

The socio-economic impact of age-related macular degeneration (AMD) in Bulgaria, Germany and USA

A disease burden assessment of GA and nAMD

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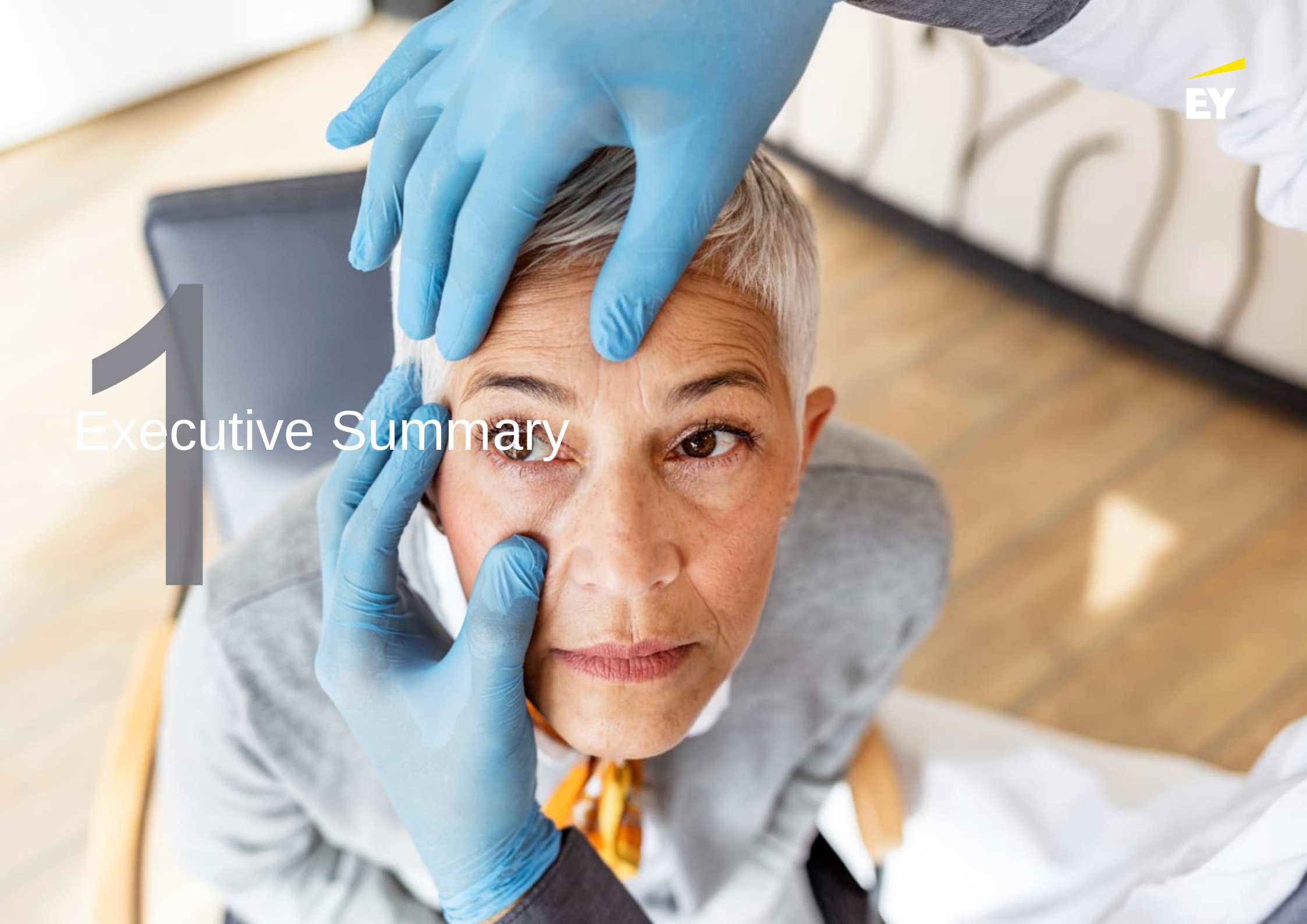
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1 Executive Summary

This study assesses the economic impact of AMD in Germany, Bulgaria and the USA

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Introduction

This report outlines the disease burden and cost impact of age-related macular degeneration (AMD) on individuals living with the disease and their caregivers in Bulgaria, Germany and the USA.

Purpose

Retina International (RI) engaged Ernst & Young (EY) to undertake an analysis and to assess the burden of disease related to two forms of late-stage AMD – Geographic Atrophy AMD (GA) and Neovascular AMD (nAMD). This assessment was conducted across three countries characterised by different socio and economic backgrounds: Bulgaria, Germany and the USA.

The economic model developed by EY considers direct and indirect medical costs, impact on well-being and other wider productivity impacts attributable towards the treatment, management and support of individuals living with late-stage AMD and their caregivers.

To identify the appropriate variables and data informing the economic model, we have conducted an extensive analysis of the available literature for all three countries. Other data has been collected through the resources of major international institutions such as the World Health Organisation (WHO). To obtain country specific evidence RI conducted surveys across the three countries.

The report

This report has been designed to allow policy makers to have a view on the costs associated with late-stage AMD, so decisions can be made on the basis of clear evidence.

Four cost categories were identified for this study, namely Direct Medical Costs, Indirect Medical Costs, Well-being Costs and Productivity Costs.

Populations across the three countries of interest vary significantly. To address these variances and to ensure key costs and differences are represented realistically, we focus mainly on the average cost per individual living with GA or nAMD per country.

All of the information gathered to reach the conclusions presented is included within this report. Key information is included within the sections and where there is additional relevant information, it is included in the appendices.

This report sets out the full detail of the costs involved to evaluate the economic burden of GA and nAMD. Costs are set out at individual level - which represent an individual with any form of late-stage AMD - and at country level, providing a breakdown of the cost at country level for GA and nAMD.

In the course of our research and analysis we have noted a number of limitations, some of which may represent opportunities for further research.

The report has been compiled thanks to the financial support of:

- *Alexion Pharmaceuticals*
- *Apellis Pharmaceuticals, Inc.*
- *Janssen Pharmaceutical Companies of Johnson and Johnson*
- *Novartis Pharma AG*
- *F. Hoffmann La Roche Ltd*

Retina International

Retina International is a global umbrella organisation for patient-led charities and foundations who support research into rare, genetically inherited, and age-related retinal conditions.

Retina International believes that education leading to participation is a key driver in successful innovation. The Retina International objective is to promote retina research through the engagement and education of a growing patient community and by developing robust evidence-based advocacy tools to bring about positive change. Retina International believes in structured collaboration inclusive of all stakeholders in order to address the unmet needs of patients affected by retinal disease and by employing a professional approach to all that they do.

For more information visit: www.retina-international.org

Summary results of the study - Bulgaria

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Average annual individual cost of nAMD:

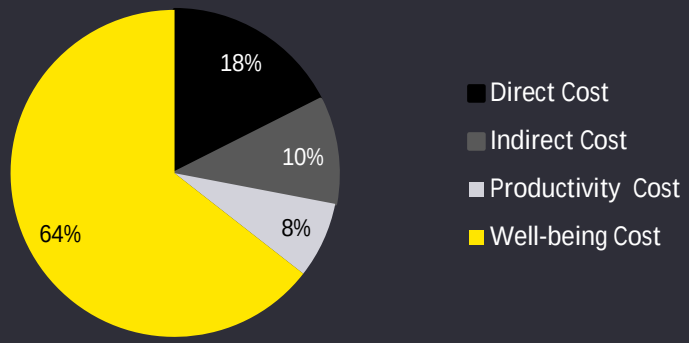
€21,722 (under 65)
€18,539 (over 65)

0.02% - 0.2% prevalence of nAMD (under 65 years)
0.1% - 3.0% prevalence of nAMD (over 65 years)

The total number of people living with nAMD amounts to 11,420 at the mid prevalence rate

€228.9m total economic impact at the mid prevalence rate scenario (all ages)

Breakdown of overall cost



Average annual individual cost of GA:

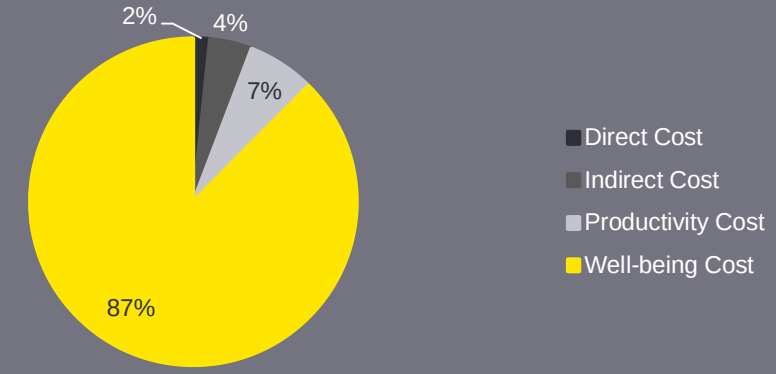
€20,661 (under 65)
€18,097 (over 65)

0.02% - 0.2% prevalence of GA (under 65 years)
0.04% - 0.9% prevalence of GA (over 65 years)

The total number of people living with GA amounts to 11,420 at the mid prevalence rate

€220.5m total economic impact at the mid prevalence rate scenario (all ages)

Breakdown of overall cost



Summary results of the study - Germany

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Average annual individual cost of nAMD:

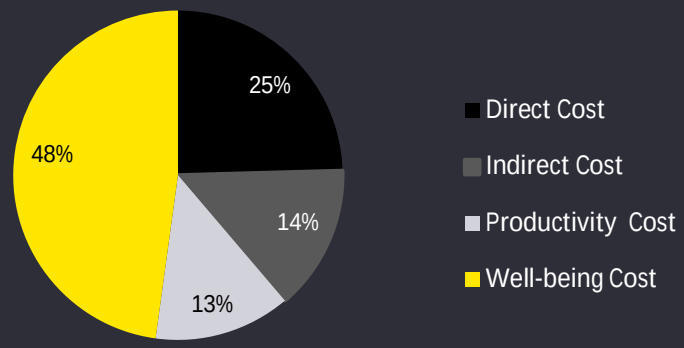
€24,780 (under 65)
€18,259 (over 65)

0.02% - 0.2% prevalence of nAMD (under 65 years)
0.2% - 5.3% prevalence of nAMD (over 65 years)

The total number of people living with nAMD amounts to 191,450 at the mid prevalence rate

€3.9bn total economic impact at the mid prevalence rate scenario (all ages)

Breakdown of overall cost



Average annual individual cost of GA:

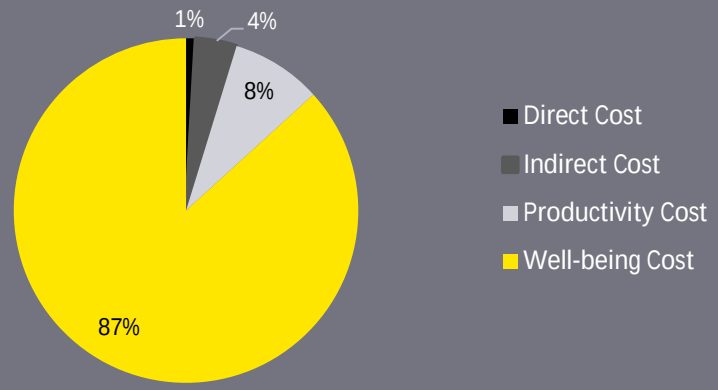
€22,571 (under 65)
€17,958 (over 65)

0.02% - 0.2% prevalence of GA (under 65 years)
0.07% - 1.6% prevalence of GA (over 65 years)

The total number of people living with GA amounts to 191,450 at the mid prevalence rate

€3.7bn total economic impact at the mid prevalence rate scenario (all ages)

Breakdown of overall cost



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Average annual individual cost of nAMD:

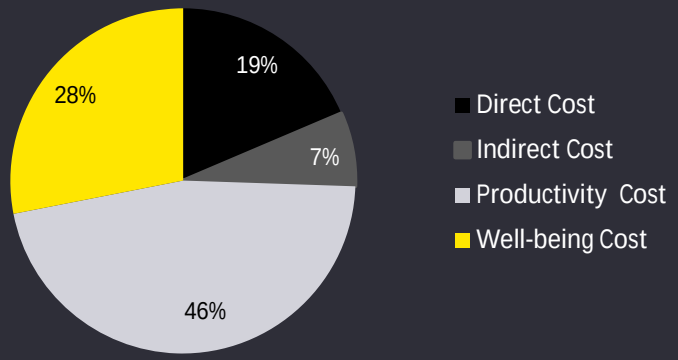
€66,376 (under 65)
€26,715 (over 65)

0.02% - 0.2% prevalence of nAMD (under 65 years)
0.1% - 3.0% prevalence of nAMD (over 65 years)

The total number of people living with nAMD amounts to 490,440 at the mid prevalence rate

€23.9bn total economic impact at the mid prevalence rate scenario (all ages)

Breakdown of overall cost



Average annual individual cost of GA:

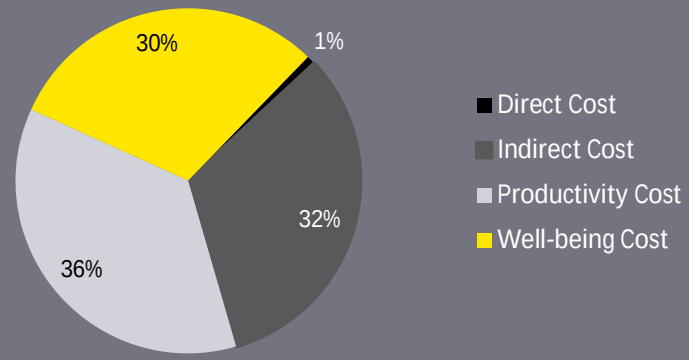
€48,326 (under 65)
€27,733 (over 65)

0.02% - 0.2% prevalence of GA (under 65 years)
0.04% - 0.9% prevalence of GA (over 65 years)

The total number of people living with GA amounts to 490,440 at the mid prevalence rate

€19.2bn total economic impact at the mid prevalence rate scenario (all ages)

Breakdown of overall cost



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Bulgaria



- *Direct medical costs* for an individual living with nAMD amount to €3,516, compared to €306 for an individual living with GA. Anti-VEGF injection cost is the largest component contributing to the nAMD cost, accounting for 73%. Imaging eye exams account for 27% of the nAMD direct medical cost, and 100% of GA cost.
- *Indirect medical costs* amount to €2,095 for those with nAMD compared to €811 for those with GA. Major components contributing to nAMD costs include formal care, accounting for 40%, and assistive technology costs, accounting for 44%. The largest component contributing to GA is assistive technology cost, accounting for 65%.
- *Well-being costs* account for the majority of the overall individual cost of GA and nAMD in Bulgaria, amounting to €16,910 and €12,923, respectively. Well-being costs are primarily driven by the 50% and 76% of nAMD and GA respondents reporting low vision, respectively. This is followed by depression, with almost 30% of both nAMD and GA respondents reporting it as a result of their condition.
- *Productivity costs* amount to €3,189 and €2,634 for those living with nAMD and GA, respectively. Almost 90% of GA and nAMD individuals report job reduction as a result of their condition, which accounts for the vast majority of the total productivity cost. Caregiver productivity cost constitutes a small proportion of the overall productivity cost, accounting for €6 (nAMD) and €71 (GA) of the overall productivity cost.

Germany



- *Direct medical costs* for an individual living with nAMD amount to €5,028, compared to €178 for an individual living with GA. Anti-VEGF injection costs is the largest component contributing to nAMD cost, accounting for 95%. Imaging eye exams account for 5% of the total nAMD direct medical cost, and 100% of GA cost.
- *Indirect medical costs* amount to €2,907 for nAMD compared to €751 for those with GA. Major components contributing to nAMD costs include expenditure on assistive technology, accounting for 62%. The largest GA cost components are assistive technology cost (37%) and nutraceutical cost (31%).
- *Well-being costs* account for the majority of the overall cost of GA and nAMD in Germany, at €16,939 and €9,804 respectively. Well-being costs are mainly driven by low vision, with 39% of nAMD and 70% of GA respondents reporting this. This is followed by depression where almost 30% of both nAMD and GA respondents report depression as a result of their condition.
- *Productivity costs* amount to €4,702 and €7,041 for individuals living with nAMD and GA, respectively. nAMD productivity cost is driven by individual job reduction, with 73% reporting an impact. Caregiver cost is driven by 13% reporting job reduction due to providing care. Among those with GA, 75% have experienced job reduction. Loss of leisure time constitutes the largest proportion of caregiver productivity cost with 60% of GA respondents providing transport during non-working hours.

USA



- *Direct medical costs* for an individual living with nAMD amount to €9,082, compared to €327 for an individual living with GA. Anti-VEGF injection cost is the largest component contributing to nAMD cost, accounting for 90%. Imaging eye exams account for 10% of nAMD direct medical cost, and 100% of GA cost.
- *Indirect medical costs* amount to €12,736 for those living with GA, compared to €3,378 for those living with nAMD. GA costs are driven by high expenditure on formal care, accounting for 48%, and accident treatment, accounting for 39%. nAMD costs are driven by a high proportion (83%) of people having to invest in assistive technology.
- *Well-being costs* amount to €11,944 and €13,711 for those living with GA and nAMD, respectively. Well-being costs are mainly driven by anxiety impact, with over 50% of people with nAMD and GA reporting anxiety as a result of their condition.
- *Productivity costs* account for the majority of the overall individual cost of nAMD and GA of €40,206 and €23,319, respectively. It is observed that a significant portion of both GA and nAMD respondents report job loss at 36% and 60%, respectively. The productivity cost associated with a nAMD caregiver is driven by job reduction due to providing care, with 17% of caregivers reporting job reduction due to informal care duties, while 25% of caregivers with GA report job reduction due to care.

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Cost category	Bulgaria GA	Bulgaria nAMD	Germany GA	Germany nAMD	USA GA	USA nAMD
Direct medical cost drivers	€306 100% Imaging eye exams	€3,516 *of which* 73% Anti-VEGF Imaging eye exams	€178 100% Imaging eye exams	€5,028 *of which* 95% Anti-VEGF Imaging eye exams	€327 100% Imaging eye exams	€9,082 *of which* 90% Anti-VEGF Imaging eye exams
Indirect medical cost drivers	€811 *of which* 65% Assistive technology Other	€2,095 *of which* 84% Formal care + assistive technology Other	€751 *of which* 68% Assistive technology + nutraceuticals Other	€2,907 *of which* 62% Assistive technology Other	€12,736 *of which* 87% Formal care + accident treatment Other	€3,378 *of which* 83% Assistive technology Other
Well-being cost drivers	€16,910 *of which* 55% Low vision Anxiety + depression	€12,923 *of which* 47% Low vision Anxiety + depression	€16,939 *of which* 59% Low vision Anxiety + depression	€9,804 *of which* 57% Low vision Anxiety + depression	€11,944 *of which* 42% Low vision Anxiety + depression	€13,711 *of which* 45% Depression Low vision + anxiety
Productivity cost drivers	€2,634 *of which* 97% Individual Caregiver	€3,189 *of which* 99% Individual Caregiver	€4,702 *of which* 98% Individual Caregiver	€7,041 *of which* 93% Individual Caregiver	€23,319 *of which* 88% Individual Caregiver	€40,206 *of which* 99% Individual Caregiver



2 Background

Age-related Macular Degeneration is the leading cause of blindness in adults over 55 years old. Demographic aging effects are likely to increase the impacted population

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What is AMD?

AMD is one of the leading causes of irreversible vision loss among the elderly in the Western World.

AMD occurs by the gradual deterioration of the macula, the part of the retina responsible for clear vision in an individual's direct line of sight, as a result of aging. The risk of getting advanced AMD increases from 2% for those ages 50-59, to nearly 30% for those over the age of 75.[1] Furthermore, it is the most common cause of blindness in developed countries and accounts for 8.7% of all blindness worldwide in the age cohort of 45–85 years.[2] AMD is known to have a genetic component, however several research studies have identified a number of lifestyle factors that increase the risk of developing AMD, which include smoking, obesity, poor diet, high alcohol intake and UV light.[3]

Early-stage AMD

Most patients of AMD live with a form of AMD known as Early-stage AMD. In this form of the disease the photoreceptors (cones and rods) in the central retina become damaged and the central vision progressively deteriorates very slowly over a number of years. Whilst there is no treatment for Early-stage AMD, lifestyle changes (such as ceasing smoking or dietary changes) have been shown to delay the progress of the condition.

Early-stage AMD is a progressive condition, meaning that for many of those affected by it, the impact on their life is minimal especially in the early years of the condition. However Early-stage AMD can progress to more serious versions of the condition, known as Late-stage AMD, and the lack of treatment can lead to stress and anxiety for those affected.

Late-stage AMD

Late-stage AMD comes in two forms: Geographic Atrophy and Neovascular AMD. Geographic Atrophy (GA) is an advanced form of Dry AMD and can lead to permanent loss of visual acuity and is responsible for 10-20% of blindness in AMD, affecting more than 5m people globally.[4] A representation is provided in figure 2.1. There is currently no proven therapeutic treatment to prevent or slow its progression, however, a number of therapeutic interventions are explored in research laboratories and clinical trials. Loss of visual function as a result of GA is considered irreversible and usually bilateral, with half of patients developing GA in both eyes within seven years of the initial GA diagnosis.[5]

The other form of late-stage AMD is Neovascular AMD (nAMD), which is also referred to as Wet AMD (wAMD). This occurs when abnormal new vessels grow under the retina, resulting in a leakage of fluid and blood in the macula, hence the name Wet AMD. This can lead to rapid loss of central vision within days. As of 2020, nAMD affects 20 million people worldwide and is the leading cause of vision loss in people over the age of 55 years[6] in developed countries. Although nAMD contributes to only 10-15% of the overall prevalence of AMD globally, it represents ~90% of severe vision loss caused by macular degeneration.[7] Unlike GA, treatments now exist for nAMD. The main treatment for nAMD is known as Anti–vascular endothelial growth factor therapy (Anti-VEGF). These are treatments injected directly into the impacted eye which can significantly delay or prevent the loss of central vision.

Fig 2.1. Fundus photos showing a healthy retina, GA and nAMD



Source: National Eye Institute Media Gallery

The three countries in this study have been chosen to provide a range of different costs and experiences

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Scope and Limitations

This study focuses on late-stage AMD. Whilst there are societal costs associated with early AMD, particularly in terms of the stress, anxiety and worry that the condition can cause, these are hard to quantify and will vary significantly depending on the stage of the condition that an individual is at. This has meant that this study will not seek to quantify these costs.

Countries used in the Study

Three countries have been chosen for the purposes of this study. They are: USA, Germany and Bulgaria.

These countries have been chosen to provide a range of different costs and experiences. The USA is the country with the largest population of individuals impacted by a form of late-stage AMD (for which clinical data is readily available). Germany and Bulgaria have been chosen to represent a high income EU country and low income EU country, respectively.

To identify the appropriate variables informing the economic model, we have conducted an extensive analysis of the available literature for all three countries. Papers published in the last ten years were included, however relevant studies from 2009 and 2011 were also included.

Where information is missing for some countries, representative data has been collected through other publicly available databases.

Action

Evidence based results from this study can be used to provide a basis for policy and planning to mitigate against the burden of disease, including justifying investment in the development of and access to preventative or treatment interventions, and increased provision towards low vision and support services.

Report structure

The remainder of the report is set out as follows:

- Section 3 outlines:
  - The methodological approach adopted to present the costs reported in the document (such as rounding and conversion rates), the approach to the literature review, the assumptions behind the economic model;
  - The methods adopted in order to identify the prevalence rate and estimate the total number of individuals impacted by late-stage AMD;
  - The methods adopted in order to identify the costs associated to individuals living with each form of late-stage AMD, that are clustered in the following four cost categories:
    - Direct medical costs;
    - Indirect medical costs;
    - Well-being costs;
    - Productivity costs.
- The methodology is homogeneous across the three countries of the study and for both forms of late-stage AMD.
- Sections 4,5 and 6 present the country specific results - Bulgaria, Germany and USA respectively - at individual level and at country level differentiated per nAMD and GA.
- Section 7 provides a conclusion on the impact and true cost of late-stage AMD, as well as limitations observed throughout this study.



3 Methodology

In order to assess the burden of late-stage AMD, we have developed an economic model to assess the relevant costs to individuals and society

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3.1 Research Methods

In order to evaluate the costs across the three countries, the following research methods have been used:

- Primary data collection (survey): In order to establish the experiences of those living with AMD and their caregivers in the three countries a survey was undertaken by Retina International (RI). RI survey results provide country specific evidence.
- Consultations with health care professionals: The discussion with healthcare professionals practicing in each country helped in better understanding the context of AMD in each of the countries and in framing some of the assumptions made in the study.
- Data collection: Data was collected from a wide variety of publicly available databases - such as the WHO, Oxford Economics - across all three countries.
- Literature reviews: Where public data was not available, data was draw from published articles from PubMed. This was mainly used to establish prevalence rates across the countries.

Data collected was then combined for each country to estimate the societal cost of late-stage AMD. For comparability all figures in this report are provided in Euros, with the 2020 average exchange rate used to convert from Dollars and Bulgarian Lev.*

3.2 The EY Model

To quantify the costs of late-stage AMD to both at individual level - differentiating for GA and nAMD - and at country level, a model has been developed which focuses on four cost categories. These are:

1. **Direct Medical Costs:** These are the costs associated with Anti-VEGF for the treatment of nAMD and the costs associated with diagnostic and routine imaging eye exams, sustained by both GA and nAMD.
2. **Indirect Medical Costs:** These are the additional costs incurred in treating late-stage AMD, costs which are often overlooked. They include factors such as receiving formal care (i.e. from professional, non-family, caregivers), and purchasing glasses and other assistive aids. It also considers that individuals with low vision are more prone to accidents and falls which can incur extra costs if a hospital visit is required.
3. **Well-being Costs:** Late-stage AMD can significantly impact the health and well-being of both the individuals affected by the disease and their caregivers. Whilst there is no direct financial cost associated with this there is a large cost associated with poor physical and mental health and the impact this has on individuals.
4. **Productivity costs:** Late-stage AMD imposes a cost on the economy in that it can take productive (and often very experienced) individuals out of the workforce and force them to retire early. It can also force people to divert time from leisure activities to attending treatments and appointments.

