

# Causes of blindness in the adult population of the Republic of Ireland

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## Abstract

**Background/aim**—Blindness in the developed countries affects 3.5 million people. This study was conducted on the causes of blindness in the Republic of Ireland based on the register of the National Council for the Blind of Ireland. The aim was to determine the prevalence of potentially avoidable blindness and to identify its causes.

**Method**—Criteria for registration as blind are in Ireland: best corrected visual acuity of 6/60 (0.1) or less in the better eye or a visual field restricted to 20 degrees or less. Data on 5002 adults 16 years and older registered as blind were analysed. The causes of blindness are classified in 17 diagnostic categories.

**Results**—The leading causes of blindness are macular degeneration and glaucoma, each accounting for 16% (812 and 795). Cataract accounted for 11% (561), a third of these had an associated cause of blindness and one tenth had a cognitive deficit. Diabetic retinopathy ranked as the 11th cause of blindness and accounted for 3% (147). More than half of the patients were 65 years and older.

**Conclusion**—25% of blindness was potentially avoidable. The treatable causes were glaucoma and diabetic retinopathy in the working population and glaucoma and cataract over 65 years of age. Glaucoma is the most important, which raises the question of a screening programme. The prevalence of blindness of 3% due to diabetic retinopathy is lower than in most other series.

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Blindness is defined by the World Health Organisation as best corrected visual acuity in the better eye of less than 0.05 (3/60) or a visual field of 10 degree or less.<sup>1</sup> It was estimated that 38 million people in the world are blind and a further 110 million are visually impaired.<sup>2</sup>

We conducted a study based on the national blind register in the Irish adult population. The purpose of the study was to evaluate the prevalence of potentially treatable causes of blindness and to identify these.

## Method

All legally blind people are registered by the National Council for the Blind of Ireland. Criteria for legal blindness in Ireland are: visual acuity of 6/60 (0.1) or worse in the better eye or a visual field restricted to 20 degrees or less

in the widest diameter of vision. This corresponds with severe visual impairment as defined by the WHO<sup>1</sup> (Table 1). Registration is granted after an ophthalmologist completes an application form giving visual acuity, field, refraction, brief details of ophthalmic procedures, ophthalmic diagnosis, and systemic diagnosis. The causes of blindness are classified in 17 different diagnostic categories and entered in a computerised register. When there is more than one cause, the patient is classified under only one diagnostic category, judged the most important one by the registering ophthalmologist.

We analysed data from this register between May and November 1996 for all people aged 16 years and older. We divided the causes of blind registration in five age groups: 16-34 years, 35-54 years, 55-64 years, 65-79 years, 80 years and over. We compared the blind population with the total Irish population of same age and sex as estimated by the March 1996 census of population (Central Statistic Office).

## Results

During the study period, 5002 people aged 16 years and older were registered as blind, 0.2% of the total Irish population.

The leading causes of blindness were macular degeneration (16.2%, 812 patients) and glaucoma (15.9%, 795 patients) (Table 2).

In the age group 16-34 years, albinism and congenital cataract accounted each for 14% (194) of registered blindness, followed by optic atrophy (10%, 72) and retinitis pigmentosa (9%, 66). In the age group 35-54 years, retinitis pigmentosa accounted for 14% (142) followed by albinism (9%, 93), cataract (8.5%, 86), myopia (7%, 74), and congenital cataract (7%, 68). In the age group 55-64 years, retinitis pigmentosa accounted for 14% (65) followed by glaucoma (12%, 55), cataract (12%, 53), and myopia (9%, 41). In the older age groups, 65-79 years, glaucoma (20%, 266) and macular degeneration (20%, 266) were most important. Over 80 years of age, macular degeneration accounted for 32% (478), glaucoma for 27% (399), and cataract for 16% (231).

Glaucoma over the age of 80 years affected proportionally more males (205/536=38%) than females (194/950=20%).

