Methodology and baseline findings of the Sumba Eye Program

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ABSTRACT

Background: The Sumba Eye Program (SEP) is an outreach clinical eye service that delivers specialist eye services to the population in Sumba, Nusa Tenggara Timur, and training support for Indonesian eye health personnel. Objective: We report the baseline clinical findings from one visit to West Sumba, provide an overview of the methodology of our program and present initial progress towards establishing a sustainable local eye care service. Method: Data was collected for patients presenting for examination during a five-day clinic from 10-14 June 2013. Demographic information, presenting and best corrected distance and near visual acuity and refractive correction were recorded. As part of management, corrective spectacles and therapeutics were prescribed and cataract procedures were performed. Result and Discussion: 765 patients between the ages of 2 and 97 years were assessed by optometrists. The most prevalent eye condition diagnosed was an uncorrected refractive error, with 692 patients (90%) managed with refractive correction. 96 (12%) were referred for ophthalmology consultation, of which 87 underwent surgery, predominantly for cataract extraction and intra-ocular lens insertion. Conclusion: The Sumba Eye Program is contributing to the reduction of avoidable vision loss in the West Sumba population, however, ongoing training and recruitment of national health workers is essential to further build the capacity of the local service and assist with sustaining the outreach eye program, with the eventual goal of local provision of care at all levels.

Keyword: Vision Impairment, Nusa Tenggara Timur, Indonesia, Sumba, Eye care


INTRODUCTION

The World Health Organisation (WHO) estimated that in 2014, 285 million people worldwide had a vision impairment, of whom 39 million were blind.3 It is estimated that 90% of people with blindness live in low resource settings, which are often in rural and remote areas.4,5,6,7,8 Indonesia is classified by the United Nations Development Program as a country of Medium Human Development, ranking 108 of 186 countries on the Human Development Index (HDI) in 2013.9 Data from the Indonesian statistic body (Badan Pusat Statistik) shows that in 2012 the province of NTT was near the bottom of the HDI for Indonesia, ranked at 31 out of the 33 Indonesian provinces. It was among 7 provinces which had the highest poverty levels in the country.10 Uncorrected refractive errors and cataracts are the leading causes of visual impairment and blindness with a global disease burden of 42% and 33% respectively.11 Despite the majority of vision impairment being treatable, eye diseases remain largely untreated and people continue to live with avoidable vision impairment, reducing their quality of life and hindering their ability to undertake their daily activities and participate in community life.

The Sumba Eye Program (the SEP), established in 2007 serves as an outreach biannual clinical eye service for residents in West Sumba. The SEP collaborates with the Department of Ophthalmology, Hasanuddin University (UNHAS) and is managed and endorsed by the Royal Australasian College of Surgeons (RACS). The service, delivered by teams of volunteer ophthalmologists, optometrists, nurses and administration staff was established to address the gap in eye care services in Sumba and its surrounding regions. In recent years, the SEP activities have become increasingly focused on teaching and training local and regional eye health workers.

Sumba is an Indonesian island in the province of Nusa Tenggara Timur (NTT) that has no local access to ophthalmology, optometry or specialist eye care services. West Sumba is served by three hospitals. The main hospital in the island’s second
largest town, Waikabubak, in the Sumba Barat regency currently employs six general practitioners, one surgeon, one intern, one pediatrician and two residents (one ophthalmologist and one anesthetist from Bali). Surgical services are limited to general surgery caesarian procedures; there is no local provision for specialist surgery. The SEP predominantly operates in Waikabubak, providing specialist eye care services to the urban community and rural populations in neighboring regencies, Sumba Barat Daya and Sumba Tengah. The three regencies have a combined population of over 458,000 of which 90% of residents live in rural or remote environments. The only other clinical eye services available in West Sumba are screening by a local doctor and eye care nurse at the Karitas Hospital in Weetabula, and eye surgery provided intermittently by visiting ophthalmologists from Jakarta.

At inception, the SEP’s main activity was delivering eye care services to a large number of patients with avoidable vision loss. The services were provided in the format of intensive outreach clinics delivered annually at the main hospital, Rumah Sakit Umum Daerah (RSUD) Waikabubak. Cataracts and refractive error were the two most common causes of vision impairment in the group presenting for examination, thus cataract extractions and refractive correction through the provision of spectacles were the main services provided. Between 2007 and 2013, the SEP performed eye examinations for 4950 Sumbanese, with the majority (79%) requiring eye health care intervention. Need for intervention was determined by blindness, low vision, or mild visual impairment in one or both eyes, in accordance with WHO’s International Classification of Diseases, revision 10 (WHO ICD-10). In total, 600 procedures were performed with the goal of restoring sight, and 3322 pairs of spectacles were provided to manage uncorrected refractive error.

