Prevalence and Causes of Vision Loss in Sub-Saharan Africa in 2015: Magnitude, Temporal Trends, and Projections.

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Synopsis

Approximately 22 million Africans have poor vision at distance and an additional 101 million have poor near vision or presbyopia. The main causes are the easily treatable cataract and undercorrection of refractive error. Glaucoma, age related macular degeneration and diabetic retinopathy are on the increase.

ABSTRACT

Background: To assess prevalence and causes of vision loss in Sub-Saharan Africa in 2015, compared to prior years, and to estimate expected values for 2020.

Methods: A systematic review and meta-analysis assessed prevalence of blindness (presenting distance visual acuity<3/60 in the better eye), moderate and severe vision impairment (MSVI; presenting distance visual acuity <6/18 but ≥3/60) and mild vision impairment (MVI; presenting distance visual acuity <6/12 and ≥6/18); and also near vision impairment (<N6 or N8 in the presence of ≥6/12 best-corrected distance visual acuity) in Sub-Saharan Africa (SSA) for 1990, 2010, 2015, and 2020.

Results: In SSA age-standardized prevalence of blindness, MSVI and MVI in 2015 were 1.03% (80% uncertainty interval (UI): 0.39 -1.81), 3.64% (80% UI: 1.71-5.94) and 2.94% (80% UI: 1.05-5.34), respectively, for males and 1.08% (80% UI: 0.40-1.93), 3.84% (80% UI: 1.72-6.37) and 3.06% (80% UI: 1.07-5.61), for females, constituting a significant decrease since 2010 for both genders. There were an estimated 4.28 million blind individuals and 17.36 million individuals with MSVI; 101.08 million individuals were estimated to have near vision loss due to presbyopia. Cataract was the most common cause of blindness (40.1%), whereas undercorrected refractive error (48.5%) was the most common cause of MSVI. Sub-Saharan West Africa had the highest proportion of blindness compared to the other SSA subregions.

Conclusions: Cataract and undercorrected refractive error, two of the major causes of blindness and vision impairment, are reversible with treatment and thus promising targets to alleviate vision impairment in SSA.

INTRODUCTION

Nearly 30% of those in the World's Multidimensional Poverty Index (MPI) live in sub-Saharan Africa (SSA).[1] Sub-Saharan Africa has some of the lowest levels of infrastructure investment in the world. Health and eye health mirrors these deficits. However, there are also indications that there have been reductions in poverty and improvements in life expectancy. In terms of poverty dynamics, of the 19 SSA countries for which Alkire and Housseiniwe (2014)[2] presented time-series data (2008 or later), 17 countries had statistically significant reductions in multidimensional poverty. This reduction in poverty may impact health and change the spectrum of disease in Africa, including the prevalence of vision impairment and blindness. Survival also is improving, with anticipated accompanying aging of the population, which is likely to affect the prevalence of age-related eye diseases in the region substantially.[3] These secular trends highlight the need to determine the corresponding temporal trends of blindness and vision impairment.

Efforts to address eye health needs at a global level such as VISION 2020: Right to Sight, Universal Eye Health: A global action plan 2014 – 2019 (GAP)[4] adopted by World Health Organization (WHO) Member States at the World Health Assembly in 2013 and similar efforts, such as the WHO's recently published 'World report on vision' [5], aim to reduce vision impairment and blindness. Achieving the targets of these efforts, such as reducing the prevalence of avoidable vision impairment by 25% from 2010 to 2019 as with GAP,[4] requires epidemiological data—both to aid the planning of programs and to monitor the success and achievements of these campaigns/efforts. Furthermore, such data are critical for advocacy efforts to place eye health on the radar of governments and other influential parties.

Generating evidence for eye health planning/assessment is a particularly difficult task for SSA given the paucity of population-based studies in many parts thereof. We previously published the temporal trends from 1990-2010 and the sub-regional variations based on available data at that time.[6] In 2010, 16.6 million people had MSVI and 4.8 million people were blind in Africa, and there has been an increase in the absolute numbers affected since 1990. However, there has been a significant reduction in the age-standardised prevalence of blindness and vision impairment from 1990 to 2010 with the estimated age-standardised prevalence of blindness declining from 1.9% in 1990 to 1.3% in 2010 while MSVI decreased from 5.3% in 1990 to 4.0% in 2010. Taking into account the additional population-based studies that were completed, here we present the temporal trends from 1980 to 2015 derived from a systematic review and meta-analysis of population-based datasets submitted to the Global Vision Database relevant to Sub-Saharan Africa vision impairment and blindness. In addition, we present the functional presbyopia prevalence which was not reported previously, highlighting a significant vision impairment challenge and unmet need in the region. These estimates are especially important as the World Health Organization (WHO) is in the process of presenting a World Report which will follow the Global Action Plan 2014-2019 and these data can support future efforts in Africa.

METHODS

The methodology for the prevalence estimates for vision impairment and blindness—including the method of data identification, access, and extraction—has previously been described in detail and published in full elsewhere.[7-9] Here, we present the methodology most pertinent to this report.

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 (GBD) regions, using data from the Global Vision Database.[10] The sub-Saharan Africa super-region consists of the regions of Central Africa, East Africa, Southern Africa, and West Africa. The distribution of countries within these regions is presented in Table 1.

Using definitions and an analytical framework similar to that of Stevens et al,[11] we developed statistical models to estimate the prevalence of two of the core categories of vision impairment: blindness (presenting visual acuity worse than 3/60) and a combined moderate and severe grouping called MSVI (presenting visual acuity worse than 6/18 to 3/60 inclusive).[11]

We included distance and near vision impairment data from relevant population-based studies. These studies were identified through a systematic review which included studies published between 1980 and 2014 and unpublished data identified by members of the Vision Loss Expert Group of the Global Burden of Disease Study.

For the statistical analysis, our model is based on the age-specific prevalence of vision impairment for 5-year age intervals. In cases where studies reported the prevalence of vision impairment for a wider age group - such as all ages or adults over 50 years - we converted these to 5-year age groups as follows. We fit two universal age patterns, one for the prevalence of blindness and one for the prevalence of MSVI, meta-analyzing from aggregated studies that reported prevalence for the narrower age groups. We fitted two hierarchical Bayesian logistic regressions to estimate vision impairment prevalence over time - by age group, gender and country - one model each for each vision impairment group.[12] We modeled hierarchical linear trends over time, allowing for region-specific trends in prevalence of vision impairment for each of the seven world regions, including SSA. Prevalence estimates were reported as posterior means along with 80% posterior uncertainty intervals (UI). In the previous paper,[6] we were not able to provide a full characterization of the uncertainty inherent in our estimates due to limitations in our statistical inference approach. The 95% CIs were based on an approximate approach. We were able to overcome these limitations in the current paper through the use of Markov chain Monte Carlo inference for our Bayesian model, and thus we are able to provide Bayesian posterior uncertainty intervals (UIs). We calculated trends, with uncertainty intervals, of age-standardized vision impairment by calculating the difference between the 1990 and 2015 age-standardized prevalences.

