Original Article

Epidemiology of Eye Diseases in a Community Eye Camp in Northern Pakistan

PJO – Official Journal of Ophthalmological Society of Pakistan

Erum Shahid[1], Muhammad Shahzaib[2], Uzma Fasih[3]
Asad Raza Jafri[4]
[1,2,3]Karachi Metropolitan University & Abbasi Shaheed hospital, Karachi.
[4]Karachi Metropolitan University & Spencer Eye Hospital, Karachi

ABSTRACT

Purpose: To determine the epidemiology of eye diseases in Skardu, Gilgit-Baltistan, in the North of Pakistan.

Study Design: Cross sectional observational study.

Place and Duration of Study: Camp organized by a Private Eye Hospital in Skardu, Gilgit Baltistan from 22nd April to 28thApril 2024.

Methods: In this 7-day camp, outreach services were provided in Dambudas, Khaplu, and Shigar, offering routine eye examinations, treatment for minor ocular problems, and spectacles for refractive errors, while surgical cases were referred to the main hospital. Comprehensive evaluations included slit-lamp examination, visual acuity testing, fundoscopy, tonometry for glaucoma suspects, and refraction. Medicines were dispensed free, and cataract patients were counseled and scheduled for surgery. Frequencies are computed for categorical variables and means for numerical data.

Results: There were 3411 patients with mean age of 36.48 ± 11.34 years. Males accounted for 57% of the patients. The highest percentage of patients was 61 years and above (26.53%). There were 65.79% patients with anterior segment diseases. Allergic conjunctivitis was seen in 33.56%, and pterygium in 1.32% of individuals. Diabetic retinopathy was seen in 1.73%, cataracts in 7.33%, and glaucoma in 1.91%. Refractive errors were reported in 30.35% with hypermetropia (15.48%) being the most common. Medicines were prescribed to 62.22%, spectacle prescriptions to 24.89%, and surgical interventions were performed in 3.98% of patients.

Conclusion: The allergic conjunctivitis was most frequent ocular problem, followed by refractive errors (hypermetropia being the commonest). Diabetic retinopathy was the most common disease among posterior segment pathology.

Keywords: Epidemiology, Gilgit Baltistan, Pakistan, Eye, Hypermetropia, Refractive errors.

How to Cite this Article: Shahid E, Shahzaib M, Fasih U, Jafri AR. Epidemiology of Eye Diseases in a Community Eye Camp in Northern Pakistan. 2025;41(4):426-432. **Doi:10.36351/pjo.v41i4.2192**

Correspondence: Erum Shahid
Karachi Metropolitan University & Abbasi Shaheed hospital, Karachi
Email: drerum007@yahoo.com

Received: August 07, 2025
Revised: September 13, 2025
Accepted: September 23, 2025

INTRODUCTION

Understanding the prevalence and patterns of ocular diseases is crucial for developing effective prevention and treatment strategies. According to WHO, globally 2.2 billion people have near or distant vision loss with cataract and refractive errors being the leading causes of vision loss worldwide.[1,]In Asia, dry eye disease is the most prevalent, particularly among women and older populations.[2] A study conducted at a tertiary care United Nations Hospital identified refractive errors, allergic conjunctivitis, and presbyopia as the three most common diseases.[3] In high-altitude regions, patterns of eye diseases is quite different. A study conducted in Nepal at 2500 meters above sea level reported a higher incidence of retinal diseases such as hypertensive retinopathy, Age related macular degeneration (ARMD), and high-altitude retinopathy, associated with hypoxic conditions.[4] Another study reported a high prevalence of cataract in these

regions.[5] Eye camps in Nepal have played a significant role in treating avoidable blindness. Gurung et al, have shown that cataracts are the leading cause of blindness in an eye camp organized in rural Nepal, followed by refractive errors.[6] These camps significantly reduce blindness rates by providing cataract surgeries and correcting refractive errors.[6,7] These findings highlight the role of camps in treating eye diseases in remote areas.

