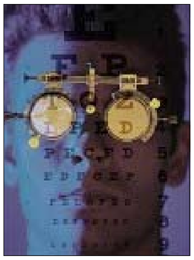
# Refractive Error Blindness and its Outcomes



*Editors Note: On occasion we are provided with a paper that can be of value to all of our members. We are pleased to include in this issue of "Visions" this paper by Dr. C. Ellis Potter, OD, FAAO which was recently published in the Kansas Optometric Journal*

**Refractive Error Blindness** is the degree of visual handicap due to the lack of the best refractive correction.

In third world countries, Refractive Error Blindness is a problem of significant proportions both in terms of individual handicap and in terms of burden to society. Until the World Health Organization recently changed to the above definition Refractive Error was neglected as a leading cause of Blindness.

Inadequate statistics and the lack of uniform definition have slowed the acceptance and recognition of this cause of blindness. For instance, in many studies the world-wide incidence of refractive error has been based on the presenting acuity level at distance in the best eye. Presenting acuity could mean: no refractive correction, wearing prefabricated (store bought) glasses, wearing a pair of glasses passed on from a family member or friend, a pair of glasses found on the street or even an out-dated prescription made many years prior. As an example of ambiguity of the presenting acuity definition, a myopic person (nearsighted) that is 20/200 without glasses, who failed to wear glasses to the assessment would be considered blind. Yet with *best correction* they may be 20/20, function normally, lead a normal productive life and not be blind. **To assess blindness adequately, the refractive error must be known.**

Additionally, vision acuity levels to determine blindness are not universally accepted. In some studies 20/200 (6/60) was considered blind, while others defined blindness as 20/400 (3/60). Variability with age and function must also be considered to determine true refractive error blindness. A teenage 3 Diopter hyperope (a far-sighted individual) may be able to accommodate (focus) to see normally while a 3 Diopter Hyperope that is 60 years old would be unable to see 20/200 without correction. Further, because myopic, hyperopic, and presbyopic conditions change in degree with age, the statistics and data determined at one age are invalid for other age groups. **For a fair assessment of blindness, only corrected acuity is valid.**

The true incidence of refractive error blindness awaits future study. Some previous studies sample school children, who obviously are not a representative cross section of populations as a whole, not only because of age variables, but also because in many cultures significant numbers of children do not attend school. Some studies are conducted in clinics, schools and hospitals where people have particular problems which skew the sampling statistics. Other studies are based on statistics determined by school teachers, auto-refractors or other paramedical professionals. To adequately assess refractive error versus disease caused blindness, trained ophthalmic personal must assess the refractive error with random controlled sampling.

The degree of refractive error blindness varies widely and affects all social and economic classes. Dandona and Dandona in a literature search, from minimally available information, determined that Refractive Error Blindness may vary from .40% (1 in 250) in China to .11% (1 in 900) in Austrialia.[1] Even in the United States the degree of refractive error blindness was .33% in blacks (1 in 300) and .24% in whites (1 in 414). Despite the low percentage, Dandona feels that uncorrected refractive error is the **second leading cause** of treatable blindness following cataracts.[2]

The degree of handicap secondary to uncorrected refractive error varies with the degree of refractive error, the individual's age and the requirement for vision. Vision acuity alone can not assess the degree of handicap. For instance, a 10 diopter myope may be "blind" when attempting to drive an automobile or count sheep but perform adequately to sew, write or do complicated tasks like repairing a watch. Then too, most observers know that vision acuity levels even better than 20/200 may not be adequate to function in many societies. Levels of vision of even 20/40 (6/12) may cause headaches, eye strain and inefficiencies to a degree that an individual can not carry out a task. Further, blindness due to refractive error has a profound effect on the quality of life and the role of the individual. In the west, we know that refractive error can affect an individual's demeanor and personality development. It may even affect career choices. Given these definitions and the degree to which they occur, the significance of refractive error inefficiency is many times greater than .36% as indicated by Dandona, et. al.[3]

Ellwein estimates that half of the visual impairment caused by refractive error remains uncorrected and given that the problem cuts across all social, economic, geographic, ethnic and cultural classes and it is a **world wide public health problem**. [4]

Further, the burden of refractive error blindness to society may be under appreciated in terms of "blind-person years." If a highly myopic 10 year old child has their best refractive correction until age 65 years, 55 years of blindness is avoided. A 55 year old individual, who is adequately corrected following cataract surgery, will have, at the age of 65, avoided 10 years of blindness. Dandona & Dandona in their article, suggest that "in terms of blind-persons years . . . the **burden on society due to refractive error blindness is about twice that due to cataract blindness**."[5]

The dilemma of Refractive Error Blindness is alleviation. The possible corrections include spectacles, contact lenses and refractive surgery. In many