Prevalence and Causes of Vision Loss in East Asia: 2015: Magnitude, Temporal Trends, and Projections

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SYNOPSIS

Sixty million people in East Asia are blind or have distance vision impairment (<6/18 in the better eye) and 265 million uncorrected presbyopia. Leading but readily addressable causes are uncorrected refractive error and cataract with these rising along with diabetic retinopathy and glaucoma in recent decades.

ABSTRACT

Background

To determine the prevalence and causes of blindness and vision impairment in East Asia in 2015 and to forecast the trend to 2020.

Methods

Through a systematic literature review and meta-analysis, we estimated prevalence of blindness (presenting visual acuity < 3/60 in the better eye), moderate and severe vision impairment (MSVI; 3/60 ≤ presenting visual acuity < 6/18), mild vision impairment (mild VI: 6/18 ≤ presenting visual acuity < 6/12) and uncorrected presbyopia for 1990, 2010, 2015, and 2020. A total of 44 population-based studies were included.

Results

In 2015, age-standardised prevalence of blindness, MSVI, mild VI, and uncorrected presbyopia was 0.37% (80% Uncertainty Interval, UI 0.12 - 0.68%), 3.06% (80% UI 1.35 - 5.16%), and 2.65% (80% UI 0.92 - 4.91%), 32.91% (80% UI 18.72 - 48.47%), respectively, in East Asia. Cataract was the leading cause of blindness (43.6%), followed by uncorrected refractive error (12.9%), glaucoma, age-related macular degeneration, corneal diseases, trachoma and diabetic retinopathy. The leading cause for MSVI was uncorrected refractive error, followed by cataract, age-related macular degeneration, glaucoma, corneal disease, trachoma and diabetic retinopathy. The burden of vision impairment due to uncorrected refractive error, cataracts, glaucoma and DR has continued to rise over the decades reported.

Conclusions

Addressing the public health care barriers for cataract and uncorrected refractive error can help eliminate almost 57% of all blindness cases in this region. Therefore, public health care efforts should be focused on effective screening and effective patient education, with access to high quality health care.

INTRODUCTION

Approximately one fifth of the world's 7.6 billion people reside in East Asia. From 2015 onwards it is estimated that East Asia's elderly population (aged 65 years or older) will grow by 22% every 5 years for the next 20 years.[1] With this increase in growth of the elderly population that is unparalleled in human history, we expect to see a dramatic increase in major age-related eye diseases and vision impairment in this region. Vision loss is among the top three most common impairments in terms of years lived with disability (YLD),[2] and has a clinically meaningful impact on overall mobility and independence in populations in the region.[3] Furthermore, vision impairment decreases quality of life among affected people, and therefore poses a large and growing public health concern for East Asia.

Several studies have investigated the prevalence of vision impairment in East Asian countries,[4-6] but there are few reports summarising epidemiological data and establishing specific causes for vision loss across the region. Notably, the Vision Loss Expert Group of the Global Burden of Disease Study was the first to summarize causes of vision loss from 1990-2010 in East Asia.[7] We demonstrated that those with moderate to severe vision impairment (MSVI) in 2010 numbered 33.3 million and those with blindness numbered 5.2 million.[7] We also reported that the major causes of blindness and MSVI were cataract (28.1%; 13.3%) and uncorrected refractive error (13.7%; 46.1%), respectively. With an increasing elderly population and changing lifestyles and socio-economic conditions in East Asia, and newly published studies an updated report on vision loss is needed to improve systematic allocation of healthcare resources for the coming years. The current report aims to update these epidemiological data by analysing the prevalence and causes of vision loss in East Asia for 2015, providing projections for 2020, and comparing these findings globally.