Eye diseases constitute a major public health burden in Pakistan, influenced by social and environmental factors. A national study identified cataract as the leading cause of blindness, followed by corneal opacity, uncorrected aphakia, and glaucoma.[8] In contrast, refractive errors were the most frequent cause of moderate visual impairment, followed by cataract. A study by Babar et al, has reported trachoma, an infectious conjunctivitis in 4.4% of the rural population in an eye camp.[9] Another study reported Myopia as the most common refractive error in Northern Pakistan [10]

Disease patterns differ at high altitudes, the reason being hypoxic conditions leading to retinal diseases,[4]prolonged exposure to UV-rays leading to cataracts[11] and pterygium,[12] environmental conditions such as low humidity leading to dry eye disease,[13] and limited health care access.

In April 2024, a non-government organization in Skardu organized an eye camp to provide essential eye care services to the local population. Skardu is a valley surrounded by snow-capped mountains situated in Gilgit Baltistan, in the North of Pakistan, located approximately 2500 meters above sea level. It is a well-established fact that disease patterns vary significantly between high altitudes and lowlands and are influenced by geographical location and environmental factors. There is no published research regarding the prevalence of ocular disease in this region which highlights a significant gap.

This study aimed to determine the prevalence and pattern of eye diseases among individuals residing in the mountainous region of Skardu, Gilgit Baltistan in the North of Pakistan. By generating localized data on ocular health, this research will provide valuable insights for stakeholders, enabling the development of targeted eye care facilities in this area.

METHODS

It was a descriptive observational study approved by the ethical committee of the institute **(OSP-IRB/0020-2025).** The data was collected from an eye camp organized by a private eye Hospital Skardu, Gilgit Baltistan is one of the provinces in the north of Pakistan and Skardu is the capital of Baltistan. The free eye camp was set up for 7 days from 22nd April to 28thApril 2024. The ophthalmic team consisted of two ophthalmic surgeons, two medical officers, one nurse, one optometrist, and two pharmacists. On day one an outreach camp was arranged in Dambudas the capital city of Rondu district, day 2 the camp was in Khaplu, the capital city of Ghanche district and on day 3 it was in Shigar, a capital city in Shigar district (Figure 1). The team conducted ocular examinations, managed minor eye conditions, and prescribed spectacles for refractive errors. Surgical cases were referred to the main hospital for further management, with transportation provided. A hospital-based eye camp was then held for four days in Gamba, Skardu district. Each patient underwent a comprehensive assessment including slit-lamp examination, visual acuity testing with Snellen's chart, fundoscopy, intraocular pressure measurement by applanation tonometry, and refraction using autorefraction for spectacle prescription. Medications were dispensed free of cost. Patients with significant cataracts were counseled and subsequently scheduled for cataract surgery during the camp.

Data was analyzed using SPSS version 26. Quantitative variables were expressed as means ± SD. Qualitative variables, like eye diseases, were expressed as frequency and percentage.

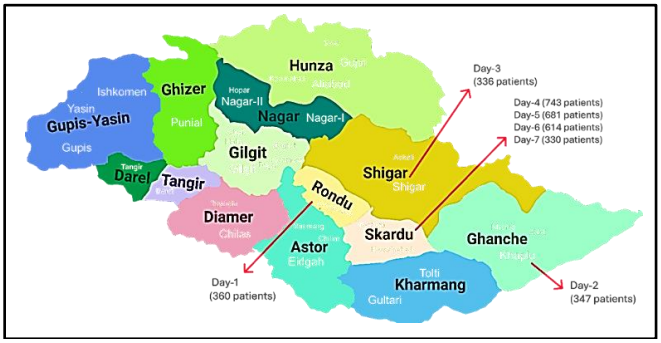

Figure 1: Map of Gilgit, Baltistan showing outreach camps and main camp with a number of patients who visited each day.

RESULTS

The total number of patients registered in the camp was 3411. The highest patient turnout was recorded in Gamba, Skardu, with 2,368 patients over the last four

days of the camp. The breakup of the patient's turn out of seven days is given in Table 1.

Table 1: *Distribution of no of patients reporting in various places of an eye comp.*

Day and Date	Place of camp	No of Patients (%)
Day 1 /22 April 24	Dambudas	360 (10.55%)
Day 2 /23 April 24	Khaplu(Keris)	347 (10.17%)
Day 3 /24 April 24	Shigar (Teasr)	336 (9.85%)
Day 4 /25 April 24	Gamba Skardu	743 (21.78%)
Day 5 /26 April 24	Gamba Skardu	681 (19.96%)
Day 6 /27 April 24	Gamba Skardu	614 (18.00%)
Day 7 /28 April 24	Gamba Skardu	330 (9.67%)
Total 7 days		3411 (100%)

The age distribution of patients attending the camp was 0 to 89 years with a mean age of 36.48 ±11.34. Males accounted for 57% (1944) of the patients and females accounted for 43% (1467). The frequency of the patient's stratification according to age groups is given in Table 2.

