

# Situation Analysis of Refractive Services in Pakistan

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## ABSTRACT

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**Background:** Refractive errors are the commonest cause of vision impairment in Pakistan, but control efforts are hampered by a paucity of data for planning. To address these information gaps, a study design was developed to look at both the demand and supply sides. The objectives were to review the available human resources, determine the methods of provision of refractive services, determine the level and gaps in infrastructure available for refractive services, estimate the number of refractions provided and identify the training needs for these services.

**Methods:** Stakeholder consultation between the National Steering Committee for Prevention of Blindness and the Pakistan Association of Opticians, to agree on objectives and method, desk research study, two population-based studies and situation analysis of refractive services provided by public and private sectors.

**Results:** The prevalence of visually disabling refractive errors (visual acuity less than 6/12) is about 3.7% and rises with each decade after 30 years, mostly due to presbyopia. Over 6 million refractions are done annually by 868 ophthalmologists in the private sector, 235 hospitals, 1352 of the 2049 opticians and less than 200 optometrists. More than 2 million pairs of spectacles are dispensed per year. The training needs identified by opticians include optometry, refraction and contact lenses (65%), fitting of lenses and “edging” (57%), powering of lenses (45%), low vision (38%) and artificial eyes (35%).

**Conclusions:** One of the strategies to control refractive errors is training and widespread deployment of optometrists/refractionists in public and private sectors. The current training programs cannot address the need; new programs must be set up, and existing programs must increase their intake. New programs are required for training dispensing opticians.

Vision-impairing refractive errors affect a significant proportion of the world’s population, affecting both sexes and all ages. Refractive errors are simple to diagnose, measure and correct with spectacles. The lack of refraction and provision of spectacles in eye care services in underserved communities has significant negative consequences in terms of lost education and employment opportunities, which result in impaired quality of life and lost economy for the individual, the family and the community.

The basis of planning for any kind of service is good-quality, reliable data. Unfortunately, the current data on refractive errors and services available in Pakistan are insufficient for effective planning of refractive services. Varying rates of prevalence of refractive errors are reported in the literature. In prevalence studies conducted within the country, there were significant variances. This is due to the fact that different investigators followed different methods and used different cut-off points. In recent years the number of optical outlets in Pakistan has mushroomed, but owing to the absence of any structure governing the dispensing opticianry sector, no reliable data are available on the number of

outlets, extent of coverage and quality of services available. Where services are available, little information is available on the factors affecting the uptake of services.

To address these information gaps, a study design was developed to look at both the demand and supply sides. This included a combination of two gold-standard district-level prevalence studies, a desk study on available information, a study on community perceptions and a detailed situation analysis of available services and coverage.

## Background

The global magnitude of refractive errors is not reliably known, as there is great variation in groupings according to age, definition of blindness and examination method. A World Health Organization (WHO) report on elimination of avoidable visual disability due to refractive errors suggests that 5–25% of blindness in some countries is due to refractive errors and that as much as 4% of the population sees less than 6/18 (20/60) because of this condition.<sup>1</sup> The WHO recently reported that 153 million people worldwide are blind or visually impaired for distance vision due to uncorrected refractive errors.<sup>2</sup> The correction of refractive errors to eliminate this form of avoidable disability has been included as a priority component within the planned areas of action under VISION 2020: The Right to Sight.

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According to the WHO blindness survey of 1988–90 in Pakistan,<sup>3</sup> the prevalence of blindness in Pakistan was 1.78%, and 20% of all blindness was due to refractive errors. However, the National Blindness and Visual Impairment Survey indicated a prevalence of blindness of 0.9%, with 3% due to refractive errors.<sup>2</sup> Based on these numbers, there is an urgent need to increase refraction services in a comprehensive manner. The increasing focus on refraction services brought about by the global initiative VISION 2020: The Right to Sight and the positive changes in the economy and literacy levels create a favourable environment and present a great opportunity.

