**Institution:** Anglia Ruskin University

**Unit of Assessment:** UoA 3 (Allied Health Professions, Dentistry, Nursing and Pharmacy)

**Title of case study:** Case Study A. Addressing The Global Burden of Eye Diseases

## 1. Summary of the impact

Anglia Ruskin University's Professor **Bourne** leads the Vision Loss Experts Group (VLEG) which is part of the Global Burden of Disease Study (GBD. Comprising 79 leading ophthalmic epidemiologists from around the world, and carried out in partnership with the World Health Organization (WHO), VLEG compiled the most up-to-date statistics ever generated on the prevalence of global blindness, facilitating the analysis of trends and risk factors, and producing detailed future projections.

VLEG data have been described as "*a critical contribution to our understanding of present and future health priorities for countries and the global community*" (Editor-in-Chief, *The Lancet, Dec 2012*). The findings have directly impacted on healthcare policymakers and professionals, charities and economic analysts, both in the UK and overseas, increasing their awareness of global eye care issues. These users have applied this increased awareness at a:

a. *Global level* where the data have become a significant resource in health analyses by economists and healthcare planners such as PricewaterhouseCoopers and the World Economic Forum (WEF), enabling these organisations to provide recommendations for eye-health policies and practices. These reports predict the socio-economic impact of visual impairment in the world and provide an insight into the economic return from investments in eye-health treatment programmes. These in turn have informed the development of healthcare planning nationally and internationally, including the Eye Health Strategy by Vision2020 Australia. In addition, the research findings were used by NGOs and opinion leaders in ophthalmology at the Congress of the International Agency for the Prevention of Blindness (IAPB), informing discussion of blindness prevention strategies. This led directly to the development of an Action Plan for the Prevention of Avoidable Blindness and Visual Impairment (2014-2019) by the WHO, which was endorsed by the 66th World Health Assembly. Furthermore, the World Bank, as part of its mission to alleviate poverty, has adopted the data to inform funding priorities for health care projects in developing countries.

b. *National level* where VLEG findings drew attention to the absence of reliable data, subsequently leading to the commissioning of a detailed countrywide National Eye Survey of Trinidad and Tobago (NESTT), worth £350,000, in order to identify and address eye-health priorities.

## 2. Underpinning research

**Bourne** (Professor, Vision & Eye Research Unit (VERU), Anglia Ruskin University, 2007-present) was invited to lead the VLEG by the GBD core group in 2008, in recognition of his extensive experience in ophthalmic epidemiology in developing countries including Pakistan, Bangladesh and Thailand. Reflecting this position, **Bourne** is the recipient of a number of key grants including: The Bill and Melinda Gates Foundation [1], Fight for Sight [2-3] and the Brien Holden Vision Institute Foundation (Australia) [4] which have supported VLEG's work. **Bourne** has also been lead or corresponding author on a number of significant outputs reporting VLEG's findings (see below).

The VLEG group comprised 79 international collaborators including the WHO (key researchers listed as co-authors in [5-6]). A Research Fellow in VERU (**Price,** 2008-2010; now Lecturer in the Department of Vision & Hearing Sciences, Anglia Ruskin University, 2010- present) assisted with data collection and analysis.

VLEG took up the formidable challenge of assembling and analysing epidemiological data from 187 countries by systematically reviewing around 15,000 relevant articles published between 1980 and 2010. The group also secured unpublished "grey data" from hospitals and vision practitioners, and micro-data from ongoing and archival research projects. This effort was the first systematic review of visual impairment and blindness since 1990, and is the largest such study ever performed, incorporating comprehensive geographic and trend analyses globally [5-7], along with detailed analyses of specific regions, including the UK [8].

As VLEG lead, Bourne was responsible for: (i) providing the expertise to drive the project and coordinate members' activities; (ii) liaising with the overall GBD project management at the Institute

of Health Metrics and Evaluation (IHME) at the University of Washington; (iii) determining how the systematic data would be collected, analysed and presented.