Table 2: *Frequency distribution of patients according to different age groups.*

Age Range in Years	No of Patients	Percentage
0-1	56	1.64
1-10	510	14.95
11-19	725	21.25
20-40	655	19.21
41-60	560	16.42
61-Above	905	26.53
Total	3411	100

The frequency distribution of eye diseases revealed following key findings. Allergic conjunctivitis was the most prevalent condition affecting 1145 patients (33.56%), followed by vernal keratoconjunctivitis with 740 cases (21.69%). Other conditions include infective keratoconjunctivitis (11.87%), and pterygium (1.32%) among anterior segment diseases. Diabetic retinopathy (1.73%) was the most frequently reported posterior segment disease. Refractive errors were also significant, with hypermetropia being the most common (15.48%), followed by myopia (10.70%), and astigmatism (6.80%). Cataracts were also reported in 7.33% patients, and glaucoma in 1.91% of the patients. The frequency of ocular diseases is given in Table 3.

Among the patients examined, the majority had anterior segment involvement (65.79%), followed by refractive errors (30.35%), ocular adnexa disorders (2.11%), and posterior segment diseases (1.75%). Regarding patient management, 0.62% were referred for further evaluation, 3.98% underwent surgery, 62.22% received medications, 24.89% were prescribed spectacles, and 8.30% had spectacles dispensed during the camp.

DISCUSSION

Northern Pakistan consists of the Himalayas, Karakoram, and Hindukush ranges. Skardu is a gateway to the Karakoram range. It has an average elevation of 2500 meters above sea level. There were 3.98% of patients who underwent surgery. Studies have shown that the surgery conducted in the free eye camps was economical and more accessible to the patients in these areas.[14,15]

The most prevalent eye diseases were anterior segment diseases, and allergic conjunctivitis (33.56%) was the most common reason for visiting this camp. Similarly, vernal keratoconjunctivitis (VKC) was the most frequent (21.69%) among teenagers.

Bastola reported ocular allergy in 11.2% of 356 patients attending an eye camp in a hilly region, with most affected individuals being adolescents.[16] Another study documented a prevalence of 7.19% among eye camp attendees.[17] The higher prevalence of allergic conjunctivitis in our study may be attributed to the camp being conducted in the spring season and the majority of participants being farmers. Additionally, vernal keratoconjunctivitis (VKC) has been reported more frequently at high altitudes (10.7%) compared to low altitudes (1.1%) in school-aged children in Saudi Arabia.[18]

In our study, the prevalence of pterygium was 1.32%. Other studies have reported pterygium in 6.41%,[17] 27%,[19] and1.5%[20] of eyes presenting an eye camp in hilly or mountainous regions. Pterygium has a high prevalence i.e. 65.8% at an altitude of 3800m, as compared to 20.7% at 2710 m reported by Shrestha.[21] The frequency of dry eye has been reported as 20% in high versus low altitude and 54% of the native population were diagnosed with dry eye as compared to recently posted soldiers due to excess evaporation of tears.[22] Dry eyes were diagnosed in only 2 patients in this study. We did not clinically evaluate every patient for dry eye with an ocular surface disease index questionnaire, tear film breakup time, or Schirmer test.

