

A Survey on Pattern of Ocular Morbidity in a Rural Community in Rwanda

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Abstract

Background: Majority of ocular morbidities found in developing countries are preventable and curable and vary from country to country and from community to community. Screening of ophthalmic conditions in communities with underserved ophthalmic services, can help detect and treat various spectra of ocular morbidity. Untreated ocular conditions may lead to vision impairments and blindness. **Methods:** A free walked-in ophthalmic screening outreach survey was conducted at a rural community in Rwanda and the total number of attendees was 762. Clients' demographics, detailed case history, and ophthalmic specific evaluation tests generated the survey data. Treatment offered was based on the diagnoses made. Clients who required special treatment or reviews were referred to the health care facilities for further investigations and subsequent management. The recorded data on observation forms was analyzed aided by Statistical Package for Social Sciences (SPSS) computer software using descriptive statistics. **Results:** Majority of the clients were from Mageragera community (91.5%) where the outreach was conducted. The number of females 71.7% (546) seen were more than males 28.3% (213) in ratio of 2.5:1. Age group with the highest number of clients was (1 - 10) years, 139 (18.2%) while the least was (≥ 71 years), and 34 (4.5%) respectively. Among ocular morbidities diagnosed, conjunctivitis ranked highest 562 (73.8%), followed refractive errors 118 (15.5%) and cataract 31 (4.1%). Glaucoma was diagnosed in 4 (0.5%) clients. Medication given included mainly steroidal, non-steroidal and antibiotics ophthalmic drugs. **Conclusion:** A total of 762 clients benefited from early diagnoses, treatment and referrals. The pattern of eye diseases observed was similar to other reports from other developing countries. Statistics from this survey provides baseline data which can be used for planning, management and prevention of ocular conditions in the studied community as well as in research.

Keywords

Community Screening, Rural Community, Patterns of Ocular Morbidity

1. Introduction

Most of the ocular morbidities found in developing countries are preventable and curable. These developing countries are underserved of ophthalmic services more especially in the rural communities. This implies that eye health services are not readily accessible to majority of the population who reside rural. Undetected and untreated ocular morbidities increase vulnerability to blindness. "Ocular Morbidity" is best explained as the spectrum of eye disease or disorder experienced by a population or community (Kimani, *et al.* 2013).

Rwanda as a country, is listed among developing countries and is still struggling with equity of health care including ophthalmology services. Researches have documented that free eye screening program as intervention strategy is very useful to detect, treat and prevent blindness and visual impairment in the target community. Such intervention can help ascertain the pattern of ocular morbidity present in a given community population for better planning.

1.1. Background

World Health Organization (WHO) made an estimate in 2010, that there were 285 million people visually impaired of which 39 million are totally blind. That 80% of these causes of visual impairment are preventable and curable (WHO, 2013). In Africa the number of visually impaired is estimated to be 26 million out of which 6 million are blind. This estimate was derived from a population based studies in Botswana, Cameroon, Eritrea, Ethiopia, Gambia, Ghana, Kenya, Mali, Nigeria, Rwanda, Uganda and Tanzania (Naidoo *et al.*, 2014)

The pattern of ocular disease varies from country to country and even in the same country from district to district (Abraham & Megbelayin, 2017) The two main causes of visual impairment in the world are uncorrected refractive error (42%) and cataract (33%), (WHO, 2013). A study conducted Asia in Western Nepal, indicates that Refractive error (26.8%) is the most common ocular morbidity followed by conjunctivitis (20.6%), cataract (11.8%), and Pterygium (6%), (Tuladhar, Dhakal, & Dhakal, 2013).

In Africa, in a rural community in Ethiopia, four ocular morbidities identified in order of severity included conjunctivitis (29%), cataract (16.3%), presbyopia (15.4%) and uncorrected refractive error (7.9%), (Addisu, 2013). In Nigeria Imo State, rural communities were screened, and the most common ocular morbidity found were refractive error (31.6%), glaucoma (23.5%), presbyopia (17%) and cataract (12%). This work was suggestive of establishing well equipped primary eye care services (Achigbu & Ezeanosike, 2017).

Rwanda is a sovereign state in East Africa with a widely varied geography. It has one of the highest population densities in Africa (1060/sq. mi) with a

young, mostly rural population. In 2018, the population is estimated at 12.50 million, an increase from 2013's estimate of 11.8 million (NISR, 2018) the overall prevalence of visual impairment in Rwanda was 5.3% in 2006 (not including presbyopia) and the prevalence of blindness was 1.8% (Mathenge, Nkurikiye, Limburg, & Kuper, 2007). **Figure 1(a)** and **Figure 1(b)** shows the map of Rwanda as a country (in yellow) and the rural community where the survey was conducted respectively.

