

# Future sight loss UK (2): An epidemiological and economic model for sight loss in the decade 2010-2020

## Executive summary

Report prepared for RNIB

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# Executive summary

Future Sight Loss in the decade 2010 to 2020: an Epidemiological and Economic Model. This work was commissioned by Royal National Institute of Blind People.

## Commissioned brief

The brief was that epidemiologists, experienced in the area of ophthalmic research, should apply the best methods to derive estimates of the numbers of people that were likely to have age-related macular degeneration, cataract, diabetic retinopathy and glaucoma at two points in time, 2010 and 2020. The baseline and cumulative costs to society of the prevailing health and social care provision and support in that time-frame were to be estimated by an economist with experience of ophthalmic research using a cost of illness approach from the societal perspective. A committee composed of clinical and academic members would have an advisory role. The epidemiological and economic findings would provide estimates available to inform the UK Vision Strategy up to 2020.

## Structure of the report

As this is a working document to inform the Strategy, it is structured to allow each eye disease to stand alone for the estimated numbers and the related costs of the resources. Apart from notes which explain some basic terms, methods are presented in Appendices, as are the additional epidemiological tables for the prevalence of disease by age and sex for the year.

The report has an Executive summary, four main parts, one for each disease, and Appendices, which hold prevalence tables by age-group and gender, and sections on methods for epidemiology and costing.

Within the main parts, the epidemiological estimates of numbers for each disease and for the categories of that disease are given as Section 1. This covers a decade, for the year 2010 (the base year), 2015 and 2020, for the UK and the "devolved countries".

Section 2 presents the estimated costs to society of the resources used in health and social service and in providing informal care. All are directly related to the provision of care for those with, or at serious risk of, sight loss from the relevant eye disease. These estimates and projections are made within the requirements of the initial brief that the recognised and / or recommended treatment for those diseases forms the clinical basis for disease progression. This requires assumptions to be made at times about the rate of coverage of treatment and if these are varied in the model they are found in Section 3 of the relevant part of the report.

In this report, partial sight is defined as corrected visual acuity  $<6/12$ - $6/60$  in the better seeing eye. Blindness is defined as corrected visual acuity  $<6/60$  in the better seeing eye. The term 'sight loss' is used to indicate partial sight or blindness. For glaucoma, the definitions also take into account severe restriction of visual fields.

# Key findings

## Age-related Macular Degeneration (AMD)

	year 2010	year 2020
<b>Population at risk, UK</b>	<b>21,585,853</b>	<b>25,332,332</b>

People with the disease are grouped into early AMD, neovascular AMD (NV AMD) (wet) and geographic atrophy (dry), and analysed further by those partially sighted and those blind from the disease.

### Numbers with the disease

- 1,493,963 people are estimated to have early AMD in 2010. By the end of the decade, this is projected to be 1,821,434 people.
- Additionally, 414,561 people are estimated to have NV AMD (wet) in one or both eyes in 2010. This is projected to increase to 515,509 people in 2020.
- Apart from NV AMD, 193,652 people are estimated to have geographic atrophy (dry AMD) only, in one or both eyes in 2010, with an estimated increase to 240,358 in 2020.

### Sight loss from both types of AMD

In 2010, caused by both types of AMD, 132,970 people will be partially sighted and 90,254 people will be blind. This is assuming that the new treatment for NV AMD covers 75 per cent of those eligible from 2010.

In 2020, the numbers of people expected to be partially sighted are 171,530, and 120,452 people are expected to be blind. This is under the same assumption that 75 per cent of people with NV AMD will be treated, but it also allows for an increase in the older population.

### Cost

In 2010, the estimated cost of detection, treatment and provision of state and family social care for everyone with AMD is more than £1.6 billion (this is under the assumed 75 per cent levels of anti-VEGF treatment for NV AMD and assuming status quo for “low vision” service for AMD). More than £16.4 billion is the estimated cumulative cost over the decade from 2010 to 2020, under the same conditions but allowing for demographic change (at 2008-9 prices used at the baseline year of 2010).

For the decade, from 2010 to 2020, the health care treatment component amounts to 17.8 per cent of the total, i.e. more than £2.9 billion. The personal and social costs are 76 per cent, which is more than £12.5 billion pounds. These proportions vary little for the countries within the UK.