* BGN to EUR @ 0.511; USD to EUR @ 0.877

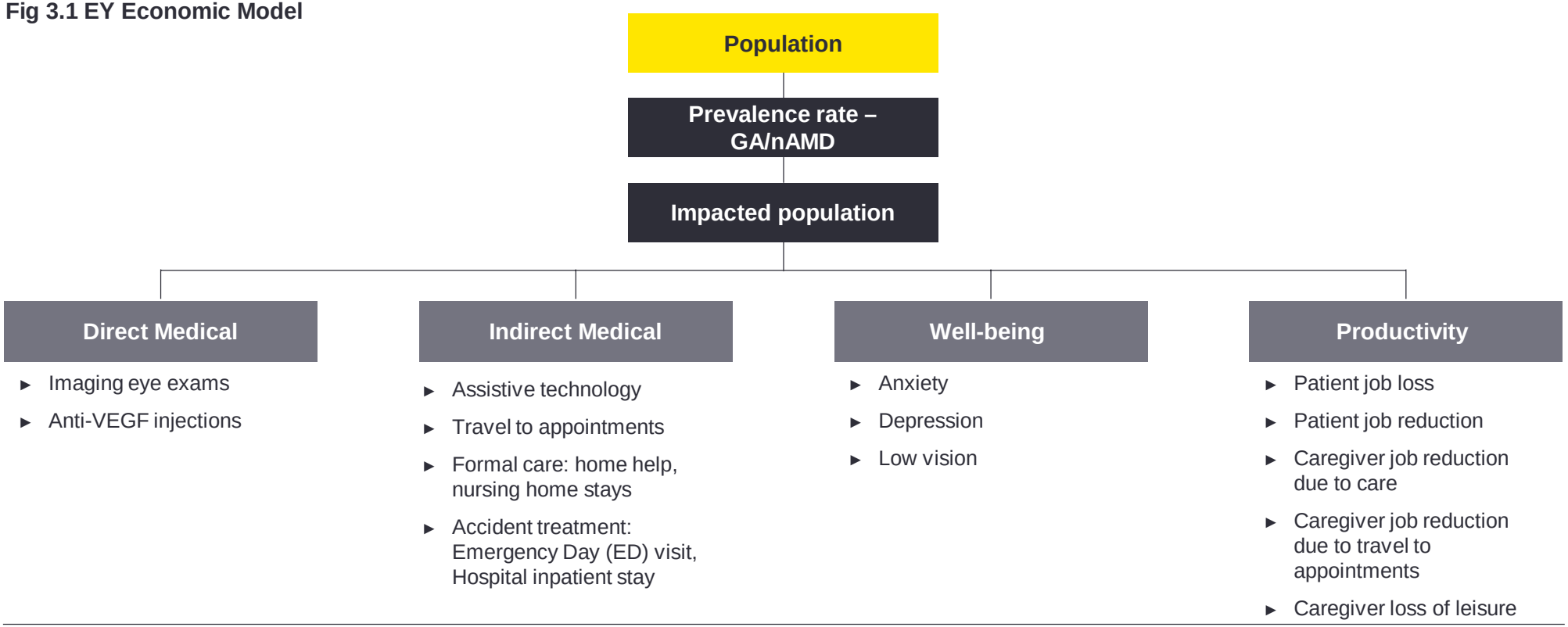
The economic model adopts a prevalence approach and estimates costs relating to direct and indirect medical, well-being and productivity impact

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The graph below, Figure 3.1, illustrates the schematic overview of the economic model developed and used by EY, details of which are shown in the following slides. The model estimates the cost burden that the representative individual affected by a form of late-stage AMD has to bear, by country of residence. By combining the impacted population of each country and the individual cost level, the overall economic burden at country level is estimated. In particular:

- **Impacted Population:** the model estimates the number people impacted by late-stage AMD by applying the prevalence rate of late-stage AMD – which is identified through the literature and analysis of the data identified – to the overall population of the country. Considering the variance of prevalence rates identified in the research, the analysis is going to provide three prevalence rate scenarios: low, mid and high prevalence rate.
- **Cost at individual level:** this component of the model identifies the average cost of the disease associated to a representative individual living with GA or nAMD. The overall cost is the sum of the four cost categories identified: direct medical cost, indirect medical cost, well-being cost and productivity cost.

Fig 3.1 EY Economic Model



Prevalence rate - these were determined through a detailed literature review of academic research

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3.3 Determining prevalence rates

An extensive literature review of academic research meta-analysis papers was conducted to identify population-based studies of forms of late-stage AMD. Prevalence refers to the percentage of a particular population who have a disease or health condition. Papers published in the last ten years were included, however relevant studies from 2009 and 2011 were also included. Given the variance in the prevalence rates, this has resulted in a wide range of actual prevalence rates. In this report three scenarios of prevalence rates have been considered − low, mid and high – per country and age group (under 65 years and over 65 years). The mid scenario rate is not the mathematical mid-point between the low and high prevalence rate scenarios, but is the middle reported rate between the high and low rates. While different age brackets were considered in the meta-analysis studies, for the purpose of this study the focus will be on three age groups – under 65 years, over 65 years and a total (all ages), for simplicity of representation and understanding purposes.

Two prevalence rate studies were sourced for Bulgaria, one giving an overall prevalence rate for all types of AMD[8] and one study with a breakdown between early and late AMD (however does not differentiate between GA/nAMD).[9] In the absence of prevalence rates for GA and nAMD in Bulgaria, the rates for the USA were assumed for Bulgaria, as the USA rates are lower and hence a more conversative assumption. As no age split data was available for Bulgaria, a pro-rata approach was taken, which assumes the same proportional spread as reported for German rates (by age), adjusted for overall Bulgarian prevalence rates[8,9] Research indicated four prevalence studies were available for Germany, each giving a breakdown between early and late AMD, while one study gave a breakdown of rates for late-stage forms of AMD (GA and nAMD).[10,11,12,13] However, one study[13] provided a considerably high (28.1%) of early AMD in Germany among the total population, and we have not relied on this rate. Three studies were identified for the USA with a focus on the prevalence rates of the late-stage forms of AMD.[14,15,16]

3.4 Calculating impacted population

In order to calculate the impacted population of AMD, the various prevalence rates, by age group and type of AMD, are applied to the total population of each of the countries. As discussed previously, we have considered three prevalence rate scenarios. In calculating the impacted population, we apply the mid scenario prevalence rate. Table 3.1 presents the data related to the impacted population in the mid prevalence rate scenario. The complete representation of the impacted population in all the scenarios is provided in the country-specific sections and an overview of all prevalence rates are illustrated in the able on page 104.

Table 3.1 Impacted population by age group and type of late-stage AMD (mid prevalence rate)

AMD type	Age group	Bulgaria	Germany	USA
GA	Under 65	5,416 (0.1%)	65,120 (0.1%)	274,160 (0.1%)
	Over 65	6,004 (0.4%)	126,330 (0.7%)	216,280 (0.4%)
	Total impacted population	11,420	191,450	490,440
nAMD	Under 65	5,416 (0.1%)	65,120 (0.1%)	274,160 (0.1%)
	Over 65	6,004 (0.4%)	126,330 (0.7%)	216,280 (0.4%)
	Total impacted population	11,420	191,450	490,440

Source: EY Analysis

Direct medical - these costs were calculated at an individual level

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3.5 Direct medical cost

Direct medical costs include the two main parameters of costs associated with treatment of the disease for those living with nAMD: Anti-VEGF injection costs and imaging eye exams costs associated with diagnostic and routine imaging eye exams. For those living with GA, direct costs are the costs only attributable to imaging eye exams. Therefore:

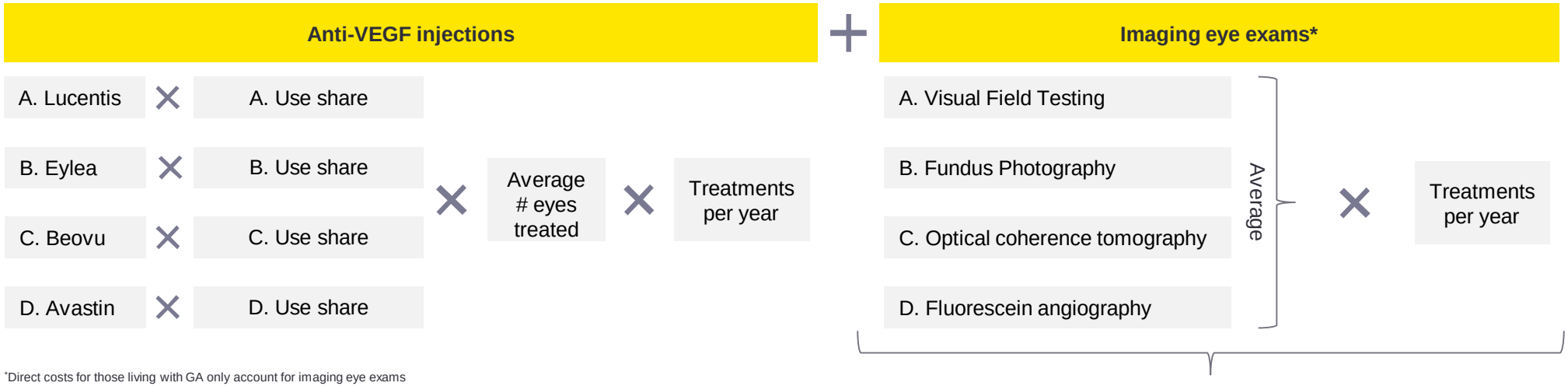
- nAMD: includes Anti-VEGF and Imaging eye exams;
- GA: Imaging eye exams only.

To estimate the Anti-VEGF injections costs, the most common Anti-VEGF injections used and the share use (i.e., usage rate) in treatment has been identified through literature and with health care professionals in each country. The number of eyes treated is based on the assumption of 75% of people receiving treatment in one eye and 25% in both eyes. This hypothesis has been confirmed as reasonable by health care professionals in each country. The number of treatment per year is the number of visits reported by the RI survey respondents. Treatment cost only applies to those affected by nAMD as no treatment is currently available to those with GA.

To estimate the imaging eye exams cost the most common exams administered and the average number of appointments per year has been identified from literature.[21, 22, 23, 24] The weighted average cost of an eye exam is calculated by multiplying each of the types of eye exam with the associated mean number visits in a year and averaging the four types. Average annual imaging eye exam costs per individual are then calculated by multiplying the average cost of an eye exam by the number of eye care visits reported by an individual with nAMD/GA in the RI survey.

Fig 3.2 sets out the formula for calculating average direct medical cost per patient.

Fig 3.2 Schematic overview of direct medical costs calculation (nAMD)



*Direct costs for those living with GA only account for imaging eye exams

Direct medical – anti-VEGF injections are the current standard of care for nAMD patients

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3.5.1 Anti-VEGF injection

To estimate the anti-VEGF injections costs, the most common Anti-VEGF drugs used and the use share in treatment has been identified through literature and with direct consultation with health care professionals in each country. The number of treatments per year, is the average number of treatment recommended for each of the treatments, as sourced from literature review. The number of eyes treated is based on the assumption of 75% of people receiving treatment in one eye and 25% in both eyes. This hypothesis has been confirmed as reasonable by health care professionals in each country. The anti-VEGF injections cost only applies to those affected by nAMD as no treatment is currently available to those with GA.

Anti-VEGF injections – referenced in Table 3.2 - are administered through repetitive intravitreal injections. These injections help to stabilise vision loss in nine out of ten patients and in some cases can even improve sight.[17] The recommended frequency of these injections may vary from every few weeks to every few months in the first year, with reduced frequency in the subsequent years. The duration of treatment varies by patient, and the treatment may be stopped once the vision in the eye is sufficiently low that therapy can no longer make a difference.[18] The main Anti-VEGF injections prescribed for nAMD by ophthalmologists include three branded injections (Lucentis, Eylea and Beovu) – approved by the FDA in the USA and the EMA in the EU – and an off-label drug (Avastin). Below are the most common methods of administrations:

- Lucentis (ranibizumab) is given as a 0.5mg dose per injection to patients every four weeks for the first three months in loading doses and then once every two months in the first year.
- Eylea (Aflibercept) is the most commonly prescribed drug given as a 2mg one-time injection dose. Eylea is given to patients every four weeks for the first three months and subsequently once every 2–3 months in the first year.
- Beovu (brolucizumab) is the only drug with the ability to maintain eligible nAMD patients for longer dosing intervals, which is given every four weeks for the first three months and then once every four months.
- Avastin (bevacizumab) is less expensive than the rest, as an off-label drug. Discussions with healthcare professionals in each of the countries indicate that it is the most preferred choice of doctors and patients across the countries; therefore, it is assumed a higher share of individuals with nAMD use Avastin. It is given to patients every four weeks for the first three months, and then once every two months.

For patients who have nAMD and who do not respond in the first instance to anti-VEGF injections and continue to have fluid in the retina, PDT treatment (which utilises photosensitive intravenous drug) is recommended[19]. Visudyne (verteporfin), a common intravenous drug, is given infrequently. On average, patients receive 15mg of Visudyne twice a year.[20] These costs are provided for completeness and are not included in the costings model.

nAMD treatment is primarily administered in an outpatient setting

As the Anti-VEGF injections are primarily administered through an outpatient setting, additional administrative and service costs to the physicians are above the treatment costs of the surgical procedure involving intravitreal administration of medication. These clinical costs were not included in the model due to the variability observed within each country.

Table 3.2 Anti-VEGF injection costs

Anti-VEGF injection	# Mean injections p/a	Unitary cost (% share use)		
		Bulgaria	Germany	US
Lucentis	7	NA	€1,017 (17%)	€1,710 (9%)
Eylea	6	€650 (20%)	€920 (13%)	€1,622 (1%)
Beovu	5	€601 (20%)	€1,415 (20%)	€2,434 (30%)
Avastin	7	€240 (60%)	€37 (50%)	€45 (60%)

Source: GlobalData (Age-Related Macular Degeneration Market Analysis 2018–2028); NHIF data for Bulgaria

Direct medical – imaging eye exams play an important role in the diagnosis, monitoring and management of late-stage AMD

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3.5.2 Imaging eye exams

The imaging eye exam cost includes diagnostic and regular eye exams. The most common exams administered and the average number of appointments per year have been identified from literature and reported in Table 3.3.

The diagnosis, monitoring and management of late-stage AMD include the following regular eye exams:

- Visual field tests help in checking the deterioration of central vision in patients with late-stage AMD. The doctor may also test the visual field, which includes both central vision and peripheral vision.[21] Leading ophthalmologists recommend repeat testing every three months (four times in a year) for those living with late-stage AMD.[22]
- Fundus photography is used for screening AMD, which captures an image of the interior of the eye, including the retina, optic disc, and macula. According to the insurance provider Aetna in the USA, the fundus photography is medically necessary no more than two times per year.[23]
- Optical coherence tomography (OCT) is routinely used for evaluating AMD lesions or abnormal blood vessels that are growing beneath the macula. A study based on 2,488 people with AMD indicates an average two visits per year for OCT examination per patient.[24]
- Fluorescein angiography identifies the presence, location and size of the neovascular complex.[5] A study based on 2,488 people with nAMD indicates an average two visits per year for the examination per patient.[24]

Along with these diagnostic routine exams, patients may require ophthalmologist consultations and medical advice on the treatment progress. Typically, consultations or follow-ups may be required in a year for those living with late-stage AMD.

Table 3.3 Unitary cost of diagnostic and routine eye exams

Type of procedure	Unitary costs (# Mean visits in a year)		
	Bulgaria	Germany	USA
Visual Field testing	€78 (8)	€17 (4)	€74 (4)
Fundus Photography	€13 (1)	€14 (2)	€98 (2)
Optical coherence tomography	€339 (7)	€45 (2)	€51 (2)
Fluorescein angiography	€26 (1)	€49 (2)	€186 (2)

Source: US Medicare, German EBM Catalogue 2021, HTA Ltd Bulgaria

Indirect medical – schematic formula for calculating the average indirect medical costs at individual level

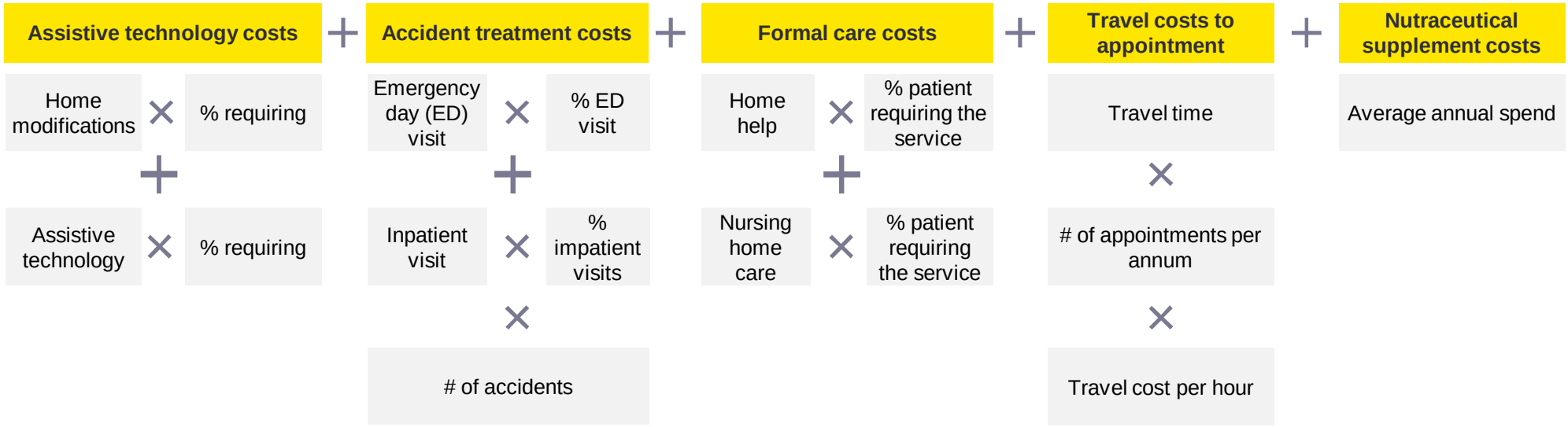
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3.6 Indirect medical cost

In calculating indirect costs, we consider five main parameters of indirect medical costs namely, assistive technology costs, accident treatment costs, formal care costs, travel costs to eye healthcare appointment, and nutraceutical supplement costs.

Figure 3.3 below sets out the formula for calculating average direct medical cost per patient.

Fig 3.3 Schematic overview of indirect medical costs calculation



Indirect medical – these costs are made up of costs attributed to assistive technologies, accident treatment, formal care, travel costs and nutraceutical supplements

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3.6.1 Calculating indirect medical costs

Assistive technology costs account for assistive resources to help perform daily tasks, and also includes the cost of implementing home modifications. These devices are seldom bought on an annual basis, for this reason, in order to not overestimate the annual expenditure on assistive technologies, we refer to the RI survey results to estimate the annual spend. RI surveys indicate the share of those living with nAMD/GA which require home modifications and assistive technologies, as well as their associated monthly expenditure on such aids and devices. The average annual cost has been calculated by taking the average monthly spend of all respondents in each country and multiplying by 12 to get an annual figure. We then multiply the average annual spend on home modifications and assistive technologies and multiply by the share of those with nAMD/GA who have reported use of use aids and devices.

Accident treatment costs accounts for the treatment of falls in a hospital setting, as it has been observed that individuals living with late-stage AMD are at a higher risk of falls with respect to an individual without late-stage AMD. The RI survey indicates the share of those with nAMD/GA reporting that their condition has led them to have an accident in the past year, as well as the number of accidents and the impact (i.e., did not require treatment, required emergency day (ED) care visit, or required hospital stay) of the accident. The average annual cost has been calculated by the combined weighted average cost of ED care visit and hospital inpatient stay. The average patient ED care visit is calculated by multiplying the share of respondents reporting requiring ED care visit by the average number of accidents per year, by the respective cost of an ED care visit in each country. Similarly, the average patient hospital inpatient stay is calculated by multiplying the share of respondents reporting requiring hospital stay by the average number of accidents per year, by the respective cost of a hospital inpatient stay in each country.

Formal care costs includes the expenditure on formal home help care or nursing home care. The RI survey indicates the share of individuals with nAMD/GA who report having to relocate their primary residence to residential care or nursing home, and those receiving formal care from either by a paid care provider or a nursing care provider. The average annual cost is calculated by the combined weighted average cost of home help and nursing home care, by the share of those indicating receiving home help and nursing home care.

Travel costs are the costs attributed to the cost of travelling to attend eye healthcare appointments. The RI survey indicates the average number of appointments patients attend for eye healthcare monitoring and assessments and the associated average travel time to appointments. These elements are then multiplied by local hourly travel time values.

Nutraceutical supplement costs capture the average annual expenditure on vitamin supplementations recommended based on ARED studies, such as Vitamin C, Vitamin E, Lutein, Zeaxanthin, Zinc, and Copper. The average annual expenditure on nutraceutical supplements sustained by an individual living with late-stage AMD has come from the RI survey results.

Indirect medical – low vision assistive aids and technologies are commonly used by patients with late-stage AMD

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3.6.2 Assistive technology

With progressive central visual loss, which is more prevalent with wet AMD, patients can lose their ability to perform more complex activities of daily living and may require assistive technologies or visual aids. Common vision aids include low vision glasses, magnifiers, telescopes and electronic aids.

In the case of macular degeneration, eyeglasses can be used to enhance or magnify near distance vision which is not possible with regular glasses. These glasses may involve magnification and a built-in prism to reduce the size of blind spots. Different lenses can be used with special tints and coatings to improve the transmission of light, reduce glare and improve the ability to see contrasts. These glasses are best suited for reading, writing, working on the computer and doing any close-up activities.[25]

The one-time cost of these eyeglasses includes the cost of frames, lens and the treatment, for reference the cost of some assistive technologies are reported in Table 3.4 .

There is a range of low vision or adaptive technology aids that can be useful for wet AMD patients. These include:

- Handheld magnifiers are the most commonly used simple, light-weight, low-priced devices that can be used. The next generation of these magnifiers are electronic magnifiers.
- Software programs for desktops such as ZoomText, which doubles as a screen magnifier maintaining more definition and clarity.
- Distance viewing/TV glasses have a small biopic telescope mounted on a person's glasses to enable a person to see objects more clearly from a distance.
- Other low vision wearables include headsets such as eSight, IrisVision and other assistive devices such as Orcam.[26] These devices are high-tech devices that can be purchased through online retail websites in the USA and Germany with some of them reimbursed under health insurance.

Table 3.4 Assistive technology costs

Unit cost of glasses and other low vision aids			
	Glasses	Magnifier	Software
Bulgaria	€50[1]	€15[1]	€767[1]
Germany	€744[4]	€35[5]	€110[5]
USA	€505[3]	€26[2]	€619[2]

Sources:
[1] HTA Ltd
[2] Southwestern Eye Centre
[3] VSP Vision Care
[4] Seh Kraft Optik
[5] Sehhelfer

Indirect medical – there is often a cost of care for the treatment of accidents or injuries due to low vision

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3.6.3 Accident treatment

Among older adults with AMD, progressive visual impairment can be associated with an increased incidence of accidents such as a slip, trip, fall, burns and car/bicycle/vehicle crashes.[27]

A multi-country observational study undertaken by Cruess et al. of the economic burden of bilateral nAMD indicated that patients with visual impairments such as AMD are more likely to have falls and fall-related injuries. Results of the study indicated that falls and fall-related fractures were more prevalent in Canada (22.4%) and Spain (20.2%), than Germany (13.3%), the UK (13.3%) and France (11.5%).[28]

Table 3.5 Accident treatment costs

Unit cost of accident/fall/injury care treatment		
	Emergency day care visit	Emergency care hospital inpatient stay
Bulgaria	€46	€463
Germany	€22	€1,612
USA	€605	€22,333

Source: Howland et al. Injury Epidemiology (2015),EBM Catalogue Germany; HTA Ltd Bulgaria

Table 3.5 represents the cost associated to emergency day care visit and per night hospital impatient stay for the countries under analysis.

3.6.4 Formal care

People impacted by AMD may require a formal (or paid) caregiver in the absence of an informal caregiver (such as spouse, children and close relatives). The practice of formal caregiving may involve care services either at home or at an external care provider (e.g. nursing home).

Full-time care giving at care recipient's home is often performed by a paid professional who provides general assistance to the patient and assists in daily living activities such as housekeeping, grocery shopping, shopping for medical supplies/medications, transport to/from medical appointments, social/cultural events and sourcing or providing information to the care recipient about their health and healthcare. These costs are outlined in Table 3.6.

- In Bulgaria, the average annual home help is €4,104.
- In Germany, average annual cost of home help is €13,726. There is an annual average fixed allowance for a care recipient to finance employed care givers across care levels (five degrees of care system). Billing takes place directly between the authorised individual caregiver and the care insurance fund.[29]
- In the USA, the average annual cost of home help is €48,158 and the formal caregiver for elderly population at home typically works 44 hours in a week. The care recipients can avail of home maker services (cooking, cleaning, laundry and providing companionship) in addition to home health aide services at additional costs.[30]

Assisted care services at adult day care centres are typically limited to fixed hours in a day. These services are intended to help enable individuals live more independently in the community and may also be used to provide respite to informal caregivers from the demanding responsibilities of caregiving, outlined in Table 3.6.

- In Bulgaria, average annual nursing home care is €8,393.
- In Germany, average annual nursing home care is €14,249. Day and night services are provided by semi-residential care homes with different allowances present based on the level of care required.[31]
- In the USA, the adult day care centres charge an average of 6-8 hours of rates for their service daily for five days in a week [40] at an average annual cost of €87,229.

Table 3.6 Formal care costs

Annual formal caregiver service costs		
	Home help	Nursing home care
Bulgaria	€4,104	€8,393
Germany	€13,726	€14,249
USA	€48,158	€87,229

Source: Genworth, US; Ministry of Health, Germany; HTA Ltd, Bulgaria

Indirect medical – there are often travel costs associated with travelling to eye healthcare appointments

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3.6.5 Travel cost to appointments

A portion of the indirect costs are made up of the travel costs associated with attending eye health care appointments for monitoring and treatment of AMD.

Average travel time costs for Bulgaria and Germany were obtained from *Values of Travel Time in Europe: Review and Meta-Analysis*[32] . We use the average implied values of time (€ per hour 2010 incomes and prices)* of the 'Car Other' category along three types of road; 'Urban Free Flow; Urban Congested; and Inter Free'. The travel time value per hour for Bulgaria and Germany is €4.19 and €12.90. The USA hourly value of travel time is obtained from the US Department of Transportation Revised Departmental Guidance on valuation of Travel Time in Economic Analysis[33] and is €14.30 (2015) as referred in Table 3.7.

3.6.6 Nutraceutical supplements

The risk of vision loss can be reduced with some lifestyle changes and with use of nutritional supplements. The Age-Related Eye Diseases Study 2 (AREDS 2) conducted by the National Institute of Health in the US gave a number of recommendations including specific vitamins and minerals in the diet that can slowdown the progression of early-stage AMD by up to 25%. These vitamins and minerals include Vitamin C (ascorbic acid) 500mg; Vitamin E 400 international units; Lutein 10mg; Zeaxanthin 2mg; Zinc (as zinc oxide) 80mg; Copper (as cupric oxide) 2mg.[34]

Table 3.7 Travel cost values per country

Local travel cost values	
	Value of travel time
Bulgaria	€4
Germany	€12
USA	€14

Source: Wardman et al. Bulgaria and Germany; US Dept. of Transportation

* Considering that the last decade has been characterised by low inflation rates, the data has not been adjusted to reflect inflation - for example, the USD inflation rate in 2010 was 1.64% and in 2020 1.23% - as this change would be considered immaterial

Well-being – costs are calculated by monetising the reported sequala by a willingness-to-pay QALY value

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3.7 Well-being cost

To quantify the impact of late-stage AMD on well-being of the affected individual, we have identified, from literature the most common sequela as a result of nAMD/GA. These include: impact of low vision, anxiety and depression on well-being as a consequence of the disease. The monetary cost of each sequala is calculated by multiplying the share of individuals with late-stage AMD that are reporting being affected by the sequala, by the disability weight of the sequala, by the willingness-to-pay for a year of full health in each of the countries.

Well-being costs are not estimated for caregivers as the disability weights are associated with impacts on well-being as a direct results of a disease or condition, such as AMD. As the caregivers do not have AMD themselves, the disability weight cannot be applied to them in this calculation.

