

The causes of vision loss

IAPB evidence series

Key Findings: Causes of blindness and vision impairment in 2020 and trends over 30 years. *Adelson J, Bourne R, Briant P et al, 2020*



Acknowledgments

This report has been prepared to summarise latest findings from the Vision Loss Expert Group (VLEG).^{1,2} The 2020 update incorporates data from 528 studies and includes regional estimates and forecasts to 2050.

How to cite:

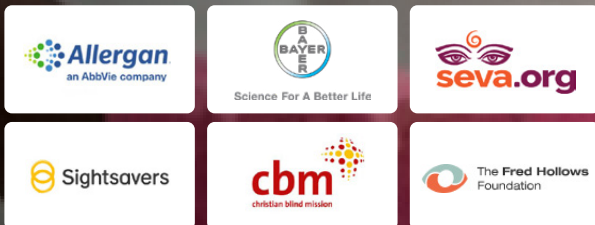
Adelson, J. et al. Causes of blindness and vision impairment in 2020 and trends over 30 years: evaluating the prevalence of avoidable blindness in relation to VISION 2020: the Right to Sight. *The Lancet Global Health*. (2020) [https://doi.org/10.1016/S2214-109X\(20\)30489-7](https://doi.org/10.1016/S2214-109X(20)30489-7)

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The IAPB Vision Atlas is powered by data from the VLEG



Definitions and key concepts

Important data considerations

Categories of vision loss: The majority of research on the causes of vision loss is focused on blindness and moderate to severe vision loss. Although mild vision impairment causes vision loss in 258 million people, and near vision impairment affects 510 million people, this report is focussed on blindness and moderate to severe vision impairment, due to the availability of more comprehensive datasets.

Age: Most data about the causes of vision loss are for adults 50 years and over. As a result, the majority of this report focuses on these older adults. Importantly, vision loss also occurs in children and younger adults and more comprehensive research is required to accurately determine the causes of vision loss in younger people.

Classifying the cause of vision loss: The VLEG were able to make reliable estimates of five significant causes of moderate to severe vision impairment and blindness. A considerable proportion of the blindness burden was listed as 'other causes of vision loss'. Due to limitations with data availability, trachoma and corneal opacities are also combined with 'other causes'.

Rapid assessment of blindness (RAAB) studies and other similar protocols are designed to identify the 'principal cause of vision impairment'. This means that when a person has two or more conditions that result in vision impairment, only the 'principal cause' is recorded. If there are two causes likely to contribute equally to vision impairment, only the cause that is 'most readily curable' or the 'most easily preventable' is recorded. For example, an elderly person with vision impairment due to both

diabetic retinopathy and cataract will be 'counted' as having cataract (but not diabetic retinopathy), while a person with vision impairment due to both cataract and uncorrected refractive error will be classified as having refractive error (but not cataract). This means that diabetic retinopathy and glaucoma may be underestimated.

This report follows the 'Magnitude of global vision loss' key findings report, which summarises the latest findings from the VLEG on the global burden of vision loss.

Regionality: This 2020 update includes substantial additions to the data sources, in terms of the geographic region that these sources cover, although some regions still rely on extrapolation from other regions. Importantly, regional level data should not be assumed to represent the sub-regional situation, and may mask significant diversity within countries and even within communities.²

What is the difference between crude and age-standardised prevalence?

Crude prevalence: The crude prevalence is the actual percentage of vision loss in each country or region. Crude prevalence should be used when assessing the burden of vision loss at the country or regional level.

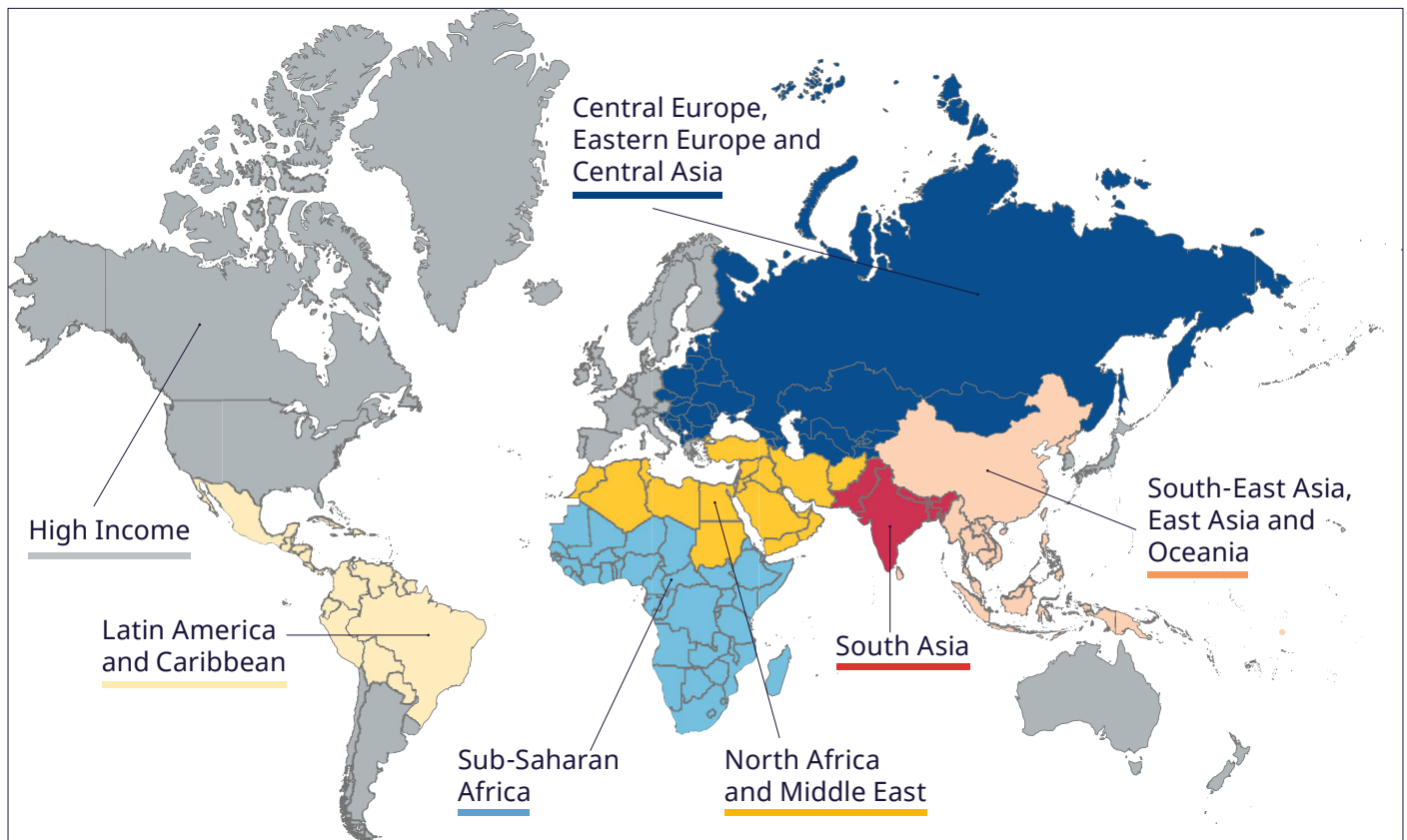
Age-standardisation: Age-standardised rates are calculated by assuming a country and/or region has an age profile identical to that of a 'standard population'. Age-standardised rates can be helpful when making comparisons between regions, or when comparing rates over time.