This survey was undertaken and designed to determine the pattern of ocular diseases and disorders in a rural community in Rwanda, to determine the ocular morbidity prevalence and to determine the gender and age of those with these ocular morbidities. The information obtained herewith, will assist to facilitate planning of important primary eye care systems that will be put in place via a viable policy for monitoring of epidemiological trends that causes visual impairment which may change from time to time.

2. Subjects and Methods

2.1. Study Area

The free medical visual outreach was conducted on 18th-21st May, 2015 at Mageragere sector, Nyarugenge District, Kigali province, Rwanda. Mageragere has an estimated population size of 23,407, an area size of 54.7 km² and a density of 428.3/km² (NIS, 2012).

2.2. Study Design

This was a cross sectional study of self-directed walk in patients that was interested in participating during the free medical visual outreach organized by the University of Rwanda, College of Medicine and Health Sciences (U R - C M H S) ,

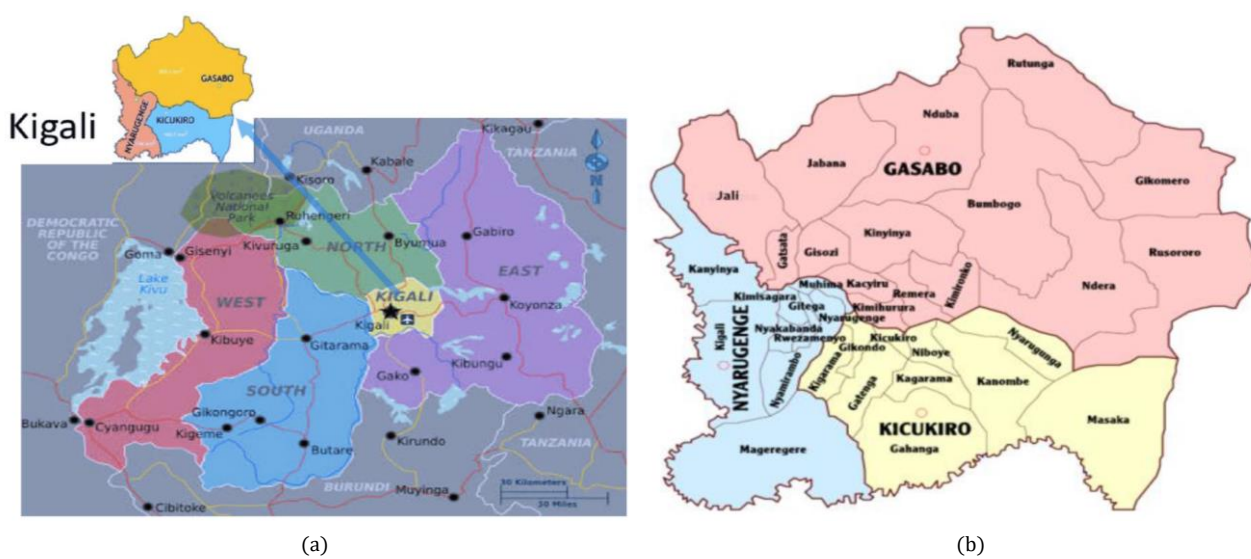


Figure 1. (a): Map of Rwanda; (b): Mageragera sector (blue).

Kigali. The district mayor and sector leader was informed through the protocol channels prior to the outreach to give an update about the purpose of the outreach & seek permission to enter the Mageragere community. The location and date for the outreach was also approved. The community also saw the benefit of this program on their ocular health and assurance was given, that they will not be exposure to any harm, the screening was conducted for three days, subsequently a total of 762 clients registered, making up the sample size.

Data was solicited from the oral interviews to obtain detailed case history, and participant evaluation using observation forms. A Snellen's chart for those who are literate was used to test visual acuity (VA). Otherwise a tumbling E chat was used and the best smallest line which the participant can read was recorded as the VA. Those that could not read the biggest letters in both charts due to very poor vision were ask to count finger (CF) at less than 6 meters. Those who were not able to count the fingers due to poor vision were tested for perception of light (PL) with the penlight at 33 cm. Pinhole test was used for those with poor vision ($<6/18$). Where necessary, the optometrist performed either dry or wet retinoscope or subjective refraction where applicable. The fundus of the patient eye was dilated where applicable to enhance visibility of the fundus.