VLEG data, with the rest of GBD data were subject to a battery of modelling and meta-analysis, leading to the production of comparable metrics about eye disease, including years lived with disability (YLDs) [9] and disability-adjusted life years (DALYs) [10]. Causes of visual impairment were included in the estimation of region-specific data. The study found a fall in the prevalence of avoidable blindness and visual impairment in 2010 compared to 1990. However, it identified an increasing number of older people with visual impairments, and continuing gender disparity. Some 32.4 million people across the globe were blind in 2010, of which 19.6 million (60%) were female. A further 191 million had moderate/severe visual impairment, of which 109 million (57%) were female [5-6]. Furthermore, VLEG data describes a wider range of severities and conditions than had been studied previously, including near/distance vision and milder grades of visual impairment that affect quality-of-life and employment potential, such as the ability to read/write and drive a motor vehicle.

Reflecting the perceived importance of the work and to promote its wide dissemination, VERU has secured the funding for VLEG from the Brien Holden Vision Institute Foundation (Australia) [4]. Working in partnership with the WHO, this funding will enable VLEG data to be maintained and updated for another 5 years. The funding will also be used to develop an online data repository and visualisation tool that will enable a much larger audience, including the public, to freely view and use VLEG data. The commissioning of a fully searchable website, to be hosted by the IAPB, will allow users to select regions or countries of interest and obtain visual impairment and blindness prevalence data, which can be grouped by age, gender, severity and other factors. This will raise public awareness of global eye health issues and highlight local causes and risk factors.

**3. References to the research**


*Grants :*

1. **Bourne R** (2008-2010). "Global Burden of Disease Study". *Bill & Melinda Gates Foundation*, US$25,000.
2. **Bourne R**, **Price H**, Taylor H, Mathers C, Leasher J (2010-2011). "Global Burden of Diseases, Injuries and Risk Factors study (GBD Study) - Modelling of global prevalence of visual impairment and blindness". *Fight for Sight*, £14,652.
3. Braithwaite T, **Bourne R,** Pesudovs K (2012-2013). "National Eye Survey of Trinidad and Tobago (NESTT): The Impact of Vision Loss on Quality of Life". *Fight for Sight*, £15,000.
4. **Bourne R**, Stevens G (2011-2017). "Global Visual Impairment and Blindness – database & Visualisations Study". *Brien Holden Vision Institute*, £168,262.

*Publications :*

5. Stevens G, White R, Flaxman S, **Price H**, Jonas J, Keeffe J, Leasher J, Naidoo K, Pesudovs K, Resnikoff S, Taylor T, **Bourne R,** (2013). Global Prevalence of Vision Impairment and Blindness: Magnitude and Temporal Trends, 1990-2010. **120**(12), 2377-84, *Ophthalmology*, doi: 10.1016/j.ophtha.2013.05.025.
6. **Bourne R,** et al (2013). Causes of vision loss worldwide, 1990–2010: a systematic analysis. *The Lancet Global Health*, Early Online Publication, 11 November 2013. doi:10.1016/S2214-109X(13)70113-X http://www.thelancet.com/journals/langlo/article/PIIS2214-109X(13)70113-X/abstract
7. **Bourne R, Price H,** Stevens G. (2012). Global Burden of Visual Impairment and Blindness. *Archives of Ophthalmology*, **130**(5), 645-647, doi: 10.1001:archophthalmol.2012.1032
8. Murray CJL, *et al.* [with **Bourne, R**] (2013). UK Health Performance: Findings of the Global Burden of Disease Study 2010. *Lancet*, **381**(9871), 997-1020, doi:10.1016/S0140-6736(13)60355-4.
9. Vos T, *et al.* [with **Bourne R**] (2013). Years lived with disability (YLDs) for 1160 sequelae of 289 diseases and injuries 1990–2010: a systematic analysis for the Global Burden of Disease Study 2010. *The Lancet*, **380** (9859), 2163-2196, doi: 10.1016/S0140-6736(12)61729-2.
10. Murray CJL, *et al.* [with **Bourne R**] (2013). Disability-adjusted life years (DALYs) for 291 diseases and injuries in 21 regions, 1990–2010: a systematic analysis for the Global Burden of Disease Study 2010. *The Lancet*, **380**(9859), 2197-2223, doi: 10.1016/S0140-6736(12)61689-4.