The definitions of vision loss used by the VLEG in 2020 are based on the International Classification of Diseases 11 (2018) classification

Category of vision loss	Visual acuity scale		
	6m	20ft	Decimal
Blindness	<3/60	<20/400	<0.05
Moderate to severe vision impairment	<6/18 but ≥3/60	<20/70 but ≥20/400	<0.3 but ≥0.05
Mild vision impairment	<6/12 but ≥6/18	<20/40 but ≥20/70	<0.5 but ≥0.3
Near vision impairment	N6 or N8 at 40cm*		

Global Burden of Disease (GBD) super regions:

The regions used in here are based on the Global Burden of Disease (GBD) regional classification system. GBD created super regions based on epidemiological similarity and geographic closeness.



1.7 billion people will live with vision loss by 2050



Image: Kyaw Kyaw Winn

Global causes of blindness and moderate to severe vision impairment

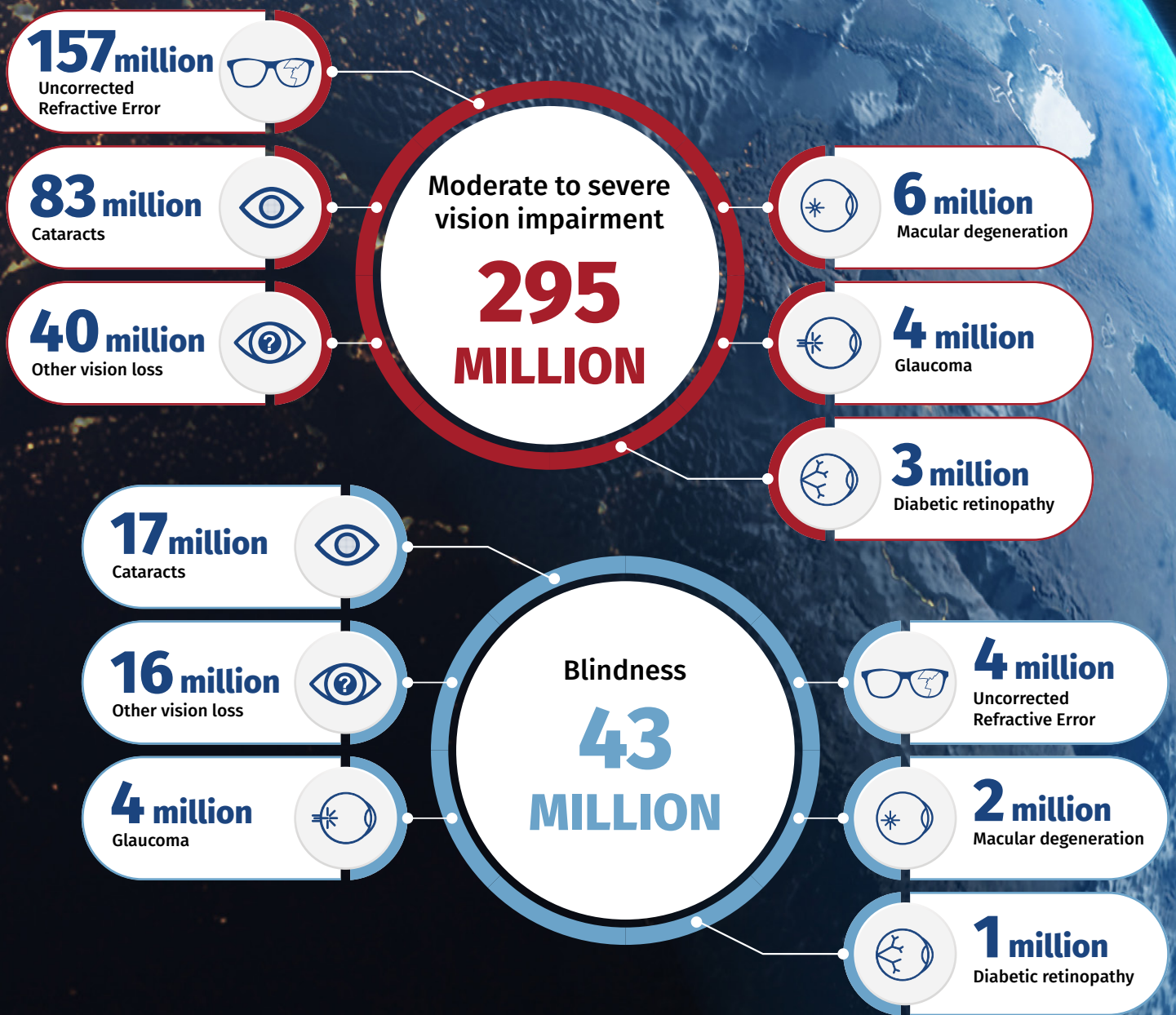
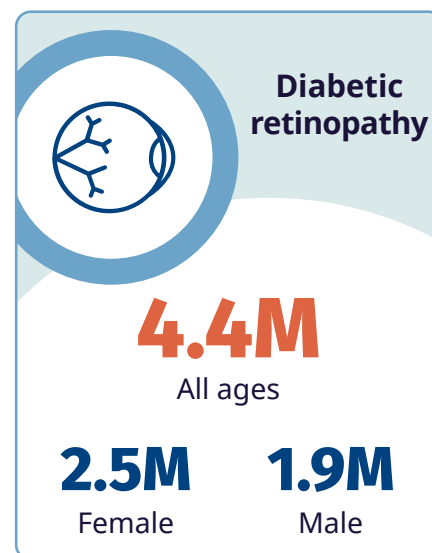
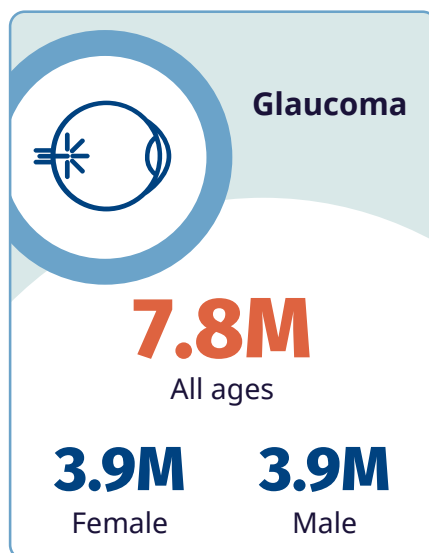
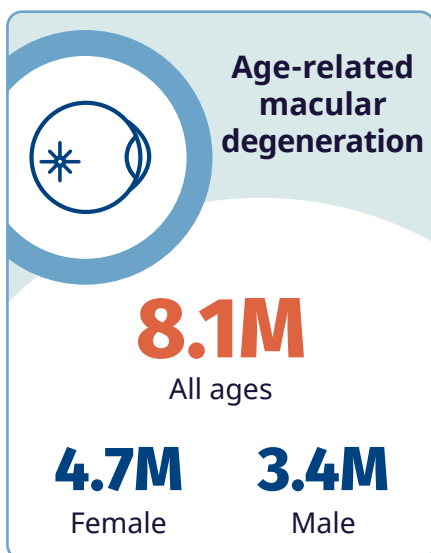
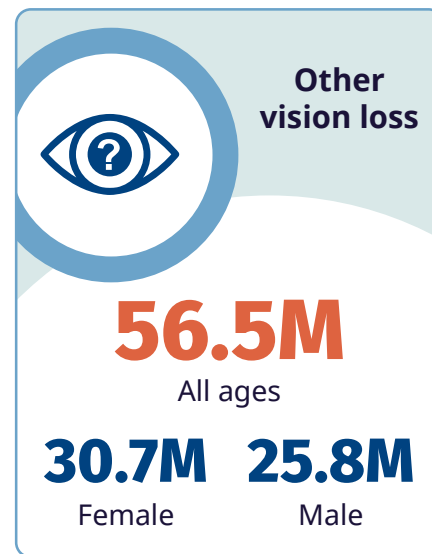
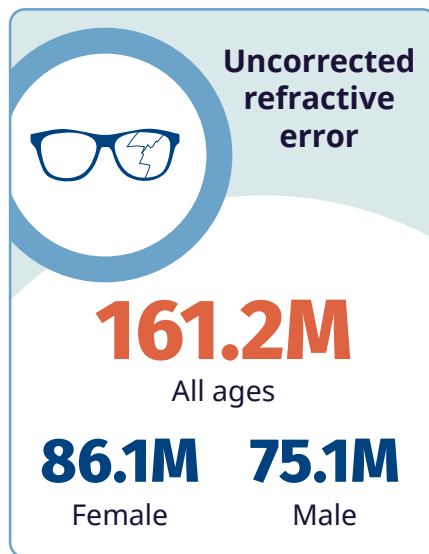
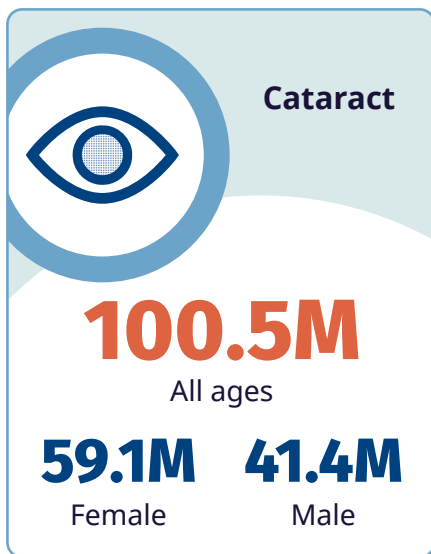