The share of individuals living with late-stage AMD who are reporting each of the sequala is obtained from the RI survey. The disability weights (DALYs) are obtained from the Burden of Disease Study conducted by the WHO, while the local QALY values were gathered from a review of available literature in the associated countries. These components are discussed further on the following page.

The weighted average of the cost of each of the sequalae is calculated by multiplying the share of individuals with late-stage AMD reports each of the three sequalae by the associated DALY, multiplied by the country specific willingness-to-pay value.

Fig 3.4 sets out the formula for calculating average well-being cost per patient.

Fig 3.4 Schematic overview of well-being costs calculation



Well-being – the impact of AMD on well-being can be calculated by converting DALYs into a monetary value

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3.7.1 Disability-adjusted life years to quantify burden of disease

AMD can significantly impact the health and well-being of both those affected by AMD and their caregivers. Whilst there is no direct financial cost associated with this there is a large cost associated with poor physical and mental health and the impact this has on individuals.

The well-being burden of AMD can be measured using disability-adjusted life years, or DALYs. DALYs are calculated by assigning a disability weighted score to a particular state of health whereby '0' equates to perfect health and '1' represents the loss of the equivalent of one full year of perfect health.

WHO defines DALYs as *"…the sum of the years of life lost due to premature mortality and the years lived with a disability due to prevalent cases of the disease or health condition in a population"* [35].

Age-specific disability weights for various forms of sequelae are included in the Global Burden of Disease Study[36]. We have identified, through literature and the RI survey, three forms of sequelae that may be impacted by the individual as a direct result of AMD. These include anxiety, depression, and low vision. The associated DALYs are illustrated in the Table 3.8. The loss of well-being associated with AMD can then be calculated by converting these DALYs into a monetary value.

3.7.2 Country-specific quality-adjusted life years

In order to assign a monetary value of the burden of each of the sequelae on well-being, a country-specific willingness-to-pay value for the gain for one quality-adjusted life year, or QALY, was attributed to each of the three countries. This is the willingness to pay for one year of full health as outlined in Table 3.9.

The loss of well-being can then be calculated by applying the DALYs to the willingness-to-pay value - QALY - to estimate the average value an individual with AMD is willing to pay for a year of full health.

Table 3.8 Disability weights

Disability weight forms of sequelae	
Sequela	**DALY**
Anxiety	0.091
Depression	0.207
Low vision	0.245

Source: Global Burden of Disease Study

Table 3.9 QALY values per country

Local QALY values	
	Willingness-to-pay
Bulgaria	€50,000
Germany	€58,533
USA	€44,473

Source: Iskrov et al. (Bulgaria); Himmler et al. (Germany); ICER (USA)

3.7.3 Impact of AMD on well-being

It is evident from research that people affected by AMD report greater emotional distress associated with poorer functional ability, as well as increased risk of accidents. Responses from the RI survey, as well as associated research, have supported the calculation of the impact of AMD in well-being by indicating the average share of people living with AMD who experience negative impact on their well-being as a result of AMD.

The RI survey posed the question to respondents asking if their condition has led them to experience anxiety or depression. Respondents reported in the RI survey that, as result of AMD, they have lost valued activities such as reading, playing and/or watching sport, playing games, or travelling.

Productivity – schematic formula for calculating the average productivity impact at individual level

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3.8 Productivity cost

This section quantifies the expenditures relating to productivity losses and changes in employment for both those living with late-stage AMD and their caregivers. Consequently, there are significant productivity losses as measured by reduced labour force participation and loss of time associated with AMD.

Productivity costs include the five main parameters of costs, individual job loss, individual job reduction, caregiver job reduction due to care, caregiver job reduction due to providing transport to eye healthcare appointments, and loss of leisure time due to providing transport to eye healthcare appointments.

Fig 3.5 below sets out the formula for calculating average productivity cost per patient.

Fig 3.5 Schematic overview of impact on productivity costs calculation

Individual Job loss	+	Individual Job Reduction	+	Caregiver Job reduction due to care	+	Caregiver job reduction due to travel to app	+	Leisure loss
% of people with AMD who are in employment		% of people with AMD who are in employment		% of caregivers reducing work hours due to care		% of caregivers reducing work hours due to travel appointments		% of caregivers providing transport during non-work hours
×		×		×		×		×
% of people experience job loss as result of AMD		% of people reduced job hours as result of AMD		Average annual working hours		# of journeys per annum		# of journeys per annum
×		×		×		×		×
Average annual gross salary		Share of hours lost		% of hours lost due to care		Time spent travelling to appointments		Time spent travelling to appointments
		×		×		×		×
		Average annual working hours		Productivity per hour		Productivity per hour		Value per leisure time
		×						
		Productivity per hour						

Productivity – the productivity impact is calculated using both individual and caregiver impacts on work activity

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3.8.1 Calculating productivity cost

Job loss measures the cost of being forced to leave the labour force or retire early due to deteriorating vision or vision loss in the case of the individual with nAMD/GA. From the RI survey, we calculate the number of people with nAMD/GA who are currently in employment, and percentage of respondent who have experienced job loss as a result of their condition. We then multiply these elements with the local average annual gross salary.

Job reduction captures the cost of taking time off work to attend appointments or reducing weekly work hours due to deteriorating vision. From the RI survey, we calculate the number of people with nAMD/GA who are currently in employment, and percentage of respondent who have experienced job reduction as a result of their condition. An assumption of 20% of work hours lost is considered along with average annual working hours in each of the countries and respective values of productivity per hour. These elements are multiplied together to the value for average annual job reduction.

Caregiver job reduction due to care measures the cost of taking time off work to provide informal care. From the RI survey we identified the share of caregivers who are forced to take time off work, as well as the average number of hours of work lost in order to provide informal care duties. These elements are multiplied with average annual working hours and productivity per hour to calculate the value for average annual job reduction due to providing informal care.

Caregiver job reduction due to travel to appointments measures the cost of taking time off work to provide transport for the AMD individual to their appointment and for providing informal care. From the RI survey we identified the share of caregivers who are forced to take time off work, the average number of trips per year caregivers are providing transport to appointments during working hours, and the associated time it takes to travel to appointments. These elements are multiplied with the average productivity per hour to calculate the value for average annual job reduction due to travel to appointments.

Caregiver loss of leisure time is measured in terms of the caregiver providing transport during non-working hours. In calculating the caregivers loss of leisure time, we monetise the value of providing transport for the patient of AMD to appointments during non-work hours. However, this calculation is likely to be an underestimate of the value of loss of leisure time to the caregiver as it is likely that other informal care duties may also cut into the caregivers leisure time. The RI survey indicates the share of caregivers providing transport in non-working hours to people living with nAMD/GA and the average number of trips per year. These elements are multiplied together with the average value of leisure time per hour to get the value for average annual loss of leisure time.

Productivity – reduced labour force participation includes job reduction and job loss of both the individual living with late-stage AMD and their caregiver

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3.8.2 Elements in calculating productivity costs associated with job loss and job reduction

Labour force participation is a measure of those aged 15 years to 65 years who are employed or actively seeking employment. Therefore in this calculation we assume those over 65 years are in retirement.

A number of data points are required in calculating the costs associated with reduced workforce participation and job loss for each of the three countries, which are summarised in Table 3.10.

Average annual gross salaries were obtained from Oxford Economics for each of the countries. The average gross salary is €8,377, €37,052, and €58,325 per annum in Bulgaria, Germany and the USA, respectively. Average annual working hours, obtained from OECD, are 1,605, 1,332, and 1,767 in Bulgaria, Germany and the USA, respectively.

We estimate productivity per hour by dividing annual gross salary by average number of hours work per annum.[37] Therefore we estimate an average productivity per hour of €5, €27 and €33 in Bulgaria, Germany and the USA, respectively.

3.8.3 Productivity loss of a caregiver in providing informal care duties

Time spent on caring for, and providing transport for people living with late-stage AMD constitutes a significant cost from loss of productivity as well as the opportunity cost of loss of personal time and the loss of time to engage in leisure activities for the caregiver. The wide range of time and resources spent on informal care provision demonstrates the broad economic impact of AMD.

Caregivers provide a broad range of informal care duties. The RI survey has demonstrated that these include housekeeping; grocery shopping; shopping for medical supplies or medicines; transport to appointments; and personal administration for the care recipient. It is assumed that this element cuts into the caregivers leisure time, however this may be an underestimate of the actual loss of leisure time as other care tasks could also be included.

Table 3.10 Productivity variables

Job loss and job reduction variables			
Data point	**Bulgaria**	**Germany**	**USA**
Average annual salary	€8,377	€37,052	€58,325
Average annual working hours	1,605	1,332	1,767
Productivity per hour	€5	€27	€33
Value of leisure time	€4	€12	€14

Source: Oxford Economics; OECD; Wardman et al.; US Dept. of Transportation, EY Analysis

Overall cost – this costs is calculated at country, which multiplies the average individual cost by the impacted population

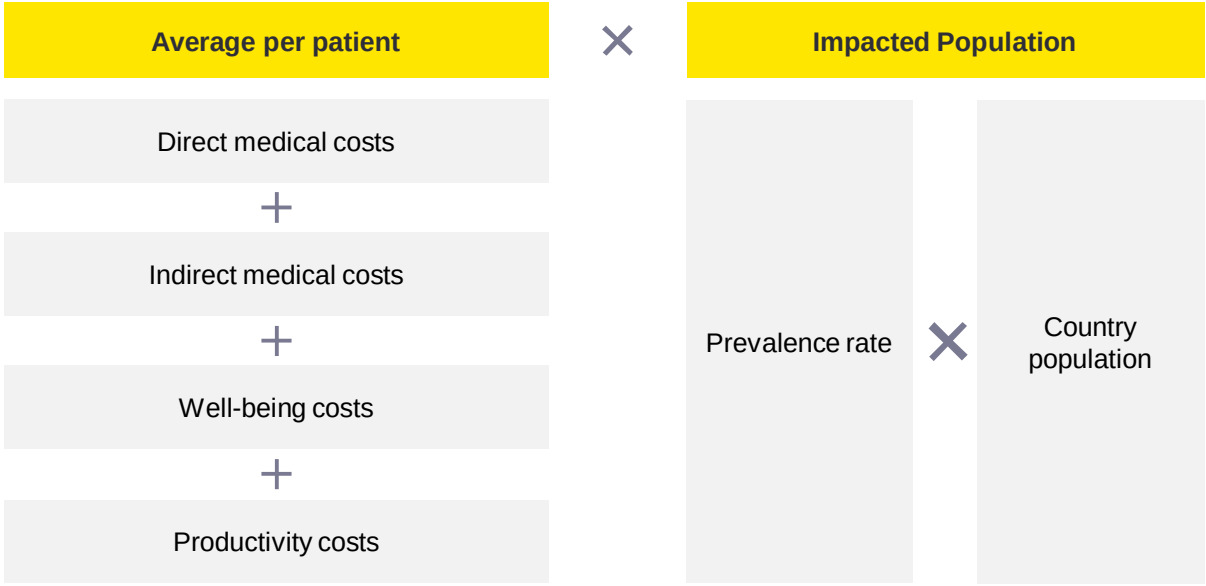
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3.9 Calculating overall cost at country level

At a country level, the total overall cost of AMD to society is calculated as the summation of the average cost per person given by the sum of the four cost categories multiplied by the impacted population. In order to not overestimate the total impact on the society, we made the assumption that people aged above 65 years are out of the labour force. For this group of people the productivity cost only accounts for the productivity loss associated with the caregiver.

Each of the components of the calculation are illustrated below.

Fig 3.6 Schematic overview of societal costs calculation



A number of assumptions are made for each of the cost categories in the study

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General approach in presenting the costs

- Figures are provided in EUR, the average 2020 exchange rate has been used for the conversion: BGN to EUR @ 0.511; USD to EUR @ 0.877
- Due to rounding, some numbers presented may not add up precisely.
- The report presents data from both the RI survey and the literature. Some datapoints which are not included in the economic model are represented in the report for two main reasons: to provide a reference of costs in a country, or to highlight primary evidence from the RI survey.

Total Costs

- The impacted population has been estimated as the sum of people over 65 and below 65 years, instead of applying the overall prevalence rate of the different scenarios to the overall population. This is due to the numerical size of the value associated with the prevalence rate expressed in percentage points and could have led to the underestimation of the impacted population.

Prevalence rate

- Given the variance in prevalence rates in the academic research, three scenarios of prevalence rates have been considered – low, mid and high - per country, also providing an age group split for people under and over 65.
- Where just one prevalence rate is available, this rate is used as the mid rate and a low and high rate is calculated using a pro-rata approach, applying the proportional spread between the high/mid/low rates from another country in this study.

Direct costs

- Anti-VEGF injections costs are attributed to nAMD only as there is currently no treatment for GA.
- In calculating the cost Anti-VEGF injections, costs associated with medical provision for injection has not been included due to the variability of pricing among health care professionals.
- The number of eyes treated is based on the assumption of 75% of people receiving treatment in one eye and 25% in both eyes. This hypothesis has been confirmed as reasonable by health care professionals in each country. The average number of eye treated per individual is then 1.25 eyes.

Productivity Costs

- To avoid an overestimation of the productivity cost, it is assumed people above 65 are retired. The productivity cost for those over 65 years is only associated with the productivity loss of the caregiver.
- The sample size that has been considered in order to identify the percentages of people that reported any type of impact on their work activities (early retirement, reduced hours of work) takes in to account all the people that reported having an impact on work even those who have indicated they might be already retired.
- In the absence of the number of hours of work reduced by those reporting a reduction in work as a result of a form of late-stage AMD, an assumption of 20% reduction in hours is considered.



4 Bulgaria

Bulgaria – overview and summary results

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This section outlines the analysis and conclusions for Bulgaria, split between nAMD and GA:

- Pages 34-42 set out the findings for nAMD;
- Pages 43-50 set out the findings for GA.

The section presents the findings for each of the following components:

- The prevalence rates for each form of late-stage AMD in Bulgaria and an estimate for the total number of individuals impacted for each of nAMD and GA;
- Overall average economic burden for an individual affected for each of nAMD and GA;
- The average annual direct cost for an individual living with each of nAMD and GA;
- The average annual indirect cost for an individual living with each of nAMD and GA;
- The average annual well-being cost for an individual living with each of nAMD and GA;
- The average annual productivity cost for associated to an individual living with each of nAMD and GA;
- The cost at country level for each of nAMD and GA in Bulgaria.

The average annual individual cost is €21,722 and €20,661 for nAMD and GA respectively. The breakdown by cost category and component is set out opposite and outlined in further detail over the course of this section.

Table 4.1 Breakdown by cost category of Bulgaria costs

	nAMD	GA
Anti-VEGF injection costs	€2,563	-
Imaging eye exams	€952	€306
Direct cost	**€3,516**	**€306**
Formal care - *Home help*	-	-
Formal care - *Nursing home care*	€839	-
Assistive technology - *Home modifications*	€47	€68
Assistive technology- *Assistive resources*	€885	€461
Accident treatment - *Emergency day visits*	€46	€26
Accident treatment - *Hospital inpatient stay*	-	€132
Travel to appointments	€70	€22
Nutraceutical supplements	€207	€103
Indirect cost	**€2,095**	**€811**
Anxiety	€2,274	€3,229
Depression	€4,527	€4,376
Low vision	€6,122	€9,305
Well-being cost	**€12,923**	**€16,910**
Patient productivity loss - *Patient job reduction**	€1,508	€1,474
Patient productivity loss - *Patient job loss**	€1,675	€1,089
Caregiver productivity loss - *Caregiver job reduction due to care*	-	€66
Caregiver productivity loss - *Caregiver job reduction due to travel*	€4	€3
Caregiver productivity loss - *Caregiver loss of leisure*	€2	€2
Productivity cost	**€3,189**	**€2,634**
Average annual individual cost (under 65 years)	**€21,722**	**€20,661**
Average annual individual cost (over 65 years)	**€18,539**	**€18,097**

Source: EY Analysis

* These costs are not applicable to those over 65 years as stated in the assumptions

nAMD – prevalence rate of nAMD in Bulgaria ranges between 0.02%-0.2% among under 65s and 0.1% and 3% among the over 65s

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4.1 Prevalence of nAMD in Bulgaria

4.1.1 Prevalence of nAMD in under 65s

The prevalence rate of nAMD in under 65s (Figure 4.1) ranges from 0.02% in the low prevalence rate scenario to 0.2% in the high prevalence rate scenario. The mid prevalence rate scenario accounts for 0.1% of the population.

The total population, obtained from Eurostat, in Bulgaria is 6,916,548 of which 5,415,657 are under 65 years. As a result the total impacted population ranges from 1,083 to 10,831, as outlined in Table 4.2.

4.1.2 Prevalence of nAMD in over 65s

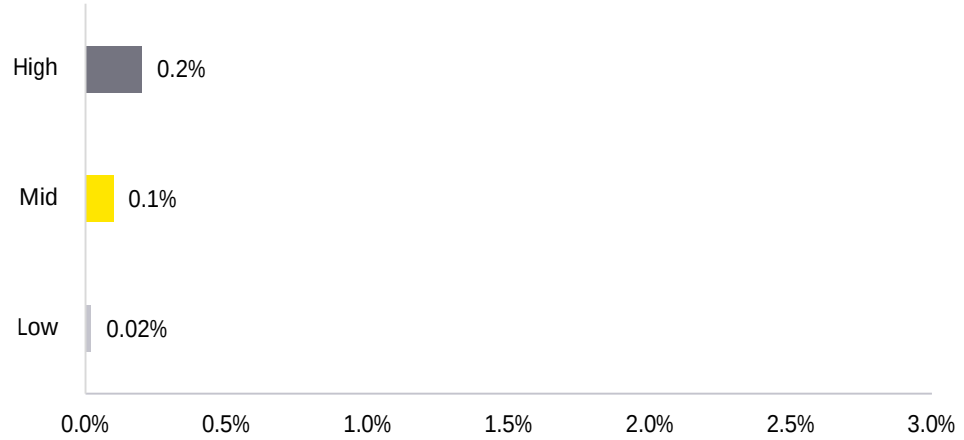
The prevalence rate of nAMD in over 65s (Figure 4.2) ranges from 0.1% in the low prevalence rate scenario to 3% in the high prevalence rate scenario. The mid prevalence rate scenario accounts for 0.4% of the population.

The total population of over 65s is 1,500,891. As a result the total impacted population ranges from 1,501 to 45,027, as outlined in Table 4.2.

Table 4.2 Total nAMD impacted population

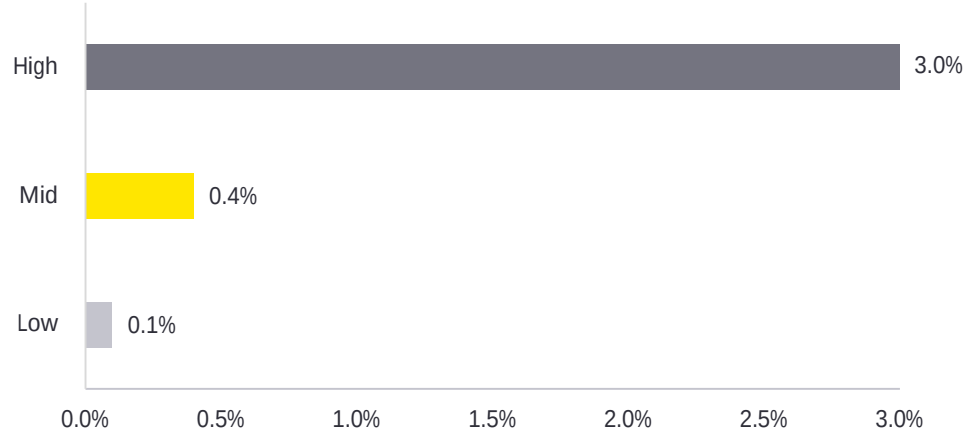
	Low prevalence rate	Mid prevalence rate	High prevalence rate
Under 65 years	1,083	5,416	10,831
Over 65 years	1,501	6,004	45,027
Total	**2,584**	**11,420**	**55,858**

Fig. 4.1 Prevalence rate, under 65 years (nAMD)



Source: Li et al. (2019); Klein et al. (2011); Klein & Klein (2013); Frost & Sullivan (2017); EY Elaboration

Fig 4.2 Prevalence rate, over 65 years (nAMD)



Source: Li et al. (2019); Klein et al. (2011); Klein & Klein (2013); Frost & Sullivan (2017); EY Elaboration

nAMD – the average annual cost for an individual living with nAMD in Bulgaria is €21,722

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4.2 Overall cost at individual level

The overall average economic burden for an individual living with nAMD in Bulgaria amounts to €21,722, if they are still in the labour force (under 65 years). This cost is mainly driven by well-being, accounting for 59%, or €12,923, of the overall cost at individual level. This is followed by direct medical and productivity costs, accounting for 16% (€3,516) and 15% (€3,189), respectively, and indirect medical costs, which account for 10%, (€2,095). This breakdown is illustrated in Figure 4.3.

Given the assumption of retirement for people over 65, the average cost for the over 65 cohort is €18,539, as the productivity cost accounts for the caregiver component only.

4.3 Direct medical cost

The average annual direct medical cost for an individual living with nAMD in Bulgaria amounts to €3,516.

This cost is made up of 30% attributed to diagnostic and routine eye imaging exams, amounting to €952, and 70% attributed to intervention therapies, amounting to €2,563.

4.3.1 Anti-VEGF injection

- The main Anti-VEGF costs used to treat nAMD in Bulgaria are outlined in Table 4.3. According to discussions with health care professionals in Bulgaria, the most commonly used therapy is Avastin (60%), followed by Eylea and Beovu, with a reported share of 20% each.
- Observations from the RI survey results outline that 90% of the nAMD respondents in Bulgaria have had a surgical procedure to treat their condition. The number of procedures the respondents have had in the past year ranges from 1 to 10, with an average number of procedures of 5.2.
- The average cost of Anti-VEGF injection per eye amounts to €394, and the average number of treatments per year for an individual living with nAMD according to RI survey is 5.2. This results in an average annual cost of €2,563 as referenced to in Table 4.4.
- In Bulgaria, these are known as application costs and are reimbursed by National Health Insurance Funds.

Fig. 4.3 Breakdown of under 65 overall cost (nAMD)

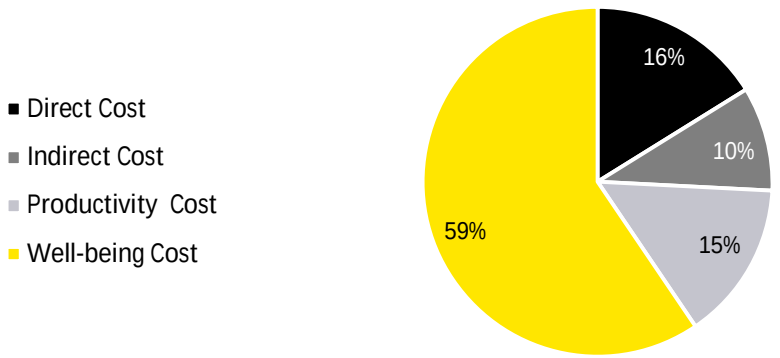


Table 4.3 Unitary Anti-VEGF injection costs

Anti-VEGF	Unitary cost	% share use
Eylea	€650	20%
Beovu	€601	20%
Avastin	€240	60%

Source: NHIF data

Table 4.4 Average annual Anti-VEGF injection costs

	Annual costs
Average cost of Anti-VEGF injection per eye	€394
# of treatment (p/a)	5.2
Average number of eye treated	1.25
Average individual cost	**€2,563**

Source: RI survey; EY Analysis

nAMD – the average direct medical cost for an individual living with nAMD in Bulgaria is €3,516

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4.3.2 Imaging eye exams

The main type of diagnostic and routine eye exams undertaken by an individual affected by nAMD and the unitary cost are illustrated in Table 4.5.

The weighted average cost of these imaging eye exams amounts to €113. RI survey respondents living with nAMD have indicated the average number of eye care appointments is 8.4. This results in the average annual cost at individual level of imaging eye exams to be €952 as illustrated in Table 4.6.

Table 4.5 Unitary cost of imaging eye exams

Type of procedure	Unitary clinical costs
Visual Field testing	€78
Fundus Photography	€13
Optical coherence tomography	€339
Fluorescein angiography	€26

Source: HTA Ltd

Table 4.6 Average annual cost of imaging eye exams

	Annual clinical costs
Average cost of eye exam	€113
# of eye care visits (p/a)	8.4
Average individual cost	**€952**

Source: RI Survey; EY Analysis

nAMD – the average indirect medical costs amount to €2,095 per year for an individual living with nAMD

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4.4 Indirect medical cost

The average annual indirect cost for an individual with nAMD in Bulgaria is €2,095.

This cost is made up 44% attributed to device costs amounting to €932, 40% attributed to formal care, amounting to €839, 10% attributed to nutraceutical supplements, amounting to €207, the 3% and 2% is attributed to travel costs (€70) and accidental costs (€46), respectively.

4.4.1 Formal care

The annual cost of nursing home care in Bulgaria is €8,393. The share of nAMD respondents from the RI survey indicating they are in a nursing home is 10%. This results in an average annual nursing home cost of €839, as referenced in Table 4.7.

The annual cost of formal home help care is €4,104. However, 0% of nAMD respondents indicate that they receive formal home help care, as referenced in Table 4.7.

4.4.2 Assistive technology

- Respondents from the RI survey indicate if they have had to invest in home modifications and utilised assistive resources to support living with nAMD.
- The average annual spend of nAMD respondents on home modifications is €118, with 40% of nAMD respondents having to invest in home modifications at their primary residence due to their condition. This results in an average individual cost of €47 – referenced in Table 4.9.
- 60% of nAMD respondents utilise assistive resources, with an average annual spend of €1,475.This results in an average individual cost of €885. – reference Table 4.9. For reference unitary costs of glasses and low vision aids are represented in Table 4.8.

Table 4.7 Annual formal caregiver service costs

	Home help	Nursing home care	**Total formal care cost**
Annual cost	€4,104	€8,393	
Share use	0%	10%	
Average individual cost	**€0**	**€839**	**€839**

Source: HTA Ltd; RI Survey results, EY Analysis

Table 4.8 Unit cost of glasses and other low vision aids

Glasses	Magnifier	Software
€50	€15	€767

Source: HTA Ltd.

Table 4.9 Annual device costs

	Home modifications	Assistive resources	**Total device cost**
Average annual spend	€118	€1,475	
Share use	40%	60%	
Average individual cost	**€47**	**€885**	**€932**

Source: RI Survey results, EY Analysis

nAMD – average annual expenditure on nutraceutical supplements amounts to €207

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4.4.3 Accident treatment

- According to the RI survey, 30% of nAMD respondents reported an accident in the past year in Bulgaria. Respondents reported an average of 1.5 accidents, of these, 67% required ED visit. The average individual cost of ED visit is then €46. While 0% required a hospital inpatient stay, as outlined in Table 4.10.
- The annual cost of accident treatment at individual level is €46 as reported in Table 4.10.

4.4.4 Travel to appointments

- The average travel cost per hour is €4 in Bulgaria and is obtained from *Values of Travel Time in Europe: Review and Meta-Analysis*[38].
- From the RI survey, nAMD respondents indicate that they attend an average of 8.4 appointments per year and average hourly travel time to these appointments is 2 hours, as outlined in Table 4.11.