We applied our model to forecast the prevalence of blindness and MSVI into the future (2020 and 2050). We calculated trends, with uncertainty intervals, of age-standardized vision impairment by calculating the difference between the 1990 and 2015 age-standardized prevalence.

We estimated the prevalence of functional presbyopia (near vision impairment due to uncorrected presbyopia), from studies where presbyopia was defined as presenting near vision worse than N6 or N8 at 40cm regardless of distance refractive status. We only included data from those people whose best-corrected 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.

Our model relies on health status and education as covariates. Since it is impossible to predict how these will evolve decades into the future, we extrapolated these covariates to the year 2020 and then held them constant to 2050 in order to forecast prevalence of blindness and MSVI into the future. As our model gives estimates of crude prevalence for country-years we relied on the United Nations Population Division's (UNPOP) forecasts to 2050 to derive crude numbers affected and age-standardized prevalence.[13]

We estimated the proportions of overall vision impairment attributable to cataract, glaucoma, age-related macular degeneration, diabetic retinopathy, corneal opacity, trachoma, undercorrected refractive error, and all other causes combined in 1990–2015 by geographical region and year. [7-9]

RESULTS

Of the total of 288 studies included in the global meta-analysis Sub-Saharan Africa contributed 69 studies. Since the last global meta-analysis that produced estimates for 2010,[6] 16 new studies were added from countries in Sub-Saharan Africa (Table 1). We considered the age-standardised prevalence estimates by gender and sub regions for the SSA region for all ages as well as for adults 50 years and older. In 2015, the age-standardised prevalence for all ages and genders was 1.06% (0.40-1.87) for blindness and 3.74% (1.72-6.12) for MSVI, 3.0% (1.06-5.48) for mild vision impairment and 49.37% (34.75-63.96) for presbyopia (Table 2). SSA contributed 11.88% of the global number of people blind in 2015 and a predicted 12.34% for 2020, while for MSVI this was 8.01% in 2015 and 8.30% in 2020. SSA contributed 9.53% of the global prevalence of presbyopia in 2015 and a predicted 10.05% in 2020, a slight increase.This is a lesser contribution than for blindness probably due to the younger age of the population. Women had a slightly higher prevalence for all categories (blindness, MSVI and Mild VI) in the all age age-standardised prevalence. The age-standardised prevalence (all ages) of blindness and MSVI decreased from 1.12% (0.43-1.98) and 3.88% (1.86-6.29) in 2010 to 1.06% (0.39-1.87) and 3.75% (1.71-6.17) respectively in 2015.

The age-standardised prevalence of blindness in the 50 years and older age group was higher than the age-standardised prevalence for all ages, 4.19% (1.62-7.32) for males and 4.36% (1.63-7.76) for females (Table 3A; Table 3B presents crude prevalence). These values are lower than the age-standardised blindness prevalence for males and females in 2010 which were 4.47% (1.77%-7.72%) and 4.65% (1.75%-8.19%), respectively. A similar trend was evident for MSVI (2015: males 13.59% [6.60-21.84%], females 14.20% [6.63-23.16%]; 2010: males 14.08% [7.14-22.24%], females 14.70% [7.15-23.59%]. In 2015 and 2010, West Africa had the highest age-standardised prevalence of blindness (all ages, 2015: 1.25% [0.48-2.19%]) and Central Africa the lowest (all ages, 2015: 0.69% [0.21-1.31%]).In 2015 and 2010, West Africa had the highest age-standardised prevalence of MSVI and Southern Africa the lowest.[6]

In contrast, given anticipated population growth and aging, the absolute number of people with blindness, MSVI and Mild VI is predicted to increase in SSA from 2015 to 2020 (Table 4). SSA mirrors the global trend. In 2015, the estimated number of blind people was 4.28 million people (1.54-7.68) but by 2020 we forecast this will increase to 4.74 million (1.65-8.63). The number of people with MSVI is expected to increase from 17.36 million (7.53-29.16) to 19.67 million (7.97-33.54). Based on these figures, in 2015 and 2020 respectively, SSA comprises 11.9% and 12.3% of world blindness. For MSVI, Africa in 2015 and 2020 contributes or will contribute 8.0% and 8.3% to the world MSVI respectively, a small increase in the proportion. Functional presbyopia is predicted to increase from 101.08 million (70.54-131.76) in 2015 to 118.99 million (82.99-155.20) in 2020.

The proportion of blindness and MSVI by cause for all ages in 2015 is presented in Tables 5 and 6, respectively. As in 1990, cataract continues to be the main contributor to blindness in the SSA region and this trend is forecast to remain through 2020. The category of ‘other’ conditions is the next main cause of blindness, followed by glaucoma, undercorrected distance refractive error, age-related macular degeneration, corneal opacity, trachoma and then diabetic retinopathy. By 2020 the percentage of blindness due to glaucoma in SSA will be 13.5% (4.30%-25.4%) compared to the global prevalence of 8.3% (2.64-15.8).

Undercorrected refractive error was the main cause of MSVI in 2015, as also was the case in 1990 and which is projected to continue as such to 2020. Cataract is the next main cause of MSVI followed by other conditions, age-related macular degeneration, glaucoma, trachoma, corneal opacity and diabetic retinopathy, respectively.

The data show great variation in crude and age-standardised blindness prevalence for the countries in the region (Figure 1). Among adults aged 50 years and older, the crude prevalence of blindness for both males and females was the lowest in Equatorial Guinea and the highest in Ethiopia, while age-standardised prevalence was lowest in Gabon and highest in Ethiopia.

Among adults aged 50 years and older as well as for all ages, the crude prevalence of MSVI for both males and females was the lowest in Botswana and highest in Eritrea (Figure 2).

DISCUSSION

The series of population-based studies that were conducted in Africa since the last review in 2010, have provided data that was more granular with more detailed information for different eye diseases that have been considered for blindness and visual impairment in this paper. Still, these studies represent focal geographies within countries and primarily focus on the 50 years and older age group, which in turn is a limitation of our meta-analysis of the studies, and contributes to the wide uncertainty intervals of prevalence estimates. There is still a lack of nationally representative population-based studies in Africa.