Over time, the SEP has increased its focus on teaching and training of Indonesian health personnel in an effort to help establish a sustainable local eye care community.

We intend to report the methodology and baseline clinical findings from one outreach visit to West Sumba in June 2013. The study has three principal aims:

i) to describe the methodology of co-ordinating the SEP’s biannual West Sumba outreach clinic;

ii) to present the initial findings of the SEP regarding the caseload in the clinic population during a week-long outreach visit in June 2013;

iii) to present the initial approaches made in helping to establish a sustainable local eye care service.

METHODS

Patient Recruitment

Prior to the SEP team’s arrival in June 2013, the Sumbanese eye care workers screened for eligible patients and established a patient list for examination by the visiting team. The eye care workers are trained in visual acuity testing and subjective refraction, and anterior segment examinations. They were provided with motorcycles to enable them to travel to remote villages in West Sumba to screen for eye disease and refractive error, provide information to the communities on eye health care and refer patients who required surgery or assessment by the visiting SEP team. In order to reach a greater number of patients in the more disadvantaged rural areas, the optometrists arrived in Sumba before the team to conduct eye examinations in the Kodi district and sort eye referrals for the SEP. The SEP has a working partnership with the Sumba Foundation, a local NGO, which assists with on-the-ground publicity of the SEP service, patient recruitment, and transportation. The Sumba Foundation arranged transport for referred patients from remote districts, who may otherwise have been unable to get to the hospital. Many Waikabubak residents heard about the clinic through word of mouth and presented to the clinic without a referral.

A total of 765 people presented at the hospital for examination during the 5-day screening clinic from 10–14 June 2013. The SEP protocol was divided into six stages:

i) patient registration and collection of basic demographic data by the hospital’s administration staff;

ii) presenting and best corrected distance and near visual acuity (VA) were assessed by visiting optometrists or Sumbanese eye care workers;

iii) refractive correction and dispensing of spectacles;

iv) ophthalmology consultation for referred patients;
v) pre-operative preparation conducted by a local community health worker and volunteer SEP nurses;
vi) surgery performed by visiting ophthalmologist;

vii) the post-operative check conducted in the morning after surgery. (Figure 1: SEP outreach program patient flow). Several Sumbanese who are proficient in English are employed to interpret between patients and SEP team members.

The hospital administration staff conducted a short interview to collect basic personal and demographic information on each patient as they presented to the clinic. All patient records were entered into a password protected Microsoft Excel spread sheet.

**Vision Examination**

Patients’ best distance VA was assessed using a 3-meter E-optotype Snellen chart. The E-optotype was chosen on account of the high observable illiteracy rate of patients who resided outside of the town center. Snellen units were converted to LogMAR equivalents for analysis. For those unable to read the largest letter on the chart (6/60 VA), VA was recorded as counting fingers (CF) at 2 meters, 1 meter or 0.5 meters, hand movements (HM), light perception (LP), or no light perception (NLP). Near visual acuity was recorded using N-notation at 40 centimeters. Best corrected visual acuity (BCVA) was established by subjective refraction.

Pupil dilation was achieved with tropicamide 1% and phenylephrine 2.5%. Anterior and posterior segment examinations were performed using a slit lamp (Topcon, Medical Systems, NJ, USA). The conjunctiva and corneal surface were examined with fluorescein. Intraocular pressure (IOP) in each eye was measured using Goldmann applanation tonometry (Carl Zeiss Meditech, California, USA). Inclusion criteria for ophthalmology referral included: axial cataracts causing visual impairment (VA threshold 6/60 or worse); pterygium causing the visual disturbance; posterior capsule opacity; lid malposition; and raised intraocular pressures or other ocular signs indicating glaucoma (IOP threshold 21mmHg or above). Patients presenting with a treatable condition that the visiting ophthalmologists were unable to treat due to unavailability of equipment or inability to provide personal follow-up care on complex cases after the team’s departure, were advised to seek treatment in Bali or Java. Those patients were put into contact with the Sumba Foundation, which sought to assist with logistics and funding if the patient did not have the means to access overseas treatment.

