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Heraclitus believed that everything is in flux, that change encompasses the natural world and the human condition. History buttresses this notion, and the years since 1990 are no exception. Between then and now the world has witnessed tremendous change: the internet, social media, 9/11, global warming, the collapse of the Soviet Union—the list goes on. Amidst these rivers of change, however, a pessimist might note that one thing has remained fairly constant: the number of blind people worldwide.

The prevalence of blindness, as for that of any disorder, crucially is determined by its definition. WHO defines blindness as presenting visual acuity (ie, the acuity without glasses at the time of testing) in the better eye of less than 3/60. Previously the WHO definition cited the best-corrected visual acuity. The logic behind the change was to capture individuals who are blind or visually impaired because of uncorrected refractive error (ie, correctable with spectacles).

The Global Burden of Disease Study 2010 (GBD) aims to provide robust data about the spatiotemporal distribution of major human diseases, including visual impairment, by age and sex worldwide. In *The Lancet Global Health*, Rupert Bourne and colleagues,[1] for the Vision Loss Expert Group of the GBD, report the distribution and temporal changes in prevalence of blindness and moderate to severe vision impairment from 1990 to 2010, worldwide. According to the current WHO definition, their data from 21 regions showed that 31·8 million people were blind in 1990, and in 2010, 32·4 million were blind.[1–3] Of these, in 1990, 68% (95% uncertainty interval 65–70) were blind from treatable causes, compared with 65% (61–68) in 2010. Leading causes of blindness worldwide did not change between 1990 and 2010: cataract (39% and 33%, respectively), uncorrected refractive error (20% and 21%), and macular degeneration (5% and 7%).

But the pessimist would be wrong to believe that nothing had changed. The most common cause of blindness is cataracts, which is an age-related disease. Since 1990, the worldwide population and its median age have increased. Hence, changes in demographics pose challenges for reduction of the prevalence of blindness, as they do for other age-related disorders. The optimist points out that the global age-standardised prevalence of blindness for adults aged 50 years and older decreased from 3·0% (95% CI 2·7–3·4) worldwide in 1990 to 1·9% (1·7–2·2) in 2010.[3] A reduction in the prevalence of blindness caused by infections, particularly trachoma and onchocerciasis, was seen, and was achieved mainly through improved infection control. The proportion of global blindness attributed to uncorrected refractive error did not change, and has remained at around 20% since 1990.

Of interest is that Bourne and colleagues used Bayesian hierarchical modelling to provide credible intervals for prevalence of vision impairment. A similar method was used to provide estimates for the proportion of blindness attributable to various causes. Researchers trained in frequentist statistics will not be familiar with this form of statistical analysis. Bayesian statistics are rarely seen in randomised clinical trials and are virtually unheard of in medical laboratory science. Although it has been argued that the Bayesian omelette cannot be made without breaking Bayesian eggs, a Bayesian approach lends itself to hierarchical models, and is arguably the manner in which clinical medicine and science is conducted in practice.

A substantial proportion of blindness due to uncorrected refractive error is probably related to nuclear cataract, which defocuses as well as obscures vision. The misclassification in epidemiological studies occurs because the WHO protocol for blindness surveys instructs researchers to designate as the principal cause of vision impairment that which is most easily treatable. Hence, cataract-induced refractive error might be recorded as uncorrected refractive error when, in fact, the individual requires surgical intraocular-lens implantation rather than glasses. Increased rates of cataract surgery earlier in the disease course (with accurate biometric assessment of intraocular-lens power) would reduce the prevalence of blindness due to cataract, uncorrected refractive error, and angle-closure glaucoma, which would kill three birds with one stone.[4]

A shocking discrepancy of up to 50 times difference in the prevalence of blindness remains between developed countries and developing regions. In fact, population-based studies from developed regions rarely report the prevalence based on the WHO definition. Extrapolation from available data shows that 0·1–0·2% of adults aged

40 years and older in Australia and the USA are blind according to the WHO definition,[5,6] whereas in central Myanmar the rate is 8·0%.[7]

Heraclitus was right, of course, everything is in flux. Rates of change differ and may be frustratingly slow, but those interested in reducing the burden of blindness should be encouraged by the trends reported by Bourne and colleagues.[1] They should not, however, be complacent. Challenges remain and further reductions in the prevalence of blindness will not come easily as the rates of age-related retinal and optic-nerve diseases increase with the ageing population. Nevertheless, a scientific approach to programme delivery in collaboration with local health workers will continue to reap rewards.[8]

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I declare that I have no conflicts of interest.

1 Bourne RRA, Stevens GA, White RA, et al, on behalf of the Vision Loss Expert Group. Causes of vision loss worldwide, 1990–2010: a systematic review. *Lancet Global Health* 2013; published online Nov 11. http://dx.doi.org/10.1016/S2214-109X(13)70113-X.

2 Thylefors B, Negrel AD, Pararajasegaram R, Dadzie KY. Global data on blindness. *Bull World Health Organ* 1995; **73:** 115–21.

3 Stevens GA, White RA, Flaxman SR, et al. Global prevalence of vision impairment and blindness: magnitude and temporal trends, 1990–2010. *Ophthalmology* 2013; published online July 10. DOI:10.1016/j.ophtha.2013.05.025.

4 Chan W, Garcia JA, Newland HS, et al. Killing two birds with one stone: the potential effect of cataract surgery on the incidence of primary angle-closure glaucoma in a high-risk population. *Clin Exp Ophthalmol* 2012; **40:** e128–34.

5 Munoz B, West SK, Rubin GS, et al. Causes of blindness and visual impairment in a population of older Americans: the Salisbury Eye Evaluation Study. *Arch Ophthalmol* 2000; **118:** 819–25.

6 Taylor HR, Keeffe JE, Vu HT, et al. Vision loss in Australia. *Med J Aust* 2005; **182:** 565–8.

7 Casson RJ, Newland HS, Muecke J, et al. Prevalence and causes of visual impairment in rural myanmar: the Meiktila Eye Study. *Ophthalmology* 2007; **114:** 2302–08.

8 Muecke J, Sia DI, Newland H, Casson RJ, Selva D. Perspective on ophthalmic support in countries of the developing world. *Clin Exp Ophthalmol* 2013; **41:** 263–71.