As a result of its young population age structure, SSA currently has one of the lower absolute burdens of vision impairment. However, Sub-Saharan Africa has the highest age-standardized prevalence of vision impairment in the world,[8] suggesting the burden of vision impairment may become the highest in the world once the demographic transition involving longer life expectancy takes place. The proportion of people aged 50 years and older who have vision impairment (presenting) exceeds 25% in the region (Table 3A). Interventions to prevent future blindness, including investment in infrastructure and training of eye care practitioners, are indicated now to forestall or at least mitigate this incoming tidal wave of vision impairment.

Cataract remains the most important cause of blindness in 2015 and the second most important cause of MSVI. The African age-standardised cataract prevalence has been consistently higher than the global prevalence from 1990 to 2015 and we project it to continue thus through 2020. Furthermore, the number of cataract blind persons has increased from 2010 (11.9 million) to 2015 (12.60 million). Despite the considerable focus on cataract services in national programs, often funded by external donors rather than indigenous infrastructure, the number of cataract blind is projected to increase further by 2020 (13.4 million) as a result of population growth and population aging.[13]

These considerations demonstrate that a significant effort is needed to ensure the promotion, availability, affordability, accessibility and sustainability of cataract surgical services in SSA. Cataract surgical rates (CSR) of around 500 operations/million population/annum are common in many countries whereas the VISION 2020 global initiative has stated that 2000/million population/annum is need to achieve elimination of cataract blindness.[14-16] Cataract surgical rates for SSA countries average 442 operations/million population/annum, ranging from 157 (Liberia) to 1490 operations/million population/annum (Botswana).[17] Despite significant focus on cataract blindness and vision impairment, this limited progress may be attributed to underdevelopment of existing eye care systems. Examples include the the lack of human resources, poor access to existing services, and lack of appropriate infrastructure, equipment and consumables. Procurement for essential consumables is also a major barrier, with several countries still without intraocular lenses on their essential list, and for those that do there is no guarantee that government hospitals will receive any intraocular lenses as part of government procurement processes. This underdevelopment is compounded by population growth and aging. The number of ophthalmologists and other eye care practitioners remain low in most countries; [18 19] unless this is addressed, the prevalence of cataract will remain a significant contributing factor to blindness and vision impairment. Strategies to increase surgical output also need to be urgently addressed. Sufficient surgical infrastructure such as operating theatres or access to operating theatres as well as surgical equipment and maintenance support for this infrastructure need to be implemented as it is a prerequisite to increased surgical output.[15] Sustainable economic models also are prerequisite to a sustained surgical and clinical care output and a sufficiently vibrant eye care profession.

In terms of undercorrected refractive error, the data from 1990 to 2015 and projection to 2020 depict a lower prevalence for SSA than the global prevalence, reflecting the lower surge in myopia rates in Africa compared to the rest of the world.[20] However, myopia is projected to increase globally affecting 50% of the world population by 2050, and this increase in prevalence likely will occur in Africa as well. While myopia primarily will affect the MSVI prevalence data, the projected 20% of myopia consisting of high myopia, with its potentially blinding sequelae, [20] also may affect the prevalence of blindness. Unless refractive services are expanded to a corresponding degree, the gains made in reducing the prevalence of blindness and vision impairment through avoidable blindness prevention efforts in Africa will be dampened through likely increased incidence of uncorrected myopia. There are some promising signs over the last 10 years with the development of new optometry schools in Mozambique, Malawi, Eritrea, Ethiopia, Cameroon, Gambia and Mali. However, in general the number of training programs for refractionists or optometrists in Africa is insufficient, and this human resource remains a significant barrier. Furthermore, access and affordability of spectacles still remains a significant barrier for many, which needs to be addressed to lower the burden of undercorrected refractive error and functional presbyopia. As a result of these challenges, while there has been an incremental increase in refractive services, it has not been of the scale that is needed to substantially reduce the leading cause of vision impairment in SSA. Investing in refractive services also likely would help address the challenges that Africa has in terms of screening, detecting and diagnosing other eye diseases such as glaucoma, diabetic retinopathy and age-related macular degeneration. These diseases usually do not manifest symptoms until their advanced stages, hence the importance of refractive services that can motivate the population to undergo eye examinations to provide early detection and prevention. These refractive services need satisfactory training programs and effective referral pathways for onward hospital management of patients. Technology offers the promise of supporting the delivery of refractive services. Various technologies from self-refracting spectacles to mobile phone based autorefractors have been offered as possible solutions. However thus far such solutions have not gained the broader applicability as hoped. Further investment in low cost, digital or automated screening and examination tools that can decrease the time it takes to conduct a refraction or demand lesser technical skill need to be developed.

Africa has a disproportionate prevalence of global blindness and vision impairment attributable to glaucoma relative to its population and age structure. The prevalence of glaucoma-attributable blindness has increased from 1990 to 2015 and is projected to increase in 2020. It is not surprising as the resources (specialists, clinicians, drugs and equipment) to manage glaucoma are limited.[21 22] Addressing glaucoma by focusing on the disease specifically, to the degree that has been possible, has not yielded the outcomes needed thus far. Other strategies should be explored and validated including adopting a team approach to glaucoma and integrating glaucoma screening, diagnosis and management into the process of providing eye exams either as part of a comprehensive eye exam or within refractive error or cataract services.

An immense investment in the elimination of trachoma in Africa has been associated with a significant decline in prevalence. The proportion of blindness and vision impairment due to trachoma has progressively reduced from 1990 to 2015 and is projected to reduce even further by 2020. This trend can be attributed to the significant global efforts in implementing programs and raising funds to address trachoma in SSA. In 1998, the World Health Assembly committed to the Global Elimination of Trachoma as a cause of blindness and the WHO Alliance set up to spearhead these efforts set the year 2020 as the target date for elimination.[23] According to Courtright et al (2018) "Prospects for achieving elimination are more promising. Global mapping of trachoma is almost complete, most trachoma endemic countries have clear and practical plans for implementation and elimination, and governments, donors and partners have significantly increased their support for elimination."[24]

It was previously assumed that age-related macular degeneration (AMD) is not a major concern in Africa; this perception was influenced by the lack of population based studies in Africa that adequately quantified AMD.[25] However, our study indicates that the global trend of AMD causing a progressively greater share of blindness is similar in Africa. In fact, in 2015, the proportion of blindness due to AMD was marginally higher than the global prevalence of blindness due to AMD. This trend is projected to continue in 2020 and as the demographic transition occurs in SSA, the impact is expected to be even greater.