Previously, there was no evidence available to estimate the extent and type of services available for correcting refractive errors. Although a Pakistan Association of Opticians exists, its potential role in promoting refractive services as part of a national program has remained limited. The National Steering Committee for Prevention of Blindness proposed a study to determine the type, scale and level of refractive services available in the country. The purpose of the study was to 1) understand community perceptions regarding treatment and the affordability and availability of refractive services, 2) determine the type, extent and level of refractive and optical services in the country, 3) identify the gaps in the infrastructure and human resources by comparison with the standardized procedures needed, and 4) develop strategies to coordinate the different service providers in order to improve services. The study was expected to provide the much-needed information for planning for refractive services within the context of the comprehensive eye care service model that has been adopted in Pakistan.

For institutional services, the study objectives were to 1) review the available human resources (ophthalmologists, optometrists and refractionists) and their pattern of training for refractive services in public and private hospitals, 2) determine the method of provision of refractive services in the hospital (i.e., who is the key contact person), 3) determine the level and gaps in infrastructure for refractive services in the hospitals, 4) estimate the number of refractions provided by these hospitals, and 5) identify the training needs for these services.

For individual services, the study objectives were to determine 1) the number of refracting opticians and their qualifications and experience, 2) the number and extent of refractions conducted by these refracting opticians, 3) the level of infrastructure and kind of optical services being provided by them and 4) current training and training needs to be addressed.

## Methods

A stakeholders meeting with representation from ophthalmology, optometry and opticianry was convened in Islamabad in 2004. Stakeholders had been briefed on the purpose of the situation analysis and were invited to participate. A consensus was developed on the need

for situation analysis, and the recommendations from this meeting fed into the study design.

The national and provincial Committees for Prevention of Blindness endorsed the concept and study design and commissioned the situation analysis. This was approved by the federal Ministry of Health and the provincial health departments. The provincial comprehensive eye care cells, under the guidance of the provincial coordinators, took a lead role, and most of the field work and data collection was organized by community ophthalmologists with their field teams. Technical assistance for the process and the study was provided by the Sightsavers refractive error and low vision advisor. Logistic and technical support was also provided by the Sightsavers country office.

Quantitative and qualitative tools were developed through a participatory consultation process, field-tested and used to collect the information from various sources. For individual service providers (e.g., refracting opticians), resource persons were commissioned to collect information across the country. All the information was entered on a pretested and precoded questionnaire. Data entry and analysis were done using Epi Info version 6.04 (Centers for Disease Control and Prevention, Atlanta).

Given the lack of reliable data, two population-based studies were also undertaken to determine the prevalence of refractive errors in schoolchildren and adults above 30 years in Gadap Town in Karachi and in Sindh and Bannu in North West Frontier Province. The executive district officer for education, principals, headmasters and headmistresses were informed about the study before the survey. The teams that carried out these studies consisted of a community ophthalmologist, epidemiologist, medical officer, two ophthalmic technicians and a driver.

A desk research study was performed to review the studies on prevalence of refractive errors conducted in Pakistan. Most of the data available on refractive error are unpublished, and studies conducted have been for school screening among children of different ages.

## Results

The data from the two population-based studies suggest that the prevalence of visually disabling refractive errors (visual acuity less than 6/12) is about 3.7% and rises with each decade after 30 years, mostly due to presbyopia. There is a large unmet need of presbyopia treatment, particularly in the rural communities.

### Magnitude of Refractive Errors

Based on the available published<sup>4–9</sup> and unpublished data, it is estimated that the prevalence of visually disabling refractive errors in Pakistan is about 3.5–4.5% in children and 4% in the overall population. This suggests that for a population of 150 million, there are approximately 6 million people of all ages, including 2.7 million

**Table 1. Availability of equipment for refraction**

Service provider	Equipment, % of providers*							
	Trial set	Vision box	Trial frame	Retinoscope	Cross-cylinder	Auto-refractor	Keratometer	Lensometer
Ophthalmologists	100	100	100	95	80	45	42	60
Hospitals	98	98	98	88	72	60	58	62
Opticians	118	111	118	18	45	23	11	127

\*In cases in which the total exceeds 100%, some respondents indicated that they did not do refraction but had that particular equipment available.

children, in need of refractive correction. There are about 1.4 million people blind in both eyes, of whom 42,000 are blind due to severe refractive errors.

