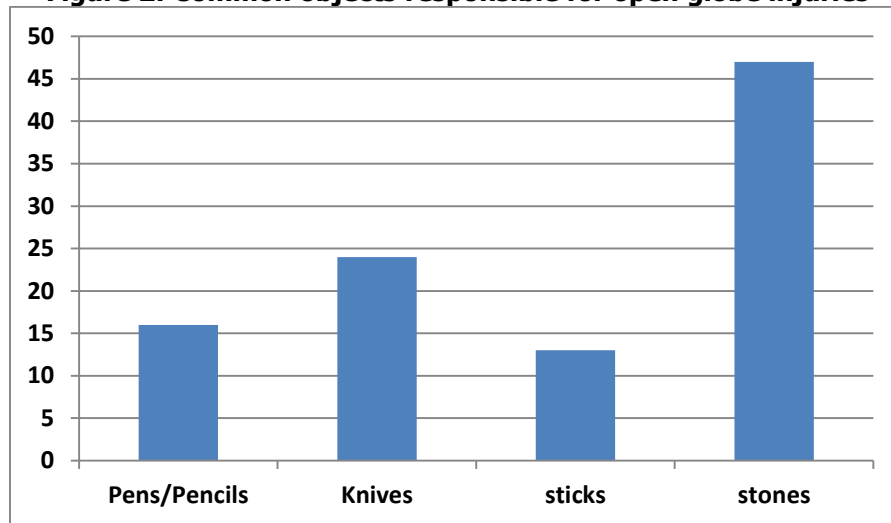


Figure 2 concerning common objects responsible for open globe injuries, most of the respondents 47/100(47%) mentioned stones, 24/100(24%) knives, 16/100 (16%) pens/pencils while the least 13/100(13%) stick.

Table 3: Individual-related factors contributing to open globe injuries

Responses	Frequency (n=100)	Percentage %
What games do you play?		
Foot ball	49	49
Rugby	16	16
Cricket	12	12
Boxing	23	23
Total	100	100
Is socioeconomic status associated with open globe injuries?		
Agree	70	70
Disagree	19	19
Not sure	11	11
Total	100	100
Accidents are associated with global injuries		
Agree	66	66
Strongly Agree	26	26
Disagree	8	8
Total	100	100
Lack of toys among children contributes to global injuries		
Agree	67	67
Strongly Agree	20	20
Disagree	13	13
Total	100	100

In Table 3; According to individual-related factors contributing to open globe injuries, when respondents were asked about the type of games they play, 49/100(49%)

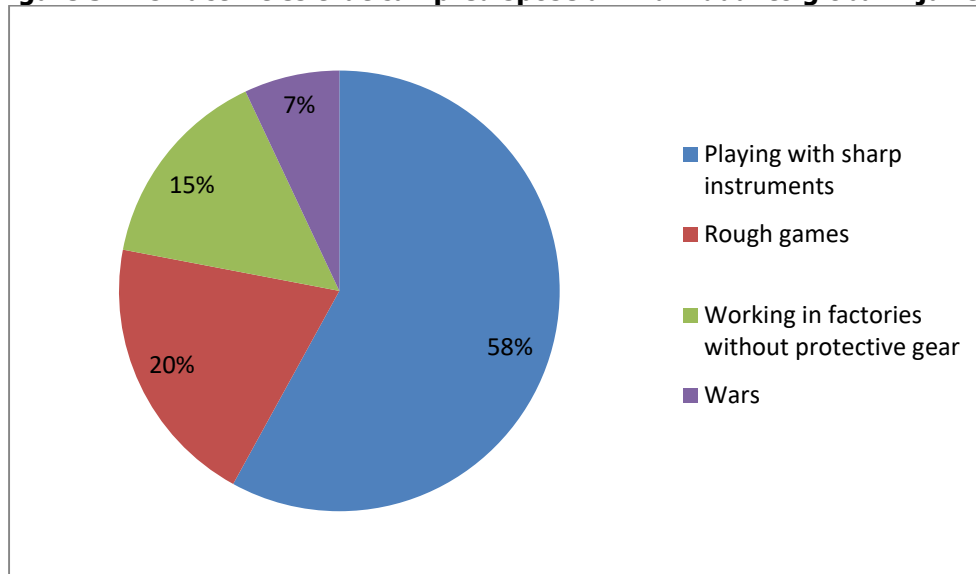
indicated that they play football, 16/100(16%) rugby, 12/100(12%) cricket while 23/100(23%) boxing. The majority 70/100(70%) of the respondents agreed that social-economic status is associated with open globe

injuries, 11/100(11%) were not sure and 19/100(19%) respondents disagreed.