METHODS

The methodology used for the preparation of prevalence estimates for vision impairment and blindness, which includes a PRISMA checklist, PRISMA flowsheet

and a detailed account of the statistical models used, have been published in full elsewhere.[8-10] A brief overview is given as follows. Using data from the Global Vision Database,[11] we estimated 1990-2015 trends in vision impairment prevalence and their uncertainties, by age and gender, for 188 countries in the 21 Global Burden of Disease regions. For this report targeting East Asia, we included data from a total of 44 studies from the Chinese mainland (n = 41 studies) and Taiwan (n = 3 studies). South Korea and Japan were not included in this report, as data from these two countries were included in the report addressing the high-income Asia Pacific region.[12]

Eligible studies were identified through a systematic review, including reports published between 1980 and 2014 and unpublished data identified by members of the Vision Loss Expert Group convened for the 2010 Global Burden of Disease Study. Using the same search terms as a previously-published systematic review published previously,[13] we extended the review to include more recently published studies up to July 2014.

Using World Health Organization (WHO) definitions and an analytical framework similar to our earlier report,[14] we estimated the prevalence of two of the core categories of vision impairment: *1*) blindness (presenting visual acuity < 3/60 in the better eye), and *2*) a combined moderate and severe vision impairment grouping called MSVI (3/60 ≤ presenting visual acuity < 6/18). These definitions were used to standardise all prevalence following the strategy of Stevens et al.[14] Four regressions were used to convert two commonly used definitions of blindness (visual acuity worse than 6/60 and visual acuity of 6/60 or worse) to our definition of blindness; and two commonly reported definitions of vision impairment (visual acuity worse than 6/18 but no worse than 3/60 and visual acuity worse than 6/12 but no worse than 3/60) to our definition of MSVI.

We fitted two hierarchical Bayesian logistic regressions (one for the prevalence of blindness and one for MSVI) to estimate vision impairment prevalence over time, by age group, gender and country. Using fully Bayesian statistical inference,[15] our posterior estimates of vision impairment were able to flexibly borrow strength such that country-specific estimates were informed by study data from the same country, and by study data from other countries in the same region or the same year. We

modelled hierarchical linear trends over time to estimate region-specific trends in prevalence of vision impairment. Prevalence estimates are reported as posterior means along with 80% posterior uncertainty intervals (UI).

In order to estimate the prevalence of near vision impairment due to uncorrected presbyopia (functional presbyopia), we included studies where presbyopia was defined as presenting near vision worse than N6 or N8 at 40 cm regardless of distance refractive status. We only included people whose best-corrected distance visual acuity was 6/12 (20/40) or better, so as to avoid double counting those with both distance and near vision impairment associated with non-refractive causes. We developed a similar model to the main model used for blindness and MSVI for uncorrected presbyopia.

We applied our model to forecast future estimates of the prevalence of blindness and MSVI. Our model relies on health status and education as covariates. Since it is impossible to predict how these will evolve into the future, we extrapolated these covariates to the year 2020. We used the United Nations Population Division's (UNPOP) forecasts to derive crude numbers and to provide the WHO reference population which was used to age-standardise estimates of prevalence.[16]

Using Bayesian hierarchical logistic regression models, we estimated the proportions of overall vision impairment attributable to uncorrected refractive error, cataract, glaucoma, age-related macular degeneration (AMD), diabetic retinopathy (DR), corneal diseases, trachoma, and other causes in 1990–2015 by geographical region and year.[10]

RESULTS

A total of 44 studies met the inclusion criteria for the Global Burden of Disease Study super-region of East Asia and were included for analysis. The majority of studies (30/44) included only adults, while 6 involved the entire age range. Seventeen were conducted in both rural and urban regions while 13 were conducted only in urban areas and 14 only in rural areas.

In 2015 the age-standardized prevalence of blindness (all ages) was 0.37% (80% UI 0.12 - 0.68%) in East Asia, while the prevalence of MSVI was 3.06% (80% UI 1.35 - 5.16%) and the prevalence of mild VI was 2.65% (80% UI 0.92 - 4.91%) (**Table 1**). The age-standardised prevalence of uncorrected presbyopia was 32.91% (80% UI 18.72 - 48.47%) (**Table 1**).

A comparison between the world and East Asia for the age-standardized prevalence of vision loss by gender and age group for 2015 can be found in **Table 2**. In the group aged 50 years and older in East Asia, both genders demonstrated a slightly higher prevalence of MSVI and mild VI, compared to the world population. This trend also was observed for all ages. On the contrary, the global prevalence of blindness for all ages was higher than the prevalence in East Asia for both genders. In general, compared to males, females demonstrated a higher prevalence of blindness, MSVI and mild VI when considering either the entire population **(Table 1)**, or the subpopulation aged 50 years or older (**Table 2**). In addition, the same pattern of higher prevalence in females was observed across the different countries in East Asia (**Figures 1 and 2**).