Figure 1: Global causes of vision loss (all ages, 2020)

The number affected by each cause of vision loss
(Blindness and moderate to severe vision impairment, all ages, 2020 estimates)



All ages



Cataract is responsible for blindness in **17 million people**, and moderate to severe vision impairment in **83.5 million people**

All ages



Uncorrected refractive error is responsible for blindness in **3.7million people** and moderate to severe vision impairment in **157.5 million people**

Image: Gaurav



9/10 people with blindness, moderate to severe or near vision impairment have conditions that are preventable or treatable







Vision loss impacts people across their life course. However the most reliable data on the causes of vision loss is only available for adults 50 years and over with blindness or moderate to severe vision impairment. For this reason the following sections focus on this older age group.

Reliable data on the magnitude and causes of vision loss (including mild) in younger adults, adolescents and children is urgently needed.







Contribution of each cause to the total burden of vision loss


(Blindness and moderate to severe vision loss, adults 50+, 2020)


Blindness


	Cataract	45%
	Other vision loss	29%
	Glaucoma	11%
	Uncorrected refractive error	7%
	Age-related macular degeneration	5%
	Diabetic retinopathy	3%

Moderate to severe vision impairment


	Uncorrected refractive error	42%
	Cataract	38%
	Other vision loss	14%
	Age-related macular degeneration	3%
	Glaucoma	2%
	Diabetic retinopathy	1%

50+  **Cataract** continues to be the leading cause of blindness (**45%**) and second largest cause of moderate to severe vision impairment (**38%**)

50+  **Cataract** is responsible for blindness in **15.2** million people, and moderate to severe vision impairment in **78.8** million people **50+**.

50+  **Uncorrected refractive error** is the leading cause of vision impairment (**42%**)

50+  **Uncorrected refractive error** is responsible for blindness in **2.3** million people and moderate to severe vision impairment in **86.1** million people **50+**.

 The grouping of **'other vision loss'** causes, is a significant contributor to the global burden of both blindness (**29%**)