On whether accidents are associated with open globe injuries, the biggest number of respondents 66/100(66%) agreed, 26/100(26%) strongly agreed and 8/100(8%) disagreed.

The highest number of respondents 66/100 (66%) agreed that lack of toys among children contributes to open globe injuries, 20/100(20%) strongly agreed while the least 13/100(13%) disagreed.

Figure 3: Risk activities that can predispose an individual to global injuries.



According to Figure 3 on risk activities that can predispose an individual to open globe injuries, most of the respondents 58/100 (58%) said playing with sharp instruments/objects,

20/100 (20%) rough games, 15/100(15%) working in factories without protective gear, while the least 7/100 (7%) said wars.

Environmental-related factors contributing to global injuries

Table 4: Environmental-related factors contributing to open globe injuries.

Responses	Frequency (n=100)	Percentage %
Where did you get the injury from		
Home	47	47
Street	12	12
Highway	16	16
Bars	25	25
Total	100	100
Does type of occupation predispose people to open globe injuries?		
Yes	88	88
No	12	12
Total	100	100
Mention occupations that put people at a higher risk of global injuries		
Industry/construction jobs	35	35
Soldiers	12	12
Drivers	27	27
Student/pupil	26	26
Total	100	100

According to environmental-related factors contributing to open globe injuries in Table 4, when respondents were asked where they got the injury from, the majority 47/100(47%) said at home, 16/100(16%) highways, 25/100(25%) bars while 12/100(12%) said they got the injury from the street. Of all respondents, 97/100 (97%) reported that the type of occupation predisposes people to open globe injuries and 3/100 (3%) disagreed.

Regarding occupations that put people at a higher risk of open globe injuries, 35/100 (35%) said industry/construction jobs, 26/100(26%) student/pupil, 27/100(27%) drivers while 12/100 (12%) soldiers.

DISCUSSIONS

The study established that, on socio-demographic data of respondents on age, (50%) of the respondents were between 20-30 years, (35%) were between 31-40 years, (15%) were between 41-50 years. Respondents belonged to various age groups and this could be attributed to the fact that the study targeted both patients/caretakers of children with open globe injuries.

On tribe, the study established that the majority (65%) of the respondents were Bagisu. This could be attributed to the fact that the study area is in the Bugisu Sub-region where there is a high number of Bagisu than any other ethnic group.

The study revealed that the highest number of the respondents (40%) were Protestants while the least number (12%) were born again.

Concerning marital status, the highest number (66%) was married. This was important since married parents can offer proper supervision for especially young children who are at high risk of open globe injuries.

The education level of the respondents established that (48%) of the respondents were primary school dropouts. People with lower education levels might have inadequate knowledge concerning risk factors and preventive measures for open globe injuries and the minorities of the respondents (20%) had attained a tertiary level of Education.

According to the study findings, the majority of the respondents (71%) indicated that they had between 5-8 children.

Socio-demographic factors leading to global injuries

The study established that (43%) of the respondents take alcohol. It should be noted that people who drink alcohol often engage in fights/reckless driving and this increases their risk of open globe injuries.

The highest number of respondents (79%) agreed that global injuries are more common in children than adults. This is because children tend to play with sharp objects. This concurs with Agrawal et al, (2013) among 153 Indian patients who observed that penetrating eye injuries were common in children below 16 years.

Concerning the part of the eye that is more likely to be affected by open globe injuries, (52%) of the respondents mentioned the cornea. This is because it's the most exposed outer part of the eye which is also in agreement with a study done by Onakpoya et al (2015) in Nigeria who observed that the cornea was the most affected site of open globe injury. Regarding common objects responsible for open globe injuries, most of the respondents (47%) reported stones while (24%) had knives. This agrees with a study done by Yuan et al (2014), categories of objects that were used to inflict or were the cause of the 249 open globe injuries. Knives, bottles, and glass accounted for 51.1% of all open globe injuries, and there was therefore a strong association between them.

Individual-related factors leading to global injuries

The study revealed that (16%) of the respondents play rugby, (12%) cricket, (49%) football and (23%) boxing. Such games are rough and as a result, predispose individuals to global injuries.

In the study, it was revealed that the majority (70%) of the respondents agreed that socioeconomic status is associated with open globe injuries, (11%) were not sure while (19%) disagreed. The study findings above are in line with one carried out by Okubasi & Haleyville (2014) in Ethiopia which established that many children whose parents are low-income earners cannot afford to buy toys for their children. In addition, they cannot buy safety gear for their children like helmets and goggles which could protect them from eye injuries.