Table 1 Definitions<sup>1</sup>

	Visual acuity	Field
Legal blindness in Ireland	<6/60	<20 degrees
Severe visual impairment WHO	<6/60, >3/60	
Blindness WHO	<3/60	<10 degrees

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Table 2 Causes of blind registration in the adult population of the Republic of Ireland

	16–34 years old	35–54 years old	55–64 years old	65–79 years old	80 years and older	Total
Albinism						
Congenital cataract	14.0%	14.1%	14.0%	19.8%	32.2%	16.2%
Optic atrophy	13.7%	9.2%	12.0%	19.7%	26.9%	15.9%
Retinitis pigmentosa	10.3%	8.5%	11.6%	11.0%	15.5%	11.2%
Cataract	9.4%	7.3%	9.0%	10.1%	5.9%	7.3%
Tumour	6.0%	6.8%	7.2%	6.1%	3.6%	7.1%
Myopia	4.3%	6.3%	5.0%	4.7%	1.5%	5.0%
Trauma	3.8%	5.7%	5.0%	4.2%	1.4%	4.5%
Glaucoma	3.1%	5.3%	4.6%	4.1%	1.3%	4.4%
Macular degeneration	3.0%	4.4%	4.5%	1.6%	1.2%	3.8%
Retinal detachment	2.3%	4.2%	4.4%	1.4%	1.1%	3.6%
Diabetic retinopathy	2.0%	3.1%	3.5%	1.3%	1.0%	2.9%
Retinal detachment	1.6%	1.4%	1.3%	0.8%	0.3%	1.2%
Diabetic retinopathy	1.4%	1.3%	0.4%	0.5%	0.2%	0.4%
ROP	0.0%	0.8%	0.2%	0.2%	0.1%	0.4%
Multiple sclerosis	0.0%	0.2%	0.0%	0.1%	0.0%	0.4%
Stroke	23.9%	18.5%	15.1%	13.4%	7.3%	14.2%
Other	1.3%	3.1%	2.0%	1.0%	0.6%	1.4%
Unknown						
Totals:	732 patients	1007 patients	100%	1350 patients	1486 patients	5002 patients
			100%	100%	100%	100%

Diabetic retinopathy accounted for 3% (147) of registered blindness and had the highest proportion in the age group 55–64 years, accounting for 5% (23).

Trauma caused three times more blindness in males than in females for all age groups.

**Discussion**

Blindness in the developed world affects 3.5 million people.<sup>2</sup> Two types of studies have been conducted: one based on a sample of population—for example, patients from a hospital, and the other based on a register for the blind. For both types, different definitions of blindness and different methods of evaluation make comparison difficult. Blind registration exists in most developed countries and is held by state or partially state funded organisations who provide help to the visually impaired. The registers list the people satisfying criteria for legal blindness in their country. There are limitations of register based studies. The data reflect only those who register.<sup>3</sup> The classification of the causes of blindness often mixes anatomical and causal diagnoses so that two patients with the same pathology can be classified with two different causes—for example, retinal detachment and trauma.<sup>4</sup> The data are per patient and not per eye and not all registration forms are completed accurately.

Data on blindness in the developed countries are limited, compared with some developing countries, which have published several large scale studies.<sup>2 4 5</sup> However, studies have been performed in some countries such as Australia,<sup>6</sup> Germany,<sup>7</sup> Great Britain,<sup>8–12</sup> Italy,<sup>13–15</sup> and the USA.<sup>16</sup> The leading causes of blindness reported are macular degeneration, glaucoma, cataract, and diabetes (Table 3).

More than half the patients in our study were older than 65 years and a third were over 80 years of age. This confirms the increasing frequency with older age.<sup>10 17 18</sup> Three conditions caused three quarters of the blindness in those over 80 years of age—macular degeneration, glaucoma, and cataract.

Macular degeneration accounted for a quarter of the blindness over 65 years of age. It has a prevalence of 8%–20%. It accounts for up to half of the blindness in other studies.<sup>19 20</sup>

Glaucoma accounted for 16% (795) of adult blindness and its importance increased with age. In other studies the proportion of blindness due to glaucoma ranges from 7% to 21%.<sup>21</sup> Glaucoma could be considered as a preventable cause of blindness.<sup>22</sup> It requires treatment early to preserve sight. The disease is asymptomatic until very advanced. Screening is difficult in the absence of a single reliable test to detect it and the diagnosis sometimes requires an experienced clinician. No national screening programme exists in Ireland. Costing of such a programme has been investigated in England<sup>23</sup> and could compare favourably with the cost of the blindness due to glaucoma. Our results emphasise the need for allocating resources to screening, treatment, and research on glaucoma. The higher prevalence for males (noticeable over 80 years of age with 0.62%

Table 3 Leading causes of blindness in other studies<sup>5 6 8 10 13</sup>

	Macular degeneration	Glaucoma	Cataract	Diabetes
Bavaria 1992	15%	14%	5%	7%
Turin 1967–91	4%	9%	27%	13%
Avon 1989	49%	15%	2%	6%
New South Wales 1986*	38%	13%	16%	2%
Scotland 1980	30%	15%	10%	9%
Ireland 1996	16%	16%	11%	3%

\*This study looked at people aged 50 and older.