## Varying the assumptions about treatment levels

In our model, varying the assumptions about the likely percentage of people receiving treatment among suitable cases of NV AMD would have the following results: if only 50 per cent of those with neovascular disease are treated, the numbers with sight loss due to NV AMD will be 149,326 in 2010. If 90 per cent of people are treated, this number will be less (143,519 with sight loss), which is a difference of 5,807.

## Sight restored by treatment

The gain in visual acuity, over the decade, due to Ranibizumab treatment was considered in terms of numbers who convert from being partially sighted to having adequate vision (6/12 or better), under the 3 assumed levels of treatment coverage. The expected numbers (to nearest 1,000) regaining sight in this way over the decade are 67,000 at 50 per cent treatment coverage, 96,000 people at 75 per cent coverage, and 112,000 at 90 per cent treatment coverage. Over the decade, the number of people expected to convert from blindness to partially sighted are: 6,000 at 50 per cent treatment coverage, 8,000 at 75 per cent coverage, and 10,000 at 90 per cent treatment coverage.

For the year 2010, the AMD overall health care costs will be **£256,630,028** at 50 per cent treatment, and **£354,290,363** at 90 per cent treatment, an increase of **£ 97.66 million**. The social and personal costs will be **£1,263,008,484** and **£1,237,632,225** at 50 per cent and 90 per cent respectively, showing a difference (decrease) of **£25.376 million**.

## Cataract

	year 2010	year 2020
<b>Population at risk, UK</b>	<b>30,784,728</b>	<b>33,462,473</b>

### Sight loss from cataract

For 2010, our model estimates that prevalence of partial sight due to cataract will be 206,224 and blindness to be 27,907. In 2020, should this condition remain visually impairing at this level in the population, it is estimated that 248,504 people will be partially sighted, and 32,750 will be blind.

### Number of cataract operations

Based upon the surgical workload for 2007-8, the number of cataract operations in 2010 is likely to be more than 389,000. Based upon the expected population structure, this will have increased to a yearly surgical load of 473,944 in 2020.

### Cost

**£995,144,453** is the estimated expenditure on cataracts in 2010. This includes referral and surgical treatment for those with operable cataract, and for ongoing social and personal care for those who are partially sighted or blind from cataract.

**£9,516,840,540** is estimated to be the cumulative cost for the whole decade 2010 to 2020, under the same conditions but allowing for demographic change (at 2008/9 prices used at the baseline year of 2010). Under these conditions, **47.64 per cent** of the decade costs are accounted for through health care treatment. Over **36 per cent** of the decade costs are incurred on social and personal care, the majority of this latter 36 per cent is expected to be spent on those with sight loss due to cataract, either with aphakia or irremediable lens opacity.

### Varying the assumptions about endophthalmitis risk

Though severe surgical complications with cataract are rare, one in particular, endophthalmitis, considerably affects quality of life post-surgically and may lead to serious loss of sight, even if treated. Prophylactic intervention incurs additional costs at the point of surgery and is being implemented. Under the Base Case assumption, 199 cases of endophthalmitis would be expected in 2010, the total cost of illness for cataract being £995,144,453. Under the assumption, the higher incidence will result in 510 cases, at a total cost of illness of £996,323,311. The extra cost incurred by the 311 additional cases will be about **£1.2 million**.

## Diabetic Retinopathy (DR)

Diabetic Retinopathy is a complication of diabetes, occurring as a result of damage to the blood vessels of the retina, induced by diabetes

	year 2010	year 2020
<b>Population at risk, UK</b>	<b>51,469,409</b>	<b>54,876,508</b>
<b>Diabetes (diagnosed)</b>	<b>2,665,029</b>	<b>3,342,634</b>

### Numbers with diabetic retinopathy

For the coming year of 2010, more than 748,000 people are expected to have background diabetic retinopathy (early signs of DR) and 85,484 will be classified as falling into non-proliferative and proliferative retinopathy combined (more advanced stages than background DR). By 2020, this is expected to rise to more than 938,000 for background retinopathy and 107,218 for non proliferative and proliferative retinopathy (combined).