## 4. Details of the impact

The richness and detail of VLEG data enables its users (government policymakers, non-governmental organisations including healthcare providers and charities, researchers and educators, *inter alia*) in countries worldwide to obtain location-relevant information, rather than relying upon data from neighbouring regions, or data that has been amalgamated across regions. This provides a more accurate view of the specific issues faced by each country which, due to differing risk factors, may differ markedly from their neighbours. For example, users can assess the impact of gender, age, ethnicity and other predictive variables in their region to establish specific eye care priorities. In addition, this has enabled the data to be used in third-sector reports that estimate the global economic cost of unmet eye-health issues, impacting on policy of global aid agencies. Where data were found to be sparse (e.g. the Caribbean), this has stimulated governments to commission new, country-based population studies. Finally, the data has also formed the basis of training events with key policymakers and healthcare professionals, impacting on their professional practice.

The initial tranche of VLEG data and analyses (together with other GBD data) were released recently in the first ever dedicated special issue of *The Lancet* (Dec 2012) which was launched by the UK Department of Health [8-10 section 3]. This was followed by outputs which specifically detail the global prevalence of visual impairment published in Ophthalmology [5 section 3] and Lancet Public Health [6 section 3]. The summary VLEG data were made available in 2012 through a database held by the WHO, replacing far less-detailed and accessible paper-based statistics [1]. The database, which is available on request to users, enables ready access to information which can guide policy decisions and support epidemiological research.

***A. Impacts on the Economy and International Development***

VLEG findings were used in the global analyses of eye-health economics carried out by PricewaterhouseCoopers's economic reports *'Price of Sight'* and '*Investing in Vision'* (Feb 2013) [2]. This economic report calculates the costs and benefits of achieving the IAPB's VISION 2020 goal of eliminating avoidable blindness by the year 2020. It highlights the importance of eye-health for economic prosperity. Key findings include: "*In developing countries, an additional investment of only US$2.20 per capita per year for 10 years is required to eliminate avoidable blindness and visual impairment*" and "*In developing countries, the economic benefits of eliminating avoidable blindness and visual impairment outweigh the costs by a factor of 4 to 1*". The report identifies economic incentives for other governments and third-sector organisations to invest in eye-health programmes, improving public health and economic productivity, as seen, for example, in the draft Eye Health Strategy by Vision2020 Australia for 2014 to 2019 [3] (May 2013).

The World Bank has adopted the GBD (including the VLEG) data to inform funding strategies and priorities for developing countries via its International Development Association, whose core mission is to reduce global poverty. In a *Lancet editorial* (Dec 2012), the President of the World Bank, states that the World Bank "*continues to make extensive use of this signal contribution to global health*", and that the data will "*set the terms of health policy, planning, and funding discussions for years to come*" [4].

The WEF have used VLEG data in the design of their *Human Capital Initiative*, to demonstrate the detrimental effect of visual impairment on a nation's economic potential and productivity [5]. WEF has selected "eyesight quality" as a key component to ascertain how population demographics change over time, and to ascertain how blindness degrades economic potential.

Drawing directly upon the GBD VLEG data, the Global Indicators for Blindness Prevention (GIBP) project has produced a framework for assessing the progress of the various global initiatives that aim to eliminate avoidable blindness by identifying areas or countries that urgently require resources (2012). Sponsored by The Fred Hollows Foundation, the project began at the Centre for Eye Research Australia (CERA) and uses various indicators (including causes of vision loss and availability/affordability of eye-care services) as important indicators.

Finally, the VISION2020 (Right to Sight) initiative, a joint programme of the WHO and the IAPB, released an IAPB Briefing Paper in 2012 [6], referring directly to VERU at Anglia Ruskin University and a key publication by **Bourne** ([5] section 3 above). The avowed purpose of IAPB Briefing Papers is to inform IAPB members and others about important and emerging issues affecting the elimination of avoidable blindness and the development of eye health systems.