Table 4 Causes of blindness in the working population

16–64 years of age	%
Retinitis pigmentosa	12.6
Albinism	9.8
Congenital cataract	8.5
Cataract (excluding congenital)	8.4
Optic atrophy	7.0
Myopia	6.6
Glaucoma	6.0
Trauma	4.7
Retinal detachment	4.2
Diabetic retinopathy	3.5
All other	28.7
Total	100.0

(205/33 000) compared with 0.32% (194/60 300) for females in our study) had been reported before.<sup>24</sup>

Cataract surgery has undergone major technical advances making it safer and more successful. Yet it still accounts for 13% (380) of blind registration over 65 years of age and 16% (231) over 80 years of age, and is the leading cause of blindness in some populations of the developed world.<sup>15 18</sup> As they were registered, these patients had access to an ophthalmologist at least once. We reviewed the medical data on every person entered with cataract as a cause of blindness in our study. Of 561 non-congenital cataracts, 195 (35%) had another cause of blindness, glaucoma in 45, age related macular degeneration in 25 and retinal detachment in 20. Sixty four (11%) patients with a cataract also had a mental handicap—12 (2%) had Down's syndrome and five (1%) had a psychiatric condition. Others<sup>18</sup> have reported a high rate of poorer cognitive functions associated with poorer visual acuity. The benefits of cataract extraction are difficult to evaluate in these patients.

In the working population (16–64 years of age), the leading causes of blind registration were genetic (Table 4). Most of them cannot be treated with the present scientific knowledge. Prevention exists through genetic counselling. Retinitis pigmentosa and albinism accounted for 22%. In addition, some of the congenital cataracts and some other disorders are also genetic. The proportion of genetic causes was higher than was found in children (16%).<sup>25</sup>

Diabetic retinopathy in our study affected 3% (147) of those registered blind. It represented the 10th cause of blindness in the working age group. In the literature it accounts for 2%–20% of blindness.<sup>4 6–9 11 12 14 26 27</sup> The age distribution with a maximum in the group 55–64 years of age (5%, 23) is similar to other studies.<sup>9</sup> Different hypotheses can explain the low rate found in our study. Underregistration is one possible explanation. However, we cannot explain why blind diabetics would reg-

ister less than those blind from other causes. Registration under another diagnostic category is possible—for example, under glaucoma when diabetic retinopathy is a complication of rubeotic glaucoma, or under retinal detachment when diabetic retinopathy is a complication of retinal detachment. The Irish population may be particularly resistant to diabetic retinopathy. Others found a lower rate of diabetic retinopathy in an Irish population with diabetes mellitus diagnosed after the age of 70 years than did studies in other countries.<sup>28 29</sup> The authors note that a different presentation of the data may explain a lower rate, but a genuine low rate of diabetic retinopathy in the Irish diabetic population is possible. Finally, the presence of a hospital based screening programme since 1991, the availability of lasers and good medical standards may play a role.

In all, 3.6% (181) were blind following trauma. The male to female ratio is about 3 to 1 in all age groups for traumatic blindness. Males have been reported in other studies to have a higher risk. This tendency is already apparent from childhood.<sup>30–32</sup>

In conclusion, about 75% of registered blindness is unavoidable; 25% of registered blindness follows a potentially treatable affection. In the working population (16–64 years of age), glaucoma and diabetic retinopathy are significant causes of blindness that could be avoided. In the older age groups, glaucoma and cataract are the major preventable causes of blindness. Patients over 65 years of age frequently present with associated pathologies which make their treatment more difficult.

The proportion of blindness due to diabetic retinopathy is lower than in most other studies.<sup>4 7–9 11 12 14 26 27</sup> We have no certain explanation. The Irish population may be less prone to develop diabetic retinopathy than others. The presence of a hospital based screening programme since 1991 is certainly favourable.

The absence of a screening programme for glaucoma underlines the importance of each ophthalmologist/optometrist/optician screening all his/her adult patients who consult for other reasons. Establishing a national screening programme may reduce the prevalence of new blindness. The cost effectiveness of such a programme remains to be proved, but preliminary estimations are favourable.<sup>23</sup>

This study also clarifies the question of blindness due to cataract, showing that one third of these patients have a cause other than cataract for blindness.

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