Report on preoperative visual acuities of patients from two AMM surgical trips to Magdalena, Northern Bolivia

BY DAVE GOLDSMITH AND PIETER GOUWS

The Andean Medical Mission (AMM), founded in 2012, recently celebrated 12 years of dedicated service in the Bolivian Amazon, aiming to eliminate avoidable blindness. Over this period, AMM has successfully performed over 1700 surgeries, including for children with congenital or traumatic cataracts, and treated hundreds of patients for infections, chemical burns, foreign body removals, and eye diseases such as glaucoma.

Focus areas of AMM

The AMM focuses its efforts in the Beni department of northern Bolivia, prioritising the following:

- Regular visits to remote, hard-to-reach rural communities, offering free eye consultations, ophthalmic surgery, follow-up, and medical services.
- Building local capacity by supporting the growth of local ophthalmology services.
- Training village doctors in managing blinding diseases and eye trauma and providing a 24-hour helpline for eye emergencies.
- Targeting and immunising against diseases that affect children's eyesight.

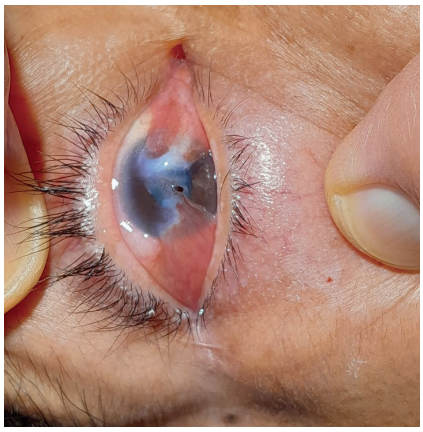
Visual impairment statistics

The number of blind and severely visually impaired patients encountered annually in Beni is alarming. The International Agency for the Prevention of Blindness (IAPB) had set a target to eliminate avoidable blindness worldwide by 2020. Despite AMM's efforts, the number of bilaterally blind or nearly blind patients remains high.

According to the International Centre for Eye Health's 2014 assessment of avoidable blindness model, the prevalence of blindness in Bolivia ranges from 2.1–3.6%; severe visual impairment from 0.9–1.9%; and moderate visual impairment from 6.1–8.8%.

Population and regional challenges

Bolivia's population in 2024, as per United Nations data, is approximately 12.3 million, with an estimated 400,000 blind individuals. In Beni Department, where AMM operates, about 450,000 people reside, with an estimated 7000–9000 people experiencing very low vision or blindness. The number of people becoming blind each year in Bolivia surpasses the capacity of existing services.



Large pterygium in a 50-year-old man who worked in road construction.

Perception of light, black cataract after its removal with MSICS. Imagine trying to see through this and what a difference having a properly measured clear acrylic pseudophakic lens will make to this person.

Beni is a challenging region for building eyecare services due to its geography and infrastructure. One third of the population lives in three large cities, another third in midsized towns of 3000–10,000 people, and the rest in village communities of 500–1000 people. The region features vast rivers, swamps, savannas, and a three-month rainy season, with poor road connections and vast distances between towns, making access to specialist medical services difficult. Environmental factors such as high UV exposure, dry and dusty conditions, limited clean water, and poor access to basic medicines contribute to the high rates of blindness and low vision. And the high cost of ophthalmic treatment and low incomes further exacerbate these issues.

Report overview

This report provides a snapshot of the visual acuity (VA) of patients attending AMM eye clinics in Magdalena (population: 12,000) during two recent surgical trips: 10 days in July 2023 and seven days in June 2024. These visits marked the sixth and seventh surgical trips to Magdalena over the past 12 years.

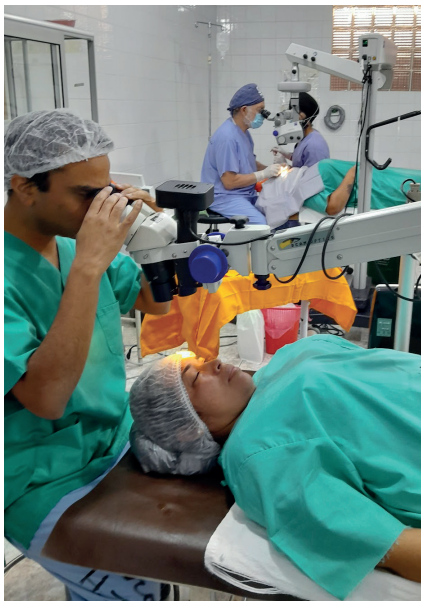
Andean Medical Mission's threshold for surgery is VA worse than 6/48 in the operated eye and 6/36 or worse in the better eye, with exceptions made for certain cases (e.g. patients who drive for a living). Space, time, and consumables usually limit patient selection to those with the greatest need, typically filling all available slots (80–100 per trip). Andean Medical Mission aims to see everyone who comes to their clinics but can realistically see no more than 400–500 patients in a 10-day period to provide adequate ophthalmology services. From this pool, patients are selected for surgery or medical treatment as needed.