Table 3: *Frequency distribution of eye diseases.*

Eye diseases	Males	Females	Frequency N (%)
Eyelids			
Blepharitis	7	8	15 (0.44%)
Chalazion	15	7	22 (0.65%)
Stye	8	6	14 (0.41%)
Tumor	2	3	5 (0.15%)
Ptosis	5	1	6 (0.18%)
Conjunctiva			
Allergic conjunctivitis	653	492	1145 (33.56)
VKC	577	163	740 (21.69)
Infective conjunctivitis	279	126	405 (11.87%)
Dry eye	0	2	2 (0.06%)
Pterygium	29	16	45 (1.32%)
Conjunctival Corneal neoplasia	0	0	0
Cornea			
Keratitis	7	2	9 (0.26%)
Opacity	11	4	15 (0.44%)
Laceration	3	0	3 (0.09%)
Keratoconus	2	0	2 (0.06%)
Sclera			
Scleritis	0	0	0
Episcleritis	1	3	4 (0.12%)
Lens			
Cataract	142	108	250 (7.33%)
Glaucoma			
Open	29	21	50 (1.47%)
Angle Glaucoma	6	9	15 (0.44%)
Angle Closure Glaucoma	35	30	65 (1.91%)
Total			
Uveal tract			
Anterior uveitis	16	9	25 (0.76%)
Posterior uveitis	0	0	0
Pan uveitis	0	0	1 (0.03%)
Retina			
ARMD	3	2	5 (0.15%)
Proliferative Diabetic retinopathy (DR)	5	7	12 (0.35%)
Non-proliferative DR	27	20	47 (1.38%)
BRVO	1	1	2 (0.06%)
CRVO	3	1	4 (0.12%)
Optic nerve			
Optic atrophy	2	0	2 (0.06%)
Lacrimal system			
Acute dacryocystitis	0	3	3 (0.09%)
Chronic dacryocystitis	2	5	7 (0.21%)
Orbit			
Proptosis	1	1	2 (0.06%)
Floor fracture	1	0	1 (0.03%)
Squint	5	6	12 (0.35%)
Refractive errors			
Myopia	208	157	365 (10.70%)
Hypermetropia	242	286	528 (15.48%)
Astigmatism	131	101	232 (6.80%)
Presbyopia	71	54	125 (3.66%)

Posterior segment pathologies were observed in 2.05% of participants in this study, with diabetic retinopathy being the most common. A study from Lhasa reported that 22.9% of fundus lesions contributed to low vision and blindness among Tibetans.[19] Another study specifically assessing posterior segment disorders found a high incidence of retinal diseases (52%) in individuals over 40 years, including hypertensive retinopathy (32%), diabetic retinopathy (1.8%), age-related macular degeneration (8.1%), and high-altitude retinopathy (10.4%).[3]

In this study, 7.3% of patients had cataracts. Previous reports from eye camps in similar geographic regions have documented the prevalence of visually significant untreated cataracts as 11.8%,[20] 47.6%,[23] and 5.9%.[16] The majority of individuals in our study were under 40 years of age, with a mean age of 36 years. The observed prevalence may appear lower because only patients with significant cataracts requiring surgery were included.

Refractive errors (RE) were seen in 36.65% of the inhabitants visiting this eye camp, and the most frequent RE was hypermetropia. Many schoolchildren came to the camp for eye screening. Refractive errors' prevalence varies in different studies, 73.5%,[10] 30.5%,[18] 32.8%,[23] 11.2%,[5] 73.8%[20] and 22%.[17] All of these studies have reported a high incidence of myopia, but none of them were conducted at an altitude above 2000m. It has also been previously reported that the high power of an intraocular lens is required in the inhabitants of this region to make them emmetrope. [24]

We had highest number of Geriatric patients followed by teenagers. Elderly patients in remote areas face significant challenges in accessing eye health care. They are more susceptible to specific eye diseases like cataracts, diabetic retinopathy, and age-related macular degeneration.[25] If untreated they can significantly affect an individual's quality of life. On the other hand, young adults constitute the main workforce of a nation. Early detection and treatment of common eye problems, especially refractive errors, is vital for academic performance, social development, and the well-being of young individuals.

This study provides a detailed insight into the prevalence and pattern of eye diseases among individuals residing in the mountainous terrain of Northern Pakistan. The results can be generalized since the first three days of the camp consisted of outreach programs covering three districts. This area is researched less compared to urban centers, and it provides valuable data to the field of public health research.

This study has helped to highlight the need for targeted awareness of eye health programs to educate the public about preventing and diagnosing eye diseases at an initial stage. The stakeholders should emphasize improving healthcare infrastructure and expanding eye care services to mountainous terrain. Local doctors and healthcare workers in remote areas should receive training to diagnose and treat common eye disorders.

The limitations of this study include its retrospective design. The demographic variables, including occupation, literacy, marital status, and systemic diseases of the participants, could not be collected. These demographic details could influence the prevalence and pattern of eye diseases. Causal associations could not be established with this study design. Eye camps have their own limitations; they typically have limited resources and lack comprehensive diagnostic equipment, which may result in underdiagnosis of many eye diseases. It is also difficult to assess the long-term outcomes of interventions and medical treatments.