4.4.5 Nutraceutical supplements

Average annual expenditure on nutraceutical supplements is obtained from the RI survey and amounts to €207 for individuals living with nAMD in Bulgaria as outlined in Table 4.12.

Table 4.10 Annual cost of accident treatment

		Emergency day visit	Hospital inpatient stay	**Total accident cost**
Cost		€46	€463	
% requiring treatment		67%	0%	
# of accidents	1.5			
Average individual cost		**€46**	**€0**	**€46**

Source: HTA Ltd; RI Survey results, EY Analysis

Table 4.11 Travel cost variables

Travel cost variables	
Travel time to appointment	2
# of appointments per annum	8.4
Travel cost per hour	€4
Average individual cost	**€70**

Source: Wardman et al; RI Survey results, EY Analysis

Table 4.12 Nutraceutical supplements

Nutraceutical supplements	
Average individual cost	**€207**

Source: RI Survey results, EY Analysis

nAMD – well-being costs account for the largest proportion of total costs (59%), amounting to €12,923

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4.5 Well-being

The average annual well-being cost for an individual living with nAMD in Bulgaria amounts to €12,923.

This cost is made up of 47%, or €6,122 attributed to low vision, 35%, or €4,527 attributed to depression, and 18%, or €2,274 attributed to anxiety as outlined in Table 4.14.

4.5.1 Willingness-to-pay for full health QALY

In Bulgaria, in the absence of specific AMD research for the value of one QALY gained, a willingness-to-pay study for the value of 'Innovative Pharmaceutical Therapies in Oncology and Haematology'[39] was considered. This study resulted in a €50,000 (BGN 97,791) median cost per QALY gained. However, it is acknowledged that there are limitations in using a QALY for a terminal disease rather than something specific to a life limiting condition. Therefore the results may be an overestimate, as referenced in Table 4.13.

4.5.2 Anxiety

50% of nAMD respondents in the RI survey have indicated that their condition has led them to experience anxiety.

4.5.3 Depression

Among the respondents living with nAMD in Bulgaria, 30% reported experiencing depression as a result of their condition.

4.5.4 Low vision

According to the RI survey, 50% of those living with nAMD in Bulgaria report having low vision.

Table 4.13 QALY values

Local QALY values	
Willingness-to-pay	€50,000

Source: Iskrov et al.

Table 4.14 Well-being variables

	Anxiety	Depression	Low vision	Total Cost
DALY	0.091	0.302	0.245	
% reporting	50%	30%	50%	
Average individual cost	**€2,274**	**€4,527**	**€6,122**	**€12,923**

Source: Global Burden of Disease Study; RI survey results

nAMD – the average annual productivity impact for an individual living with nAMD is estimated to be €3,189

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4.6 Productivity costs

The average annual productivity cost for an individual in work activity living with nAMD in Bulgaria amounts to €3,189.

This cost is mainly driven by the productivity costs relating to the individual with nAMD, accounting for 99.8% (or €3,183) of the cost, while the nAMD caregiver cost accounts for 0.1%, or €6 of the average annual productivity cost (see page 41).

4.6.1 Patient productivity

- nAMD individual productivity cost variables are outlined in Table 4.15. The average annual salary in Bulgaria is €8,377, with the average annual working hours being 1,605. This results in a productivity per hour value of €5.
- From the RI survey, it is estimated that 100% of individuals with nAMD are currently in employment.
- 90% of respondents indicated that they have experienced job reduction as a result of nAMD. With the assumed share of hours lost to be 20%, the average individual productivity cost associated with job reduction as a result of nAMD amounts to €1,508, as referenced in Table 4.16.
- 20% of respondents indicated that they have experienced job loss as a result of nAMD. The average individual productivity cost associated with job loss is €1,675, as referenced in Table 4.16.

Table 4.15 Productivity cost variables

Job loss and job reduction variables	
Average annual salary	€8,377
Average annual working hours	1,605
Productivity per hour	€5
Share of nAMD individuals in employment	100%

Source: Oxford Economics; RI survey results, EY Analysis

Table 4.16 Impact on individual work activity

	Job reduction	Job loss	**Total cost**
Share reporting impact	90%	20%	
Average individual cost	**€1,508**	**€1,675**	**€3,183**

Source: RI survey results, EY Analysis

nAMD – the average annual productivity impact for a caregiver of an individual living with nAMD in Bulgaria is estimated to be €6

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4.6.2 Caregiver productivity

- Table 4.17 outlines the impact nAMD care duties have had on the caregiver. 0% of nAMD caregivers in Bulgaria have experienced job reduction due to care.
- However, 29% of caregivers reported having to provide transport to an average of 4 eye healthcare appointments during work hours, resulting in an average cost of €4.
- 14% of nAMD caregivers provide transport to appointments during non-work hours. With an average travel time of 39.6 minutes (0.66 hours) to 4 appointments, the average annual value of loss of leisure time associated with providing transport during non-work hours is €2, outlined in Table 4.18.

Table 4.17 Impact on caregiver work activity

	Job reduction due to care	Job reduction due to providing transport during work hours	Total cost
Share reporting	0%	29%	
Hours lost due to care	0%		
Productivity per hour	€5	€5	
Average annual working hours	1,605		
# of journeys per year		4	
Average travel time (hrs)		0.66	
Average individual cost	**€0**	**€4**	**€4**

Source: RI survey results, EY Analysis

Table 4.18 Loss of leisure variables

Loss of leisure variables	
Providing transport during non-work hours	14%
# of journeys per annum	4
Average travel time (hrs)	0.66
Value of leisure time	€4
Average individual cost	**€2**

Source: RI survey results, EY Analysis

nAMD – the overall cost of nAMD in Bulgaria ranges from €51.35m to €1.07bn

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4.7 Total societal cost of nAMD in Bulgaria

The total cost of nAMD in Bulgaria ranges from €51.35m in the low prevalence rate scenario to €1.07bn in the high prevalence scenario. The mid rate scenario indicates a total cost of €228.94m as reported in Table 4.19.

Well-being costs constitutes the majority of the total cost of nAMD at 59%*. This is driven by the large share of nAMD patients with low vision (50%), resulting in total well-being cost ranging from €33.93m (low prevalence) to €721.83m (high prevalence). Direct medical costs account for 18%, ranging from €9.08m (low prevalence) to €196.38m (high prevalence). Indirect costs (€5.41m - €117m) account for 10%, followed by productivity costs (€3.46m - €22.95m), accounting for 8%.

Table 4.19 Overview of total nAMD costs (all age groups)

		Low prevalence rate	Mid prevalence rate	High prevalence rate
Bulgaria	**Impacted population (nAMD)**	**2,584**	**11,419**	**55,858**
	nAMD overall cost	**€51.35m**	**€228.94m**	**€1.07bn**
Categories	Direct Cost	€9.08m	€40.15m	€196.38m
	Indirect Cost	€5.41m	€23.92m	€117.0m
	Productivity Cost	€3.46m	€17.31m	€34.81m
	Well-being Cost	€33.39m	€147.57m	€721.83m
Age	Impacted population (nAMD) – Over 65	1,501	6,004	45,027
	Average individual cost - over 65	€18,539	€18,539	€18,539
	Overall cost - Over 65	€27.82m	€111.30m	€834.75m
	Average individual cost - under 65	€21,722	€21,722	€21,722
	Impacted population (nAMD) – Under 65	1,083	5,416	10,831
	Overall cost - Under 65	€23.53m	€117.64m	€235.28m

Source: EY Analysis

*Percentages of the breakdown costs are represented at the mid prevalence rate scenario. These may change according to the different scenario rate selected.

Fig. 4.4 nAMD cost – low prevalence rate (€m)

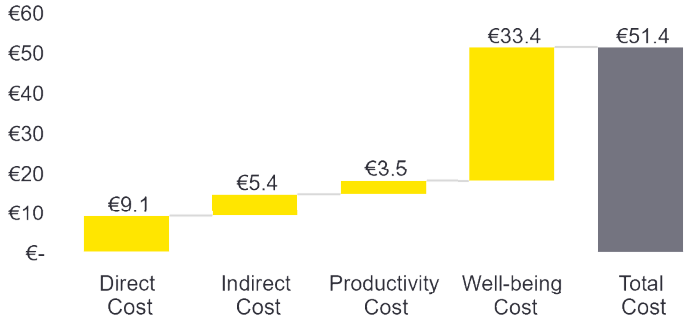


Fig. 4.5 nAMD cost – mid prevalence rate (€m)

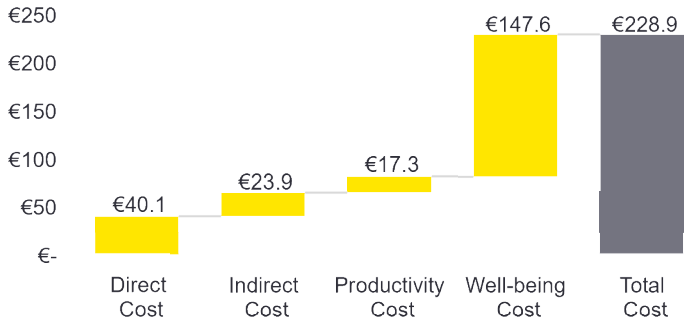
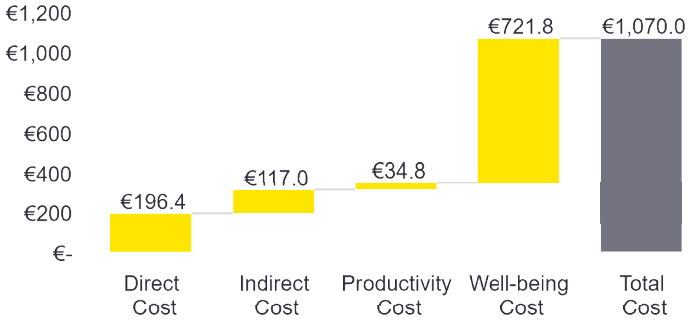


Fig. 4.6 nAMD cost – high prevalence rate (€m)



GA – there is a GA prevalence rate in Bulgaria between 0.02%-0.2% among under 65s and 0.04% and 0.9% among the over 65s

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4.8 Prevalence of GA in Bulgaria

4.8.1 Prevalence of GA in under 65s

The prevalence rate of GA in under 65s (Figure 4.7) Bulgaria ranges from 0.02% in the low prevalence rate scenario to 0.2% in the high prevalence rate scenario. The mid prevalence rate scenario accounts for 0.1% of the population as illustrated in Figure 4.7.

The total population, obtained from Eurostat, in Bulgaria is 6,916,548 of which 5,415,657 are under 65 years. As a result the total impacted population ranges from 1,083 to 10,831, as outlined in Table 4.20.

4.8.2 Prevalence of GA in over 65s

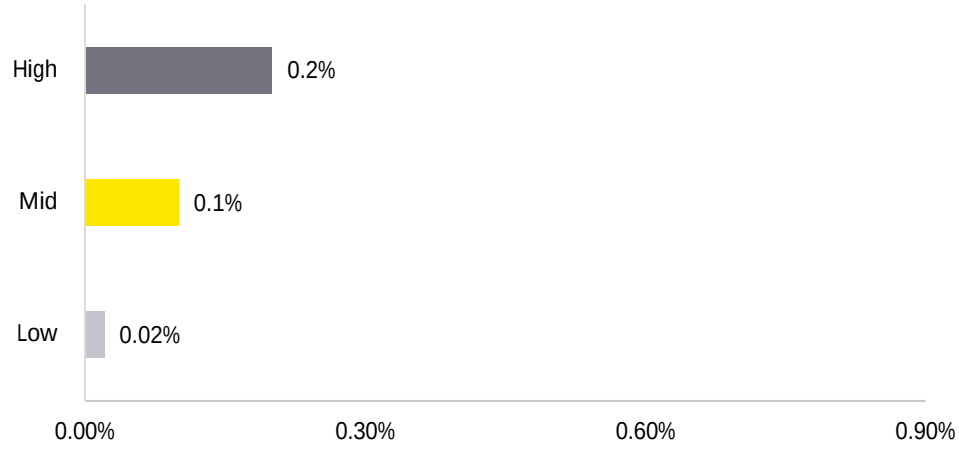
The prevalence rate of GA in over 65s (Figure 4.8) Bulgaria ranges from 0.04% in the low prevalence rate scenario to 0.9% in the high prevalence rate scenario. The mid prevalence rate scenario accounts for 0.4% of the population, see Figure 4.8.

The total population in Bulgaria is 6,916,548 of which 1,500,891 are over 65 years. As a result the total impacted population ranges from 600 to 13,508, as outlined in Table 4.20.

Table 4.20 Total GA impacted population

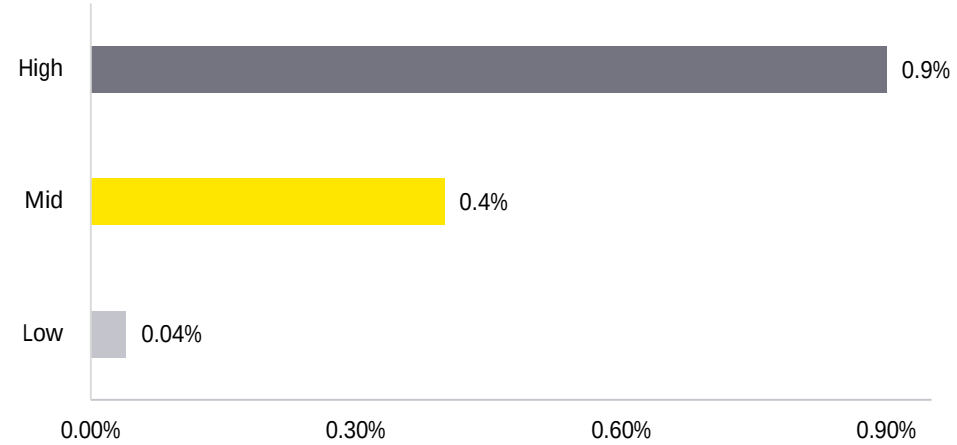
	Low prevalence rate	Mid prevalence rate	High prevalence rate
Under 65 years	1,083	5,416	10,831
Over 65 years	600	6,004	13,508
Total	**1,683**	**11,420**	**24,339**

Fig. 4.7 Prevalence rate, under 65 years (GA)



Source: Li et al. (2019); Klein et al. (2011); Klein & Klein (2013); Frost & Sullivan (2017); EY Elaboration

Fig. 4.8 Prevalence rate, over 65 years (GA)



Source: Li et al. (2019); Klein et al. (2011); Klein & Klein (2013); Frost & Sullivan (2017); EY Elaboration

GA – the average cost for an individual living with GA in Bulgaria is €20,661

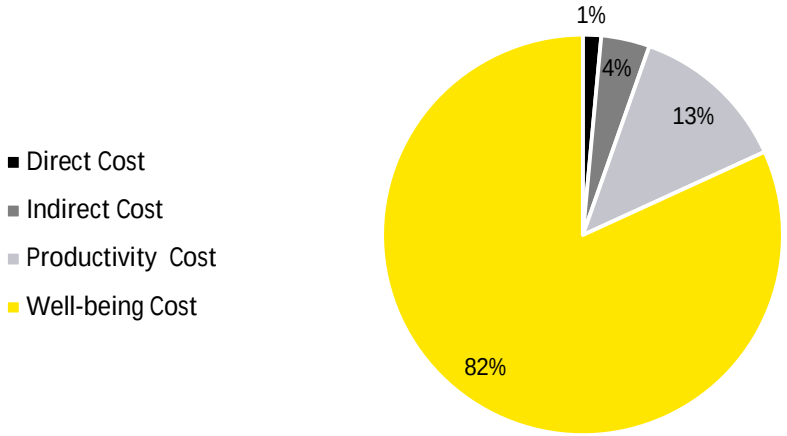
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4.9 Overall cost at individual level

The overall average economic burden for an individual living with GA in Bulgaria amounts to €20,661, if they are still in the labour force (under 65 years).This cost is mainly driven by well-being, accounting for 82%, or €16,910, of the overall cost at individual level (under 65 years). This is followed by productivity costs, accounting for 13%, or €2,634. Indirect medical costs account for 4% (€811) and direct medical costs account for 1% (€306) of the overall cost (under 65 years). This breakdown is illustrated in Figure 4.9.

Given the assumption of retirement for people over 65, the average cost for the over 65 cohort is €18,097, as the productivity cost accounts for the caregiver component only.

Fig. 4.9 Breakdown of under 65 overall cost, (GA)



4.10 Direct medical cost

The average annual direct cost for an individual living with GA in Bulgaria amounts to €306.

This cost is only made up of imaging eye exams as Anti-VEGF injections or other specific treatments are currently unavailable for those with GA.

4.10.1 Imaging eye exams

- The main type of diagnostic and routine eye exams undertaken by an individual affected by GA and the unitary cost, are illustrated in Table 4.21.
- The weighted average cost of these imaging eye exams amounts to €113. RI survey respondents living with GA have indicated the average number of eye care appointments is 2.7. This results in the average annual cost at individual level of imaging eye exams to be €306 as illustrated in Table 4.22.

Table 4.21 Unitary cost of imaging eye exams

Type of procedure	Unitary clinical costs
Visual field testing	€78
Fundus photography	€13
Optical coherence tomography	€339
Fluorescein angiography	€26

Source: HTA Ltd

Table 4.22 Average annual cost of imaging eye exams

	Annual clinical costs
Average cost of eye exam	€113
# of eye care visits (p/a)	2.7
Average individual cost	**€306**

Source: RI Survey; EY Analysis

GA – average annual individual cost associated with indirect costs amount to €811

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4.11 Indirect medical cost

The average annual indirect cost for an individual living with GA in Bulgaria amounts to €811.

This cost is made up by 65% attributed to device costs amounting to €529, 19% is attributed to accidental costs (€158), 13% is attributed to nutraceutical supplements (€103), and 3% attributed to travel costs (€22).

4.11.1 Formal care

- As no GA respondents in the RI survey reported the use of formal care facilities, there is €0 attributed to this cost, as reflected in Table 4.23.

4.11.2 Assistive technology

- Respondents from the RI survey indicate if they have had to invest in home modifications and utilise assistive resources to support living with GA. Respondents also indicate their annual spend on such aids as illustrated in Table 4.25.
- Average annual spend on home modifications of GA respondents is €72, with 94% indicating they have invested in home modifications. This results in an average individual cost of €68.
- 47% of GA respondents utilise assistive resources, with an average annual spend of €981. This results in an average individual cost of €461 as reported in Table 4.25. Unitary costs of glasses and low vision aids are referenced in Table 4.24.

4.11.3 Accident treatment

- According to the RI survey results, 47% of GA respondents reported having an accident in the past year in Bulgaria. Respondents reported an average of 2.2 accidents a year, of these, 25% required ED visit, resulting in a cost of €26. 13% required a hospital inpatient stay, resulting in a cost of €132, as outlined in Table 4.26.
- The annual cost of accident treatment at individual level is €158.

Table 4.23 Annual formal caregiver service costs

	Home help	Nursing home care	Total formal care cost
Annual cost	€4,104	€8,393	
Share use	0%	0%	
Average individual cost	**€0**	**€0**	**€0**

Source: HTA Ltd; RI Survey results, EY Analysis

Table 4.24 Unit cost of glasses and other low vision aids

Glasses	Magnifier	Software
€50	€15	€767

Source: HTA Ltd

Table 4.25 Annual device costs

	Home modifications	Assistive resources	Total device cost
Average annual spend	€72	€981	
Share use	94%	47%	
Average individual cost	**€68**	**€461**	**€529**

Source: RI Survey results, EY Analysis

Table 4.26 Annual cost of accident treatment

		Emergency day visit	Hospital inpatient stay	Total accident cost
Cost		€46	€463	
% requiring treatment		25%	13%	
# of accidents	2.2			
Average individual cost		**€26**	**€132**	**€158**

Source: HTA Ltd; RI Survey results, EY Analysis

GA – average annual expenditure on nutraceutical supplements amounts to €103

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4.11.4 Travel to appointments

- The average travel cost per hour is €4 in Bulgaria and is obtained from *Values of Travel Time in Europe: Review and Meta-Analysis*[38].
- From the RI survey, GA respondents indicate that they attend an average of 2.7 appointments per year and average hourly travel time to these appointments is 1.94 hours, as outlined in Table 4.27.
- The average individual travel cost is €22.

4.11.5 Nutraceutical supplements

Average annual expenditure on nutraceutical supplements is obtained from the RI survey and amounts to €103 for individuals living with GA in Bulgaria, as outlined in Table 4.28.

Table 4.27 Travel cost variables

Travel cost variables	
Travel time to appointment	1.94
# of appointments per annum	2.7
Travel cost per hour	€4
Average individual cost	**€22**

Source: Wardman et al.; RI Survey results, EY Analysis

Table 4.28 Nutraceutical supplements

Nutraceutical supplements	
Average individual cost	**€103**

Source: RI Survey results, EY Analysis

GA – average annual well-being cost for a patient affected by GA in Bulgaria is €16,910

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4.12 Well-being

The average annual well-being cost for an individual living with GA in Bulgaria amounts to €16,910 as reported in Table 4.30.

This cost is made up of 55%, or €9,305 attributed to low vision, 26%, or €4,376 attributed to depression, and 19%, or €3,229 attributed to anxiety as outlined in Table 4.30.

4.12.1 Willingness-to-pay for full health QALY:

In Bulgaria, in the absence of specific AMD research for the value of one QALY gained, a willingness-to-pay study for the value of 'Innovative Pharmaceutical Therapies in Oncology and Haematology'[39] was considered. This study resulted in a €50,000 (BGN 97,791) median cost per QALY gained. However, it is acknowledged that there are limitations in using a QALY for a terminal disease rather than something specific to a life limiting condition. Therefore the results may be an overestimate.

4.12.2 Anxiety

71% of GA respondents in the RI survey have indicated that their condition has led them to experience anxiety.

4.12.3 Depression

Among the respondents living with GA in Bulgaria, 29% reported experiencing depression as a result of their condition.

4.12.4 Low vision

According to the RI survey, 76% of those living with GA in Bulgaria report having low vision.

Table 4.29 QALY values

Local QALY values	
Willingness-to-pay	€50,000

Source: Iskrov et al.

Table 4.30 Well-being variables

	Anxiety	Depression	Low vision	Total Cost
DALY	0.091	0.302	0.245	
% reporting	71%	29%	76%	
Average individual cost	**€3,229**	**€4,376**	**€9,305**	**€16,910**

Source: Global Burden of Disease Study; RI survey results

GA – the average annual productivity cost for an individual living with GA is estimated to be €2,634

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4.13 Productivity costs

The average annual productivity cost for an individual in work activity living with GA in Bulgaria amounts to €2,634.

This cost is mainly driven by the productivity costs relating to the individual with GA, accounting for 97.3% (€2,563) of the cost, while the GA caregiver productivity cost accounts for 2.7%, or €71 of the average annual productivity cost (see page 49).

4.13.1 Patient productivity

- GA individual productivity cost variables are outlined in Table 4.31. The average annual salary in Bulgaria is €8,377, with the average annual working hours being 1,605. This results in a productivity per hour value of €5.
- From the RI survey, it is estimated that 100% of individuals with GA are currently in employment.
- 88% of respondents indicated that they have experienced job reduction as a result of GA. With the assumed share of hours lost to be 20%, the average individual productivity cost associated with job reduction as a result of GA amounts to €1,474, as outlined in Table 4.32
- 13% of respondents indicated that they have experienced job loss as a result of GA. The average individual productivity cost associated with job loss is €1,089. As outlined in Table 4.32

Table 4.31 Productivity cost variables

Job loss and job reduction variables	
Average annual salary	€8,377
Average annual working hours	1,605
Productivity per hour	€5
Share of GA individuals in employment	100%

Source: Oxford Economics; RI survey results, EY Analysis

Table 4.32 Impact on individual work activity

	Job reduction	Job loss	**Total cost**
Share reporting impact	88%	13%	
Average individual cost	**€1,474**	**€1,089**	**€2,563**

Source: RI survey results, EY Analysis

Source: Retina International survey results, EY Analysis

GA – the average annual productivity cost for a caregiver of an individual living with GA in Bulgaria is estimated to be €71

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4.13.2 Caregiver productivity

- Table 4.33 outlines the impact GA care duties have had on the caregiver.
- 3% of GA caregivers reported job reduction due to care, with a reported average of 25% of work hours reduced due to care. This results in an average cost of €66. A further 44% of caregivers reported having to provide transport to an average of 2 eye healthcare appointments during work hours, resulting in an average cost of €3 as set out in Table 4.33.
- 31% of GA caregivers provide transport to appointments during non-work hours. With an average travel time of 39.6 minutes (0.66 hours) to 2 appointments, the average annual value of loss of leisure time associated with providing transport during non-work hours is €2 as set out in Table 4.34.

Table 4.33 Impact on caregiver work activity

	Job reduction due to care	Job reduction due to providing transport during work hours	Total cost
Share reporting	25%	44%	
Hours lost due to care	3%		
Productivity per hour	€5	€5	
Average annual working hours	1,605		
# of journeys per year		2	
Average travel time (hrs)		0.66	
Average individual cost	**€66**	**€3**	**€69**

Source: RI survey results, EY Analysis

Table 4.34 Loss of leisure variables

Loss of leisure variables	
Providing transport during non-work hours	31%
# of journeys per annum	2
Average travel time (hrs)	0.66
Value of leisure time	€4
Average individual cost	**€2**

Source: RI survey results, EY Analysis

GA – the overall cost of GA in Bulgaria ranges from €33.24m to €468.24m

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4.14 Total societal cost of GA in Bulgaria

The total cost of GA in Bulgaria ranges from €33.24m in the low prevalence rate scenario to €468.24m in the high prevalence scenario. The mid rate scenario indicates a total cost of €220.54m. Table 4.35

Well-being costs constitutes the majority of the total cost of GA at 88%*. This is driven by the large share of GA patients with low vision (76%), resulting in total well-being cost ranging from €28.47m (low prevalence) to €411.57m (high prevalence). Direct medical costs account for 1.6%, ranging from €0.52m (low prevalence) to €7.45m (high prevalence). Indirect (€1.36m - €19.73m) and productivity (€2.9m - €29.49m) costs account for 4% and 6.7% respectively.

Table 4.35 Overview of total GA costs

		Low prevalence rate	Mid prevalence rate	High prevalence rate
Bulgaria	**Impacted population (GA)**	**1,683**	**11,419**	**24,339**
	GA overall cost	**€33.24m**	**€220.54m**	**€468.24m**
Categories	Direct Cost	€0.52m	€3.5m	€7.45m
	Indirect Cost	€1.36m	€9.26m	€19.73m
	Productivity Cost	€2.9m	€14.69m	€29.49m
	Well-being Cost	€28.47m	€193.1m	€411.57m
Age	Impacted population (GA) – Over 65	600	6,004	13,508
	Average individual cost – Over 65	€18,097	€18,097	€18,097
	Overall cost - Over 65	€10.86m	€108.65m	€244.46m
	Impacted population (GA) – Under 65	1,083	5,416	10,831
	Average individual cost – Under 65	€20,661	€20,661	€20,661
	Overall cost - Under 65	€22.38m	€111.89m	€223.78m

Source: EY Analysis

*Percentages of the breakdown costs are represented at the mid prevalence rate scenario. These may change according to the different scenario rate selected.