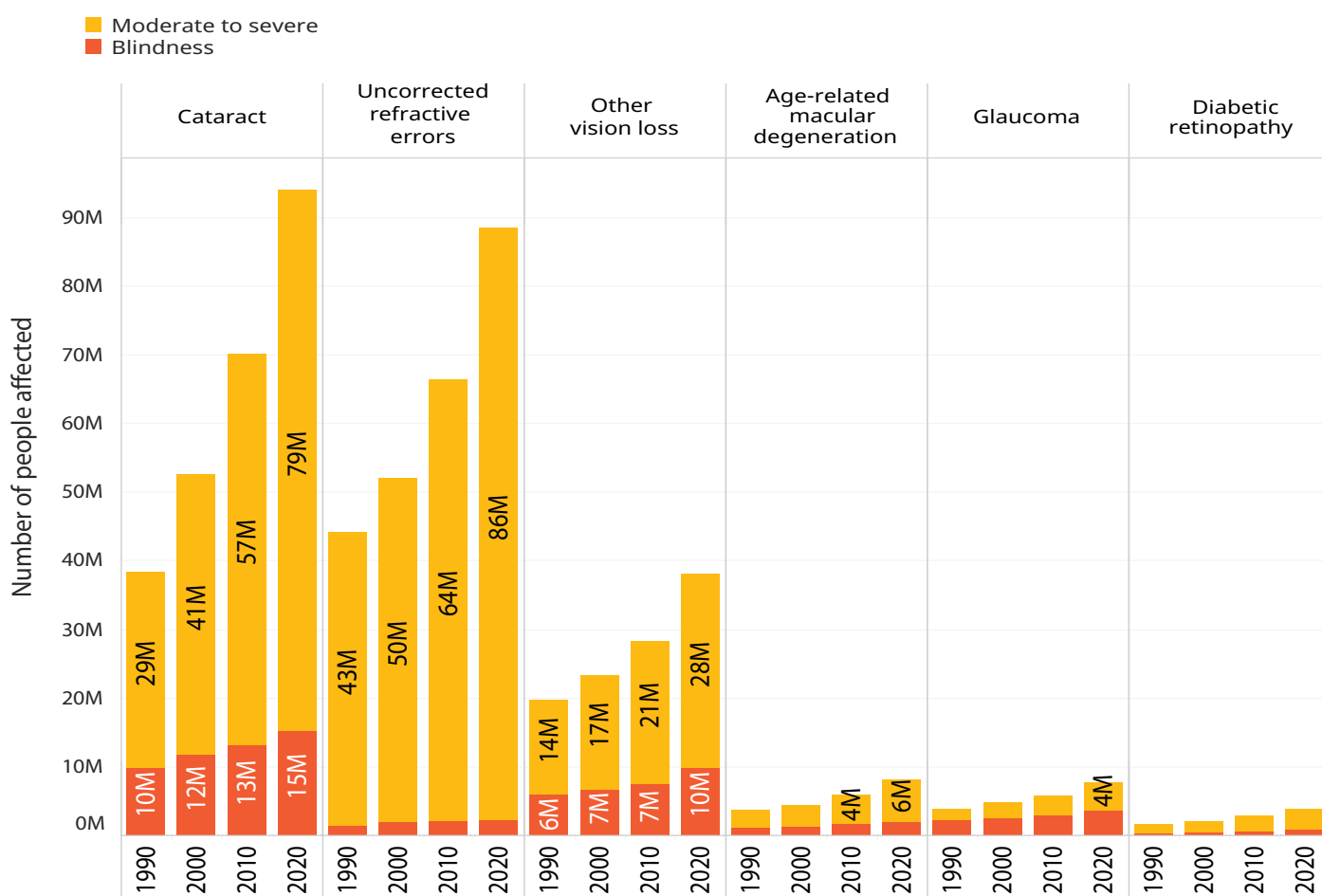
Change in causes of vision loss

Since 1990, there has been a steady increase in the number of people (adults 50+) affected by blindness and moderate to severe vision impairment, with the steepest increase in those affected by refractive disorders and cataract.

There has also been an increase in the proportion of people with blindness and moderate to severe vision loss (crude prevalence), indicating that eye care services have failed to keep pace with population growth.

Given that the vast majority of vision loss is caused by cataract, refractive error, diabetic retinopathy, and glaucoma, which can be avoided with early detection and timely intervention, there is a significant need to reduce the morbidity from these causes of blindness and vision impairment globally.

Figure 2: The change in the numbers affected by each cause of vision loss (Blindness and moderate to severe vision impairment, adults 50+, 1990 - 2020)

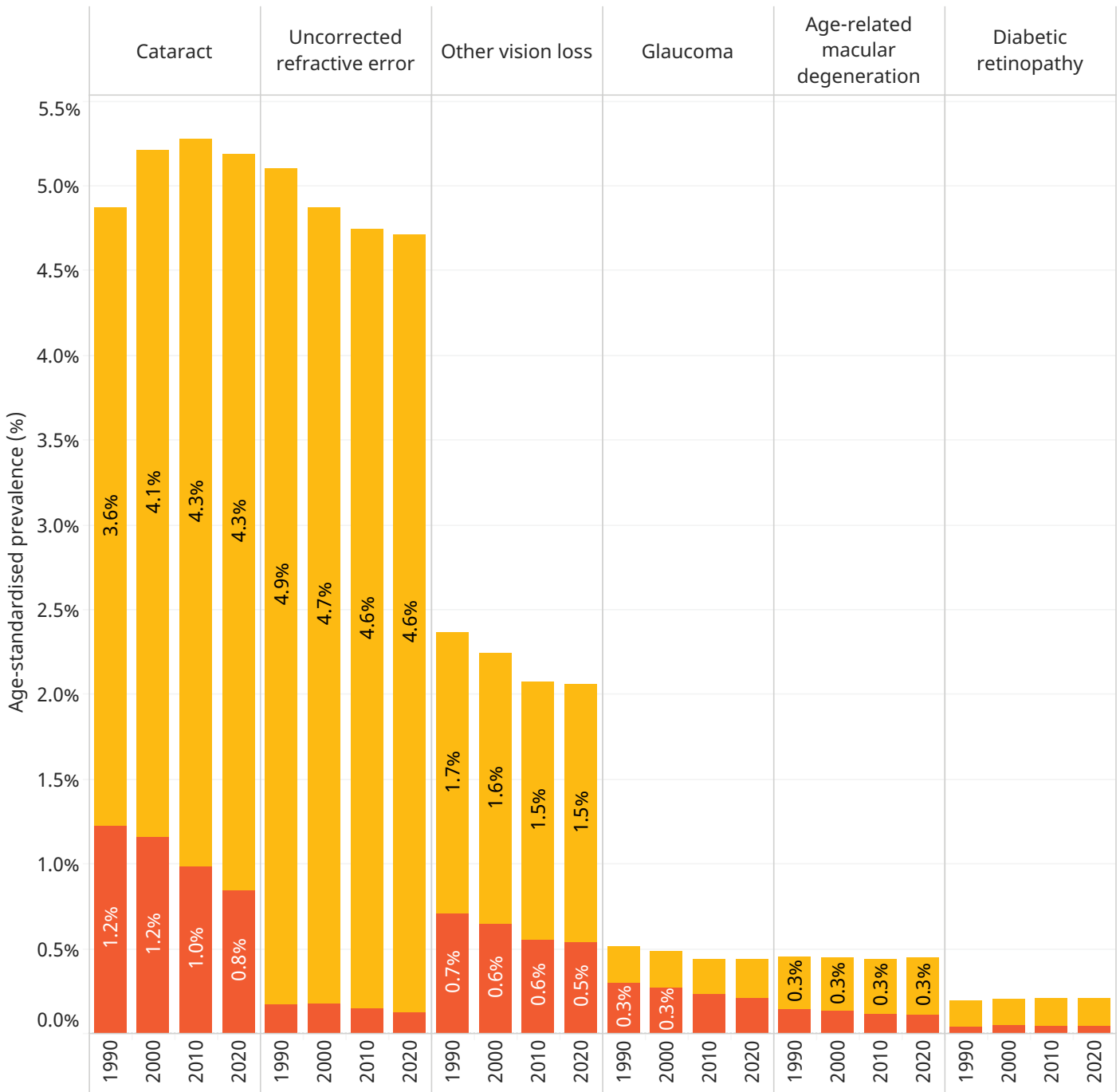


All causes of vision loss in adults 50+ have increased since 1990



Figure 3: The Age-standardised prevalence of each cause of vision loss (Blindness and moderate to severe vision impairment, adults 50+, 1990 - 2020)

■ Moderate to severe
■ Blind



The age-standardised prevalence of blindness in adults aged 50+ has decreased

The age-standardised prevalence provides additional perspective on whether the 'rate' of vision loss due to each cause is changing significantly over time, by adjusting the population structure to remove the confounding effects of population ageing. With the exception of diabetic retinopathy, the age-standardised prevalence of all other causes of blindness has decreased between 1990-2020. This is a reassuring change in the right direction.