The anterior and posterior segment was examined for clinical findings and diagnosis using the pen torch and direct ophthalmoscope where applicable, in relevant cases the retina (fundus) was observed under mydriasis (dilation of the pupil). Intraocular pressure was measured using a non-contact tonometer for both eyes. Cases that require more detailed examination was carried out using the Slit lamp biomicroscope and where need be were referred to the nearest secondary or tertiary eye unit putting into consideration the participant home address.

The World Health Organization (WHO) recommended categories was referred to objectively state when a vision is normal, impaired or blinded. Visual acuity equal to or better than 6/18 indicate a normal central vision and when worse than 6/18 indicate moderate to severe visual impairment. Glaucoma was that intraocular pressure (IOP) of more than 20 mmHg and a glaucomatous optic disc cupping of 0.7 to 1.0 or a fixed dilated pupil with and IOP of 35 mmHg, but participants with IOP between 20 to 35 mmHg and no glaucomatous cupping was regarded as ocular hypertension.

Findings were triangulated and diagnosis was made based on the case history for each participant, clinical findings, records for age, sex, VA and ocular morbidity was kept. Data collected was coded and fed into SPSS (Statistical Package for Social Sciences) version 20.0 for statistical analysis. Indicative of statistical significance a P Value of < 0.05 was accepted.

2.3. Selection Criteria

2.3.1. Inclusion Criteria

All client from the age of 1 years and above that registered, for the children the assent forms must be signed before the registration.

2.3.2. Exclusion Criteria

All client who did not register for the free medical visual outreach was not part of the study.

2.4. Data Management

The data collected was well secured and kept highly confidential by the researcher locked in the computer with a special password, the data were analyzed by SPSS 21 version.

2.5. Ethical Consideration

The study was approved by the Institutional Review Board of the University of Rwanda, College of Medicine and Health Sciences Ethics committee.

3. Results

A total of 762 clients who attended and registered for the outreach clinic were treated and majority were from Mageragera community (91.5%). Demographics show that majority of the outreach attendants were females, 71.7% (546) and 28.3% (213) males in a ratio of 2.5:1. Most of the outreach attendants 139 (18.2%) were in the age group 1 - 10 years and the least were in the age group ≥ 71 years and above 34 (4.5%), **Figure 2.**

Figure 3 Shows Visual Acuity (VA) for both eyes classified $\leq 6/18$ for Moderate Visual Impairment and $\leq 3/60$ for Severe Visual Impairment according to WHO classification.

Table 1 shows the pattern of various ocular morbidity in the study community. Some participants suffered more than one eye disease. Conjunctivitis presented the highest ocular morbidity followed by refractive errors.

The medication given was according to the diagnoses made during the outreach as shown in **Figure 4.** Other forms of treatment given included spectacles prescription for correction of refractive errors 192 (15.6%) issued according to the refractive errors measured 32 (4.2%) referrals to tertiary eye units, 6 (0.8%) received counselling services and one (0.1%) had foreign body in the eye removed.

4. Discussion

A total of 762 clients attended the community outreach clinic and the large turnout could have been due to the fact that the services rendered were accessible i.e. free of charge and the services were brought to the community. Demographic Characteristics showed there were more females (546, 71.7%) who participated than the males (213, 28%). These findings are similar to other studies in Nigeria and Nepal (Achigbu *et al.*, 2016, Tuladhar & Dhakal,

2012). Elsewhere, a study reported male preponderance and another showed equal accessibility of both gender (Rizyal *et al.*, 2010 & Ukponmwan, 2013). Majority 91.5% of the respondent resides within the Mageragere community. Patients examined were from all