Diabetes mellitus is no longer confined to rich nations and is increasing everywhere.[26] The proportion of blindness and vision impairment due to diabetic retinopathy mirrors this reality. Blindness and vision impairment due to diabetic retinopathy in SSA, while lower than the global prevalence, has shown a steady increase in prevalence which is projected to continue to 2020. This trajectory poses a major challenge for eye care in Africa, as the capacity to provide adequate management of diabetes mellitus and its ocular complications is limited. It is critical that strategies such as the training of other cadres besides ophthalmologists (e.g., diabetic nurses) and/or telemedicine programs to monitor diabetic patients be considered. In countries such as South Africa and Nigeria, graduating optometrists have the ability to conduct dilated fundus exams and should be considered as part of the diabetic management team. Telemedicine and the advances in low cost digital imaging techniques also offer an opportunity for ophthalmologists to reach more patients by leading team-based approaches to the problem.

While blindness and visual impairment studies focusing on disease-specific causes rather than disease prevalence have limitations in providing information regarding secular trends, it may be that the large investment in trachoma, measles immunization and Vitamin A supplementation programs as well as improved living conditions may have contributed to reduced corneal blindness.

The gender disparities in access to eye care and the prevalences of blindness and vision impairment, is a challenge in Africa. The gender disparities in the age-standardised prevalences (all ages) of blindness and MSVI evident in 2010 remains manifest in the 2015 data. In 2010 and 2015, the disparity was 0.05% for blindness; and 0.2% for MSVI. Focus on services addressing the eye care needs of women is needed to eliminate the gap in blindness as well as MSVI.

The limitations in the methodology of our study have been published elsewhere.[8] In our previous review of the 1990-2010 data, we identified a gap in the literature in terms of the measurement of the burden of blindness and vision impairment due to onchocerciasis as well as the shortage of nationally representative studies. These limitations are relevant to this review as well.[6] The fact that our method largely reflects Rapid Assessment of Avoidable Blindness (RAAB) studies, which report cause-specific data for a limited number of diseases as a pragmatic strategy to simplify conduct of population-based studies, means that these studies prioritize cataract and refractive error as causes and underestimate other diseases that may co-exist. This limitation has particular relevance in SSA, where the second most important cause of blindness is the "other" category instead of undercorrected refractive error as in much of the world. The RAAB studies also focus on those aged 50 years and older which results in a paucity of data from younger age groups in this region.

An adaptation of RAAB and other large-scale population-based studies need to be considered as the category "other conditions" features significantly in the prevalence of blindness (second highest cause) and vision impairment (third highest cause). The range of diseases that make up this category needs to be delineated, as lack of knowledge of the nature of the problem limits capacity to address these conditions. While doing so may place greater training, financial and human resource burden on data collection, the high burden of the "other conditions" category makes it imperative that the diseases in that category be defined and addressed.

Cataract and undercorrected refractive error constitute more than 50% of blindness and vision impairment in 2015 and are projected to do so in 2020 as well. Continued and increased investment to address these conditions has the potential to significantly reduce the prevalence of blindness and vision impairment in SSA. However, the increase in prevalence of glaucoma, AMD and diabetic retinopathy raise the need for comprehensive eye care services to enable these conditions to be diagnosed and managed. This is a particularly huge challenge for SSA as the human resources and infrastructure to provide such services is limited. However, given the limited progress in targeting cataract blindness by both governments and civil society organisations on average in SSA, a systems approach that provides comprehensive eye health, articulation with other sectors in health care such as diabetic clinics, and the appropriate referral pathways may be what is needed.[6] Sustainable economic models for such services, such as have been demonstrated in other parts of the world,[27] will be needed. Eye care need to become part of the Universal Health Coverage strategies that are progressively deployed in SSA countries. Programs to alleviate blindness “backlogs” should bear in mind the potential impact of widespread free services on future development of sustainable approaches to the delivery of services that alleviate vision impairment; subsidized programs may be preferable to free programs.

Despite the progress made in reducing the blindness and vision impairment prevalence, much of this has been achieved through the efforts in addressing conditions such as trachoma which are more amenable to a campaign type of approach and may truly be eliminated, as opposed to endemic diseases which are now causing most blindness. As the African population ages and undercorrected refractive error, AMD and diabetic retinopathy prevalence increases, innovative sustainable approaches need to be adopted. The emergence of technological solutions can assist in this regard but in addition comprehensive team approach to eye care will be needed likely including task shifting and appropriate referral pathways within team-based service delivery. Still, task shifting programs should avoid disincentivizing medical school graduates from training in ophthalmology; access to higher level training and robust career opportunities will be needed at all levels of eye care professions to retain the human resources needed to deal with the endemic causes of blindness on an ongoing basis.

The proportions of blindness from cataract, glaucoma, undercorrected refractive error and diabetic retinopathy are expected to increase by 2020. A comprehensive strategy from government, civil society and private sector that is aimed at addressing eye care needs can make a significant impact in terms of reducing the overall prevalence of blindness. However, given the current human resource and infrastructure in SSA much effort is needed.

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TABLE 1. Countries included in Sub-Saharan Africa super-region.

Sub-Region	Countries
Central Africa	Angola, Central African Republic, Congo*, Democratic Republic of the Congo, Equatorial Guinea, Gabon
East Africa	Burundi*, Comoros, Djibouti, Eritrea*, Ethiopia*, Kenya*, Madagascar, Malawi*, Mauritius, Mozambique*, Rwanda*, Seychelles, Somalia, Sudan*, Tanzania*, Uganda*, Zambia*
Southern Africa	Botswana*, Lesotho, Namibia, South Africa*, Swaziland, Zimbabwe*
West Africa	Benin*, Bukina Faso, Cameroon*, Cape Verde*, Chad, Cote d'Ivoire, Gambia*, Ghana*, Guinea, Guinea-Bissau, Liberia, Mali*, Mauritania*, Niger, Nigeria*, Senegal, Sierra Leone*, Sao Tome and Principe, Togo

*Those for which data were available are marked with an asterisk.
A list of all references used for this analysis can be found in a web appendix (see http://www.anglia.ac.uk/verigbd)

TABLE 2. Crude and age-standardised prevalence (%) of blindness and moderate and severe vision impairment (MSVI), mild vision impairment (VI) and presbyopia in 2015 in Sub Saharan Africa (all ages); 80% uncertainty intervals are given in brackets