In 2015 the total number of people blind was estimated at 6.19 million in East Asia (**Table 3**), and China alone had 6.02 million blind people. The total number of blind individuals residing in East Asia was projected to increase by 8.2% to 6.70 million in 2020. In addition, 52.88 million people had MSVI and 46.42 million more had mild VI, in 2015. The number of individuals with MSVI and mild VI, is projected to increase by 10.6% and 9.9%, respectively by 2020. There were 265.34 million additional people with near vision impairment due to uncorrected presbyopia and the number was projected to increase to 289.84 million by 2020.

Cataract has been the leading cause of blindness in East Asia since first studied in 1990, accounting for more than 42% of blindness, and was estimated to continue being the leading cause in 2020 (**Table 4**). In 2015 the second largest cause of blindness was uncorrected refractive error (12.90%, 80% UI 11.15 - 14.61%), followed by glaucoma (7.06%, 80% UI 2.79 - 12.53%), AMD (5.33%, 80% UI 1.34 - 10.95%), corneal disease (4.26%, 80% UI 0.71 - 9.41%), trachoma (1.81%, 80% UI 1.25-2.36%), and lastly DR (0.51%, 80% UI 0.09 - 1.08%). This trend was projected to remain the same for 2020 except that trachoma will have a much lower impact on

total blindness compared to other causes. The percentage of blindness due to DR globally in 2015 (1.06%) was more than double, compared to East Asia (0.51%). Conversely, the percentage of blindness due to cataract (43.58%) and trachoma (1.81%) in East Asia in 2015 was much higher than the global prevalence of blindness due to these diseases in 2015. Notably, the percentage of blindness owing to uncorrected refractive error was lower in East Asia (12.90%), compared to the world (20.28%).

The percentage of total MSVI by cause for all ages is presented in **Table 5**. The leading cause for MSVI globally and for East Asia has been uncorrected refractive error since first reported in 1990, and was projected to continue being the leading cause for 2020. Interestingly, the prevalence of uncorrected refractive error for East Asia was lower than the prevalence globally throughout these years although this should be interpreted with caution due to the relatively wide uncertainty intervals. Cataract was the second most common cause of MSVI accounting for 32.54% (80% UI 24.96-40.48%) of total MSVI in 2015. Conversely to uncorrected refractive error, the prevalence of cataract-induced MSVI in East Asia was higher than the global prevalence for all years. The third most common cause of MSVI in 2015 was AMD, followed by glaucoma, corneal disease, trachoma, and lastly DR. The specific cause rankings for MSVI for 2020 were projected to remain fairly constant, except for a slight decrease in the percentage of MSVI due to trachoma (0.14%, 80% UI 0.00-0.64). Generally for causes of MSVI in East Asia, there has been an increase in the percentages prevalence for uncorrected refractive error, cataract, glaucoma, and DR from 1990 to 2015, whereas there has been a decrease for corneal disease and trachoma.

DISCUSSION

In 2010, the Global Burden of Disease Study group estimated the prevalence and major causes of blindness and MSVI for different global regions including East Asia.[7] As the East Asian population rapidly ages, we expected an increase in number of people with blindness and MSVI and near vision impairment due to uncorrected presbyopia in this region in the next decade. This report provided an updated meta-

analysis (adding a further 16 studies from this region) of the prevalence and major causes of blindness and MSVI for 2015 in East Asia and projected these findings to 2020 using data from 41 studies conducted in this region.