***B. Impacts on Public Policy and Services, Health and Welfare***

Policy decisions by government health departments have been informed by our research. In addition to the Australian example mentioned above, the geographically-linked VLEG data highlighted the paucity of population-based data on visual impairment and blindness for the Caribbean. This moved the Health Minister of Trinidad & Tobago, the Honourable Dr Fuad Khan, to pledge £350,000 to collect detailed population eye-health statistics to address this unmet need (2012). At the opening ceremony of the 2012 Congress of the Ophthalmological Society of the West Indies, Dr Khan identified "*an urgent need to understand the prevalence of blindness and visual impairment in Trinidad and Tobago, in order to provide an evidence base on which to structure delivery of resources*" [7]. The resulting National Eye Survey of Trinidad &Tobago (NESTT), which commenced in March 2013, is a joint partnership between Anglia Ruskin University, University of Oxford, and the University of the West Indies.

Policy debates on how to respond effectively to GBD findings have also taken place in many countries, including the UK, where GBD results were launched by the Department of Health at a special symposium in December 2012, and the USA, where international development funding reviews rely upon GBD statistics [8] (Feb 2012). Public Health England refers to the VLEG findings as having "great national and international impact" [9].

VLEG research formed the basis of a clinical education and awareness programme in Hyderabad, India, at the IAPB 9th General Assembly (September 2012). The Congress, held to discuss blindness loss-prevention strategy, resulted in increased awareness of the global prevalence of visual impairment among NGOs and opinion leaders within ophthalmology. This led directly to the development of an action plan by the WHO for the prevention of avoidable blindness and visual impairment for 2014-2019, which was endorsed by the 66th World Health Assembly [10] (May 2013). The VLEG data were also disseminated to global healthcare education providers at the Congress, with a view to improving training and education for health care practice.

**5. Sources to corroborate the impact**

***A. Impacts on the Economy and International Development***

1. [Testimony] Senior Scientist in the Evidence and Information for Policy Cluster at the World Health Organization in Geneva
2. [Economic Report] 'Investing in Vision' (part of 'Price of Sight'). PricewaterhouseCoopers (PwC), funded by *Fred Hollows Foundation* (Feb 2013) http://www.hollows.org.au/our-work/the-price-of-sight.
3. [Strategy] Vision for the Future: Global Eye Health Strategy for Australia2020 for 2014 to 2019 [2](2013). http://www.vision2020australia.org.au/uploads/blog/78/Vision2020_GlobalPolicyBrochure_FINAL.pdf
4. [Editorial Comment] Jim Yong Kim, President, World Bank. *The Lancet (Dec 2012)*, vol. **380**, no: 9859 p255.
5. [Testimony] Project Manager, World Economic Forum WEF confirming the use of VLEG data in the Health Capital Initiative project for vision-related statistics.
6. [Position Paper] Taylor, K. (2012). International Agency of the Prevention of Blindness (IAPB) Briefing Paper: The Global Burden of Disease (GBD) 2010 Study. http://www.iapb.org/news/gbd-data-vision-loss-released?mini=2012-01.

***B. Impacts on Public Policy and Services, Health and Welfare***

7. [Speech] Minister of Health, Opening Ceremony 2012 Congress of The Ophthalmological Society of the West Indies, 11th July, 2012. http://www.health.gov.tt/downloads/DownloadDetails.aspx?id=276.
8. [Interview] Founder of GBD outlining how GBD results will influence US health policy.http://www.cfr.org/world/global-burden-disease-its-implications-us-policy/p30043
9. [Testimony] Director, Population Health Science, Public Health England. http://www.cfr.org/world/global-burden-disease-its-implications-us-policy/p30043
10. [Report] The 66th World Health Assembly endorsed the WHO Action plan for the prevention of avoidable blindness and visual impairment 2014–2019 Towards universal eye health: a global action plan 2014–2019 (May 2013). http://apps.who.int/gb/ebwha/pdf_files/WHA66/A66_11-en.pdf