CONCLUSION

Males and the elderly above 60 years of age constituted the major patient group presenting to this eye camp. The anterior segment pathology was the most common cause of visiting this eye camp in Skardu, a mountainous region of northern Pakistan. The allergic conjunctivitis was most frequent in young adults, followed by refractive errors (hypermetropia being most common). Diabetic retinopathy was the most common disease among posterior segment pathologies.

Funding: This study was not funded by any organization.

Patient's Consent: Researchers followed the guide lines set forth in the Declaration of Helsinki.

Conflict of Interest: Authors declared no conflict of interest.

Ethical Approval: The study was approved by the Institutional review board/Ethical review board **(OSP-IRB/0020-2025).**

REFERENCES

1. **Liu L, Jiao J, Yang X, Zhang J, Yu H, Li C, Pan L, Ma B, Sun H, Zhang J, Li Y.** Global, Regional, and National Burdens of Blindness and Vision Loss in Children and Adolescents from 1990 to 2019: A Trend Analysis. Ophthalmology. 2023;**130(6):**575-587. Doi: 10.1016/j.ophtha.2023.02.002.
2. **Cai Y, Wei J, Zhou J, Zou W.** Prevalence and Incidence of Dry Eye Disease in Asia: A Systematic Review and Meta-Analysis. Ophthalmic Res. 2022;**65(6):**647-658. Doi: 10.1159/000525696.
3. **Baranwal VK, Mishra A, Sharma V, Gupta S, Shyam S, Verma S.** The prevalence of various eye diseases among patients of different nationalities attending the ophthalmology clinic at a tertiary care united nations hospital: a 5-year retrospective analysis. Contemp Med Res.2019;**6(9):**I7–I10. Doi: 10.21276/ijcmr.2019.6.9.3
4. **Thapa R, Ruit S, Poudel MP, Neupane P, Banjara P, Duwal S, et al.** Population Prevalence, Pattern and Associated Factors for Retinal Diseases at High Altitude in Nepal. Clin Ophthalmol. 2024;**18:**2555-2565. Doi: 10.2147/OPTH.S457153.
5. **Shrestha S, Shrestha SM, Gurung A.** Comparative Study of Prevalence of Cataract at High Altitude and Kathmandu Valley. J Nepal Health Res Counc. 2016;**14(33):**81-84. PMID: 27885287.
6. **Gurung J, Tuladhar S, Sharma A.** The role of eye camps in rural areas of Nepal. J Gandaki Med Coll Nepal. 2019;**12(2):**90-93. Doi: 10.3126/jgmcn.v12i2.27220
7. **Sitaula RK, Joshi SN, Khanal S.** Surgical eye camp in rural area of Nepal and its role in Vision 2020. J Chitwan Med Coll. 2016;**6(2):**1-5.
8. **Dineen B, Bourne RR, Jadoon Z, Shah SP, Khan MA, Foster A, et al.** Causes of blindness and visual impairment in Pakistan. The Pakistan national blindness and visual impairment survey. Br J Ophthalmol. 2007;**91(8):**1005-1010.
9. **Babar ZUD, Khan MS, Murtaza B, Khattak RA, Shah S, Shahzad K.** Various Manifestations Of Trachoma In Internally Displaced Rural Population - A Free Eye Camp Based Survey. J Ayub Med Coll Abbottabad. 2019;**31(1):**32-35. PMID: 30868779.
10. **Sirang Z, Nanji K, Jeeva IK, Khan ZW, Kazmi HS.** Types of refractive errors in northern Pakistan: a hospital-based survey. Ophthalmol J. 2019;**4:**86-91.
11. **Miyashita H, Hatsusaka N, Shibuya E, Mita N, Yamazaki M, Shibata T, et al.** Association between ultraviolet radiation exposure dose and cataract in Han people living in China and Taiwan: A cross-sectional study. PLoS One. 2019;**14(4):**e0215338. Doi: 10.1371/journal.pone.0215338. Erratum in: PLoS One. 2019;**14(6):**e0218857. Doi: 10.1371/journal.pone.0218857.