East Asia alone accounted for 17.2%, 24.4%, and 24.2% of the world's blind, MSVI, and uncorrected presbyopia populations, respectively (**Table 3**). Additionally, the age standardized prevalence of MSVI and mild VI was higher in East Asia compared to the global prevalence for all ages. The most common cause of blindness, namely cataract and uncorrected refractive error, together accounted for almost 57% and 80% of all blindness and MSVI cases, respectively in the region. The increased burden of disease from these few avoidable conditions reflects the dire need for increased awareness of avoidable MSVI and blindness. For this region, simply providing suitable custom or ready-made glasses is a non-surgical approach that can greatly reduce the number of people with MSVI and blindness.[17-19] Recently, eight Commissions and Ministries of China have jointly issued a comprehensive plan to prevent myopia among children and adolescents, which is expected to lead to a decrease in the prevalence of uncorrected refractive error in the future.[20] In addition to making cataract surgery more accessible and affordable in the region,[21] the benefit and safety of cataract surgery also needs to be communicated more effectively to the population.[22] Therefore, health care efforts should be focused on vision screenings and patient education to increase cataract surgery uptake and reduce the burden of vision loss in East Asia. Indeed, since China's medical reform in 1998 that led to 95% medical insurance coverage of the Chinese population,[23] there has been an increased cataract surgical rate in China, from 370 in 2000 to 2205 in 2017 and it is anticipated that this will reach 3000 by the end of 2018.[24] Increasing capability and capacity for eye care in the rural population is also a major focus of China's new National Eye Health Plan through development of the county level hospitals.[25]

After refractive error and cataract, glaucoma was the next major cause for blindness in East Asia and also was projected to increase. The number of glaucoma cases in Asia was projected to increase from 39 million in 2013 to 111.8 million in 2040, and Asia accounts for the largest number of cases worldwide.[26] The contribution of the largest number of glaucoma cases of any region is not surprising given that East Asia has a population size of 1.65 billion and has been ageing rapidly. In addition, there is a higher risk for primary angle-closure glaucoma in East

Asians and a higher risk for primary open-angle glaucoma for people living in urban areas.[26,27] As glaucoma continues as a major threat to blindness in this region and is expected to worsen as China moves towards urbanization, public health strategies should aim to increase efforts for improvements in both glaucoma screening models and better access to eye care service to reduce blindness due to glaucoma.

Unlike AMD, DR prevalence has been steadily increasing from 1990 to 2015 as an increasing cause of blindness, but it is still contributes a notably lower proportion of all blindness in the East Asia region than globally. A recent review on DR also noted a similar trend where the prevalence of DR-related vision impairment in Asian countries was lower than in Western countries[28] and in Africa.[29] This observation could be due to a shorter life expectancy of diabetic persons in East Asia,[29] especially in rural parts of China due to limited access to medical care.[30] In contrast, the decrease in blindness due to AMD may be due to increased clinical therapies for choroidal neovascularization through intravitreal injections of anti-vascular endothelial growth factor antibodies.[31,32] Public health care efforts to reduce blindness and visual impairment from retinal diseases therefore should try to focus on promoting the importance of both eye screenings in diabetic people and early detection and treatment of vision-threatening DR. According to recent surveys, myopic macular degeneration has become a major cause of vision loss in East Asia.[31-35] Although we extracted data on prevalence of vision impairment due to myopic macular degeneration from studies where this was reported, the data were so sparse that an analysis of prevalence would have been meaningless. Yet it is presumed that this cause of vision impairment constitutes a proportion of the 'other' causal category.

In East Asia the prevalence of trachoma as a cause for blindness and MSVI has significantly decreased throughout the study period. Long-running trachoma control policies such as the implementation of the Chinese National programme and National Blindness Prevention and Treatment program, were instituted by the central Chinese government to eliminate trachoma by the end of 2015.[36] Therefore, active trachoma is a declining threat to vision in East Asia.

There are some limitations to our studies. First, data from Rapid Assessment of Avoidable Blindness (RAAB) surveys were included in this meta-analysis, but these

surveys only contributed data to presenting visual acuity and in some cases best-corrected visual acuity data was usually measured through a pin hole. Consequently these studies were only statistically analysed for cataract and uncorrected refractive error as causes for vision loss, potentially biasing upward the proportion of blindness attributed to these entities. Second, a significant percentage of vision loss causes were only categorized under “other causes” accounting for about 25% of blindness and 12% of MSVI in 2015; what these causes are needs further definition beyond what is available in our data sources. Third, studies used different disease definitions, especially for glaucoma.[37] Fourth, participants with vision impairment may have multiple ocular diseases contributing to their vision loss which make it difficult to decipher the disease with the greatest impact. Moreover, there were few population-based studies on near vision impairment as most studies focused on the causes of distance vision impairment. Lastly, the projections for 2020 should be taken with caution as these projections assumed that access to healthcare and literacy remained unchanged after 2015.