Inequalities in the causes of vision loss: Ageing

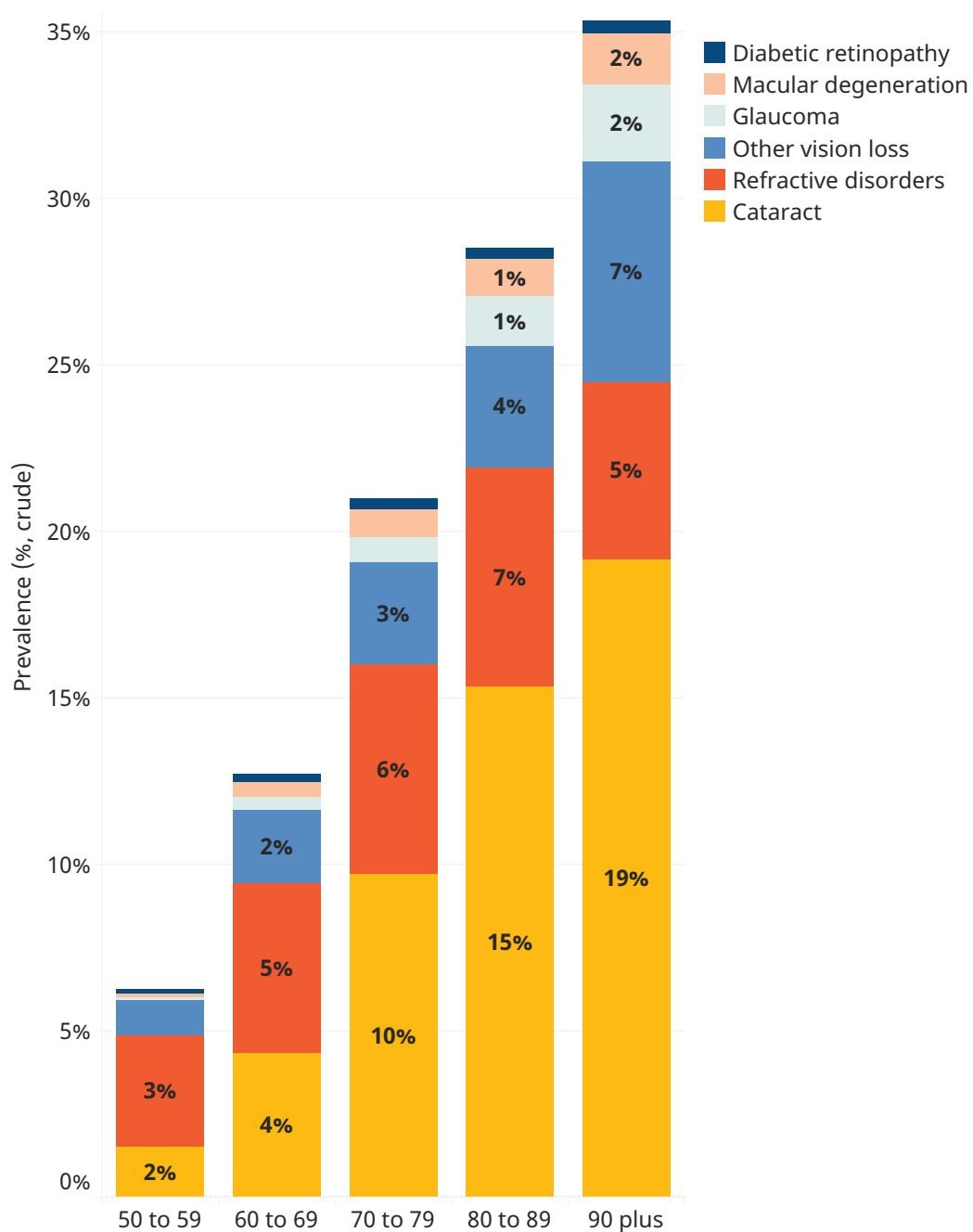
Vision loss is associated with ageing and the majority of those with vision loss (73%) are aged 50 years and older.