	Blind	MSVI	Mild VI	Presbyopia
Crude prevalence				
Males	**0.40 (0.15 - 0.71)**	**1.65 (0.73 - 2.75)**	**1.48 (0.49 - 2.77)**	
Females	**0.49 (0.18 - 0.89)**	**1.97 (0.84 - 3.33)**	**1.71 (0.56 - 3.21)**	
All	**0.45 (0.16 - 0.80)**	**1.81 (0.79 - 3.04)**	**1.60 (0.52 - 2.99)**	**47.09 (31.97 - 62.59)**
Age-standardised prevalence				
Males	**1.03 (0.39 - 1.81)**	**3.64 (1.71 - 5.94)**	**2.94 (1.05 - 5.34)**	
Females	**1.08 (0.40 - 1.93)**	**3.84 (1.72 - 6.37)**	**3.06 (1.07 - 5.61)**	
All	**1.06 (0.40-1.87)**	**3.74 (1.72-6.12)**	**3.00 (1.06-5.48)**	**49.37 (34.75 - 63.96)**

TABLE 3A. Age-standardised prevalence of blindness and moderate and severe vision impairment (MSVI) and mild vision impairment (VI) by gender and region comparing adults 50 years and older with all ages, for 2015 in Sub-Saharan Africa; 80% uncertainty intervals in brackets

	50+						**All ages**					
	Men			**Women**			**Men**			**Women**		
Region	**Blind**	**MSVI**	**Mild VI**	**Blind**	**MSVI**	**Mild VI**	**Blind**	**MSVI**	**Mild VI**	**Blind**	**MSVI**	**Mild VI**
Sub-Saharan Africa, Central	2.62 (0.83 - 4.87)	13.58 (5.94 - 22.93)	10.38 (3.81 - 18.76)	2.94 (0.91 - 5.69)	15.18 (6.53 - 25.78)	11.15 (4.08 - 19.87)	0.64 (0.20 - 1.20)	3.65 (1.53 - 6.25)	3.02 (1.01 - 5.63)	0.72 (0.22 - 1.40)	4.09 (1.68 - 7.07)	3.27 (1.08 - 6.04)
Sub-Saharan Africa, East	4.17 (1.66 - 7.15)	12.77 (6.14 - 20.58)	9.62 (3.67 - 17.15)	4.36 (1.68 - 7.54)	13.54 (6.28 - 22.18)	10.02 (3.79 - 17.88)	1.02 (0.40 - 1.76)	3.41 (1.58 - 5.55)	2.77 (0.98 - 5.06)	1.07 (0.41 - 1.87)	3.63 (1.62 - 6.03)	2.91 (1.01 - 5.34)
Sub-Saharan Africa, Southern	3.57 (1.25 - 6.54)	9.23 (4.27 - 15.23)	7.62 (2.77 - 13.73)	3.62 (1.23 - 6.65)	9.46 (4.12 - 15.81)	7.74 (2.72 - 14.09)	0.87 (0.30 - 1.61)	2.42 (1.09 - 4.03)	2.10 (0.72 - 3.85)	0.89 (0.30 - 1.64)	2.47 (1.05 - 4.18)	2.13 (0.71 - 3.96)
Sub-Saharan Africa, West	4.91 (1.96 - 8.50)	15.59 (7.94 - 24.47)	11.01 (4.40 - 19.08)	5.18 (2.01 - 9.17)	16.42 (8.08 - 26.07)	11.35 (4.45 - 19.79)	1.21 (0.47 - 2.10)	4.20 (2.05 - 6.71)	3.26 (1.20 - 5.84)	1.28 (0.49 - 2.28)	4.45 (2.10 - 7.22)	3.41 (1.22 - 6.18)
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)	0.46(0.17-0.84)	2.79(1.29-4.55)	2.46(0.84-4.55)	0.49(0.17-0.90)	2.99(1.33-4.99)	2.60(0.88-4.85)

TABLE 3B. Crude prevalence of blindness and moderate and severe vision impairment (MSVI) and mild vision impairment (VI) by gender and region comparing adults 50 years and older with all ages, for 2015 in Sub-Saharan Africa; 80% uncertainty intervals in brackets

	50+						**All ages**					
	Men			**Women**			**Men**			**Women**		
Region	**Blind**	**MSVI**	**Mild VI**	**Blind**	**MSVI**	**Mild VI**	**Blind**	**MSVI**	**Mild VI**	**Blind**	**MSVI**	**Mild VI**
Sub-Saharan Africa, Central	1.99 (0.61 - 3.73)	11.58 (4.86 - 19.91)	9.51 (3.34 - 17.57)	2.47 (0.75 - 4.80)	13.79 (5.75 - 23.73)	10.67 (3.82 - 19.23)	1.99 (0.61 - 3.73)	11.58 (4.86 - 19.91)	9.51 (3.34 - 17.57)	2.47 (0.75 - 4.80)	13.79 (5.75 - 23.73)	10.67 (3.82 - 19.23)
Sub-Saharan Africa, East	3.49 (1.35 - 6.04)	11.42 (5.35 - 18.61)	9.10 (3.40 - 16.39)	3.82 (1.45 - 6.67)	12.53 (5.69 - 20.73)	9.71 (3.62 - 17.45)	3.49 (1.35 - 6.04)	11.42 (5.35 - 18.61)	9.10 (3.40 - 16.39)	3.82 (1.45 - 6.67)	12.53 (5.69 - 20.73)	9.71 (3.62 - 17.45)
Sub-Saharan Africa, Southern	2.85 (0.99 - 5.26)	7.79 (3.54 - 12.94)	6.70 (2.38 - 12.19)	3.49 (1.18 - 6.43)	9.22 (4.00 - 15.45)	7.61 (2.67 - 13.89)	2.85 (0.99 - 5.26)	7.79 (3.54 - 12.94)	6.70 (2.38 - 12.19)	3.49 (1.18 - 6.43)	9.22 (4.00 - 15.45)	7.61 (2.67 - 13.89)
Sub-Saharan Africa, West	3.55 (1.35 - 6.27)	12.96 (6.30 - 20.82)	10.22 (3.98 - 18.00)	3.99 (1.48 - 7.19)	14.21 (6.71 - 23.03)	10.81 (4.17 - 19.08)	3.55 (1.35 - 6.27)	12.96 (6.30 - 20.82)	10.22 (3.98 - 18.00)	3.99 (1.48 - 7.19)	14.21 (6.71 - 23.03)	10.81 (4.17 - 19.08)
World	1.71 (0.63 - 3.08)	9.72 (4.62 - 15.85)	8.11 (2.99 - 14.69)	2.05 (0.74 - 3.73)	11.22 (5.25 - 18.36)	8.96 (3.34 - 16.13)	0.43 (0.15 - 0.77)	2.64 (1.21 - 4.37)	2.35 (0.80 - 4.38)	0.55 (0.20 - 1.01)	3.27 (1.47 - 5.42)	2.79 (0.96 - 5.17)