Fig. 4.10 GA cost – low prevalence rate (€m)

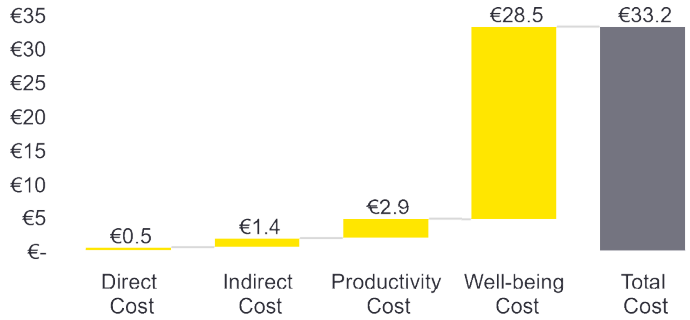


Fig. 4.11 GA cost – mid prevalence rate (€m)

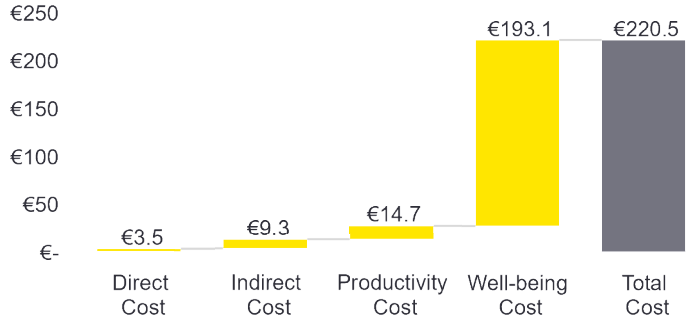
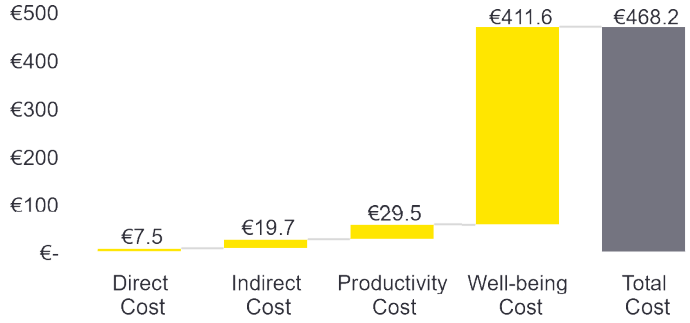


Fig. 4.12 GA cost – high prevalence rate (€m)





5 Germany

Germany – overview and summary results

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This section outlines the analysis and conclusions for Germany, split between nAMD and GA:

- Pages 53-61 set out the findings for nAMD;
- Pages 62-69 set out the findings for GA.

The section presents the findings for each of the following components:

- The prevalence rates for each form of late-stage AMD in Germany and an estimate for the total number of individuals impacted for each of nAMD and GA;
- Overall average economic burden for an individual affected for each of nAMD and GA;
- The average annual direct cost for an individual living with each of nAMD and GA;
- The average annual indirect cost for an individual living with each of nAMD and GA;
- The average annual well-being cost for an individual living with each of nAMD and GA;
- The average annual productivity cost for associated to an individual living with each of nAMD and GA;
- The cost at country level for each of nAMD and GA in Germany.

The average annual individual cost is €24,780 and €22,751 for nAMD and GA respectively. The breakdown by cost category and component is set out opposite and outlined in further detail over the course of this section.

Table 5.1 Breakdown by cost category of Germany costs

	nAMD	GA
Anti-VEGF injection	€4,754	-
Imaging eye exams	€274	€178
Direct cost	**€5,028**	**€178**
Formal care - *Home help*	-	-
Formal care - *Nursing home care*	€427	-
Assistive technology - *Home modifications*	€159	€240
Assistive technology - *Assistive resources*	€1,631	€42
Accident treatment - *Emergency day visits*	-	€1
Accident treatment - *Hospital inpatient stay*	€68	€90
Travel to appointments	€172	€148
Nutraceutical supplements	€450	€230
Indirect cost	**€2,907**	**€751**
Anxiety	€852	€1,598
Depression	€3,359	€5,303
Low vision	€5,593	€10,038
Well-being cost	**€9,804**	**€16,939**
Patient productivity loss - *Patient job reduction**	€5,410	€4,613
Patient productivity loss - *Patient job loss**	€1,112	-
Caregiver productivity loss - *Caregiver job reduction due to care*	€241	-
Caregiver productivity loss - *Caregiver job reduction due to travel*	€140	€38
Caregiver productivity loss - *Caregiver loss of leisure*	€139	€51
Productivity cost	**€7,041**	**€4,702**
Average annual individual cost (under 65 years)	**€24,780**	**€22,571**
Average annual individual cost (over 65 years)	**€18,259**	**€17,958**

Source: EY Analysis

* These costs are not applicable to those over 65 years as stated in the assumptions

nAMD – the prevalence rate of nAMD in Germany ranges between 0.02%-0.2% among under 65s and 0.2% and 5.3% among the over 65s

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5.1 Prevalence of nAMD in Germany

5.1.1 Prevalence of nAMD in under 65s

The prevalence rate of nAMD in under 65s (Figure 5.1) in Germany ranges from 0.02% in the low prevalence rate scenario to 0.2% in the high prevalence rate scenario. The mid prevalence rate scenario accounts for 0.1% of the population.

The total population, obtained from Eurostat, in Germany is 83,166,711 of which 65,119,535 are under 65 years. As a result the total impacted population ranges from 13,024 to 130,239, as outlined in Table 5.2.

5.1.2 Prevalence of nAMD in over 65s

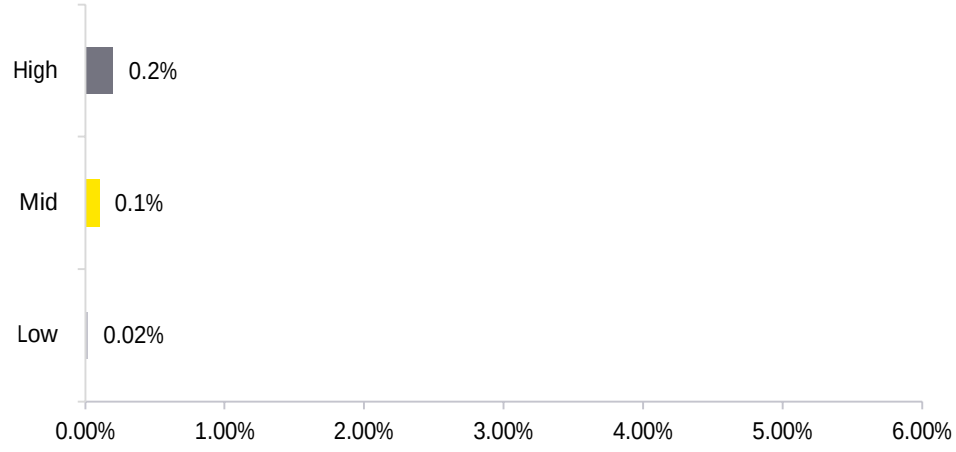
The prevalence rate of nAMD in over 65s (Figure 5.2) in Germany ranges from 0.2% in the low prevalence rate scenario to 5.3% in the high prevalence rate scenario. The mid prevalence rate scenario accounts for 0.7% of the population.

The total population in Germany is 83,166,711 of which 18,047,176 are over 65 years. As a result the total impacted population ranges from 31,583 to 947,477, as outlined in Table 5.2.

Table 5.2 Total nAMD impacted population

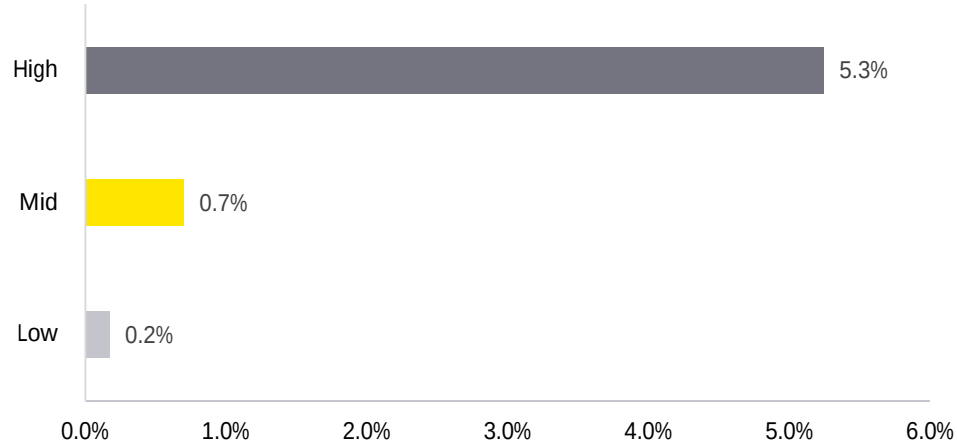
	Low prevalence rate	Mid prevalence rate	High prevalence rate
Under 65 years	13,024	65,120	130,239
Over 65 years	31,583	126,330	947,477
Total	**44,607**	**191,450**	**1,077,716**

Fig. 5.1 Prevalence rate, under 65 years (nAMD)



Source: Li et al. (2019); Klein et al. (2011); Klein & Klein (2013); Frost & Sullivan (2017); EY Elaboration

Fig 5.2 Prevalence rate, over 65 years (nAMD)



Source: Li et al. (2019); Klein et al. (2011); Klein & Klein (2013); Frost & Sullivan (2017); EY Elaboration

nAMD – the average annual cost for an individual living with nAMD in Germany is €24,780

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5.2 Overall cost at individual level

The overall average economic burden for an individual living with nAMD in Germany amounts to €24,780, if they are still in the labour force (under 65 years). This cost is mainly driven by well-being costs, accounting for 40%, or €9,804, of overall cost at individual level. This is followed by productivity and direct medical costs, accounting for 28% (€7,041) and 20% (€5,028), respectively. Indirect medical costs account for 12%, or €2,907. This breakdown is illustrated in Figure 5.3.

Considering the assumption of retirement for people over 65, the average cost for the over 65 cohort is €18,529, as the productivity cost amounts for the caregiver component only.

5.3 Direct medical cost

The average annual direct cost for an individual living with nAMD in Germany amounts to €5,028.

This cost is made up of 4% attributed to diagnostic and routine eye imaging exams, amounting to €274, and 96% attributed to intervention Anti-VEGF injection costs, amounting to €4,754.

5.3.1 Anti-VEGF injection

- The main Anti-VEGF costs used to treat nAMD in Germany are illustrated in Table 5.3. In Germany, the most commonly used therapy is Avastin (50%), followed by Eylea (20%) and Lucentis (17%). Beovu has a share use of 13%.
- Observations from the RI survey results outline that 94% of the nAMD respondents in Germany have had a surgical procedure to treat their condition. The average number of procedures the respondents have had in the past year is 6.8, as outlined in Table 5.4.
- The average cost of intervention therapy per eye amounts to €559, and the average number of treatments per year of an individual living with nAMD according to RI survey is 6.8. This results in an average annual cost of €4,754, as referenced to in Table 5.4.

Fig. 5.3 Breakdown of under 65 overall cost, (nAMD)

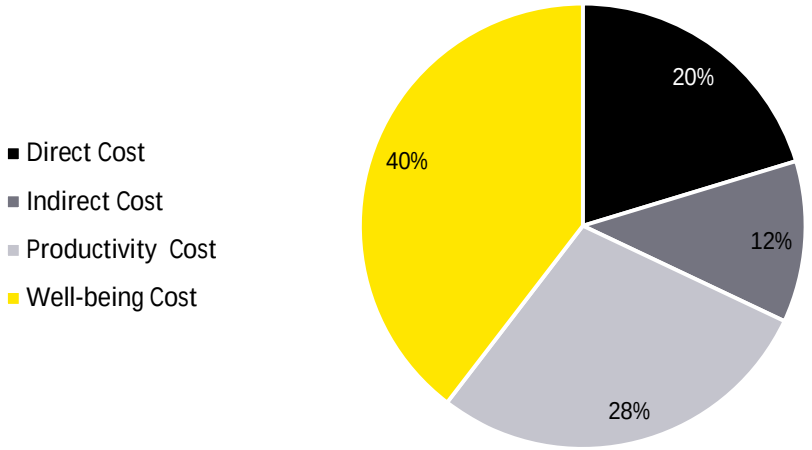


Table 5.3 Unitary Anti-VEGF injection costs

Anti-VEGF	Unitary cost	% share use
Lucentis	€1,017	17%
Eylea	€920	20%
Beovu	€1,415	13%
Avastin	€37	50%

Source: GlobalData (Age-Related Macular Degeneration Market Analysis 2018–2028)

Table 5.4 Average annual Anti-VEGF injection costs

	Annual costs
Average cost of Anti-VEGF per eye	€559
# of treatment (p/a)	6.8
Average number of eye treated	1.25
Average individual cost	**€4,754**

Source: RI survey; EY Analysis

nAMD – the average annual direct medical cost for an individual living with nAMD in Germany is €5,028

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- These are flat costs of services in the public outpatient sector regulated in the EBM (German Uniform Evaluation Standard) catalogue which is updated each quarter.[40]

5.3.2 Imaging eye exams

- The main type of diagnostic and routine eye exams sustained by an individual affected by nAMD, the unitary cost, and mean number of visits required, which are illustrated in Table 5.5.
- The weighted average cost of these imaging eye exams amounts to €31. RI survey respondents living with nAMD have indicated the average number of eye care appointments is 8.8. This results in the average annual cost at individual level of imaging eye exams to be €274, as illustrated in Table 5.6.

Table 5.5 Unitary cost of imaging eye exams

Type of procedure	Unitary clinical costs
Visual Field testing	€17
Fundus Photography	€14
Optical coherence tomography	€45
Fluorescein angiography	€49

Source: German EBM Catalogue 2021

Table 5.6 Average annual cost of imaging eye exams

	Annual clinical costs
Average cost of eye exam	€31
# of eye care visits (p/a)	8.8
Average individual cost	**€274**

Source: RI Survey; EY Analysis

nAMD – indirect medical costs amount to €2,907 per year for an individual living with nAMD

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5.4 Indirect medical cost

The average annual indirect cost for an individual living with nAMD in Germany amounts to €2,907.

This cost is made up 62% attributed to device costs amounting to €1,790, 15% each is attributed to formal care (€427) and nutraceutical supplements (€450), while 6% and 2% is attributed to travel costs (€172) and accident treatment costs (€68), respectively.

5.4.1 Formal care

- The annual cost of formal home help care is €13,726. However, 0% of nAMD respondents in the RI survey indicate that they receive formal home help care (Table 5.7).
- The annual cost of nursing home care in Germany is €14,249. The share of nAMD respondents from the RI survey indicating they are in a nursing home is 3%. This results in an average annual nursing home cost of €427 (Table 5.7).

5.4.2 Assistive technology

- Respondents from the RI survey indicate if they have had to invest in home modifications and utilised assistive resources to support living with nAMD. Respondents also indicate their annual spend on such aids as illustrated in Table 5.9.
- Average annual spend of nAMD respondents in home modifications is €994, with 16% indicating they have invested in home modifications. This results in an average individual cost of €159.
- 55% of nAMD respondents utilise assistive resources, with an average annual spend of €2,965. this results in an average individual cost of €1,631. Table 5.9. Unitary costs of glasses and low vision aids are referenced in Table 5.8.

Table 5.7 Annual formal caregiver service costs

	Home help	Nursing home care	**Total formal care cost**
Annual cost	€13,726	€14,249	
Share use	0%	3%	
Average individual cost	**€0**	**€427**	**€427**

Source: Ministry of Health, Germany; RI Survey results, EY Analysis

Table 5.8 Unit cost of glasses and other low vision aids

Glasses	Magnifier	Software
€744	€35	€110

Source: Seh Kraft Optik; Sehhelfer

Table 5.9 Annual device costs

	Home modifications	Assistive resources	**Total device cost**
Average annual spend	€994	€2,965	
Share use	16%	55%	
Average individual cost	**€159**	**€1,631**	**€1,790**

Source: RI Survey results, EY Analysis

nAMD – average annual expenditure on nutraceutical supplements amounts to €450

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5.4.3 Accident treatment

According to the RI survey results, 19% of nAMD respondents reported an accident in the past year in Germany. Respondents reported an average of 0.3 accidents.

- As the respondents from the RI survey didn't report any falls, a rate from research conducted in Germany was considered[28]. The study indicates that 6% of accidents as result of AMD required medical treatment. We assumed the 6% to be an ED visit and applied the pro-rata approach adopting US ED/hospital stay data, to calculate the percentage of hospital inpatient stay in Germany. This resulted in the share requiring a hospital inpatient stay to be 14%, as outlined in Table 5.10.
- The average individual cost of ED visit is then €0.39, and the cost of hospital inpatient stay is €68, as outlined in Table 5.10.
- The annual cost of accident treatment at individual level is €68 as reported in Table 5.10.

5.4.4 Travel to appointments

- The average travel cost per hour is €12 in Germany and is obtained from Values of Travel Time in Europe: review and meta-analysis[41]
- From the RI survey, nAMD respondents indicate that they attend an average of 8.8 appointments per year and average hourly travel time to these appointments is 1.58 hours, as outlined in Table 5.11.
- Average individual travel cost amounts to €172.

5.4.5 Nutraceutical supplements

Average annual expenditure on nutraceutical supplements is obtained from the RI survey and amounts to €450 for individuals living with nAMD in Germany. See Table 5.12

Table 5.10 Annual cost of accident treatment

		Emergency day visit	Hospital inpatient stay	Total accident cost
Cost		€22	€1,612	
% requiring treatment		6%	14%	
# of accidents	0.3			
Average individual cost		**€0.39**	**€68**	**€68**

Source: Cruess at al.; EBM Catalogue Germany; Cruess et al.; RI Survey results, EY Analysis

Table 5.11 Travel cost variables

Travel cost variables	
Travel time to appointment (hrs)	1.58
# of appointments per annum	8.8
Travel cost per hour	€12
Average individual cost	**€172**

Source: Wardman et al.; RI Survey results, EY Analysis

Table 5.12 Nutraceutical supplements

Nutraceutical supplements	
Average individual cost	**€450**

Source: RI Survey results, EY Analysis

nAMD – well-being costs account for the largest proportion of total costs (40%), amounting to €9,804

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5.5 Well-being

The average annual well-being cost for an individual living with nAMD in Germany amounts to €9,804. Table 5.14

This cost is made up of 57%, or €5,593 attributed to low vision, 34%, or €3,359 attributed to depression, and 9%, or €852 attributed to anxiety.

5.5.1 Willingness-to-pay for a year of full health QALY

In Germany, a recent study[42] ,which compares the monetary cost of health interventions to the associated health consequences, applied the well-being valuation approach to calculate a monetary value of a QALY. The estimated monetary values range from €20,000 to €60,000, while the baseline calculation provided an average monetary valuation value of €58,533 as reported in Table 5.13.

5.5.2 Anxiety

16% of nAMD respondents in the RI survey have indicated that their condition has led them to experience anxiety.

5.5.3 Depression

Among the respondents living with nAMD in Germany, 19% reported experiencing depression as a result of their condition.

5.5.4 Low vision

According to the RI survey, 39% of those living with nAMD in Germany report having low vision.

Table 5.13 QALY value

Local QALY values	
Willingness-to-pay	€58,533

Source: Himmler et al.

Table 5.14 Well-being variables

	Anxiety	Depression	Low vision	Total Cost
DALY	0.091	0.302	0.245	
% reporting	16%	19%	39%	
Average individual cost	**€852**	**€3,359**	**€5,593**	**€9,804**

Source: Global Burden of Disease Study; RI survey results

nAMD – the average annual productivity cost associated to an individual living with nAMD in Germany amounts to €7,041

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5.6 Productivity costs

The average annual productivity cost for an individual in work activity living with nAMD in Germany amounts to €7,041.

This cost is mainly driven by the productivity costs relating to the individual with nAMD, accounting for 93% (or €6,521) of the cost, while the nAMD caregiver cost accounts 7%, or €520 of the average annual productivity cost (see page 60).

5.6.1 Patient productivity

- nAMD individual productivity cost variables are outlined in Table 5.15. The average annual salary in Germany is €37,052, with the average annual working hours being 1,332. This results in a productivity per hour value of €28.
- From the RI survey, it is estimated that 100% of individuals with nAMD are currently in employment.
- 73% of respondents indicated that they have experienced job reduction as a result of nAMD. With the assumed share of hours lost to be 20%, the average individual productivity cost associated with job reduction as a result of nAMD amounts to €5,410, as outlined in Table 5.16.
- 3% of respondents indicated that they have experienced job loss as a result of nAMD. The average individual productivity cost associated with job loss is €1,112, as outlined in Table 5.16.

Table 5.15 Productivity cost variables

Job loss and job reduction variables	
Average annual salary	€37,052
Average annual working hours	1,332
Productivity per hour	€28
Share of nAMD individuals in employment	100%

Source: Oxford Economics; RI survey results, EY Analysis

Table 5.16 Impact on individual work activity

	Job reduction	Job loss	Total cost
Share reporting impact	73%	3%	
Average individual cost	**€5,410**	**€1,112**	**€6,522**

Source: RI survey results, EY Analysis

nAMD – the average annual productivity cost for a caregiver of an individual living with nAMD in Germany is estimated to be €520

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5.6.2 Caregiver productivity

- Table 5.17, outlines the impact nAMD care duties have had on the caregiver.
- 13% of GA caregivers reported job reduction due to care, with a reported average of 5% of work hours reduced due to care. This results in an average cost of €241. A further 27% of caregivers reported having to provide transport to an average of 11 eye healthcare appointments during work hours, resulting in an average cost of €140 (see Table 5.17).
- 60% of nAMD caregivers provide transport to appointments during non-work hours. With an average travel time of 1.71hrs to 11 appointments, the average annual value of loss of leisure time associated with providing transport during non-work hours is €139 as set out in Table 5.18.

Table 5.17 Impact on caregiver work activity

	Job reduction due to care	Job reduction due to providing transport during work hours	**Total cost**
Share reporting	13%	27%	
Hours lost due to care	5%		
Productivity per hour	€28	€28	
Average annual working hours	1,332		
# of journeys per year		11	
Average travel time (hrs)		1.71	
Average individual cost	**€241**	**€140**	**€381**

Source: RI survey results, EY Analysis

Table 5.18 Loss of leisure variables

Loss of leisure variables	
Providing transport during non-work hours	60%
# of journeys per annum	11
Average travel time (hrs)	1.71
Value of leisure time	€12
Average individual cost	**€139**

Source: RI survey results, EY Analysis

nAMD - overall cost of nAMD in Germany ranges from €899.4m to €20.53bn

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5.7 Total societal cost of nAMD in Germany

The total cost of nAMD in Germany ranges from €899.4m in the low prevalence rate scenario to €20.53bn in the high prevalence scenario. The mid rate scenario indicates a total cost of €3.92bn as outlined in Table 5.19.

Well-being costs constitutes the majority of the total cost of nAMD at 48%*. This is driven by low vision cost, which accounts for 57% of the well-being cost, resulting in total well-being cost ranging from €437.31 (low prevalence) to €10.57bn (high prevalence). Direct costs account for 25%, ranging from €224.3m (low prevalence) to €5.42bn (high prevalence). Indirect costs (€129.69m - €3.13bn) and productivity costs (€108.1m - €1.41bn) account for 14% and 13%, respectively.

Table 5.19 Overview of total nAMD costs

		Low prevalence rate	Mid prevalence rate	High prevalence rate
Germany	**Impacted population (nAMD)**	**44,606**	**191,450**	**1,077,716**
	nAMD overall cost	**€899.4m**	**€3.92bn**	**€20.53bn**
Categories	Direct Cost	€224.3m	€962.68m	€5.42bn
	Indirect Cost	€129.69m	€556.62m	€3.13bn
	Productivity Cost	€108.1m	€524.11m	€1.41bn
	Well-being Cost	€437.31m	€1.88bn	€10.57bn
Age	Impacted population (nAMD) – Over 65	31,583	126,330	947,477
	Individual cost - over 65	€18,259	€18,259	€18,259
	Overall cost - Over 65	€576.66m	€2.31bn	€17.3bn
	Impacted population (nAMD) – Under 65	13,024	65,120	130,239
	Individual cost - under 65	€24,780	€24,780	€24,780
	Overall cost - Under 65	€322.73m	€1.61bn	€3.23bn

Source: EY Analysis

*Percentages of the breakdown costs are represented at the mid prevalence rate scenario. These may change according to the different scenario rate selected.

Fig. 5.4 nAMD cost – low prevalence rate (€m)

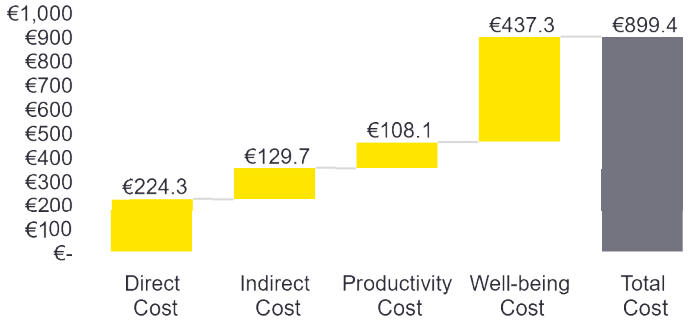


Fig. 5.5 nAMD cost – mid prevalence rate (€m)

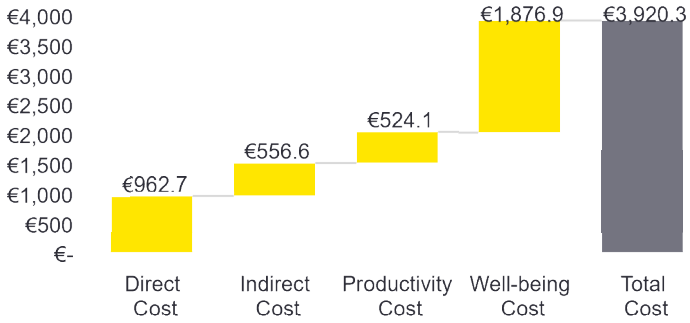
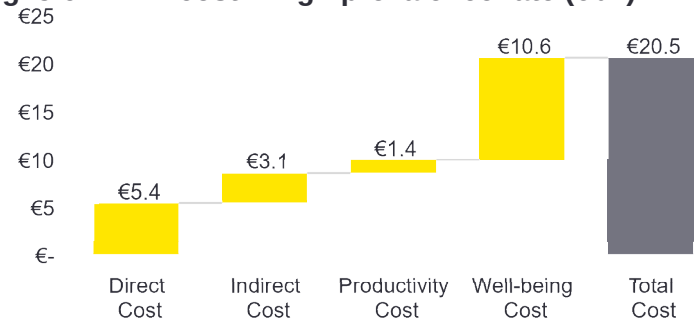


Fig. 5.6 nAMD cost – high prevalence rate (€bn)



GA – the prevalence of GA in Germany ranges between 0.02%-0.2% among under 65s and 0.07% and 1.6% among the over 65s

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5.8 Prevalence of GA in Germany

5.8.1 Prevalence of GA in under 65s

The prevalence rate of GA in under 65s in Germany ranges from 0.02% in the low prevalence rate scenario to 0.2% in the high prevalence rate scenario. The mid prevalence rate scenario accounts for 0.1% of the population (see Figure 5.7).