Most causes of vision loss are associated with ageing



Image: Lia Marmelstein

Figure 4: The prevalence (crude) of each cause of vision loss by 10-year age groups (Blindness and moderate to severe vision impairment, adults 50+, 2020)

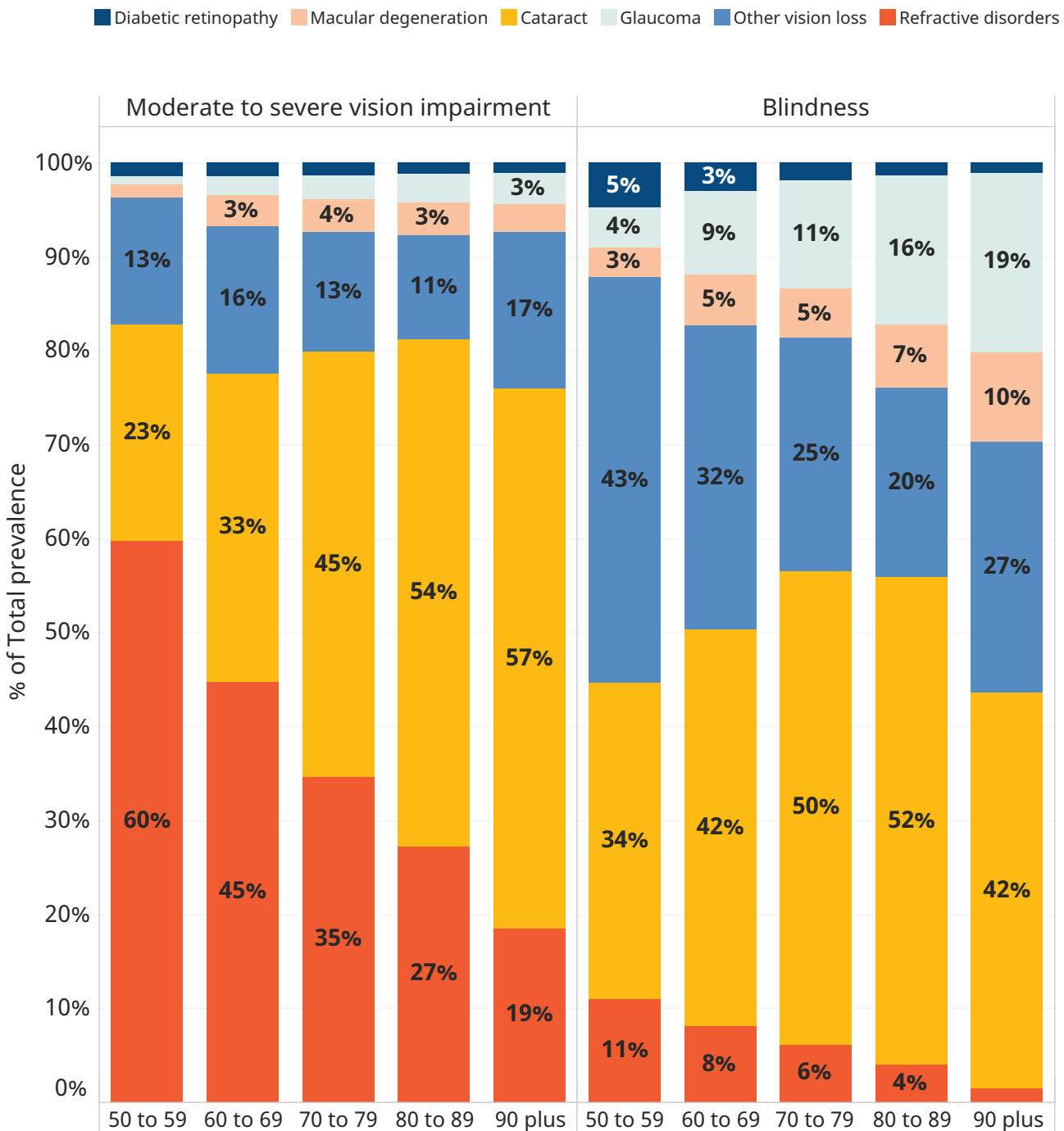


The causes of vision loss **change** with ageing

Uncorrected refractive errors are the principal cause of moderate to severe vision impairment in those aged 50 to 69 years of age, while cataract is the principal cause in those aged 70 years and above. The grouping of 'other causes of vision loss' is the principal cause of blindness in adults aged 50 to 59, with cataract being the leading cause of blindness in adults aged 60 and above.

The proportion of blindness due to glaucoma and age-related macular degeneration becomes increasingly significant as a cause of blindness in those aged 70 and above.

Figure 5: Relative contribution of each cause of vision loss by 10-year age groups (Blindness and moderate to severe vision impairment, adults 50+, 2020)



Inequalities in the causes of vision loss: Gender

Women and girls experience higher rates of blindness and moderate to severe vision impairment at every stage of their lives. The age-standardised prevalence of blindness is greater in females for cataract, macular degeneration, but greater in males for glaucoma.

The same trend can be found in moderate to severe vision impairment. Differences in the prevalence of blindness and vision impairment are most pronounced for older females.

Table 1: Age-standardised prevalence of each cause of vision loss, by gender
(Blindness and moderate to severe vision impairment, adults 50+, 2020)

Cause	Moderate to severe		Blindness	
	Female	Male	Female	Male
Cataract	4.67%	3.96%	0.93%	0.73%
Uncorrected refractive error	4.75%	4.41%	0.13%	0.12%
Other vision loss	1.63%	1.39%	0.52%	0.54%
Glaucoma	0.21%	0.25%	0.17%	0.24%
Age related macular degeneration	0.35%	0.33%	0.12%	0.08%
Diabetic retinopathy	0.17%	0.15%	0.05%	0.04%

Women and girls experience higher rates of blindness and moderate to severe vision impairment at every stage of their lives.