AMM clinic and theatre equipment

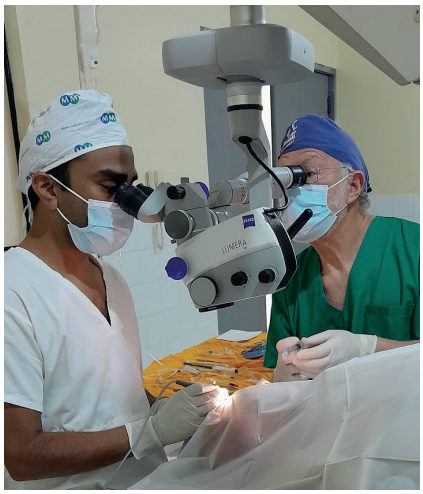
To effectively diagnose blindness from cataract and pterygium, non-government organisations (NGOs) don't require all that much clinic equipment. The level of visual loss is often so apparent that patients are led in by their carer and you can generally see the pterygium or the cataract with just a bright torch.

Perception of light (PL), hand movement (HM), and counting fingers (CF) at 1mtr, cataract will be very obvious but may not be the only cause of vision loss. They will be generally too dense for you to see though to the retina and so the inclusion of a B scan ultrasound to check for retinal detachment and a clear vitreous is helpful and avoids putting patients through surgery unnecessarily.

It is also possible to get quite good postoperative results from even PL patients with the right team and a good, experienced surgeon. Perception of light to 6/12 is a common result for AMM patients provided there are no other pathologies such as undiagnosed glaucoma, diabetic retinopathy or age-related macular degeneration (AMD), etc., which are often unknowns before surgery. The surgical team should always aim for 6/6 vision and therefore, accurate biometry is essential. Many patients will get between 6/9 and 6/12 vision even from HM or CF vision if the biometry is accurate, in our experience.



AMM's two-microscope theatre setup.



The best investment you can make as an NGO is a high-quality microscope. You will have better results; less complications and your patients will thank you, further enhancing your reputation as a result-driven organisation and encouraging greater quantities of future patients to attend your campaigns.

A good bank of IOLs is essential although most of our patients require lenses between the usual ranges of 17–26D. Just using +21D lenses in all patients is an outdated strategy and NGOs should avoid this.

Good theatre equipment, especially a high-quality microscope affects results also. The inclusion of anterior vitrectomy is a 'must have' as patients who have been blind for 10–20 years will often have a few complications with vitreous loss occurring in about 5% of PL and HM cases.

AMM equipment essentials include:

- Clinic equipment: handheld and table slit-lamp, direct and indirect ophthalmoscopes, Keeler retinoscope, tonopen, Sonomed A and B scan, and Nidek autorefractor with keratometry.
- Theatre equipment: two microscopes (one for minor operations and a Zeiss Lumera 300 for cataract surgeries), and a Zeiss Visalis 100 phaco with cautery and anterior vitrectomy.

Demographics and visual acuities

It is not surprising that most of the cataract blindness encountered is in the older population as age, lifestyle, long days working in strong UV sunlight, often dehydrated, take their toll on the health of the eyes. There is a notable difference between patients who work outdoors, such as farmers, roadworkers and builders, etc. having worst VA (particularly in the extent of the damage to the cornea from pterygium), and those that are indoors all day such as teachers, shop keepers, etc. who are less exposed to direct sunlight. This should be taken into consideration when selecting patients and care taken to save surgical spaces for the remote villagers who may take longer to arrive and may well be more deserving cases. Especially if you are limited by quantities of consumables and time.

The objective of surgery is to return as much functional vision as possible. Patients with bilateral PL or HM vision are generally unable to work and require someone to care for them. This is often a younger member of the same family such as a grandchild who may then be denied a good education as a result. Returning some functionality to the patient often benefits more than just one person.

Patients will often function quite well with just one eye and the change in quality of life from being bilaterally blind to having 6/9 or even 6/36 in just one eye is life changing. Andean Medical Mission's protocol is usually to just do one eye per patient until all the bilaterally blind cases have been operated.

In exceptional cases such as congenital cataract in children or where a patients income or safety depends on good vision in both eyes, then we would treat both eyes with a few days separation between cases.

Conclusion

The urgent need for high-quality, permanent ophthalmic surgical services in Northern Bolivia cannot be overstated. This region's population faces a significant burden of blindness that current services are insufficient to address.

We hope this report assists other NGOs and ophthalmologists planning similar work by providing insight into the visual acuity of patients likely to present in a remote setting at this latitude. Understanding these conditions can aid in better planning and resource allocation for future missions.

For more information, a copy of the original data, or to offer support, please contact Andean Medical Mission as detailed below.

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The Andean Medical Mission is a UK Charity (No. 1145662).

Demographics of Magdalena surgical patients	2023	2024
Male	45	34
Female	37	30
Under 50 years of age	10	6
50–60 years	17	10
60–70 years	17	18
70–80 years	19	20
80–90 years	7	8
Over 90 years	0	0
Age unknown by patient	12	3
Principal reason for surgery		
Cataract	59	44
Pterygium > 4mm onto the cornea	19	14
Other	4	7
Total	82	65
Patients' visual acuity prior to surgery		
PL + PL	0	2
Pl + HM	5	5
PL + CF	1	1
PL + equal to or better than 6/60	5	5
HM + HM	4	2
HM + CF	6	5
HM + equal to or better than 6/60	12	15
CF + CF	8	0
CF + 6/60	0	0
CF + equal to or better than 6/60	16	2
Total with above noted VA	57	37
All others	25	28

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Declaration of competing interests: None declared.