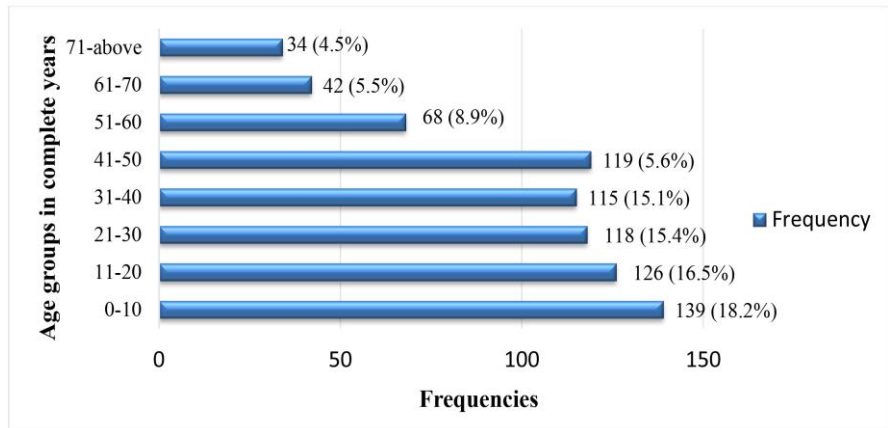


Figure 2. Age distribution of the community outreach clients, the age 0-10 years were the most active participant.

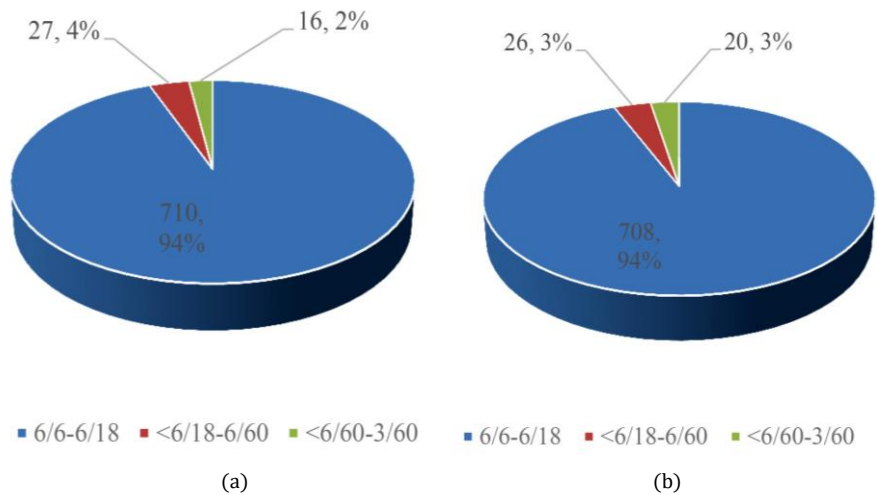


Figure 3. (a): Visual acuity right eye; (b): Visual acuity left eye.

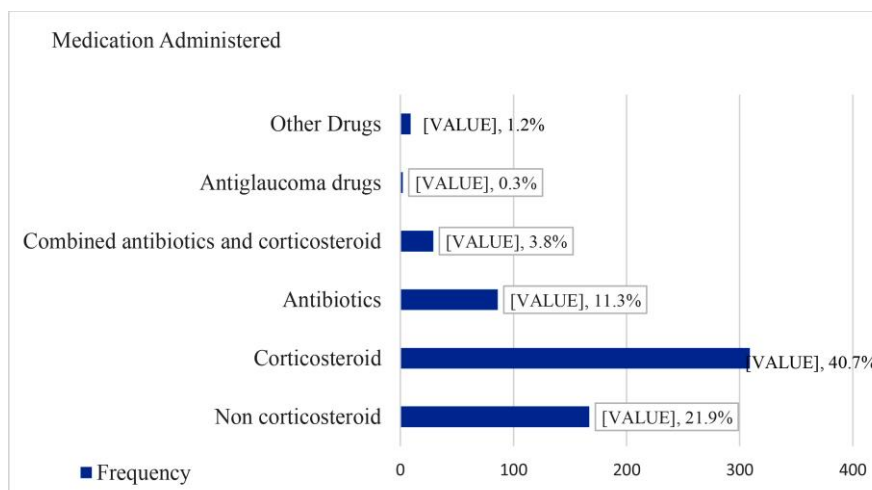


Figure 4. Medication administered for the diagnosed ocular conditions, 40% were administered corticosteroid.

Table 1. Pattern of ocular morbidity at a rural community in Rwanda.

Diagnosis	Conjunctivitis	Refractive errors	Pterygium	Uveitis	Cataract	Trauma	Maculopathy	Blepharitis	Dry Eye	Corneal scar	Cornea ulcer	Pseudophakia	Glaucoma	Hypertensive retinopathy
Percentage	74.8	15.5	0.8	0.3	4.1	0.7	0.5	0.5	0.2	0.1	0.1	0.1	0.5	0.5
Frequency	562	118	6	2	31	5	4	4	2	1	1	1	4	1

age group with the maximum numbers in the age group 1 - 10 years (18%), subsequently followed by 11 - 20 years (16%), 41 - 50 years (15.6%) (**Figure 1**). This findings are similar to a study done in India that showed that children are affected with ocular morbidity conditions than the older age (Roa *et al.*, 2018 & senyonjo *et al.*, 2014).