In conclusion, blindness and vision impairment remain a significant public health concern in East Asia. While there is a decreasing trend for the prevalence of vision impairment due to trachoma and AMD, the burden of vision impairment due to uncorrected refractive error, cataracts, glaucoma and DR continues to rise. Identifying the barriers to eliminate uncorrected refractive error and cataract as the leading causes for vision loss should become priority as these two causes are avoidable with relatively limited resources. Identifying other diseases causing an important share of visual impairment also is needed, as the burden of some of these in causing visual impairment might now exceed that of some entities studied directly (e.g., trachoma). Furthermore, routine DR screening should be implemented and better glaucoma vision impairment prevention models should be developed as these two diseases are forecasted to become the next major causes for vision loss in East Asia.

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Table 1. Crude and age-standardised prevalence (%) of blindness and moderate and severe vision impairment, mild vision impairment and near vision impairment due to uncorrected presbyopia in 2015 in East Asia

	Blindness	MSVI	Mild VI	Near VI*
Crude Prevalence				
Males	0.37 (0.13-0.69)	3.32 (1.48-5.59)	2.99 (1.02-5.59)	-
Females	0.49 (0.16-0.92)	4.09 (1.77-6.95)	3.50 (1.21-6.52)	-
All	0.43 (0.14-0.80)	3.69 (1.62-6.25)	3.24 (1.11-6.04)	34.11 (19.49-50.10)
Age-Standardized Prevalence				
Male	0.35 (0.12 - 0.64)	2.90 (1.31 - 4.86)	2.56 (0.89 - 4.73)	-
Females	0.39 (0.13 - 0.73)	3.20 (1.39 - 5.45)	2.74 (0.95 - 5.10)	-
All	0.37 (0.12 - 0.68)	3.06 (1.35 - 5.16)	2.65 (0.92 - 4.91)	32.91 (18.72 - 48.47)

MSVI, moderate and severe vision impairment; VI, vision impairment; Near VI, near vision impairment due to uncorrected presbyopia.

Definitions used are as follows: blindness (presenting visual acuity < 3/60 in the better eye), moderate and severe vision impairment (MSVI; 3/60 ≤ presenting visual acuity < 6/18), mild vision impairment (mild VI: 6/18 ≤ presenting visual acuity < 6/12).

Data presented are for all ages. 80% uncertainty intervals are given in brackets.

*A gender breakdown for near vision impairment due to uncorrected presbyopia is not presented due to data sparsity

Table 2. Age-standardised prevalence of blindness, moderate and severe vision impairment, and mild vision impairment, by sex and region comparing adults 50 years and older with all ages for 2015 in East Asia and World

	Men			Women		
Region/Age	**Blindness**	**MSVI**	**Mild VI**	**Blindness**	**MSVI**	**Mild VI**
50+						
East Asia	1.43 (0.49 - 2.62)	10.98 (5.12 - 18.19)	9.18 (3.44 - 16.56)	1.61 (0.54 - 3.00)	12.22 (5.46 - 20.48)	9.85 (3.69 - 17.83)
World	1.82 (0.67 - 3.28)	10.12 (4.85 - 16.45)	8.33 (3.10 - 15.02)	1.91 (0.68 - 3.49)	10.79 (5.00 - 17.74)	8.77 (3.23 - 15.84)
All ages						
East Asia	0.35 (0.12 - 0.64)	2.90 (1.31 - 4.86)	2.56 (0.89 - 4.73)	0.39 (0.13 - 0.73)	3.20 (1.39 - 5.45)	2.74 (0.95 - 5.10)
World	0.46 (0.17 - 0.84)	2.79 (1.29 - 4.61)	2.46 (0.84 - 4.55)	0.49 (0.17 - 0.90)	2.99 (1.33 - 4.99)	2.60 (0.88 - 4.85)

MSVI, moderate and severe vision impairment; VI, vision impairment

Definitions used are as follows: blindness (presenting visual acuity < 3/60 in the better eye), moderate and severe vision impairment (MSVI; 3/60 ≤ presenting visual acuity < 6/18), mild vision impairment (mild VI: 6/18 ≤ presenting visual acuity < 6/12).