TABLE 4. Estimated number of people (millions) affected by blindness and MSVI, mild VI, and presbyopia in Sub-Saharan Africa by region in 2015 and projections to 2020; 80% uncertainty intervals are given in brackets

Region	Total Population (millions)		Blind (millions)		MSVI (millions)		Mild (millions)		Pres
	2015	2020	2015	2020	2015	2020	2015	2020	2015
Sub-Saharan Africa, Central	114	133	0.31 (0.09 - 0.59)	0.35 (0.10 - 0.67)	2.05 (0.79 - 3.60)	2.35 (0.85 - 4.21)	1.83 (0.55 - 3.50)	2.10 (0.60 - 4.05)	11.5 16.3
Sub-Saharan Africa, East	376	431	1.66 (0.62 - 2.91)	1.91 (0.69 - 3.40)	6.23 (2.70 - 10.45)	7.22 (2.95 - 12.24)	5.48 (1.80 - 10.29)	6.33 (1.97 - 11.97)	36.0 - 45.
Sub-Saharan Africa, Southern	78	83	0.42 (0.14 - 0.78)	0.42 (0.14 - 0.79)	1.23 (0.52 - 2.08)	1.28 (0.51 - 2.21)	1.11 (0.36 - 2.06)	1.16 (0.36 - 2.19)	12.2 16.0
Sub-Saharan Africa, West	391	446	1.89 (0.69 - 3.40)	2.06 (0.72 - 3.77)	7.85 (3.52 - 13.03)	8.82 (3.66 - 14.88)	6.92 (2.32 - 12.85)	7.78 (2.44 - 14.54)	41.2 - 53.
SSA total	960	1,093	4.28(1.54-7.68)	4.74(1.65-8.63)	17.36(7.53-29.16)	19.67(7.97-33.54)	15.34(5.03-28.7)	17.37(5.37-32.75)	101. (70.5 131.
World	7,341	7,750	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 1686

TABLE 5. Percentage of blindness by cause for all ages in 1990, 2010, 2015 and 2020. 80% uncertainty intervals are given in brackets.*

1990	URE	Cataract	Glaucoma	AMD	DR	Corneal Disease	Trachoma	Othe
Sub-Saharan Africa, Central	12.68 (10.82 - 14.49)	42.02 (34.22 - 49.63)	13.00 (5.21 - 22.79)	7.50 (1.62 - 15.96)	0.44 (0.06 - 0.93)	6.80 (1.23 - 14.86)	0.96 (0.95 - 0.98)	15.18 29.04
Sub-Saharan Africa, East	12.32 (10.43 - 14.20)	36.16 (29.52 - 42.66)	10.35 (3.95 - 18.49)	5.48 (1.15 - 11.69)	0.36 (0.05 - 0.76)	5.81 (0.99 - 12.94)	15.67 (15.05 - 16.28)	12.50 23.91
Sub-Saharan Africa, Southern	12.46 (10.56 - 14.32)	34.17 (26.87 - 41.45)	14.05 (5.53 - 24.78)	14.56 (3.69 - 29.62)	1.52 (0.23 - 3.29)	6.41 (1.10 - 14.22)	1.69 (1.65 - 1.73)	14.54 27.78
Sub-Saharan Africa, West	12.40 (10.51 - 14.24)	37.65 (30.63 - 44.53)	11.69 (4.66 - 20.54)	6.46 (1.36 - 13.88)	0.42 (0.06 - 0.89)	6.15 (1.13 - 13.42)	10.32 (9.93 - 10.71)	13.84 26.46
Sub-Saharan Africa	12.46 (10.58-14.31)	37.5 (30.31-44.56)	12.27 (4.84-(21.65)	8.5 (1.96-17.79)	0.69 (0.10-1.468)	6.29 (1.11-13.86)	4.91 (6.90-7.425)	14.02 (4.45 26.80
World	20.24 (18.06 - 22.30)	35.48 (28.75 - 42.20)	8.41 (3.05 - 15.43)	7.55 (2.06 - 15.13)	0.84 (0.13 - 1.84)	5.25 (0.86 - 11.72)	2.81 (2.69 - 2.94)	19.40 33.86
2010								
Sub-Saharan Africa, Central	12.85 (11.07 - 14.61)	41.64 (32.02 - 51.20)	13.66 (5.23 - 24.14)	5.91 (1.37 - 12.38)	0.57 (0.09 - 1.15)	4.88 (0.88 - 10.64)	0.51 (0.49 - 0.53)	19.46 37.27
Sub-Saharan Africa, East	12.41 (10.59 - 14.21)	40.95 (32.03 - 49.64)	10.99 (3.99 - 19.86)	3.43 (0.73 - 7.31)	0.27 (0.04 - 0.55)	4.40 (0.74 - 9.83)	9.82 (8.99 - 10.66)	16.77 32.10
Sub-Saharan Africa, Southern	12.50 (10.66 - 14.33)	35.83 (26.99 - 4.89)	15.00 (5.66 - 26.64)	11.63 (2.99 - 23.60)	1.47 (0.25 - 3.07)	4.60 (0.76 - 10.23)	0.89 (0.83 - 0.95)	18.07 34.63
Sub-Saharan Africa, West	12.57 (10.76 - 14.34)	40.97 (31.74 - 50.02)	12.42 (4.68 - 22.12)	4.38 (0.96 - 9.28)	0.42 (0.06 - 0.85)	4.67 (0.84 - 10.20)	5.51 (5.00 - 6.03)	18.65 35.66
Sub-Saharan Africa	12.58 (10.77-14.37)	39.85 (30.70-48.94)	13.03 (4.89-23.19)	6.34 (1.51-13.14)	0.68 (0.11-1.41)	4.64 (0.81-10.21)	4.18 (3.83-2.14)	18.23 (5.78 34.92
World	20.63 (18.62 - 22.56)	34.88 (26.86 - 42.91)	8.28 (3.01 - 15.13)	5.97 (1.52 - 12.17)	1.01 (0.15 - 2.25)	3.67 (0.62 - 8.08)	1.56 (1.39 - 1.72)	24.02 41.76
2015								
Sub-Saharan Africa, Central	12.86 (11.07 - 14.62)	41.90 (31.25 - 52.62)	13.70 (4.92 - 24.75)	5.14 (1.13 - 10.85)	0.55 (0.08 - 1.11)	4.62 (0.74 - 10.27)	0.27 (0.25 - 0.29)	20.63 39.50
Sub-Saharan Africa, East	12.42 (10.59 - 14.23)	42.44 (32.31 - 52.45)	11.34 (3.85 - 20.96)	3.13 (0.63 - 6.71)	0.28 (0.04 - 0.56)	4.29 (0.65 - 9.73)	7.02 (6.13 - 7.95)	18.25 34.91
Sub-Saharan Africa, Southern	12.54 (10.70 - 14.37)	34.60 (24.89 - 44.72)	15.07 (5.23 - 27.49)	11.42 (2.71 - 23.53)	1.72 (0.27 - 3.69)	4.41 (0.65 - 9.99)	0.51 (0.44 - 0.58)	19.96 38.11
Sub-Saharan Africa, West	12.60 (10.79 - 14.38)	41.62 (31.26 - 51.99)	12.82 (4.52 - 23.35)	4.01 (0.83 - 8.59)	0.44 (0.06 - 0.91)	4.52 (0.74 - 10.03)	3.43 (2.91 - 4.01)	20.27 38.74
Sub-Saharan Africa	12.61 (10.79-14.4)	40.14 (29.93-50.45)	13.23 (4.63-24.13)	5.93 (1.33-12.42)	0.75 (0.11-1.43)	4.46 (0.70-10.01)	2.81 (2.43-3.21)	19.78 (6.29 37.82
World	20.62 (18.62 - 22.55)	34.47 (25.69 - 43.35)	8.30 (2.85 - 15.42)	5.64 (1.33 - 11.72)	1.07 (0.15 - 2.44)	3.46 (0.53 - 7.77)	0.98 (0.80 - 1.16)	25.46 44.20
2020								