### Distribution of Refractive Services

There is widespread coverage of refractive services in most parts of the country (Table 1). The available data indicate that the following were providing refractive services:

- 868 ophthalmologists in the private sector
- 235 hospitals (eye hospitals and eye units in general hospitals), including government, nongovernment, missionary, armed forces and private
- 1352 of the 2049 opticians, all in the private sector
- There are fewer than 200 optometrists in the public and private sectors.

### Status of Refractions

The estimated number of refractions done per year by the different service providers is about 6.3 million: 2.2 million by ophthalmologists in the private sector, 1.6 million in hospitals and 2.5 million by opticians. It was not possible to disaggregate the data into new and repeat refractions.

All 2049 of the country's opticians were dispensing spectacles. The estimated number of spectacles dispensed per year is about 2 million. It was not possible to disaggregate the data into new and repeat spectacles dispensed. However, the data suggest that this high turnover is likely to be providing fair coverage of the refractive need in the country. Further studies are required to estimate how much of the need in rural areas is being met.

In the private ophthalmology clinics, all refractions were done by ophthalmologists, including 8% by ophthalmology residents, 5% by paramedics and 2% by refractionists who were working in these clinics.

### Equipment for Refractive Services

The availability of essential refractive equipment varied with the service provider. Of particular concern was the very low availability of retinoscopes and cross-cylinders among opticians performing refractions.

The type of refraction varied according to the service provider: 56% of ophthalmologists reported doing

manual refraction, 5% autorefraction, and 39% both. The corresponding figures for opticians were 77%, 5% and 17%.

Of the 2049 opticians, 1032 were also dispensing contact lenses. Only 11% of opticians doing refraction had a keratometer.

A total of 1819 opticians reported doing "edging." Of these, 92.4% were doing manual edging, 1.9% were using automatic edging alone, and 5.7% were using both methods. Of the opticians doing edging, 57% had a dedicated technician for edging.

### Cost of Spectacles

The average price of a pair of spectacles with -1 sphere was less than Rs. 100 (US\$1.60) in 36% of cases, Rs. 100-200 (US\$1.60-\$3.30) in 52%, and more than Rs. 200 in 12%.

The average price of a pair of spectacles with +1 sphere was less than Rs. 100 in 41% of cases, Rs. 100-200 in 49%, and more than Rs. 200 in 10%.

These costs are equivalent to a minimum wage of 1 to 2 days' work.

### Training Needs in Opticianry

The training needs identified by opticians are optometry, refraction and contact lenses 65%, fitting of lenses and edging 57%, powering of lenses 45%, low vision 38% and artificial eyes 35%.

### Discussion

Refractive errors represent the single largest cause of avoidable vision impairment in the world. Therefore, it is imperative that national programs for prevention and control of blindness address this significant problem.

This report is unique in that it has attempted to obtain an overall picture of the prevalence of refractive errors and types of refractive services in Pakistan, including the optometry and opticianry sectors, which often are not part of large studies.

Refractive services in Pakistan are provided by different service providers. Although the optometric and opticianry sectors are well distributed throughout the country, they have not been galvanized into being part of a national program. One of the main reasons for this

has been the lack of information about the distribution and professional development needs of these sectors. Furthermore, there has been no formal mechanism for continuing professional development of practising optometrists and opticians. Most of the optician shops are family-run businesses where the trade is handed from father to son. This situation analysis of refractive services has perhaps for the first time identified the professional needs of this sector and the estimated coverage of refractive services that they provide.

While we were able to estimate the number of refractions being done per year, the rate of compliance and use of eyeglasses could not be determined. These were program questions that presented several practical problems and perhaps need to be addressed at a smaller scale using a different study design (a combination of a facility-based and community study).

Based on the need of 6.2 million with refractive errors and an estimated annual refraction rate of 6.3 million, one may be tempted to think that there is adequate coverage. However, this assumption cannot be drawn owing to the reasons mentioned above and also to the disproportionate distribution of services and high level of poverty. For instance, several districts in Balochistan were without any coverage. In Sindh province, there is a large distribution of opticianry services in the metropolis of Karachi, while rural Sindh, which accounts for 50% of the population of the province, does not have the same coverage.