80% uncertainty intervals of the prevalence estimates are given in brackets.

Table 3. Estimated number of people (millions) affected by blindness and moderate and severe vision impairment, mild vision impairment, and near vision impairment due to uncorrected presbyopia in East Asia in 2015 and projections to 2020.

	Blind		MSVI		Mild VI		Near VI*	
Region	**2015**	**2020**	**2015**	**2020**	**2015**	**2020**	**2015**	**2020**
East Asia	6.19 (2.07 - 11.46)	6.70 (2.18 - 12.50)	52.88 (23.18 - 89.57)	58.48 (24.24 - 100.74)	46.42 (15.96 - 86.58)	51.02 (16.89 - 95.95)	265.34 (154.46 - 383.89)	289.84 (169.73 - 417.83)
World	36.02 (12.86 - 65.44)	38.50 (13.18 - 70.95)	216.60 (98.51 - 359.1)	237.08 (101.50 - 399.02)	188.54 (64.46 - 350.19)	205.73 (67.30 -385.11)	1094.75 (581.13 - 1686.54)	1225.59 (653.43 - 1884.22)

*Projections for presbyopia beyond 2020 are not presented due to data sparsity

MSVI, moderate and severe vision impairment; VI, vision impairment

Definitions used are as follows: blindness (presenting visual acuity < 3/60 in the better eye), moderate and severe vision impairment (MSVI; 3/60 ≤ presenting visual acuity < 6/18), mild vision impairment (mild VI: 6/18 ≤ presenting visual acuity < 6/12).

80% uncertainty intervals of the prevalence estimates are given in brackets.

Table 4. Percentage of total blindness by cause for all ages

Region	Uncorrected Refractive Error	Cataract	Glaucoma	Age-related macular degeneration	Diabetic retinopathy	Corneal Disease	Trachoma	Other
1990								
East Asia	12.8 (11.0 - 14.5)	42.6 (35.4 - 49.7)	6.9 (2.7 - 12.4)	7.0 (1.8 - 14.7)	0.4 (0.1 - 0.8)	5.8 (1.1 - 12.4)	7.2 (6.8 - 7.6)	17.3 (6.0 - 31.4)
World	19.6 (17.3-21.8)	36.7 (30.1 - 43.2)	8.7 (3.2 - 15.7)	7.9 (2.3-15.5)	0.8 (0.2 -1.8)	4.8 (0.8 -10.5)	2.8 (2.7 -2.9)	18.8 (7.1-32.9)
2010								
East Asia	12.9 (11.1 - 14.6)	43.3 (33.9 - 52.4)	7.0 (2.9 - 12.2)	5.8 (1.5 - 11.7)	0.5 (0.1 - 1.0)	4.4 (0.8 - 9.5)	3.5 (3.0 - 4.0)	22.7 (7.8 - 41.4)
World	20.2 (18.2 - 22.2)	35.7 (27.7 - 43.7)	8.5 (3.2 - 15.4)	6.3 (1.7 - 12.6)	1.0 (0.2 - 2.2)	3.4 (0.6 - 7.4)	1.5 (1.4 - 1.7)	23.4 (9.0 - 40.8)
2015								
East Asia	12.9 (11.1 - 14.6)	43.6 (33.0 - 53.9)	7.1 (2.8 - 12.5)	5.3 (1.3 - 10.9)	0.5 (0.1 - 1.1)	4.3 (0.8 - 9.4)	1.8 (1.2 - 2.4)	24.6 (8.5 - 44.7)
World	20.3 (18.2 - 22.2)	35.1 (26.4 - 44.0)	8.5 (3.0 - 15.7)	5.9 (1.5 - 12.2)	1.1 (0.2 - 2.4)	3.2 (0.5 - 7.2)	1.0 (0.8 - 1.1)	24.9 (9.6 - 43.4)
2020								
East Asia	12.9 (11.2 - 14.6)	43.5 (31.5 - 55.3)	7.1 (2.6 - 13.0)	5.1 (1.2 - 10.6)	0.6 (0.1 - 1.2)	4.2 (0.6 - 9.5)	0.2 (0.0 - 0.8)	26.3 (9.0 - 48.0)
World	20.6 (18.5 - 22.5)	34.7 (25.0 - 44.6)	8.4 (2.7 – 16.0)	5.6 (1.2 - 11.7)	1.2 (0.2 - 2.7)	3.1 (0.4 - 7.1)	0.4 (0.3 - 0.6)	26.0 (10.0 - 45.3)