The total population, obtained from Eurostat, in Germany is 83,166,711 of which 65,199,535 are under 65 years. As a result the total impacted population ranges from 13,024 to 130,239, as outlined in Table 5.20.

5.8.2 Prevalence of GA in over 65s

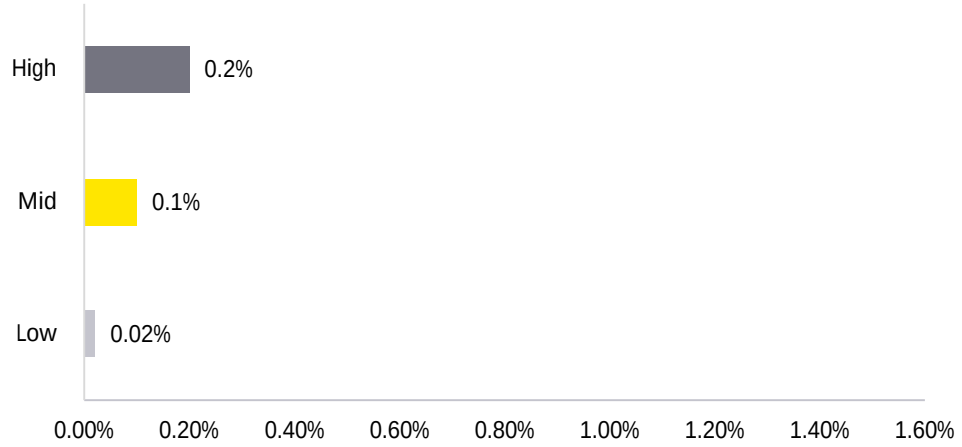
The prevalence rate of GA in over 65s in Germany ranges from 0.07% in the low prevalence rate scenario to 1.6% in the high prevalence rate scenario. The mid prevalence rate scenario accounts for 0.7% of the population (see Figure 5.8).

The total population in Germany is 83,166,711 of which 18,047,176 are over 65 years. As a result the total impacted population ranges from 12,633 to 284,243, as outlined in Table 5.20.

Table 5.20 Total GA impacted population

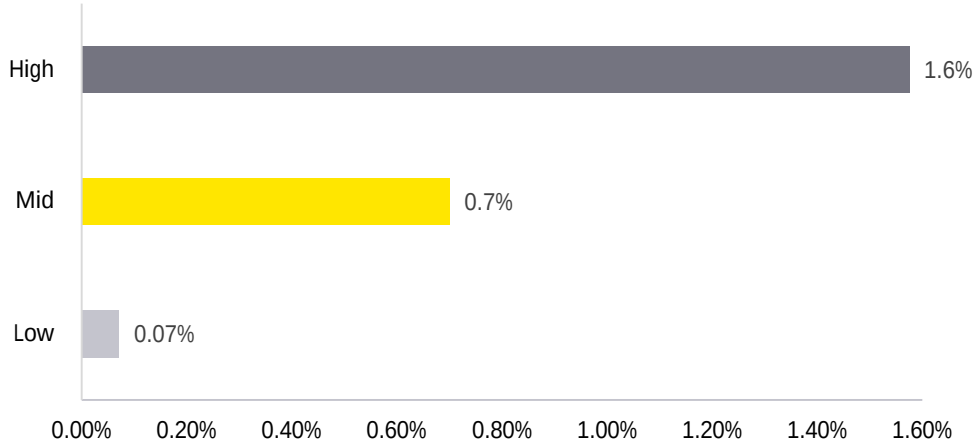
	Low prevalence rate	Mid prevalence rate	High prevalence rate
Under 65 years	13.024	65,120	130,239
Over 65 years	12,633	126,330	284,243
Total	**25,657**	**191,450**	**414,482**

Fig. 5.7 Prevalence rate, under 65 years (GA)



Source: Li et al. (2019); Klein et al. (2011); Klein & Klein (2013); Frost & Sullivan (2017); EY Elaboration

Fig 5.8 Prevalence rate, over 65 years (GA)



Source: Li et al. (2019); Klein et al. (2011); Klein & Klein (2013); Frost & Sullivan (2017); EY Elaboration

GA – average cost for an individual living with GA in Germany is €22,571

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5.9. Overall cost at individual level

The overall average economic burden for an individual living with GA in Germany amounts to €22,571, if they are still in the labour force (under 65 years). This cost is mainly driven by well-being, accounting for 75%, or €16,939, of the overall cost at individual level (under 65 years). This is followed by productivity costs, accounting for 21%, or €4,702. Indirect medical costs account for 3% (€751) and direct medical costs account for 1% (€178) of the overall cost for the under 65 years age group. This breakdown is illustrated in Figure 5.9

Considering the assumption of retirement for people over 65, the average cost for the over 65 cohort is €17,958, as the productivity cost amounts for the caregiver component only.

5.10 Direct medical cost

The average annual direct cost for an individual living with GA in Germany amounts to €178.

This cost is only made up of imaging eye exams as Anti-VEGF injections or other treatments are currently unavailable for those with GA.

5.10.1 Imaging eye exams

- The main type of diagnostic and routine eye exams sustained by an individual affected by GA and the unitary cost, are illustrated in Table 5.21.
- The weighted average cost of these imaging eye exams amounts to €31. RI survey respondents living with GA have indicated the average number of eye care appointments is 5.7. This results in the average annual cost at individual level of imaging eye exams to be €178 as illustrated in Table 5.22.

Fig. 5.9 Breakdown of under 65 overall cost, (GA)

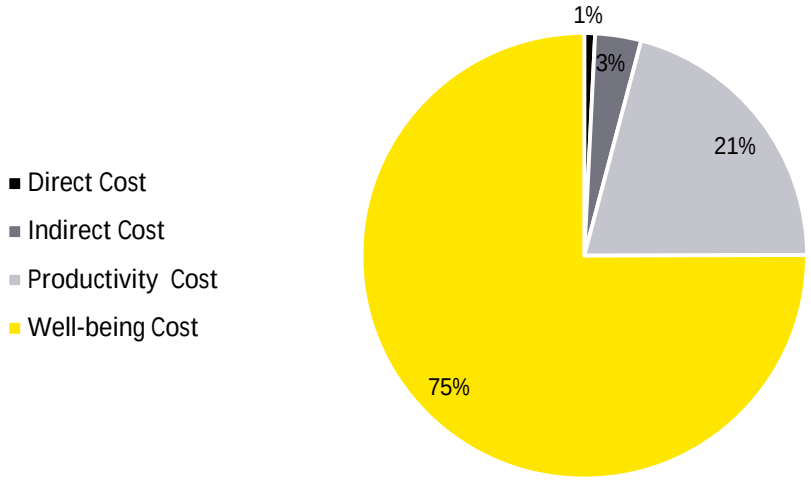


Table 5.21 Unitary cost of imaging eye exams

Type of procedure	Unitary clinical costs
Visual Field testing	€17
Fundus Photography	€14
Optical coherence tomography	€45
Fluorescein angiography	€49

Source: German EBM Catalogue 2021

Table 5.22 Average annual cost of imaging eye exams

	Annual clinical costs
Average cost of eye exam	€31
# of eye care visits (p/a)	5.7
Average annual clinical cost	**€178**

Source: RI Survey; EY Analysis

GA – average annual individual cost associated with indirect costs amounts to €751

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5.11 Indirect medical cost

The average annual indirect cost for an individual living with GA in Germany amounts to €751.

This cost is made up 37% attributed to device costs amounting to €282, 31% is attributed to nutraceutical supplements (€230), 20% is attributed to travel costs (€148), and 12% is attributed to accident treatment (€91).

5.11.1 Formal care

- As no GA respondents in the RI survey reported the use of formal care facilities, there is €0 attributed to this cost. See Table 5.23

5.11.2 Assistive technology

- Respondents from the RI survey indicate if they have had to invest in home modifications and utilise assistive resources to support living with GA. Respondents also indicate their annual spend on such aids as illustrated in Table 5.25.
- Average annual spend of GA respondents in home modifications is €480, with 50% indicating they have invested in home modifications. This results in an average individual cost of €240 as in Table 5.25.
- 60% of GA respondents utilise assistive resources, with an average annual spend of €70. This results in an average individual cost of €42. Unitary costs of glasses and low vision aids are referenced in Table 5.25.

5.11.3 Accident treatment

- According to the RI survey results, respondents reported an average of 0.4 accidents a year, referenced in Table 5.26.
- As the respondents from the RI survey didn't report any falls, a rate from research conducted in Germany was considered28. The study indicates that 6% of accidents as result of AMD required medical treatment. We assumed the 6% to be an ED visit and applied the pro-rata approach adopting the US ED/hospital stay data, to calculate the percentage hospital inpatient stay in Germany. This resulted in the share requiring a hospital inpatient stay to be 14%.

Table 5.23 Annual formal caregiver service costs

	Home help	Nursing home care	Total formal care cost
Annual cost	€13,726	€14,249	
Share use	0%	0%	
Average individual cost	**€0**	**€0**	**€0**

Source: Ministry of Health, Germany; RI Survey results, EY Analysis

Table 5.24 Unit cost of glasses and other low vision aids

Glasses	Magnifier	Software
€744	€35	€110

Source: Seh Kraft Optik; Sehhelfer

Table 5.25 Annual device costs

	Home modifications	Assistive resources	Total device cost
Average annual spend	€480	€70	
Share use	50%	60%	
Average individual cost	**€240**	**€42**	**€282**

Source: RI Survey results, EY Analysis

Table 5.26 Annual cost of accident treatment

		Emergency day visit	Hospital inpatient stay	Total accident cost
Cost		€22	€1,612	
% requiring treatment		6%	14%	
# of accidents	0.4			
Average individual cost		**€1**	**€90**	**€91**

Source: Cruess et al.; EBM Catalogue Germany; RI Survey results, EY Analysis

GA – average annual expenditure on nutraceutical supplements amounts to €230

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- The 6% required ED visit results in a cost of €1, while the 14% requiring a hospital inpatient stay results in a cost of €90, as outlined in Table 5.26.
- The annual cost of accident treatment at individual level is €91 as reported in Table 5.26.

5.11.4 Travel to appointments

- The average travel cost per hour is €12 in Germany and is obtained from Values of Travel Time in Europe: Review and Meta-Analysis[41].
- From the RI survey, GA respondents indicate that they attend an average of 5.7 appointments per year and average hourly travel time to these appointments is 2.1 hours, as outlined in Table 5.27.
- The average individual travel cost is €148.

5.11.5 Nutraceutical supplements

Average annual expenditure on nutraceutical supplements is obtained from the RI survey and amounts to €230 for individuals living with GA in Germany, as outlined in Table 5.28.

Table 5.27 Travel cost variables

Travel cost variables	
Travel time to appointment (hrs)	2.1
# of appointments per annum	5.7
Travel cost per hour	€12
Average individual cost	**€148**

Source: Wardman et al.; RI Survey results, EY Analysis

Table 5.28 Nutraceutical supplements

Nutraceutical supplements	
Average individual cost	**€230**

Source: RI Survey results, EY Analysis

GA – average well-being cost associated to a individual living with GA in Germany is €16,939

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5.12 Well-being

The average annual well-being cost for an individual living with GA in Germany amounts to €16,939.

This cost is made up of 59%, or €10,038 attributed to low vision, 31%, or €5,303 attributed to depression, and 9%, or €1,598 attributed to anxiety, as outlined in Table 5.30.

5.12.1 Willingness-to-pay for full health QALY:

In Germany, a recent study[42], which compares the monetary cost of health interventions to the associated health consequences, applied the well-being valuation approach to calculate a monetary value of a QALY. The estimated monetary values range from €20,000 to €60,000. The baseline calculation provided an average monetary valuation of a QALY of €58,533.

5.12.2 Anxiety

30% of GA respondents in the RI survey have indicated that their condition has led them to experience anxiety.

5.12.3 Depression

Among the respondents living with GA in Germany, 30% reported experiencing depression as a result of their condition.

5.12.4 Low vision

According to the RI survey, 70% of those living with GA in Germany report having low vision.

Table 5.29 QALY value

Local QALY values	
Willingness-to-pay	€58,533

Source: Himmler et al.

Table 5.30 Well-being variables

	Anxiety	Depression	Low vision	Total Cost
DALY	0.091	0.302	0.245	
% reporting	30%	30%	70%	
Average individual cost	**€1,598**	**€5,303**	**€10,038**	**€16,939**

Source: Global Burden of Disease Study; RI survey results

GA – average annual productivity cost for a patient affected by GA in Germany is €4,613

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5.13 Productivity costs

The average annual productivity cost for an individual in work activity living with GA in Germany amounts to €4,702.

This cost is mainly driven by the productivity costs relating to the individual with GA, accounting for 98% (€4,613) of the cost, while the GA caregiver productivity cost accounts for 2%, or €89 of the average annual productivity cost (see page 68).

5.13.1 Patient productivity

- GA individual productivity cost variables are outlined in Table 5.31. The average annual salary in Germany is €37,052, with the average annual working hours being 1,332. This results in a productivity per hour value of €28.
- From the RI survey, it is estimated that 83% of individuals with GA are currently in employment.
- 75% of respondents indicated that they have experienced job reduction as a result of GA. With the assumed share of hours lost to be 20%, the average individual productivity cost associated with job reduction as a result of GA amounts to €4,613 as reported in Table 5.32.
- 0% of respondents indicated that they have experienced job loss as a result of GA and therefore, the average individual productivity cost associated with job loss is €0, as reported in Table 5.32.

Table 5.31 Productivity cost variables

Job loss and job reduction variables	
Average annual salary	€37,052
Average annual working hours	1,332
Productivity per hour	€28
Share of GA individuals in employment	83%

Source: Oxford Economics; RI survey results, EY Analysis

Table 5.32 Impact on individual work activity

	Job reduction	Job loss	**Total cost**
Share reporting impact	75%	0%	
Average individual cost	**€4,613**	**€0**	**€4,613**

Source: RI survey results, EY Analysis

GA – the average annual productivity cost for a caregiver of an individual living with GA in Germany is estimated to be €99

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5.13.2 Caregiver productivity

- Table 5.33 outlines the impact GA care duties have had on the caregiver.
- However, 20% of caregivers reported having to provide transport to an average of 4 eye healthcare appointments during work hours, resulting in an average cost of €38, shown in Table 5.33.
- 60% of GA caregivers provide transport to appointments during non-work hours. With an average travel time of 1.71hrs to 4 appointments, the average annual value of loss of leisure time associated with providing transport during non-work hours is €51 shown in Table 5.34.

Table 5.33 Impact on caregiver work activity

	Job reduction due to care	Job reduction due to providing transport during work hours	**Total cost**
Share reporting	0%	20%	
Hours lost due to care	0%		
Productivity per hour	€28	€28	
Average annual working hours	1,332		
# of journeys per year		4	
Average travel time (hrs)		1.71	
Average individual cost	**€0**	**€38**	**€38**

Source: RI survey results, EY Analysis

Table 5.34 Loss of leisure variables

Loss of leisure variables	
Providing transport during non-work hours	60%
# of journeys per annum	4
Average travel time (hrs)	1.71
Value of leisure time	€12
Average individual cost	**€51**

Source: RI survey results, EY Analysis

GA – the overall cost of GA in Germany ranges from €520.44m to €8.04bn

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5.14 Total societal cost of GA in Germany

The total cost of GA in Germany ranges from €520.44m in the low prevalence rate scenario to €8.04bn in the high prevalence scenario. The mid rate scenario indicates a total cost of €3.73bn, as outlined in Table 5.35.

Well-being costs constitutes the majority of the total cost of GA at 87%*. This is driven by low vision cost, which accounts for 59% of the well-being cost, resulting in total well-being cost ranging from €434.24m (low prevalence) to €7.01bn (high prevalence). Productivity costs account for 8%, ranging from €62.36m to €637.65m. Indirect costs account for 4% (€19.28m - €311.46m), and direct costs account for 1% (€4.56m - €73.65m).

Table 5.35 Overview of total GA costs

		Low prevalence rate	Mid prevalence rate	High prevalence rate
Germany	**Impacted population (GA)**	**25,657**	**191,450**	**414,482**
	GA overall cost	**€520.44m**	**€3.73bn**	**€8.04bn**
Categories	Direct Cost	€4.56m	€34.02m	€73.65
	Indirect Cost	€19.28m	€143.87m	€311.46m
	Productivity Cost	€62.36m	€317.42m	€637.65m
	Well-being Cost	€434.24m	€3.24bn	€7.01bn
Age	Impacted population (GA) – Over 65	12,633	126,330	284,243
	Average individual cost – Over 65	€17,958	€17,958	€17,958
	Overall cost - Over 65	€226.48m	€2.26bn	€5.01bn
	Impacted population (GA) – Under 65	13,024	65,120	130,239
	Average individual cost – Under 65	€22,571	€22,571	€22,571
	Overall cost - Under 65	€293.96m	€1.47bn	€2.94bn

Source: EY Analysis

Fig. 5.10 GA cost – low prevalence rate (€m)

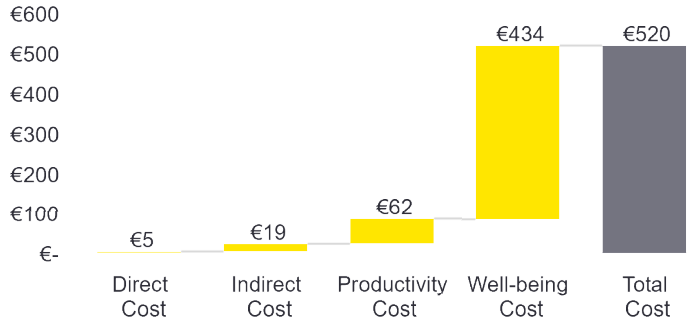


Fig. 5.11 GA cost – mid prevalence rate (€m)

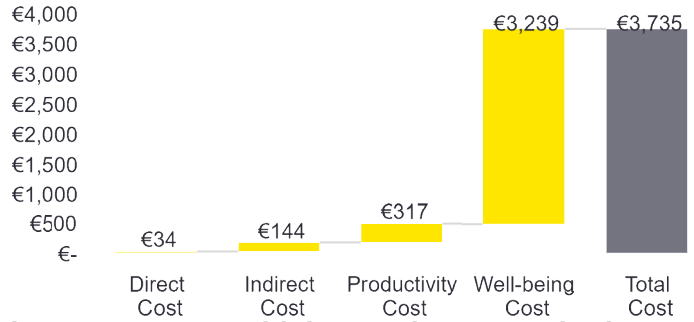
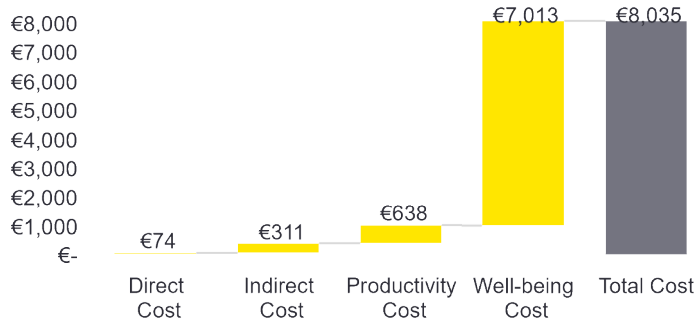


Fig. 5.12 GA cost – high prevalence rate (€m)



*Percentages of the breakdown costs are represented at the mid prevalence rate scenario. These may change according to the different scenario rate selected.


6
USA

USA – overview and summary results

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This section outlines the analysis and conclusions for USA, split between nAMD and GA:

- Pages 72-80 set out the findings for nAMD;
- Pages 81-88 set out the findings for GA.

The section presents the findings for each of the following components:

- The prevalence rates for each form of late-stage AMD in USA and an estimate for the total number of individuals impacted for each of nAMD and GA;
- Overall average economic burden for an individual affected for each of nAMD and GA;
- The average annual direct cost for an individual living with each of nAMD and GA;
- The average annual indirect cost for an individual living with each of nAMD and GA;
- The average annual well-being cost for an individual living with each of nAMD and GA;
- The average annual productivity cost for associated to an individual living with each of nAMD and GA;
- The cost at country level for each of nAMD and GA in USA.

The average annual individual cost is €66,376 and €48,326 for nAMD and GA respectively. The breakdown by cost category and component is set out opposite and outlined in further detail over the course of this section.

Table 6.1 Breakdown by cost category of USA costs

	nAMD	GA
Anti-VEGF injection	€8,214	-
Imaging eye exams	€868	€327
Direct cost	**€9,082**	**€327**
Formal care - *Home help*	€1445	-
Formal care - *Nursing home care*	-	€6,106
Assistive technology - *Home modifications*	€504	€102
Assistive technology - *Assistive resources*	€929	€1105
Accident treatment - *Emergency day visits*	€71	-
Accident treatment - *Hospital inpatient stay*	-	€4,936
Travel cost to appointments	€67	€52
Nutraceutical supplements	€363	€436
Indirect cost	**€3,378**	**€12,736**
Anxiety	€2,115	€1,995
Depression	€6,224	€4,900
Low vision	€5,372	€5,049
Well-being cost	**€13,711**	**€11,944**
Patient productivity loss - *Patient job reduction**	€4,666	€1,486
Patient productivity loss - *Patient job loss**	€34,995	€19,107
Caregiver productivity loss - *Caregiver job reduction due to care*	€297	€2,625
Caregiver productivity loss - *Caregiver job reduction due to travel*	€244	€71
Caregiver productivity loss - *Caregiver loss of leisure*	€3	€31
Productivity cost	**€40,206**	**€23,319**
Average annual individual cost (under 65 years)	**€66,376**	**€48,326**
Average annual individual cost (over 65 years)	**€26,715**	**€27,733**

Source: EY Analysis

* These costs are not applicable to those over 65 years as stated in the assumptions

nAMD – the prevalence rate of nAMD in the USA ranges between 0.02%-0.2% among under 65s and 0.1%-3% among the over 65s

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6.1 Prevalence of nAMD in the USA

6.1.1 Prevalence of nAMD in under 65s

The prevalence rate of nAMD in under 65s (Figure 6.1) in the USA ranges from 0.02% of the low prevalence rate scenario to 0.2% of the high prevalence rate scenario. The mid prevalence rate scenario accounts for 0.1% of the population as shown in Figure 6.1.

The total population, obtained from Statista, in USA is 328,230,000 of which 274,160,000 are under 65 years. As a result the total impacted population ranges from 54,832 to 548,320, as outlined in Table 6.2.

6.1.2 Prevalence of nAMD in over 65s

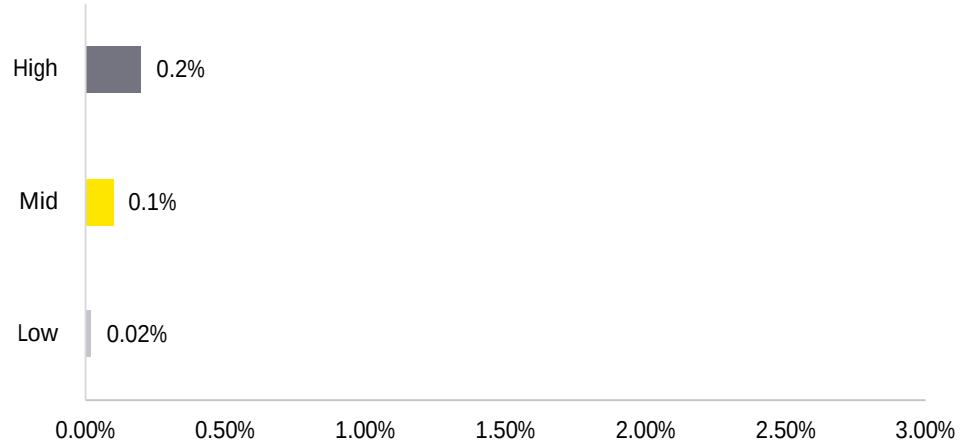
The prevalence rate of nAMD in over 65s (Figure 6.2) in the USA ranges from 0.1% of the low prevalence rate scenario to 3% of the high prevalence rate scenario. The mid prevalence rate scenario accounts for 0.4% of the population (see Figure 6.2).

The total population in USA is 328,230,000 of which 54,070,000 are over 65 years. As a result the total impacted population ranges from 54,070 to 1,622,100, as outlined in Table 6.2.

Table 6.2 Total nAMD impacted population

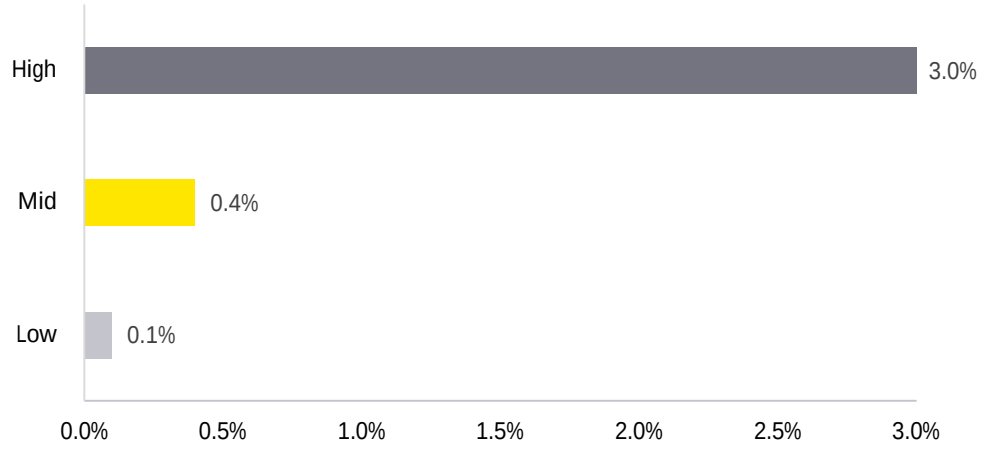
	Low prevalence rate	Mid prevalence rate	High prevalence rate
Under 65 years	54,832	274,160	548,320
Over 65 years	54,070	216,280	1,622,100
Total	**108,902**	**490,440**	**2,170,420**

Fig. 6.1 Prevalence rate, under 65 years (nAMD)



Source: Li et al. (2019); Klein et al. (2011); Klein & Klein (2013); Frost & Sullivan (2017); EY Elaboration

Fig. 6.2 Prevalence rate, over 65 years (nAMD)



Source: Li et al. (2019); Klein et al. (2011); Klein & Klein (2013); Frost & Sullivan (2017); EY Elaboration

nAMD – average annual cost for an individual living with nAMD in USA is €66,376

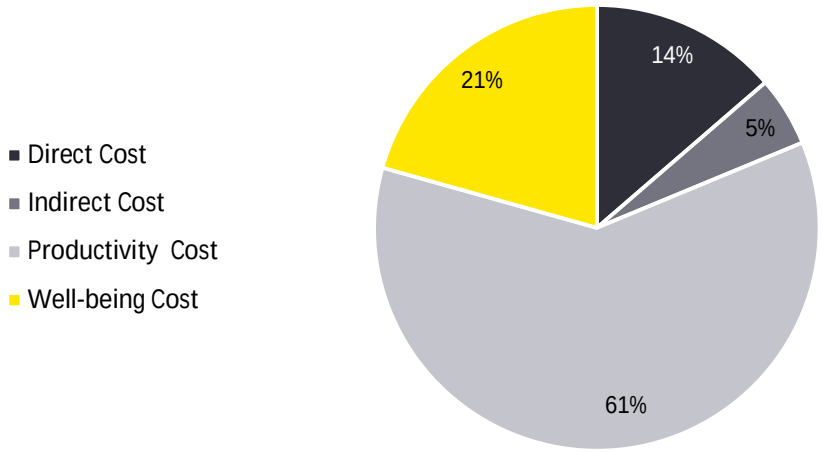
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6.2 Overall cost at individual level

The overall average economic burden for an individual living with nAMD in the USA is €66,376, if they are still in the labour force (under 65 years). This is mainly driven by productivity costs, accounting for 61%, or €40,206, of the overall cost at individual level. This is followed by well-being and direct medical costs, accounting for 20% (€13,711) and 14% (€9,082), respectively, and indirect medical costs, which account for 12%, or €3,378. This breakdown is illustrated in Figure 6.3.