On whether accidents are associated with open globe injuries, the biggest number of respondents (66%) agreed while (26%) strongly agreed and (8%) disagreed. The highest number of respondents (67%) agreed that lack of toys among children contributes to open globe injuries, (20%) strongly agreed while the least (13%) disagreed. Similarly, Umeh & Ogben (2011) in their study reported that in many developing countries like Kenya, children often lack toys to play with. As a result, most of them turn to materials from the natural environment to play with during their leisure time. As a result, they use sticks, stones, and other sharp items which increase their risk of eye injuries.

According to risk activities that can predispose an individual to open globe injuries, (58%) of the respondents said playing with sharp instruments/objects, (20%) rough games, (15%) working in factories without protective gear and the least (7%) said wars.

Environmental-related factors leading to global injuries

The study revealed that the majority (47%) of the respondents got their injuries at home. Similarly, in another

study conducted by Soni et al (2015), the home was identified as the biggest source of open globe injuries. Most of the respondents 88/100 (88%) reported that the type of occupation predisposes people to open globe injuries. Madhusudhan et al (2014) in their study conducted in Malaysia revealed that open-globe injuries are also associated with certain occupations. In particular, they mentioned industrial workers as being a major high-risk group.

Regarding occupations that put people at a higher risk of open globe injuries, (35%) said industry/construction jobs, (26%) student/pupil, (27%) drivers and (12%) soldiers.

Conclusion

From the discussion, the researcher concluded that:

The socio-demographic factors contributing to global injuries among patients attending eye care services at Mbale Regional Referral Hospital were as a result of alcohol consumption, accidents, types of occupation, and playing with sharp instruments.

Children stand at a higher risk of open globe injuries than adults age since young children like playing and when they play with sharp objects or rough games, they easily cause to the eye thus they are at high risk of open globe injuries.

The cornea was identified as the commonest affected part of the eye in the event of a penetrating open globe injury since it is exposed to the environment therefore it has a high chances of open globe injuries.

The individual-related factors contributing to global injuries among patients attending eye care services at Mbale Regional Referral Hospital were accidents because of poor roads, overspeeding drivers, and falling off from buildings from the construction sites playing with sharp instruments like sticks rough games like cricket and rugby, and playing with stone mostly at a young age.

Socio-economic factors have a great impact on open globe injuries since people have less income to buy toys for their children, and farmers are more exposed to material that can easily cause injuries to the eye, playing games such as football, cricket rugby also stands a chance of causing global injuries.

The environmental-related factors contributing to global injuries among patients attending eye care services at Mbale Regional Referral Hospital were; occupational hazards such as industrial and construction jobs for workers who were exposed and lacked protective gear while on duty.

Most open globe injuries occur at home, especially among children who play with sharps while unsupervised by their parents.

Recommendations

- Professional Health workers especially ophthalmologists and ophthalmic clinical officers, extension workers, and village health teams should

sensitize the community on risk factors, causes, and how to prevent and treat open globe injuries.

- Parents should strictly supervise/ monitor their children to prevent open globe injuries by ensuring that they do not play with sharp objects and engage in rough games such as rugby and cricket.
- Finally, industrial managers, construction engineers, and army commanding officers should procure protective gear and ensure that their workers take precautions like wearing protective gear while at work especially those working in industries, construction sites, and the army.

ACKNOWLEDGEMENT

I thank the Almighty God for having guided me through this program. I also appreciate my beloved supervisor Mr. Kyakulaga Adonia who has greatly helped me through the course of this work.

I also sincerely appreciate Jinja Regional Referral Hospital and Mbale Regional Referral Hospital management for their effort to make me a complete ophthalmic clinical officer especially, the ophthalmologist Dr. Arrach Proscovia, Dr. Bakaki Willison, Dr. Zalwango Charity and all members of the hospital community who gave in a helping hand during this research project are highly appreciated.

I would like to extend my thanks to my friends Kiwanuka Andrew and Nyabonyo Prisca including all classmates for their continuous support in terms of knowledge, guidance, and encouragement plus my beloved father, mother, brothers, and sisters for the financial support whenever required.

Finally, I thank the principal Mr. Ajwika Sam, and the academic registrar Mr. Ndikuno Nomani of Ophthalmic Clinical Officers Training School Jinja for creating a good learning environment for me.

LIST OF ABBREVIATIONS

VA	Visual acuity
AAO	American Academy of Ophthalmology
OGIs	Open globe injuries
MRRH	Mbale Regional Referral Hospital
OPD	Outpatient department

Source of funding

The author had no source of funding

Conflict of interest

The author declared no conflict of interest

Author Biography

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Page | 10

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