Data shown are in percentage, %. 80% uncertainty intervals of the percentage estimates are given in brackets.

Definition of blindness: presenting visual acuity < 3/60 in the better eye.

Table 5. Percentage of total moderate to severe vision impairment by cause for all ages

Region	Uncorrected Refractive Error	Cataract	Glaucoma	Age-related macular degeneration	Diabetic retinopathy	Corneal Disease	Trachoma	Others
1990								
East Asia	45.8 (41.0 - 49.8)	32.0 (26.5 - 37.5)	1.5 (0.5 - 2.7)	4.5 (1.0 - 9.6)	0.4 (0.1 - 0.8)	2.2 (0.4 - 4.6)	5.3 (5.0 - 5.6)	8.3 (2.5 - 16.3)
World	50.8 (46.1 - 54.7)	26.6 (21.5 - 31.8)	2.1 (0.7 - 4.1)	5.9 (1.6 - 11.9)	1.0 (0.2 - 2.2)	1.7 (0.2 - 3.8)	2.0 (1.9 - 2.1)	9.7 (3.0 - 18.5)
2010								
East Asia	46.9 (43.2 - 50.0)	32.2 (25.6 - 39.2)	1.5 (0.6 - 2.8)	3.6 (0.9 - 7.6)	0.5 (0.1 - 1.1)	1.6 (0.3 - 3.3)	2.6 (2.2 - 3.0)	10.9 (3.2 - 21.7)
World	52.1 (48.4 - 55.2)	25.5 (19.8 - 31.5)	2.0 (0.7 - 3.9)	4.7 (1.2 - 9.5)	1.2 (0.2 - 2.7)	1.2 (0.2 - 2.5)	1.1 (0.9 - 1.2)	12.2 (3.9 - 23.0)
2015								
East Asia	47.1 (43.3 - 50.2)	32.5 (25.0 - 40.5)	1.6 (0.6 - 2.9)	3.4 (0.8 - 7.1)	0.6 (0.1 - 1.2)	1.5 (0.2 - 3.3)	1.3 (0.9 - 1.8)	2.0 (3.6 - 23.7)
World	52.3 (48.7 - 55.4)	25.1 (18.8 - 31.8)	2. (0.6 - 4.0)	4.4 (1.0 - 9.1)	1.3 (0.2 - 2.9)	1.1 (0.2 - 2.5)	0.6 (0.5 - 0.8)	13.0 (4.1 - 24.6)
2020								
East Asia	47.3 (43.4 - 50.4)	32.6 (4.0 - 41.8)	1.6 (0.5 - 3.1)	3.3 (0.7 - 7.0)	0.7 (0.1 - 1.3)	1.5 (0.2 - 3.4)	0.1 (0.0 - 0.6)	12.9 (3.8 - 25.6)
World	52.6 (48.9 - 55.8)	24.7 (17.8 - 32.1)	2.0 (0.6 - 4.2)	4.2 (0.9 - 8.9)	1.5 (0.2 - 3.4)	1.1 (0.1 - 2.4)	0.2 (0.2 - 0.4)	13.6 (4.3 - 25.7)

Data shown are in percentage, %. 80% uncertainty intervals of the percentage estimates are given in brackets.

Definition of moderate and severe vision impairment: 3/60 ≤ presenting visual acuity < 6/18