Data on patients' visual acuity showed that the unaided visual acuity of 6/18 or better in at least one eye was found in 710 (92.9%) cases. At least 20 (2.6%) participants had uncorrected visual acuity of less than 6/60 in the better eye. The undetermined cases where vision that could not be tested in about nine cases of children that was not cooperating. The visual acuity findings in this survey is far much less compared to a study done in Ethiopia were uncorrected refractive error was found to be 7.9%, (Addisu, 2013).

Table 1 shows distribution pattern of the various ocular diseases. These diseases were classified based on major complains from the clients which included itchy eyes (31%), red eyes (20%) and difficulty to read near prints (12%). Adnexia conditions seen included blepharitis 4 (0.5%). Conditions of the anterior segment seen included, conjunctivitis, pterygium, uveitis, dry

eye, trauma and corneal abnormalities. One client had pseudoaphakia in one eye meaning the lens was removed surgically and replaced with intraocular lens while another had foreign body in one eye. Posterior segment conditions seen included, maculopathy, and hypertensive retinopathy and glaucoma.

Conjunctivitis occurred most commonly in 562 (73%) participants, followed by refractive errors 118 (15%) and 31 (4%) cataracts. These findings are similar to a study conducted in Ethiopia, the most common of which was conjunctivitis, but the percentage was much lower (29%), [6]. A similar study in West Nepal showed that refractive errors (26.8%) were the most common ocular morbidity followed by conjunctivitis (20.6%) [5]. Glaucoma was seen in 4 (0.5%) participants classified as one of the least common causes of morbidity, contrary to findings in studies that showed that it was among the most prevalent ocular morbidities and the most important cause of blindness. [14] [15] These variations in ocular morbidity patterns support [17] that the patterns differ with countries and regions. The RAAB conducted in the western province of Rwanda shows that the prevalence of bilateral blindness is 1.8%, with cataracts (65%) being the most ocular morbidity contributing to blindness, the ocular morbidity pattern in the Mageragere community differs from that in the western province of Rwanda, where cataracts were the main ocular morbidity [9]. The difference is related to the population of the study in which the latter studied an age group of 50 years and above. During the outreach corticosteroids (40%), non-corticosteroids (21%) and spectacles (15%) were the main forms of treatment and management used for the subjects, the least was the removal of foreign bodies and anti-glaucoma drugs were 0.1% and 0.3% respectively, although in some cases it was not sufficient to eliminate the problem at once but helped to mitigate the problem.

5. Limitation of the Study

The limitations of this survey is self-directed walk in clients who thought to have some kind of eye problems subjected themselves to the screening and those who have eye problems but do not cause them pain, discomfort, redness and impairment may ignore the screening, this creates a bias of self-selection and may affect the true prevalence of ocular morbidity within the community.

6. Conclusion

In conclusion, we can see that there are enormous variations in different findings in different parts of the world, which shows clearly that the pattern of eye morbidity, which also results in visual impairment and blindness, varies from country to country, from community to community due to the availability of eye services, awareness of eye diseases among the community and it is therefore essential that a survey be carried out before planning for eye care in a geographical location to determine the pattern of ocular morbidity pre-

sent in the population in order to effectively address these burdens of morbidity.

7. Recommendations

Scaling up the primary eye care sector by innovating robust intervention to target refractive errors, cataracts and even conjunctivitis, triggering evidence - based policies for various ophthalmic services that can adequately fit in the mid-level cadre of the eye care system, emphasizing on equipment to improve primary diagnosis, ensuring the continuous upgrade of the various cadres, supervision of the staff and a sound referral system that will not necessarily strain the tertiary level (Ophthalmologist), transferring of certain eye care services from the tertiary to the secondary and from the secondary to the basic primary eye unit and instilling a robust referral system will increase efficiency and improve access, trust and reduce the burden to the eye care services.

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Authors Contribution

The study was conceived by KE, LO, DN, MU, FT, and FK and contributed to writing the paper. KE, LO, MU, and DN analyzed the data. KE and FT registered clients. KE and LO designed the study.

Conflicts of Interest

The authors have declared that no competing interests exist.

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