12. **Hatsusaka N, Yamamoto N, Miyashita H, Shibuya E, Mita N, Yamazaki M, et al.** Association among pterygium, cataracts, and cumulative ocular ultraviolet exposure: A cross-sectional study in Han people in China and Taiwan. PLoS One. 2021;**16(6):**e0253093. Doi: 10.1371/journal.pone.0253093.
13. **Maria V, Kumar Khanna S, Chaudhary R, Maheshwari S.** A Multicentric Cross-Sectional Observational Study to Analyze the Effects of Moderate High Altitude on Ocular Health. Beyoglu Eye J. 2024;**9(1):**48-54. Doi: 10.14744/bej.2023.81557.
14. **Johnson GJ.** Improving outcome of cataract surgery in developing countries. Lancet. 2000;**355(9199):**158-159. Doi: 10.1016/S0140-6736(99)00404-3.
15. **Ruit S, Tabin GC, Nissman SA, Paudyal G, Gurung R.** Low-cost high-volume extracapsular cataract extraction with posterior chamber intraocular lens implantation in Nepal. Ophthalmology. 1999;**106(10):**1887-1892. Doi: 10.1016/S0161-6420(99)90397-4.
16. **Bastola P.** The pattern of ocular morbidity, findings from a study conducted in western remote hilly region of Nepal. Nepal J Med Sci. 2012;**1(1):**35-38. Doi: 10.3126/njms.v1i1.5795
17. **Shrestha R, Chhetri ST, Rajkarnikar S, Rajbhandari A, Shrestha O, Khadka S.** Profile of Patients Visiting a Surgical Eye Camp in Pokhara, Nepal-A Descriptive Cross-Sectional Study. Med J Shree Birendra Hosp. 2023;22(2):33-37.
18. **Abolfotouh M.** Faheem Y, Badawi I, Khairallah S. Ocular disorders among schoolboys in a high-altitude area of Saudi Arabia. Saudi J Ophthalmol.1994;124-127.
19. **Wang GQ, Bai ZX, Shi J, Luo S, Chang HF, Sai XY.** Prevalence and risk factors for eye diseases, blindness, and low vision in Lhasa, Tibet. Int J Ophthalmol. 2013;**6(2):**237-241. Doi: 10.3980/j.issn.2222-3959.2013.02.24.
20. **Gurung KB, Pandey S, Shrestha MK, Gurung R, Ruit S.** Prevalence Study of Visual Impairment and Blindness in Population of Mountainous Areas of Nepal. J Community Med Health Care. 2017;**2(3):**1015.
21. **Shrestha S, Shrestha SM.** Comparative study of prevalence of pterygium at high altitude and Kathmandu Valley. J Nepal Health Res Counc. 2014;**12(28):**187-190. PMID: 26032057.
22. **Gupta N, Prasad I, Himashree G, D'Souza P.** Prevalence of dry eye at high altitude: a case controlled comparative study. High Alt Med Biol. 2008;**9(4):**327-334. Doi: 10.1089/ham.2007.1055.
23. **Nowak R, Grzybowski A.** Outcome of an outreach microsurgical project in rural Nepal. Saudi J Ophthalmol. 2013;**27(1):**3-9. Doi: 10.1016/j.sjopt.2012.09.002.

24. **Shahid E, Jafri AR, Fasih U.** Distribution of Ocular Biometry and Intraocular Lens Power in Patients Undergoing Cataract Surgery in an Eye Camp in Northern Pakistan. Pak J Ophthalmol. 2024;**40(4)**. Doi: 10.36351/pjo.v40i4.1770
25. **Quillen DA.** Common causes of vision loss in elderly patients. Am Fam Physician. 1999 Jul;**60(1):**99-108. PMID: 10414631.

Authors Designation and Contribution

Erum Shahid; Assistant Professor: *Concepts, Design, Literature Search, Data Acquisition, Data Analysis, Statistical Analysis, Manuscript Preparation, Manuscript Editing, Manuscript Review.*

Muhammad Shahzaib; Final Year Student: *Concepts, Design, Literature Search, Data Analysis, Statistical Analysis, Manuscript Preparation, Manuscript Editing, Manuscript Review.*

Uzma Fasih; Associate Professor: *Concepts, Design, Manuscript Editing, Manuscript Review.*

Asad Raza Jafri; Associate Professor: *Concepts, Design, Data Acquisition, Manuscript Editing, Manuscript Review.*