Diabetic maculopathy, which can occur from the non-proliferative stage onwards and can lead to sight loss, is expected to be present in 187,842 diabetic people in 2010, increasing to 235,602 by the year 2020.

### Sight loss from diabetic retinopathy

40,982 people in 2010 will be partially sighted from diabetic retinopathy and 24,976 will be blind. In 2020, 46,473 people are expected to be partially sighted and an additional 29,957 to be blind.

### Cost

For the year 2010, £680,317,387 is the estimated cost of detection, treatment and provision of state and family social care for all diabetics at risk of diabetic eye disease.

£6,430,973,067 is estimated to be the cumulative cost over the ten years to 2020. Of this, 25.5 per cent (more than £1.6 billion) is considered as health care costs, and 53.1 per cent (more than £3.4 billion) as personal and social care costs.

Lost productivity due to unemployment or days lost from work, related to diabetic eye disease, is estimated to amount to £1.03 billion over the decade.

# Glaucoma

In this report, the term 'glaucoma' is used to indicate Primary Open-angle Glaucoma (POAG). Ocular hypertension (OH) is defined as intraocular pressure of more than 21 mmHg, without any accompanying signs of POAG. The risk of developing glaucoma is increased in eyes that have OH.

	year 2010	year 2020
<b>Population at risk, UK</b>	<b>30,782,718</b>	<b>33,460,453</b>
<b>African-Caribbean sub-group</b>	<b>700,020</b>	<b>904,835</b>

## Numbers with the disease (diagnosed)

- 308,044 people in 2010 and 361,183 in 2020 are estimated to have ocular hypertension.
- 265,973 people are estimated to have glaucoma in 2010.
- By the end of the decade, this is projected to be 327,440 people with glaucoma.

## Sight loss from glaucoma

- 57,646 people in 2010 will be partially sighted from glaucoma and 17,511 will be blind, assuming that the level of detection of this disease in the population is at 50 per cent.
- 71,806 people are expected to be partially sighted by 2020, and 22,261 to be blind under the same assumption about detection.

## African-Caribbean ethnic sub-group

Numbers appear small for African-Caribbean people with glaucoma, but the percentage expected to go into partial sight and blindness is higher than that for the total population.

The proportional increase over the decade for this group is 57.37 per cent for partial sight and 57.31 per cent for blindness in comparison to 24.56 per cent for partial sight and 27.12 per cent for blindness for the population in general.

## Cost

For the year 2010, **£542,038,234** is the estimated cost of detection, treatment and provision of state and family social care for all those with ocular hypertension and glaucoma under the assumed 50 per cent detection level.

**£4,889,652,026** is estimated to be the cumulative cost over the ten years to 2020 assuming the same conditions. Of this, 42.33 per cent (more than £2 billion) is considered as health care costs, and 34.14 per cent (more than £1.6 billion) as personal and social care costs.

## Varying assumptions about detection levels

**Base Case assumption:** detection rate is **50 per cent**. In this situation, the estimated numbers in the UK with sight loss due to glaucoma (nearest 1000) are: 75,000 people in 2010 and 94,000 people in 2020. The total cumulative cost of illness for glaucoma (including OH) for the decade is £4.9 billion.

**Assumption (2):** detection rate is improved to 75 per cent. In this situation, there will be a modest decrease in prevalence of sight loss from glaucoma over the decade, the estimated numbers being 71,000 in 2010, and 89,000 people in 2020. The total cumulative cost of illness for the decade will increase from £4.9 billion at 50 per cent detection to **£5.3 billion** at 75 per cent detection.

**Assumption (3):** detection rate is improved to **90 per cent**. Under this assumption, the estimated numbers with sight loss are lower at 69,000 people in 2010, rising to 86,000 people in 2020. The cumulative cost of illness for glaucoma and OH over the decade will increase from £4.9 billion (at 50 per cent detection) to **£5.5 billion** (at 90 per cent detection).



## Observation by the authors

The authors observe that a more robust information base is required to feed into projects such as this one and more importantly to inform policy initiatives of the UK Vision Strategy. The serious deficit in reliable information on levels of detection and treatment coverage for eye conditions limits the output of this decade model at present. It may also hinder the monitoring of efforts to ensure that existing and improved entitlements to eye services are fully implemented.







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