![Figure 1. SEP outreach program patient flow.](image-url)
Cost to Patient
All team members are volunteers and contribute their time and expertise pro bono. Eye care services were provided to the patients for free. Patients residing in Waikabubak were charged 10,000 Indonesian Rupiah (approximately AU $1.20) for each pair of spectacles they received. The more disadvantaged patients from rural districts were not charged.

RESULTS
A total of 765 patients, 294 male (38.4%), 456 female (60.9%), aged between 2 years and 97 years with a mean age of 48.7 were assessed by trained SEP optometrists between the 10th and 14th of June, 2013. Almost half of the patients (n=324, 42.4%) were Waikabubak residents, where the outreach clinic was based. The remaining patients came from the surrounding districts including Lambaya (n=122, 16%), Wanokaka (n=119, 15.6%) and Anakalang (n=60, 7.8%). Many traveled significant distances to attend the SEP clinic, with some traveling over 60 kilometers (over four hours travel time), from far west districts such as Kodi.

96 out of 765 (12.5%) were referred by an optometrist for ophthalmology consultation. 87 operations were performed, and 692 pairs of spectacles and approximately 120 pairs of sunglasses were dispensed.

Of the 765 patients who attended the SEP clinic, 302 (34.9%) had a presenting unilateral visual acuity of 6/18 or worse. In accordance with the WHO's International Classification of Diseases, revision 10 (WHO ICD-10), 12 135 of those patients were classified to have low vision (VA worse than 6/18, but better than 6/60), and 167 were blind in that eye (VA worse than 6/60). 47 (5.4%) patients had 6/6 or better vision. A total of 416 patients had a mild visual impairment, with visions between 6/7.5 and 6/18.

The most prevalent eye condition diagnosed in our sample population was an uncorrected refractive error. A total of 692 pairs of spectacles were dispensed for the treatment of myopia (visual acuity equal or worse than -.5DS) in at least 143 patients and presbyopia (refractive error requiring reading glasses (+1.00DS) for correction in those aged 45 years or older) in at least 446 patients. The spectacle prescriptions for 103 patients were not recorded in the patients’ medical records. 96 of 765 (12.5%) were referred by an optometrist for ophthalmology consultation. 87 operations were performed, and 692 pairs of spectacles and approximately 120 pairs of sunglasses were dispensed.

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underwent YAG or surgical capsulotomies and 8 (9.2%) pterygium excision procedures were carried out. A more detailed breakdown of surgeries is shown in Table 1.

**Surgical Outcomes**

A comparison of the 3-month post-operative uncorrected VA assessments with pre-operative VA assessments of 26 cataract patients showed that all 26 patients had improved vision 3 months after surgery (Figure 2: Uncorrected pre-operative vs uncorrected 3 months post-operative VA assessments). The results are comparable with the WHO’s adequate outcome results for cataract surgery (Table 2).\(^{13}\)

The absence of identifiers on the optometry examination records and the surgical and post-operative records for the remaining patients meant that we were unable to compare the pre- and post-operative VA assessments for 61 patients. It is unlikely that there was any selection bias in this process. The pre-operative VA assessments and surgical outcomes were recorded for all patients, but due to poor record keeping, we were unable to match those patients’ post-operative results with their demographic information and pre-operative records.

Of 26 patients: 19 had a pre-operative uncorrected visual acuity (UCVA) measurement between NLP and CF1m; 6 had a pre-operative UCVA of 6/60 and 1 patient had a pre-operative UCVA of 6/36. At the 3-month follow-up UCVA assessments, 5 patients recorded between 6/9 and 6/15, 14 recorded between 6/18 and 6/24, 5 recorded 6/36, 1 recorded 6/60 with a complication, and 1 recorded CF.

**National Capacity Development**

Ongoing skills development of national eye care personnel is now the main focus of the SEP. Capacity development has been measured by the number of eye care workers trained and the retention rate, the number of people screened by the eye care workers between SEP visits and the number of national ophthalmologists who receive training during the SEP clinics. To date, two eye care workers have been trained and are currently employed by the Sumba Foundation to provide eye care services to the community. 5 ophthalmologists and final year ophthalmology trainees (4 from UNHAS and 1 from Flores) have received on-the-job training during a 5-day SEP clinic between 2012 and 2014.

In future clinics, the outcomes of the ECN training will be measured by monitoring the appropriateness of the patients referred by the Eye Care Workers for consultation by the SEP team. This will indicate the capacity of the ECNs to accurately diagnose eye conditions and refer patients appropriately.