Considering the assumption of retirement for people over 65, the average cost for the over 65 cohort is €26,715, as the productivity cost amounts for the caregiver component only.

Fig. 6.3 Breakdown of under 65 overall cost, (nAMD)



6.3 Direct medical cost

The average annual direct cost for an individual living with nAMD in the USA amounts to €9,082.

This cost is made up of 10% attributed to diagnostic and routine eye imaging exams, amounting to €868, and 90% attributed to intervention therapies, amounting to €8,214.

6.3.1 Anti-VEGF injection

- The main Anti-VEGF costs used to treat nAMD in the USA are illustrated in Table 6.3. In the USA, the most commonly used therapy is Avastin (60%), followed by Eylea (30%). Lucentis and Beovu have a reported share of 9% and 1%, respectively.
- Observations from the RI survey results outline that 100% of the nAMD respondents in the USA have had a surgical procedure to treat their condition. The average number of procedures the respondents have had in the past year is 9.5.
- The average cost of intervention therapy per eye amounts to €692, the average number of treatments per year of an individual living with nAMD according to survey is 9.5. The results is €8,214 as annual average cost Table 6.4.

Table 6.3 Unitary Anti-VEGF injection costs

Anti-VEGF	Unitary cost	% share use
Lucentis	€1,710	9%
Eylea	€1,622	30%
Beovu	€2,434	1%
Avastin	€45	60%

Source: GlobalData (Age-Related Macular Degeneration Market Analysis 2018–2028)

Table 6.4 Average annual Anti-VEGF injection costs

	Annual costs
Average cost of Anti-VEGF per eye	€692
# of treatment (p/a)	9.5
Average number of eye treated	1.25
Average individual cost	**€8,214**

Source: RI survey; EY Analysis

nAMD – the average annual direct medical cost for an individual living with nAMD in USA is €9,082

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- These outpatient costs may vary with type of facility (Physician's office or ambulatory care centre/hospital outpatient setting) which are regularly updated in the Physician Fee Schedule for Medicare. The payment for physician services is reduced for procedures that are subject to the site of service differential when the procedure is performed outside of the physician's office.[43] For this study, we have considered an average of these costs across the site of services.

6.3.2 Imaging eye exams

- The main type of diagnostic and routine eye exams sustained by an individual affected by nAMD, the unitary cost, and mean number of visits required, are illustrated in Table 6.5.
- The weighted average cost of these imaging eye exams amounts to €102. RI survey respondents living with nAMD have indicated the average number of eye care appointments is 8.5. This results in the average annual cost at individual level of imaging eye exams to be €868 as illustrated in Table 6.6.

Table 6.5 Unitary cost of imaging eye exams

Type of procedure	Unitary clinical costs
Visual Field testing	€74
Fundus Photography	€98
Optical coherence tomography	€51
Fluorescein angiography	€186

Source: US Medicare

Table 6.6 Average annual cost of imaging eye exams

	Annual clinical costs
Average cost of eye exam	€102
# of eye care visits (p/a)	8.5
Average individual cost	**€868**

Source: RI Survey; EY Analysis

nAMD – indirect medical costs amount to €3,378 per year for an individual living with nAMD

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6.4 Indirect medical cost

The average annual indirect cost for an individual living with nAMD in the USA amounts to €3,378.

This cost is made up of 43% attributed to formal care cost amounting to €1,445 and 42% attributed to device costs amounting to €1,433. Nutraceutical supplements account for 11% (€363) with travel cost (€67) and accident treatment cost (€71) accounting for 2% each.

6.4.1 Formal care

- The annual cost of nursing home care in the USA is €87,229. However, 0% of nAMD RI survey respondents indicate that they are in nursing home care (Table 6.7).
- The annual cost of formal home help care is €48,158, incurred by 3% of nAMD survey respondents, resulting in an average individual cost of €1,445 attributed to formal home help care as shown in Table 6.7.

6.4.2 Assistive technology

- Survey respondents indicated if they have had to invest in home modifications and utilised assistive resources to support living with nAMD. Respondents also indicate their annual spend on such aids as illustrated in Table 6.9.
- Average annual spend on home modification of nAMD respondents is €607, with 83% indicating they have invested in home modifications. This results in an average individual cost of €504, as illustrated in Table 6.9.
- 77% of nAMD respondents utilise assistive resources, with an average annual spend of €1,206 (Table 6.9). This results in an average individual cost of €929. Unitary costs of glasses and low vision aids are referenced in Table 6.8.

6.4.3 Accident treatment

- 37% of nAMD respondents reported an accident in the past year in the USA. Respondents reported an average of 1.3 accidents, of these, 9% required an ED visit. 0% required a hospital inpatient stay, as outlined in Table 6.10.
- The annual cost of accident treatment at individual level is €71.

Table 6.7 Annual formal caregiver service costs

	Home help	Nursing home care	Total formal care cost
Annual cost	€48,158	€87,299	
Share use	3%	0%	
Average individual cost	**€1,445**	**€0**	**€1,445**

Source: Genworth, US; RI Survey results, EY Analysis

Table 6.8 Unit cost of glasses and other low vision aids

Glasses	Magnifier	Software
€505	€26	€89

Source: Southwestern Eye Centre; VSP Vision Care

Table 6.9 Annual device costs

	Home modifications	Assistive resources	Total device cost
Average annual spend	€607	€1,206	
Share use	83%	77%	
Average individual cost	**€504**	**€929**	**€1,433**

Source: RI Survey results, EY Analysis

Table 6.10 Annual cost of accident treatment

		Emergency day visit	Hospital inpatient stay	Total accident cost
Cost		€605	€22,333	
% requiring treatment		9%	0%	
# of accidents	1.3			
Average individual cost		**€71**	**€0**	**€71**

Source: Howland et al. Injury Epidemiology (2015); RI Survey results, EY Analysis

nAMD – average annual expenditure on nutraceutical supplements amounts to €363

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6.4.4 Travel to appointments

- The average travel cost per hour is €14 in the USA and is obtained from the USA Department of Transportation.[44]
- From the RI survey, nAMD respondents indicate that they attend an average of 8.5 appointments per year and average hourly travel time to these appointments is 0.55 hours, as outlined in Table 6.11. Average individual travel costs amount to €67.

6.4.5 Nutraceutical supplements

Average annual expenditure on nutraceutical supplements is obtained from the RI survey and amounts to €363 for individuals living with nAMD in the USA, as outlined in Table 6.12.

Table 6.11 Travel cost variables

Travel cost variables	
Travel time to appointment	0.55
# of appointments per annum	8.5
Travel cost per hour	€14
Average individual cost	**€67**

Source: Dept. of Transportation; RI Survey results, EY Analysis

Table 6.12 Nutraceutical supplements

Nutraceutical supplements	
Average individual cost	**€363**

Source: RI Survey results, EY Analysis

nAMD – the average annual well-being costs account for €13,711

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6.5 Well-being

The average annual well-being cost for an individual living with nAMD in the USA amounts to €13,711.

This cost is made up of 45%, or €6,224 attributed to depression, 39%, or €5,372 attributed to low vision, and 15%, or €2,115 attributed to anxiety, as outlined in Table 6.14.

6.5.1 Willingness-to-pay for full health QALY

A range of values from $50,000 to $200,000 are provided by the Institute for Clinical and Economic Review (IECR)[45]. For the purpose of this study, and in order to omit distortion of results, we have opted to use the value of $50,000 (€43,850) which is comparable to the other countries of this study.

6.5.2 Anxiety

53% of nAMD respondents in the RI survey have indicated that their condition has led them to experience anxiety.

6.5.3 Depression

Among the respondents living with nAMD in the USA, 47% reported experiencing depression as a result of their condition.

6.5.4 Low vision

According to the RI survey, 50% of those living with nAMD in the USA report having low vision.

Table 6.13 QALY values per country

Local QALY values	
Willingness-to-pay	€43,850

Source: ICER

Table 6.14 Well-being variables

	Anxiety	Depression	Low vision	Total Cost
DALY	0.091	0.302	0.245	
% reporting	53%	47%	50%	
Average individual cost	**€2,115**	**€6,224**	**€5,372**	**€13,711**

Source: Global Burden of Disease Study; RI survey results

nAMD – average productivity cost for a patient affected by nAMD in USA is €40,206

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6.6 Productivity costs

The average annual productivity cost for an individual in work activity living with nAMD in the USA amounts to €40,206.

This cost is mainly driven by the productivity costs relating to the individual with nAMD, accounting for 98.6% (or €39,661) of the cost, while the nAMD caregiver cost accounts for just 1.4%, or €545 of the average annual productivity cost (see page 79).

6.6.1 Patient productivity

- nAMD individual productivity cost variables are outlined in Table 6.15. The average annual salary in the USA is €58,325, with the average annual working hours being 1,767. This results in a productivity per hour value of €33.
- From the RI survey, it is estimated that 100% of individuals with nAMD are currently in employment.
- 40% of respondents indicated that they have experienced job reduction as a result of nAMD. With the assumed share of hours lost to be 20%, the average individual productivity cost associated with job reduction as a result of nAMD amounts to €4,666, as outlined in Table 6.16.
- 60% of respondents indicated that they have experienced job loss as a result of nAMD. The average individual productivity cost associated with job loss is €34,995, as outlined in Table 6.16.

Table 6.15 Productivity cost variables

Job loss and job reduction variables	
Average annual salary	€58,325
Average annual working hours	1,767
Productivity per hour	€33
Share of nAMD individuals in employment	100%

Source: Oxford Economics; RI survey results, EY Analysis

Table 6.16 Impact on individual work activity

	Job reduction	Job loss	**Total cost**
Share reporting impact	40%	60%	
Average individual cost	**€4,666**	**€34,995**	**€39,661**

Source: RI survey results, EY Analysis

nAMD – the average annual productivity cost for a caregiver of an individual living with nAMD in USA is estimated to be €544

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6.6.2 Caregiver productivity

- Table 6.17 outlines the impact nAMD care duties have had on the caregiver.
- 17% of nAMD caregivers reported job reduction due to care duties, with a reported average of 3% of work hours reduced due to care. This results in an average cost of €297. A further 64% of caregivers reported having to provide transport to an average of 11 eye healthcare appointments during work hours, resulting in an average cost of €244, as outlined in Table 6.17.
- 2% of nAMD caregivers provide transport to appointments during non-work hours. With an average travel time of 1.07 hours to 11 appointments, the average annual value of loss of leisure time associated with providing transport during non-work hours is €3, as outlined in Table 6.18.

Table 6.17 Impact on caregiver work activity

	Job reduction due to care	Job reduction due to providing transport during work hours	**Total cost**
Share reporting	17%	64%	
Hours lost due to care	3%		
Productivity per hour	€33	€33	
Average annual working hours	1,767		
# of journeys per year		11	
Average travel time (hrs)		1.07	
Average individual cost	**€297**	**€244**	**€541**

Source: RI survey results, EY Analysis

Table 6.18 Loss of leisure variables

Loss of leisure variables	
Providing transport during non-work hours	2%
# of journeys per annum	11
Average travel time (hrs)	1.07
Value of leisure time	€14
Average individual cost	**€3**

Source: Dept. of Transportation; RI survey results, EY Analysis

nAMD – the overall cost of nAMD in the USA ranges from €5.1bn to €79.7bn

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6.7 Total societal cost of nAMD in the USA

The total cost of nAMD in the USA ranges from €5.08bn in the low prevalence rate scenario to €79.73bn in the high prevalence scenario. The mid rate scenario indicates a total cost of €23.98bn as outlined in Table 6.19 .

Productivity costs constitutes the majority of the total cost of nAMD at 46%*. This is driven by the large share of patients experiencing job loss as a result of AMD, resulting in total productivity cost to range from €2.23bn (low prevalence) to €22.93bn (high prevalence). Well-being costs account for 28%, ranging from €1.49bn (low prevalence) to €27.76bn (high prevalence). Direct (€989.03m - €19.71bn) costs account for 19% and indirect (€367.86m - €7.33bn) costs account for 7%.

Table 6.19 Overview of total nAMD costs

		Low prevalence rate	Mid prevalence rate	High prevalence rate
USA	**Impacted population (nAMD)**	**108,902**	**490,440**	**2,170,420**
	nAMD overall cost	**€5.08bn**	**€23.98bn**	**€79.73bn**
Category	Direct Cost	€989.03m	€4.45bn	€19.71bn
	Indirect Cost	€367.86m	€1.66bn	€7.33bn
	Productivity Cost	€2.23bn	€11.14bn	€22.93bn
	Well-being Cost	€1.49bn	€6.72bn	€27.76bn
Age	Impacted population (nAMD) – Over 65	54,070	216,330	1,622,100
	Average individual cost – Over 65		€26,715	
	Overall cost - Over 65	€1.44bn	€5.78bn	€43.33bn
	Impacted population (nAMD) – Under 65	54,832	274,160	548,320
	Average individual cost – Under 65		€66,376	
	Overall cost - Under 65	€3.64bn	€18.2bn	€36.4n

Source: EY Analysis

*Percentages of the breakdown costs are represented at the mid prevalence rate scenario. These may change according to the different scenario rate selected.

Fig. 6.4 nAMD cost – low prevalence rate (€m)

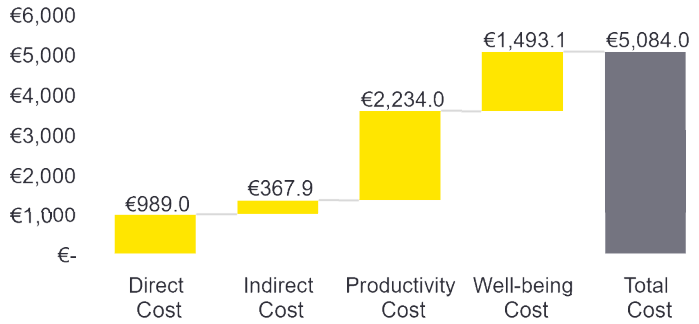


Fig. 6.5 nAMD cost – mid prevalence rate (€bn)

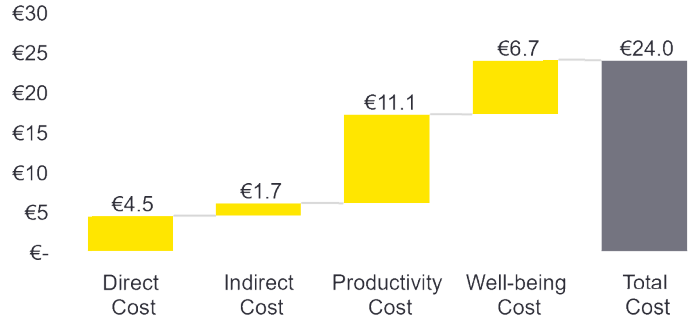
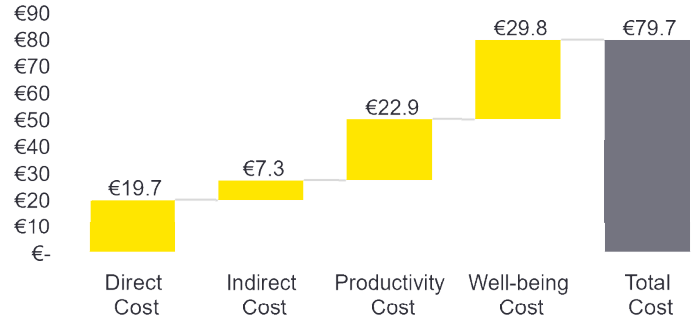


Fig. 6.6 nAMD cost – high prevalence rate (€bn)



GA – the prevalence of GA in the USA ranges between 0.02%-0.2% among under 65s and 0.04%-0.9% among the over 65s

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6.8. Prevalence of GA in the USA

6.8.1 Prevalence of GA in under 65s

The prevalence rate of GA in under 65s (Figure 6.7) in the USA ranges from 0.02% of the low prevalence rate scenario to 0.2% of the high prevalence rate scenario. The mid prevalence rate scenario accounts for 0.1% of the population (see Figure 6.7).

The total population, obtained from Statista, in the USA is 328,230,000 of which 274,160,000 are under 65 years. As a result the total impacted population ranges from 54,832 to 548,320, as outlined in Table 6.20.

6.8.2 Prevalence of GA in over 65s

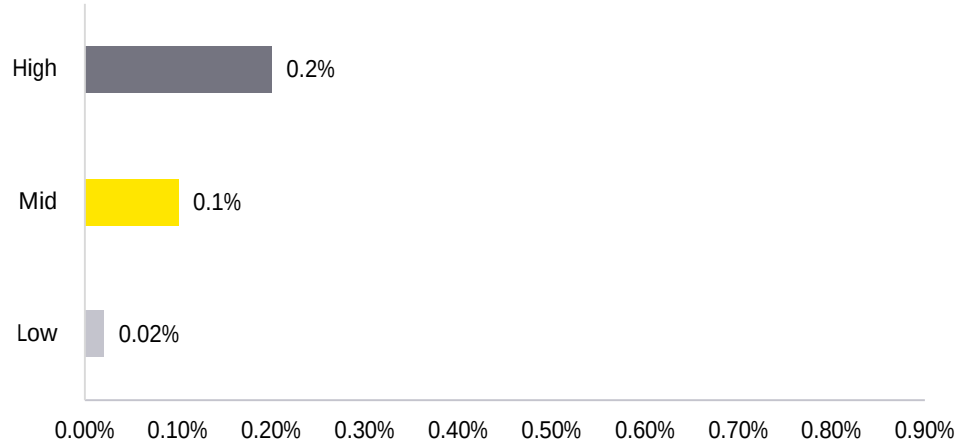
The prevalence rate of GA in over 65s (Figure 6.8) in the USA ranges from 0.04% of the low prevalence rate scenario to 0.9% of the high prevalence rate scenario. The mid prevalence rate scenario accounts for 0.4% of the population (Figure 6.8).

The total population in the USA is 328,230,000 of which 54,070,000 are over 65 years. As a result the total impacted population ranges from 21,628 to 486,630, as outlined in Table 6.20.

Table 6.20 Total GA impacted population

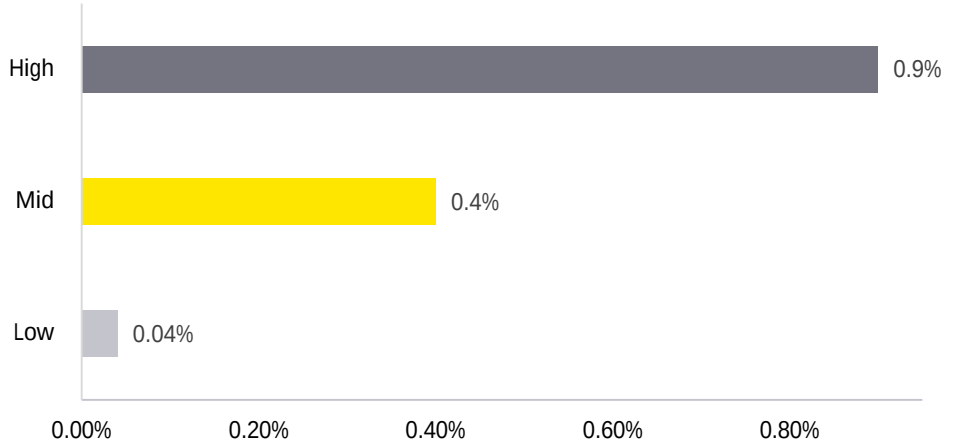
	Low prevalence rate	Mid prevalence rate	High prevalence rate
Under 65 years	54,832	274,160	548,320
Over 65 years	21,628	216,280	486,630
Total	**76,460**	**490,440**	**1,034,950**

Fig. 6.7 Prevalence rate, under 65 years (GA)



Source: Li et al. (2019); Klein et al. (2011); Klein & Klein (2013); Frost & Sullivan (2017); EY Elaboration

Fig. 6.8 Prevalence rate, over 65 years (GA)



Source: Li et al. (2019); Klein et al. (2011); Klein & Klein (2013); Frost & Sullivan (2017); EY Elaboration

GA – average cost for an individual living with GA in the USA is €48,326

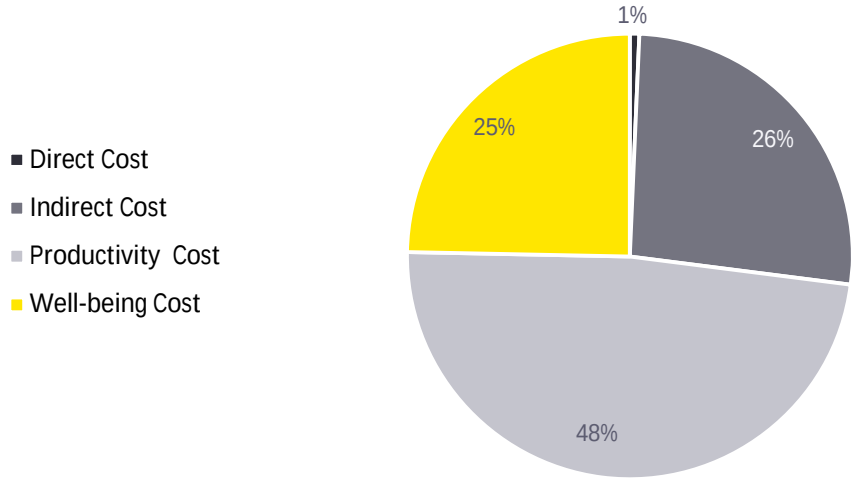
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6.9 Overall cost at individual level

The overall average economic burden for an individual living with GA in the USA is €48,326, if they are still in the labour force (under 65 years). This cost is mainly driven by productivity, accounting for 48%, or €23,319 of the overall cost at individual level. This is followed by indirect medical costs (€12,736) and well-being costs (€11,944), accounting for 26% and 25%, respectively. Direct medical costs account for just 1% (€327) of the overall cost. This breakdown is illustrated in Figure 6.9.

Considering the assumption of retirement for people over 65, the average cost for the over 65 cohort is €27,733, as the productivity cost amounts for the caregiver component only.

Fig. 6.9. Breakdown of under 65 overall cost, (GA)



6.10 Direct medical cost

The average annual direct cost for an individual living with GA in the USA amounts to €327.

This cost is only made up of imaging eye exams as Anti-VEGF injections or other treatments are currently unavailable for those with GA.

6.10.1 Imaging eye exams

- The main type of diagnostic and routine eye exams sustained by an individual affected by GA and the unitary cost are set out in Table 6.21.
- The weighted average cost of these imaging eye exams amounts to €102. RI survey respondents living with GA have indicated the average number of eye care appointments is 3.2. This results in the average annual cost at individual level of imaging eye exams to be €327 as illustrated in Table 6.22.

Table 6.21 Unitary cost of imaging eye exams

Type of procedure	Unitary clinical costs
Visual Field testing	€74
Fundus Photography	€98
Optical coherence tomography	€51
Fluorescein angiography	€186

Source: US Medicare

Table 6.22 Average annual cost of imaging eye exams

	Annual clinical costs
Average cost of eye exam	€102
# of eye care visits (p/a)	3.2
Average individual cost	**€327**

Source: RI Survey; EY Analysis

GA – average annual individual cost associated with indirect costs amount to €12,736

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6.11 Indirect medical cost

The average annual indirect cost for an individual living with GA in the USA amounts to €12,736.

This cost is made up of 48% attributed to formal care cost, amounting to €6,106, 39% is attributed to accident treatment cost (€4,936), 9% is attributed to device costs (€1,207), 3% is attributed nutraceutical supplements (€436), and just less than 1% is attributed to travel costs (€52).

6.11.1 Formal care

- The annual cost of nursing home care in the USA is €87,229. 7% of GA survey respondents indicate that they are in nursing home care, resulting in an average individual cost of €6,106, as outlined in Table 6.23.
- The annual cost of formal home help care is €48,158, however, 0% of GA respondents in the RI survey indicate that they receive formal home help care, therefore no cost is attributed to formal home help care (see Table 6.23).

6.11.2 Assistive technology

- RI survey respondents indicate if they have had to invest in home modifications and utilise assistive resources to support living with GA. Respondents also indicate their annual spend on such aids as illustrated in Table 6.25.
- Average annual spend of GA respondents is €162, with 63% indicating they have invested in home modifications. This results in an average individual cost of €102 (see Table 6.25).
- 83% of GA respondents utilise assistive resources, with an average annual spend of €1,331. This results in an average individual cost of €1,105 (Table 6.25). Unitary costs of glasses and low vision aids are referenced in Table 6.24.

6.11.3 Accident treatment

- 40% of GA respondents reported an accident in the past year. Respondents reported an average of 1.3 accidents a year, of which 17% required a hospital inpatient stay. 0% required an ED visit, as outlined in Table 6.26.
- The annual cost of accident treatment at individual level is €4,936 (Table 6.26).

Table 6.23 Annual formal caregiver service costs

	Home help	Nursing home care	Total formal care cost
Annual cost	€48,158	€87,299	
Share use	0%	7%	
Average individual cost	€0	€6,106	**€6,106**

Source: Genworth, US; RI Survey results, EY Analysis

Table 6.24 Unit cost of glasses and other low vision aids

Glasses	Magnifier	Software
€505	€26	€89

Source: Southwestern Eye Centre; VSP Vision Care

Table 6.25 Annual device costs

	Home modifications	Assistive resources	Total device cost
Average annual spend	€162	€1,331	
Share use	63%	83%	
Average individual cost	**€102**	**€1,105**	**€1,207**

Source: RI Survey results, EY Analysis

Table 6.26 Annual cost of accident treatment

		Emergency day visit	Hospital inpatient stay	Total accident cost
Cost		€605	€22,333	
% requiring treatment		0%	17%	
# of accidents	1.3			
Average individual cost		**€0**	**€4,936**	**€4.936**

Source: Howland et al. Injury Epidemiology (2015); RI Survey results, EY Analysis

GA – average annual expenditure on nutraceutical supplements amounts to €436

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6.11.4 Travel to appointments

- The average travel cost per hour is €14 in the USA and is obtained from the USA Department of Transportation[44].
- From the RI survey, GA respondents indicate that they attend an average of 3.2 appointments per year and average hourly travel time to these appointments is 1.13 hours, as outlined in Table 6.27.
- The average individual travel cost is €52.

6.11.5 Nutraceutical supplements

Average annual expenditure on nutraceutical supplements is obtained from the RI survey and amounts to €436 for individuals living with GA in the USA, see Table 6.28.