Sub-Saharan Africa, Central	12.87 (11.08 - 14.63)	41.87 (30.04 - 53.83)	13.78 (4.53 - 25.66)	4.53 (0.91 - 9.69)	0.54 (0.07 - 1.11)	4.42 (0.62 - 10.04)	0.08 (0.06 - 0.10)	21.80 41.73
Sub-Saharan Africa, East	12.40 (10.55 - 14.22)	44.19 (32.50 - 55.77)	11.63 (3.58 - 22.24)	2.75 (0.50 - 5.97)	0.28 (0.03 - 0.56)	4.25 (0.55 - 9.84)	4.00 (3.10 - 4.95)	19.83 37.91
Sub-Saharan Africa, Southern	12.59 (10.75 - 14.41)	34.05 (23.41 - 45.28)	15.24 (4.84 - 28.65)	10.70 (2.29 - 22.54)	1.96 (0.28 - 4.27)	4.34 (0.56 - 10.03)	0.11 (0.04 - 0.19)	21.13 40.35
Sub-Saharan Africa, West	12.63 (10.82 - 14.41)	42.28 (30.52 - 54.09)	13.22 (4.26 - 24.83)	3.67 (0.69 - 7.92)	0.48 (0.06 - 0.99)	4.42 (0.62 - 10.02)	1.34 (0.99 - 1.89)	21.89 41.83
Sub-Saharan Africa	12.62 (10.8-14.42)	40.60 (29.12-52.24)	13.47 (4.30-25.35)	5.42 (1.10-11.53)	0.82 (0.11-1.73)	4.36 (0.59-9.98)	1.38 (1.05-1.78)	21.16 (6.73 40.46
World	20.88 (18.87 - 22.81)	34.11 (24.44 - 43.95)	8.27 (2.64 - 15.76)	5.31 (1.13 - 11.27)	1.21 (0.15 - 2.80)	3.31 (0.44 - 7.58)	0.40 (0.30 - 0.58)	26.49 46.07

*URE=undercorrected refractive error; AMD=age-related macular degeneration; DR=diabetic retinopathy; Other=a disease not specified by the other categories.

TABLE 6. Percentage of moderate and severe vision impairment (MSVI) by cause for all ages in 1990, 2010, 2015 and 2020. 80% uncertainty intervals are given in brackets.*