**Local and regional capacity development**

The training attachment for the Sumbanese eye care workers was scheduled to take place just prior to the SEP’s visit in June 2013. With an understanding of the basic principles of refraction and eye care, the eye care workers were able to effectively screen some of the population for patients to be referred to the visiting team for further examination. The training prepared them for intensive one-on-one training by the SEP optometrists in the screening clinic. The eye care workers are now instrumental in the recruitment of patients as well as providing clinical follow-up after the team’s departure. The participating UNHAS ophthalmologists benefitted from exposure to both the surgical techniques of the Australian ophthalmologists and the outreach program model.

**DISCUSSION**

We present the methodology of the Sumba Eye Program’s biannual eye care outreach clinic and clinical findings from one visit to West Sumba in...
June 2013. We found that uncorrected refractive error and cataracts were a major cause of unilateral and bilateral visual impairment in our study cohort. Uncorrected VA assessments for 26 patients at 3 months after their operations showed that all 26 patients had a significantly improved vision as a result of their operations. Over 40% of the patients resided in the town center of Waikabubak. This was expected due to their proximity to the hospital. The Sumba Foundation pre-arranges transport for patients from remote areas, however, the journey to Waikabubak and return can require a full day of travel or an overnight stay if an operation is required. Unpredictable factors such as the weather and harvest cycles may prevent individuals from taking time away from their crops to attend the clinic, as the majority of families in rural areas depend on farming as their only income source.

It has been established that uncorrected refractive errors and cataracts are the most common causes of avoidable vision impairment in the developing world. Although there is a lack of national and provincial data on eye health in NTT, one Rapid Assessment of Avoidable Blindness (RAAB) study by Saw et al, 2003 has been conducted in rural cluster populations of Sumatra, Indonesia (n=989, adults age 18 years and over). The study found that the prevalence of bilateral low vision was 5.8% and bilateral blindness was 2.2%. The authors reported that cataract and uncorrected refractive error accounted for 74.2%, 62.5% and 60% of cases of bilateral low vision, bilateral blindness and unilateral low vision respectively. Another study by Ramke et al in 2012 examined 2014 Timorese adults ≥40 years from rural and urban cluster populations and demonstrated that vision loss caused by uncorrected refractive errors was more likely to be in rural communities due to poor access to spectacles.

Our records concur with the high prevalence of cataracts and uncorrected refractive error in the region. Like rural Sumatra and Timor-Leste, NTT is a low resource area. We can infer, from the lack of local specialist eye care in Sumba and throughout NTT, and the caseload from the SEP June 2013 clinic, that eye disease, and refractive error remain largely untreated in the province and that many people continue to live with avoidable vision impairment. However, caution should be taken before drawing conclusions from our clinical data. The SEP is an eye care service, therefore there was an inherent selection bias for participants with existing visual complaints. Population data could not be extrapolated from our data. A population based survey in NTT would be useful to address this information gap.

The SEP has taken the first steps towards establishing a permanent local eye care service on the island. The team has established strong relationships with the Head of the Sumba Barat Regency and local partners through their long-term service to the community. This has been critical in establishing trust within the community and providing reassurance to patients who are referred to the foreign practitioners for treatment. The SEP will support the ongoing development of the eye care workers’ skills through intensive on-the-job training during the SEP clinics and through email support. Their positions will be supplemented by additional candidates recruited for eye care training in 2014 and onward. Nationalisation of the eye care workers’ employment and integration into the public health system is critical to ensure sustainability.

The lack of infrastructure and government resources in Sumba, and throughout rural Indonesia, means that the establishment of a local ophthalmology service is not likely in the short-term. However, the successful collaboration between SEP and UNHAS is helping to up-skill regional ophthalmologists and training them to deliver this model of outreach clinic. The intention is to eventually hand over the SEP to UNHAS or a regional institution to own and manage nationally, with the international team members visiting intermittently for teaching and consultation on specific cases as required.

Recruitment of additional eye care workers and ongoing mentoring and training is needed to further develop the eye care workers’ skills and build the capacity of the local service to achieve wider coverage of the island. National and regional government engagement to resource a local service will be critical to promoting long-term sustainability.

A population survey at the local or provincial level is required to estimate the prevalence of eye disease and uncorrected refractive error in the community. Population data may be useful in advocating for more resources to address vision impairment in the province.

CONCLUSION

The Sumba Eye Program is contributing to reduce avoidable vision loss in the West Sumba population, however, ongoing training and recruitment of
national health workers is essential to further build the capacity of the local service and assist with sustaining the outreach eye program, with the eventual goal of local provision of care at all levels.

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