The evidence does, however, suggest that there is an extensive network of existing services where eye care and opticianry services complement each other and that basic opticianry services (dispensing only) are found in some of the remotest areas. This provides a unique basis for strengthening refractive services through public-private partnerships.

The quality of refractions and the spectacles dispensed is an area that needs further attention. In general hospitals and eye units, most refractions are done by ophthalmologists, although in some hospitals refractions are now being done by trained refractionists and optometrists. Ophthalmologists being trained for diploma and fellowship qualifications are required to undergo special training in refraction and must also appear for an examination in refraction as part of the examination requirements. However, in the opticianry sector, the quality of refractions is likely to vary from very high refractions by experienced opticians to trial-and-error subjective refractions by untrained personnel. While this presents a service challenge, it also presents an opportunity for developing and expanding training programs for refractionists and optometrists, who would then find a career in the widespread opticianry sector in the country.

The lack of a standard equipment inventory also suggests that there are likely to be issues with quality of refractions. Most general hospitals and private ophthalmologists had basic equipment for refraction but were

lacking in the use of cross-cylinders and Lensometers (focimeters) in a significant proportion of cases (about 28% and 38% respectively). The situation with opticians was in stark contrast to the eye care services: only 18% of opticians providing refractive services had retinoscopes, and 23% had autorefractors. This indicates a pressing need for raising awareness in the opticianry sector for recruitment of trained refractionists and upgrading of equipment and services.

Earlier community data suggest that the cost of a pair of spectacles of 1 sphere, US\$1.60–3.30, is in keeping with the price the community indicated that it could afford to pay. However, the cost of spectacles rose considerably with increasing power, with a 3 sphere costing over US\$10.

Correction of presbyopia is also an area of concern. The population-based studies showed very low presbyopic coverage (less than 2%) in rural communities. It was interesting to learn that almost two-thirds of those surveyed in the rural community of Bannu did not feel that they needed spectacles for near work. Data on presbyopia in the larger urban centres was not available. Further studies are necessary to determine need, coverage and compliance in both rural and urban settings.

### Human Resource Development

From 2001 to 2006 the National Programme for Prevention and Control of Blindness established refractionist and optometry training programs in the North West Frontier, Punjab and Sindh provinces. These courses follow a multiple entry and exit system and are accredited with local universities.

Based on the recommendations of VISION 2020: The Right to Sight, there is a need for a refractionist to population ratio of 1:50,000 by 2020. This implies that Pakistan needs about 3000 trained refractionists. Currently, there are only about 100 trained refractionists in the country. Therefore, the current enrolment rate of 100 per year needs to be doubled incrementally to 200 per year if the targets are to be achieved. A smaller number of optometrists will be required for the 30 teaching hospitals and to run the refractionist and optometry training programs.

The National Programme for Prevention and Control of Blindness 2005–2010 has recognized the need for refractionists and optometrists and has recommended the creation of posts for 380 refractionists and 27 optometrists. These posts will start becoming operational as of 2010. It would be desirable if the provinces could expedite the recruitment process to start as of 2008 if feasible. It is also imperative that enough trained personnel be available to fill these vacancies when they are announced.

The feedback regarding the training needs of practising opticians provides the basis for developing appropriate training programs for skills development and continuing professional development of practising opti-

cians. There is also a need to develop a formal training program for dispensing opticians.

## Conclusion

This situation analysis of refractive services is a first attempt in Pakistan to assess and review the opportunities and facilities available in both the public and private sectors in both the eye care and optometry/opticianry sectors. The findings present a unique opportunity for joint strategy development and collaboration between eye care and optometry/opticianry for strengthening and developing refractive services in the country.

There is now sufficient evidence to support an estimated prevalence of visually disabling refractive errors of 4%. The survey also highlights community perceptions about refractive errors that were often not taken into account when designing control programs and raises the issue of affordability, particularly for the 24% of the population below the poverty line (or 30% with food poverty).

One of the strategies to control refractive errors is the training and widespread deployment of refractionists in the public and private sectors. The current training programs cannot address the need; new programs must be set up and existing programs must increase their intake. The National Programme for Prevention and Control of Blindness provides the opportunities for deployment of refractionists within the public sector. However, new programs are required for training dispensing opticians.

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