	URE	Cataract	Glaucoma	AMD	DR	Corneal Disease	Trachoma	Other
1990								
Sub-Saharan Africa, Central	47.56 (43.56 - 50.77)	32.75 (25.84 - 39.79)	3.32 (1.16 - 6.19)	5.45 (1.04 - 12.00)	0.49 (0.06 - 0.99)	2.97 (0.43 - 6.60)	0.83 (0.82 - 0.85)	7.80 (2.09 - 15.69)
Sub-Saharan Africa, East	48.24 (44.95 - 50.92)	25.19 (19.87 - 30.59)	2.54 (0.86 - 4.78)	4.54 (0.91 - 9.89)	0.50 (0.07 - 1.03)	2.28 (0.31 - 5.13)	11.73 (11.26 - 12.20)	5.86 (1.57 - 11.80)
Sub-Saharan Africa, Southern	48.81 (45.93 - 51.21)	26.05 (19.93 - 32.23)	3.63 (1.20 - 6.90)	10.22 (2.35 - 21.46)	1.57 (0.23 - 3.35)	2.60 (0.37 - 5.76)	1.16 (1.12 - 1.19)	7.14 (1.93 - 14.35)
Sub-Saharan Africa, West	47.54 (44.06 - 50.48)	28.97 (22.91 - 35.17)	2.89 (1.01 - 5.39)	4.52 (0.84 - 9.99)	0.42 (0.05 - 0.84)	2.61 (0.37 - 5.80)	7.43 (7.10 - 7.76)	6.88 (1.85 - 13.83)
Sub-Saharan Africa	40.04 (44.63-50.85)	28.24 (22.14-34.45)	3.10 (1.06-5.82)	6.18 (1.29-13.34)	0.75 (0.10-1.55)	2.62 (0.37-5.82)	5.29 (5.08-5.5)	6.92 (1.86-13.92)
World	53.03 (49.40 - 56.10)	24.79 (19.70 - 29.90)	1.94 (0.61 - 3.75)	5.42 (1.34 - 11.11)	0.94 (0.16 - 2.05)	2.03 (0.27 - 4.54)	1.95 (1.85 - 2.05)	9.91 (3.12 - 18.78)
2010								
Sub-Saharan Africa, Central	48.29 (45.10 - 50.90)	32.80 (24.71 - 41.04)	3.46 (1.17 - 6.53)	4.14 (0.92 - 8.74)	0.61 (0.09 - 1.25)	2.14 (0.32 - 4.59)	0.41 (0.39 - 0.43)	10.05 (2.69 - 20.25)
Sub-Saharan Africa, East	48.42 (45.64 - 50.79)	29.40 (22.51 - 36.34)	2.66 (0.89 - 5.06)	2.68 (0.58 - 5.68)	0.34 (0.05 - 0.70)	1.77 (0.26 - 3.85)	7.80 (7.15 - 8.47)	8.11 (2.18 - 16.34)
Sub-Saharan Africa, Southern	48.82 (46.23 - 51.03)	27.57 (20.44 - 34.94)	3.88 (1.25 - 7.54)	8.05 (1.99 - 16.55)	1.61 (0.27 - 3.44)	1.87 (0.27 - 4.05)	0.56 (0.52 - 0.60)	9.08 (2.44 - 18.29)
Sub-Saharan Africa, West	48.14 (45.32 - 50.58)	31.90 (24.32 - 39.58)	3.02 (1.02 - 5.71)	2.95 (0.62 - 6.28)	0.40 (0.06 - 0.82)	2.00 (0.30 - 4.32)	3.99 (3.56 - 4.44)	9.40 (2.53 - 18.90)
Sub-Saharan Africa	48.42 (46.28-50.83)	30.42 (23.00-39.98)	3.26 (1.08-6.21)	4.46 (1.03-9.31)	0.74 (0.12-1.55)	1.95 (0.28-4.20)	3.19 (2.91-3.49)	9.16 (2.46-18.45)
World	53.66 (50.62 - 56.24)	24.28 (18.55 - 30.17)	1.89 (0.59 - 3.66)	4.23 (1.03 - 8.82)	1.16 (0.18 - 2.59)	1.37 (0.20 - 2.95)	1.05 (0.92 - 1.19)	12.37 (3.96 - 23.31)
2015								

Sub-Saharan Africa, Central	48.33 (45.09 - 50.99)	33.16 (24.29 - 42.27)	3.48 (1.11 - 6.71)	3.59 (0.76 - 7.63)	0.59 (0.08 - 1.21)	2.05 (0.28 - 4.49)	0.21 (0.20 - 0.23)	10.71 (2.87 - 21.58)
Sub-Saharan Africa, East	48.45 (45.65 - 50.87)	30.70 (22.91 - 38.65)	2.79 (0.88 - 5.41)	2.47 (0.50 - 5.26)	0.36 (0.05 - 0.73)	1.75 (0.23 - 3.84)	5.78 (5.08 - 6.52)	8.97 (2.41 - 18.05)
Sub-Saharan Africa, Southern	49.02 (46.49 - 51.19)	26.71 (19.01 - 34.75)	3.97 (1.18 - 7.93)	7.92 (1.82 - 16.67)	1.92 (0.30 - 4.20)	1.81 (0.24 - 3.99)	0.31 (0.27 - 0.36)	10.04 (2.72 - 20.17)
Sub-Saharan Africa, West	48.28 (45.45 - 50.74)	32.62 (24.14 - 41.30)	3.15 (1.00 - 6.09)	2.73 (0.54 - 5.84)	0.43 (0.06 - 0.88)	1.97 (0.27 - 4.29)	2.46 (2.00 - 2.95)	10.31 (2.78 - 20.73)
Sub-Saharan Africa	48.52 (45.67-50.95)	30.80 (22.59-39.24)	3.35 (1.04-6.54)	4.18 (0.91-8.85)	0.83 (0.12-1.76)	1.90 (1.89-4.15)	2.19 (1.89-2.52)	10.01 (2.70-20.13)
World	53.72 (50.64 - 56.34)	24.05 (17.80 - 30.51)	1.91 (0.56 - 3.77)	4.00 (0.90 - 8.47)	1.25 (0.17 - 2.83)	1.29 (0.18 - 2.81)	0.63 (0.49 - 0.78)	13.16 (4.23 - 24.78)
2020								
Sub-Saharan Africa, Central	48.38 (45.03 - 51.10)	33.29 (23.54 - 43.39)	3.52 (1.03 - 6.96)	3.15 (0.61 - 6.83)	0.58 (0.07 - 1.21)	1.99 (0.24 - 4.43)	0.05 (0.04 - 0.07)	11.40 (3.06 - 22.95)
Sub-Saharan Africa, East	48.46 (45.57 - 50.97)	32.16 (23.21 - 41.35)	2.92 (0.83 - 5.83)	2.26 (0.42 - 4.88)	0.38 (0.05 - 0.77)	1.77 (0.20 - 3.94)	3.55 (2.89 - 4.30)	9.91 (2.67 - 19.93)
Sub-Saharan Africa, Southern	49.20 (46.69 - 51.35)	26.13 (17.81 - 34.98)	4.07 (1.09 - 8.34)	7.48 (1.55 - 16.17)	2.20 (0.31 - 4.90)	1.78 (0.20 - 4.00)	0.06 (0.01 - 0.12)	10.66 (2.89 - 21.43)
Sub-Saharan Africa, West	48.38 (45.47 - 50.90)	33.40 (23.83 - 43.27)	3.29 (0.95 - 6.54)	2.53 (0.46 - 5.48)	0.47 (0.06 - 0.98)	1.97 (0.23 - 4.35)	0.89 (0.63 - 1.37)	11.25 (3.03 - 22.61)
Sub-Saharan Africa	48.61 (45,69-51.16)	31.25 (22.10-40.75)	3.45 (0.98-6.92)	3.86 (0.76-8.34)	0.91 (0.12-1.97)	1.88 (0.22-4.18)	1.13 (0.89-1.47)	10.81 (2.91-21.73)
World	53.88 (50.69 - 56.58)	23.74 (16.88 - 30.89)	1.92 (0.52 - 3.91)	3.82 (0.77 - 8.29)	1.43 (0.18 - 3.32)	1.23 (0.15 - 2.73)	0.22 (0.16 - 0.37)	13.76 (4.42 - 25.92)

*URE=undercorrected refractive error; AMD=age-related macular degeneration; DR=diabetic retinopathy; Other=a disease not specified by the other categories.