Image: Louis Leeson

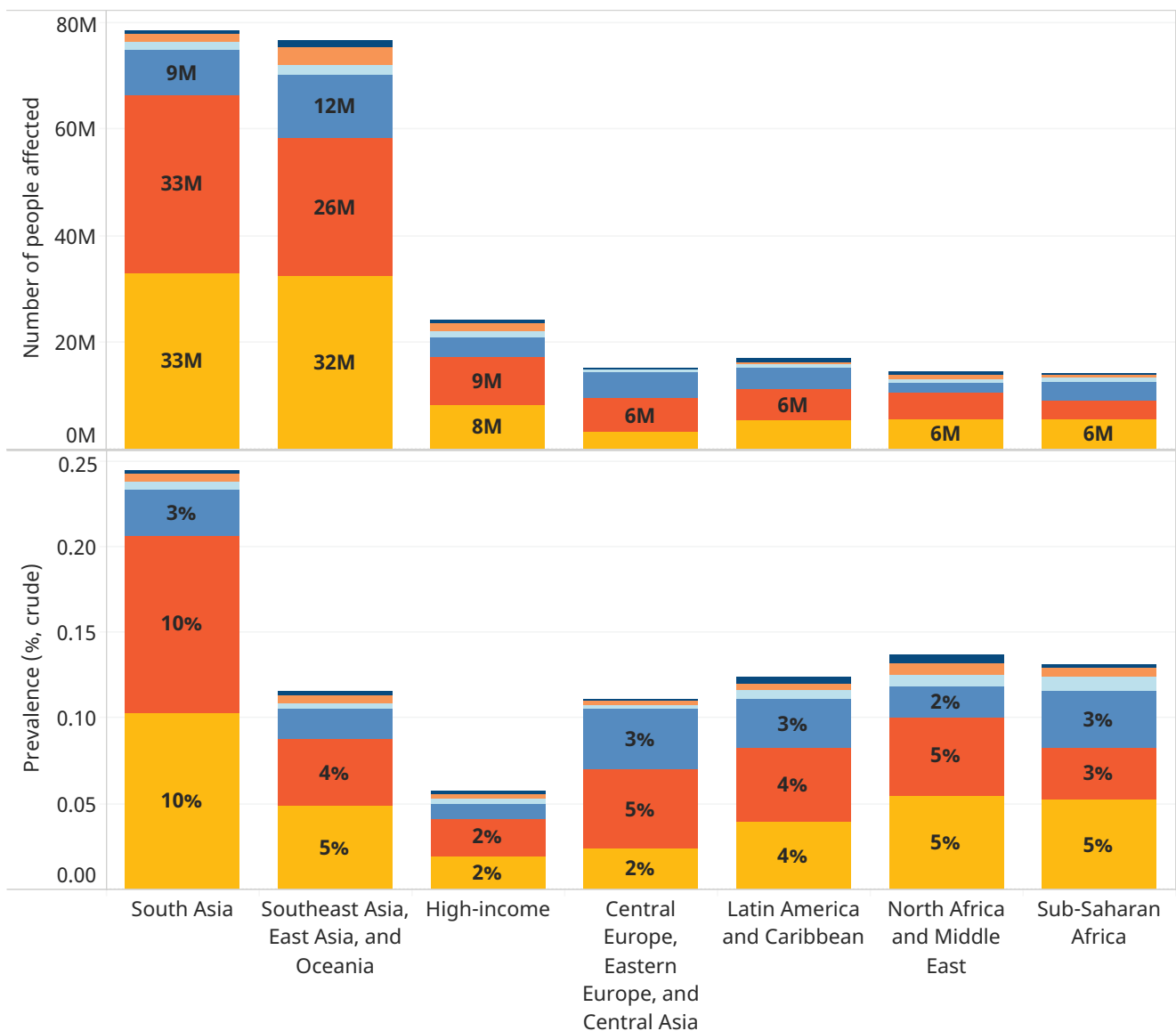
Inequalities in the causes of vision loss: Regional disparities

The two super regions South Asia and Southeast Asia, East Asia, Oceania have more people with moderate to severe vision impairment or blindness just from cataract than all causes of blindness and

moderate to severe vision impairment in each of the other five regions. Although regional level data cannot depict the diversity of situations within regions, countries, or even within communities

Figure 6: Number of people affected and crude prevalence by each cause of vision loss (Blindness and moderate to severe vision impairment, adults 50+,2020)

- Diabetic retinopathy
- Age-related macular degeneration
- Glaucoma
- Other vision loss
- Uncorrected refractive errors
- Cataract



The age-standardised prevalence of blindness, which takes into account any changes in population age structure since 1990, has decreased for all causes of blindness (except diabetic retinopathy). This is a reassuring change in the right direction.

However, the number of adults (50+) with vision loss overall has increased across all causes of blindness and moderate to severe vision impairment. Significant inequalities also persist, indicating that services are failing to meet population needs in an equitable manner.

Finally, more comprehensive data are required to provide more accurate country level data, data on the causes of mild vision loss, and information of the causes of vision loss in younger adults and children.

References

1. Adelson J, Bourne R, Briant P, et al. Causes of blindness and vision impairment in 2020 and trends over 30 years: evaluating the prevalence of avoidable blindness in relation to VISION 2020: the Right to Sight. *Lancet Glob Heal.* 2020;Published. doi:[doi:doi.org/10.1016/S2214-109X\(20\)30489-7](https://doi.org/10.1016/S2214-109X(20)30489-7)
2. Bourne R, Jonas JB, Resnikoff S. Looking Within Rather Than between Countries to Understand the Risk Factors for Vision Impairment. *JAMA Ophthalmol.* 2019;137(2):158-159. doi:[doi:10.1001/jamaophthalmol.2018.5448](https://doi.org/10.1001/jamaophthalmol.2018.5448)