Table 6.27 Travel cost variables

Travel cost variables	
Travel time to appointment	1.13
# of appointments per annum	3.2
Travel cost per hour	€14
Average individual cost	**€52**

Source: Dept. of Transportation; RI Survey results, EY Analysis

Table 6.28 Nutraceutical supplements

Nutraceutical supplements	
Average individual cost	**€436**

Source: RI Survey results, EY Analysis

GA – average well-being cost for an individual affected by GA in the USA is €11,944

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6.12 Well-being

The average annual well-being cost for an individual living with GA in the USA amounts to €11,944.

This cost is made up of 42%, or €5,049 attributed to low vision, 41%, or €4,900 attributed to depression, and 17%, or €1,995 attributed to anxiety, as outlined in Table 6.30.

6.12.1 Willingness-to-pay for full health QALY

A range of values from $50,000 to $200,000 are provided by the Institute for Clinical and Economic Review (IECR)[45]. For the purpose of this study, and in order to avoid potential distortion of results, we have opted to use the value of $50,000 (€43,850) which is comparable to the other countries of this study.

6.12.2 Anxiety

50% of GA respondents in the RI survey have indicated that their condition has led them to experience anxiety.

6.12.3 Depression

Among the respondents living with GA in the USA, 37% reported experiencing depression as a result of their condition.

6.12.4 Low vision

According to the RI survey, 47% of those living with GA in the USA report having low vision.

Table 6.29 QALY values per country

Local QALY values	
Willingness-to-pay	€43,850

Source: ICER

Table 6.30 Well-being variables

	Anxiety	Depression	Low vision	Total Cost
DALY	0.091	0.302	0.245	
% reporting	50%	37%	47%	
Average individual cost	**€1,995**	**€4,900**	**€5,049**	**€11,944**

Source: Global Burden of Disease Study; RI survey results

GA – average productivity cost for an individual affected by nAMD in USA is €20,593

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6.13 Productivity costs

The average annual productivity cost for an individual in work activity living with GA in the USA amounts to €23,319.

This cost is mainly driven by the productivity costs relating to the individual with GA, accounting for 88% (€20,593) of the cost, while the GA caregiver productivity cost accounts for 12%, or €2,726 of the average annual productivity cost (see page 87).

6.13.1 Individual productivity

- GA individual productivity cost variables are outlined in Table 6.31. The average annual salary in the USA is €58,325, with the average annual working hours being 1,767. This results in a productivity per hour value of €33.
- From the RI survey, it is estimated that 91% of individuals with GA are currently in employment.
- 14% of respondents indicated that they have experienced job reduction as a result of GA. With the assumed share of hours lost to be 20%, the average individual productivity cost associated with job reduction as a result of GA amounts to €1,486, as illustrated in Table 6.32.
- 36% of respondents indicated that they have experienced job loss as a result of GA. The average individual productivity cost associated with job loss is €19,107 (Table 6.32).

Table 6.31 Productivity cost variables

Job loss and job reduction variables	
Average annual salary	€58,325
Average annual working hours	1,767
Productivity per hour	€33
Share of GA individuals in employment	91%

Source: Oxford Economics; RI survey results, EY Analysis

Table 6.32 Impact on individual work activity

	Job reduction	Job loss	**Total cost**
Share reporting impact	14%	36%	
Average individual cost	**€1,486**	**€19,107**	**€20,593**

Source: RI survey results, EY Analysis

GA – the average annual productivity impact for a caregiver of an individual living with GA in USA is estimated to be €2,726

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6.13.2 Caregiver productivity

- Table 6.33 outlines the impact GA care duties have had on the caregiver.
- 25% of GA caregivers reported job reduction due to care, with a reported average of 18% of work hours reduced due to care. This results in an average cost of €2,625. A further 50% of caregivers reported having to provide transport to an average of 4 eye healthcare appointments during work hours, resulting in an average cost of €71 as shown in Table 6.33.
- 50% of GA caregivers provide transport to appointments during non-work hours. With an average travel time of 1.07 hours to 4 appointments, the average annual value of loss of leisure time associated with providing transport during non-work hours is €31 as shown in Table 6.34.

Table 6.33 Impact on caregiver work activity

	Job reduction due to care	Job reduction due to providing transport during work hours	**Total cost**
Share reporting	25%	50%	
Hours lost due to care	18%		
Productivity per hour	€33	€33	
Average annual working hours	1,767		
# of journeys per year		4	
Average travel time (hrs)		1.07	
Average individual cost	**€2,625**	**€71**	**€2,696**

Source: RI survey results, EY Analysis

Table 6.34 Loss of leisure variables

Loss of leisure variables	
Providing transport during non-work hours	50%
# of journeys per annum	4
Average travel time (hrs)	1.07
Value of leisure time	€14
Average individual cost	**€31**

Source: Dept. of Transportation; RI survey results, EY Analysis

GA – the overall cost of GA in the USA ranges from €3.3bn to €40bn

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6.14 Total societal cost of GA in the USA

The total cost of GA in the USA ranges from €3.25bn in the low prevalence rate scenario to €39.99bn in the high prevalence scenario. The mid rate scenario indicates a total cost of €19.25bn – as outlined in Table 6.35.

Productivity costs constitutes the majority of the total cost of GA at 36%*. This is driven by the large share of individuals experiencing job loss as a result of GA, resulting in total productivity cost to range from €1.34bn (low prevalence) to €14.11bn (high prevalence). Well-being costs account for 30%, ranging from €913.26m (low prevalence) to €12.36bn (high prevalence). Indirect (€973.8m - €13.18bn) costs account for 32%. Direct (€24.99m - €338.2m) costs account for 1%.

Table 6.35 Overview of total GA costs

		Low prevalence rate	Mid prevalence rate	High prevalence rate
USA	**Impacted population (GA)**	**76,460**	**490,440**	**1,034,950**
	GA overall cost	**€3.25bn**	**€19.25bn**	**€39.99bn**
Category	Direct Cost	€24.99m	€160.26m	€338.2m
	Indirect Cost	€973.8m	€6.25bn	€13.18bn
	Productivity Cost	€1.34bn	€6.98bn	€14.11bn
	Well-being Cost	€913.26m	€5.86bn	€12.36bn
Age	Impacted population (GA) – Over 65	21,628	216,330	486,630
	Average individual cost – Over 65	€27,733	€27,733	€27,733
	Overall cost - Over 65	€599.81m	€6bn	€13.5bn
	Impacted population (GA) – Under 65	54,832	274,160	548,320
	Average individual cost – Under 65	€48,326	€48,326	€48,326
	Overall cost - Under 65	€2.65bn	€13.25bn	€26.5bn

Source: EY Analysis

*Percentages of the breakdown costs are represented at the mid prevalence rate scenario. These may change according to the different scenario rate selected.

Fig. 6.10 GA cost – low prevalence rate (€bn)

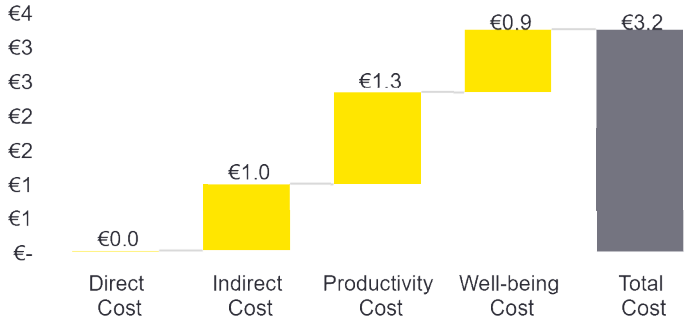


Fig. 6.11 GA cost – mid prevalence rate (€bn)

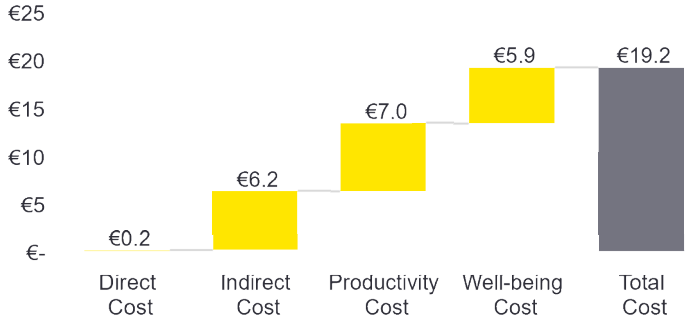
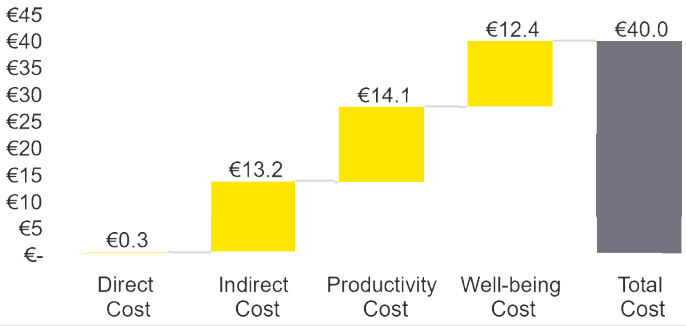


Fig. 6.12 GA cost – high prevalence rate (€bn)





7 Conclusion

Late-stage AMD presents a significant burden on the individual, those who provide care and support, and wider society

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The impact of late-stage AMD

Individuals affected by both forms of late-stage AMD tend to experience sight loss over time and in many cases the sight loss may be so significant that the individual can become legally blind.

According to the meta-analysis and scientific review studies, the prevalence rate of late-stage AMD increases with age and (consequently) is highest among people over 65 years of age.

Individuals affected by late-stage AMD tend to be affected with the condition in both eyes however the progress of the disease does not tend to be consistent across the eyes. As a result many individuals may have good vision in one eye whilst affected by low vision in the other. Equally, an individual may have almost complete sight loss in one eye whilst the other eye is still receiving treatment. Discussions with German and Bulgarian health care professionals suggest that around 75% of people affected from late-stage AMD are being treated for only one eye at a time, with the remaining 25% require treatment for both eyes.

A prevalence rate of 0.02% to 0.2% was noted for nAMD and GA for those under 65. A wider range was noted for those with nAMD over 65, of 0.1% to 3% (Bulgaria and USA) and 0.2% to 5.3% (Germany). For GA, rates ranged from 0.04% to 0.9% (Bulgaria and USA) to 0.07% to 1.6% (Germany).

The true cost of late-stage AMD

The loss of sight does not just impact on those affected by AMD themselves but has wider impacts which ripple across society. It is easy to focus simply on the costs to directly treating the disease, e.g. Anti-VEGF injections, however this is just the tip of the iceberg.

AMD can lead to individuals being forced to retire early, depriving society of the output that each person would have otherwise generated. It also directly impacts on the family of those living with AMD, who are often the first line of care givers. These informal caregivers may need to take time off work for appointments or, in more serious cases, even be forced to give up work to care for a loved one. It can also impact the mental well-being of both people affected by AMD and their caregivers, having a negative impact on their quality of life.

Whilst many of these costs are not financial (i.e. there is no direct financial transaction involved) they still place a significant cost on society, one of which is often overlooked. This can lead to a significant underestimation of the costs involved and as a result a failure to place sufficient resources to diagnose and treat the condition.

The costs we have quantified are significant, and in aggregate pose a considerable burden on the countries in this study.

Fig. 7.1 Bulgaria total costs – mid prevalence rate

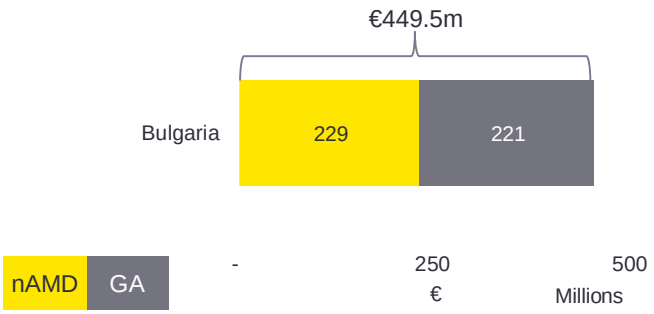


Fig. 7.2 Germany total costs – mid prevalence rate

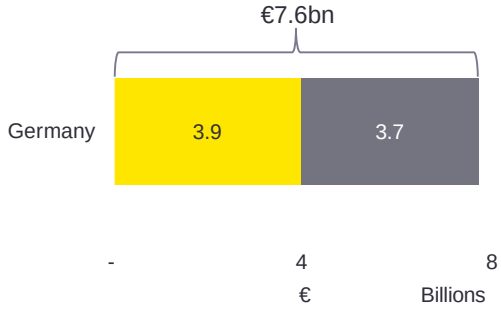
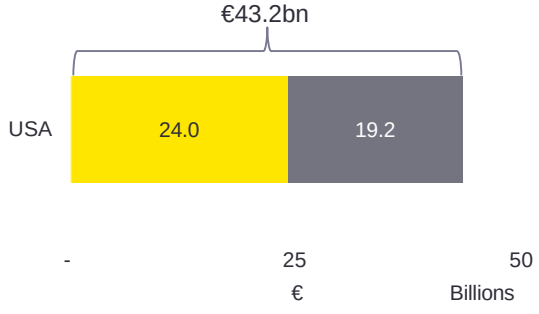


Fig. 7.3 USA total costs – mid prevalence rate



We note a number of limitations which would benefit from further research or improved data

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Item	Prevalence rate	Well-Being Quantification	Job reduction impact
Limitation	The available prevalence data has certain limitations, both in the size of the range observed and specifically the lack of data on late-stage forms of AMD in Bulgaria.	A lack of specific quantification - through a monetary value (QALY) - of the impact on the life of those reporting AMD in Bulgaria	Data is limited for quantifying the time that an individual living with the disease sacrifices in terms of work activity
Wider benefits	The benefits deriving from a more accurate estimation of prevalence rates could include: ► A reduction of the potential variance around the population impacted and consequently – considering this data is at the base of any impact assessment - improve the quality of analyses conducted at country level ► Improved modelling of the healthcare demand ► More confident investment decisions and an increase in the probability of success of initiatives taken as a result of those decisions ► Improved understanding of environmental variables that might impact the disease across countries	Among the benefits deriving from increased research on well-being are: ► A more accurate estimate of the impacts of the disease on the life of the individual with the condition ► Improved granularity for economic impact studies, considering that quantification of well-being is an increasingly common area of focus ► Improved understanding of the specific well-being conditions of the individual living with the disease, which could help private of publicly funded interventions which can be tailored more closely to the requirements of individuals with the disease and those living closely to them.	Further investigation around individual productivity could result int the following: ► A better understanding on how the disease impacts the individual work activities and identify potential actions for operational improvements ► A greater recognition in the workspace of the impact that the disease and target actions, such as providing assistive resources
Impact on our report	A more accurate estimation of impacted population would have lead to a convergence in the prevalence rate and consequently a more narrow scenario setting	QALYs that more closely match or approximate the impact from AMD would enhance the robustness of the overall analyses and consequent values for Bulgaria	The assumption to quantify the productivity loss was not specific to the countries under review and could therefore over or underestimate the impact on productivity loss



8 Appendix 1: Abbreviations

Commonly used abbreviations

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Acronym	Meaning
AMD	Age-related Macular Degeneration
Anti-VEGF	Anti–vascular endothelial growth factor
AREDS	Age-Related Eye Disease Studies
DALY	Disability-adjusted life year
EBM	German Uniform Evaluation Standard
ED	Emergency day
EMA	European Medicines Agency
EU	European Union
EY	Ernst & Young
FDA	Food and Drug Administration
GA	Geographic Atrophy
GDP	Gross Domestic Product
IECR	Clinical and Economic Review
nAMD	Neovascular AMD
NHIF	National Health Insurance Fund
OCT	Optical Coherence Tomography
PDT	Photodynamic Therapy
QALY	Quality-adjusted life year
RI	Retina International
UV	Ultraviolet
wAMD	Wet AMD
WHO	World Health Organisation
VI	Visual Impairment



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Reference	Authors	Year	Title
Section 2	**What is AMD?**		
1	BrightFocus Foundation	2021	Age-Related Macular Degeneration: Facts & Figures
2	Wong et al.	2014	Global prevalence of age-related macular degeneration and disease burden projection for 2020 and 2040: a systematic review and meta-analysis
3	Centre for Sight (Sheraz Dayer)	2021	https://www.centreforsight.com/eye-conditions/macular-degeneration
	Late-stage AMD		
4	Amdbook	2017	Geographic Atrophy
5	Boyer et al.	2017	The Pathophysiology of Geographic Atrophy Secondary to Age-related Macular Degeneration and the Complement Pathway as a Therapeutic Target
6	Connolly E et al	2018	Prevalence of age-related macular degeneration associated genetic risk factors and 4-year progression data in the Irish population
7	Mekjavic et al	2019	The Burden of Macular Diseases in Central and Eastern Europe—Implications for Healthcare Systems
Section 3	**Methodology in reporting prevalence rates**		
8	Mekjavic et al	2019	The Burden of Macular Diseases in Central and Eastern Europe—Implications for Healthcare Systems
9	Frost and Sullivan	2017	The Economic Benefits of Using Lutein and Zeaxanthin Food Supplements in the European Union
10	Li et al.	2019	Prevalence and incidence of age-related macular degeneration in Europe: a systematic review and meta-analysis
11	Prokofyeva & Zrenner	2012	Epidemiology of major eye diseases leading to blindness in Europe: a literature review
12	Frost and Sullivan	2017	The Economic Benefits of Using Lutein and Zeaxanthin Food Supplements in the European Union
13	Colijn et al.	2017	Prevalence of Age-Related Macular Degeneration in Europe: The Past and the Future
14	Rudnicka et al.	2015	Incidence of Late-Stage Age-Related Macular Degeneration in American Whites: Systematic Review and Meta-analysis
15	Klein & Klein	2013	The Prevalence of Age-Related Eye Diseases and Visual Impairment in Aging: Current Estimates
16	Klein et al.	2011	Prevalence of Age-related Macular Degeneration in the US Population
	Anti-VEGF injection costs		
17	American Academy of Ophthalmology	2019	Anti-VEGF Treatments
18	American Academy of Ophthalmology	2020	Comparison of Anti-VEGF Treatments for Wet AMD
19	US Ophthalmic Review	2015	Economic Impact of Progression of Age-related Macular Degeneration

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Reference	Authors	Year	Title
20	GlobalData	2018	Age-Related Macular Degeneration Market Analysis 2018–2028 Report
	Imaging eye exams		
21	American Academy of Ophthalmology	2021	Visual Field Test
22	Ophthalmology Management	2007	Coding for AMD Diagnostics
23	Aetna	2020	Fundus Photography Policy
24	Duke University	2011	Medicare costs for neovascular age-related macular degeneration
	Assistive technologies or visual aids		
25	Current Drug Targets	2011	Age Related Macular Degeneration and Visual Disability
26	International Academy of Low Vision Specialists	NA	High-tech Devices for Low Vision
	Accidental falls or injuries		
27	Howland et al.	2015	Savings in acute care costs if all older adults treated for fall-related injuries completed matter of balance
28	Cruess et al.	2008	Economic Burden of Bilateral Neovascular Age-Related Macular Degeneration
29	BrightFocus Foundation	2021	Age-Related Macular Degeneration: Facts & Figures
30	Genworth	2020	Cost of Care Survey
31	Federal Ministry of Health Germany	2021	Care in the home
	Travel cost		
32	Wardman et al.	2016	Values of travel time in Europe: review and meta-analysis
33	US Department of Transportation	2016	Revised Departmental Guidance on Valuation of Travel Time in Economic Analysis
	Nutraceutical supplements		
34	Lindblad et al.	2009	Change in area of geographic atrophy in the Age-Related Eye Disease Study: AREDS report number 26
	Disability-adjusted life years		
35	World Health Organisation	NA	Disability-adjusted life years
36	Global Burden of Disease Study	2019	Age-specific disability weights for untreated and treated forms of sequelae

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Reference	Authors	Year	Title
	Productivity costs		
37	OECD	2020	Average annual hours actually worked per worker
Section 4	**Travel cost**		
38	Wardman et al.	2016	Values of travel time in Europe: review and meta-analysis
	Willingness-to-pay for full health QALY		
39	Iskrov et al.	2019	What is the Value of Innovative Pharmaceutical Therapies in Oncology and Haematology? A Willingness-to-Pay Study in Bulgaria
Section 5	**Anti-VEGF injection costs**		
40	MedtechTR Consulting	2021	2021 version of the EBM catalog published in Germany
	Travel Cost		
41	Wardman et al.	2016	Values of travel time in Europe: review and meta-analysis
	Willingness-to-pay for full health QALY		
42	Himmler et al.	2020	The Value of Health – Empirical issues when estimating the monetary value of a QALY based on well-being data
Section 6	**Anti-VEGF injection costs:**		
43	Retinal Physician	2004	Intravitreal Injections: A Coding and Reimbursement Review
	Travel cost		
44	US Department of Transportation	2016	Revised Departmental Guidance on Valuation of Travel Time in Economic Analysis
	Willingness-to-pay for full health QALY		
45	Institute for Clinical and Economic Review	2020	2020-2023 Value Assessment Framework

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Data points from research

Country	Bulgaria	Germany	USA		Bulgaria	Germany	USA
Total GA – low	0.0%	0.0%	0.0%	Total nAMD – low	0.0%	0.0%	0.0%
Total GA – mid	0.1%	0.2%	0.1%	Total nAMD – mid	0.1%	0.2%	0.1%
Total GA – high	0.2%	0.4%	0.2%	Total nAMD – high	0.6%	1.2%	0.6%
Under 65 GA – low	0.0%	0.0%	0.0%	Under 65 nAMD – low	0.0%	0.0%	0.0%
Under 65 GA – mid	0.1%	0.1%	0.1%	Under 65 nAMD – mid	0.1%	0.1%	0.1%
Under 65 GA – high	0.2%	0.2%	0.2%	Under 65 nAMD - high	0.2%	0.2%	0.2%
Over 65 GA – low	0.0%	0.1%	0.0%	Over 65 nAMD - low	0.1%	0.2%	0.1%
Over 65 GA – mid	0.4%	0.7%	0.4%	Over 65 nAMD - mid	0.4%	0.7%	0.4%
Over 65 GA –high	0.9%	1.6%	0.9%	Over 65 nAMD - high	3.0%	5.3%	3.0%

Direct medical costs

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Data points from research

Variables	Bulgaria	Germany	USA
Visual Field testing	€76.65	€17.35	€73.50
Eye exam with photos (fundus or optic nerve photography)	€12.77	€13.55	€98.18
Ocular coherence tomography (OCT)	€338.57	€44.95	€51.25
Fluorescein angiography (FA)	€25.54	€48.85	€185.54
# Mean visits p/a - Visual Field testing	8	4	4
# Mean visits p/a - Eye exam with photos (fundus or optic nerve photography)	1	2	2
# Mean visits p/a - Ocular coherence tomography (OCT)	7	2	2
# Mean visits p/a - Fluorescein angiography (FA)	1	2	2
Lucentis	-	€69.40	€293.99
Beovu	€600.97	€27.10	€196.36
Eylea	€779.93	€89.90	€102.51
Avastin	€1,009.22	€97.70	€371.08
Share use of Lucentis	0	0.17	0.09
Share use of Beovu	0.2	0.13	0.01
Share use of Eylea	0.2	0.2	0.3
Share use of Avastin	0.6	0.5	0.6

Data points from RI survey

Variables	Bulgaria	Germany	USA
# Eye care visits (nAMD)	8.4	8.8	8.5
# Eye care visits (GA)	2.7	5.7	3.2
# Treatments/ surgeries per year	4.7	6.8	9.5

Indirect Medical Costs

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Data points from research

Variables	Bulgaria	Germany	USA
Emergency day visit cost	€45.97	€21.69	€605.13
Inpatient stay cost	€463.01	€1,612	€1,374.04
Home help	€4,103.39	€13,726	€48,157.82
Nursing home care	€8,393.30	€14,248.80	€87,288.61

Data points from survey

Variables	Bulgaria	Germany	USA
% Cared for by children	68%	32%	69%
% Cared for by spouse/ domestic partner	32%	66%	29%
# of accidents per person p/a (nAMD)	1.5	0.3	1.3
# of accidents per person p/a (GA)	2.2	0.4	1.3
% of accidents not requiring treatment (nAMD)	33%	80%	91%
% of accidents not requiring treatment (GA)	63%	80%	83%
% of accidents requiring treatment (ED) (nAMD)	67%	6%	9%
% of accidents requiring treatment (ED) (GA)	25%	6%	0%
% of accidents requiring treatment (hospital stay) (nAMD)	0%	14%	0%
% of accidents requiring treatment (hospital stay) (GA)	13%	14%	17%
Travel time to appointments (nAMD)	2	1.58	0.55
Travel time to appointments (GA)	1.94	2.1	1.13

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Data points from survey

Variables	Bulgaria	Germany	USA
Number of appointments per year (nAMD)	8.4	8.8	8.5
Number of appointments per year (GA)	2.7	5.7	3.2
% requiring home modifications (nAMD)	40%	16%	83%
% requiring home modifications (GA)	94%	50%	63%
Share in home care (nAMD)	10%	3%	0%
Share in home care (GA)	0%	0%	7%
Share gaining formal care (nAMD)	0%	0%	3%
Share gaining formal care (GA)	0%	0%	0%

Well-being Costs

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Data points from research

Variables	Bulgaria	Germany	USA
Willingness-to-pay QALY	€49,971.46	€58,533	€43,850
WHO QALY – Anxiety	0.091	0.091	0.091
WHO QALY – Depression	0.302	0.302	0.302
WHO QALY – Low vision	0.245	0.245	0.245

Data points from survey

Variables	Bulgaria	Germany	USA
% Reporting anxiety (nAMD)	50%	16%	53%
% Reporting anxiety (GA)	71%	30%	50%
% reporting blindness (nAMD)	0%	0%	0%
% reporting blindness (GA)	0%	0%	0%
% Reporting depression (nAMD)	30%	19%	47%
% Reporting depression (GA)	67%	46%	48%
% reporting low vision (nAMD)	50%	39%	50%
% reporting low vision (GA)	76%	70%	47%

Productivity Costs

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Data points from survey

Variables	Bulgaria	Germany	USA
% of people in employment (GA)	100%	83%	91%
% of people in employment (nAMD)	100%	100%	100%
% Job loss as result of GA	13%	0%	36%
% Job loss as result of nAMD	20%	3%	60%
% experience job reduction as result of GA	88%	75%	14%
% experience job reduction as result of nAMD	90%	73%	40%
Carer - % job loss (nAMD)	0%	0%	0%
Carer - % job loss (GA)	0%	0%	0%
Carer - % job reduction due to care (nAMD)	0%	13%	17%
Carer - % job reduction due to care (GA)	25%	0%	25%
Carer - % hours reduced due to care (nAMD)	0%	5%	3%
Carer - % hours reduced due to care (GA)	3%	0%	18%
% Providing transport to appointment (nAMD)	43%	87%	67%
% Providing transport to appointment (GA)	75%	80%	100%
% Providing transport during work hours (nAMD)	29%	27%	64%
% Providing transport during work hours (GA)	44%	20%	50%
% Providing transport during non work hours (nAMD)	14%	60%	2%
% Providing transport during non work hours (GA)	31%	60%	50%
Number of journeys per annum (nAMD)	4	11	11
Number of journeys per annum (GA)	2	4	4

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Data points from research

Variables	Bulgaria	Germany	USA
Average travel costs (per hour)	€4.19	€12.40	€14.30
Average annual gross salary	€8,377	€37,052	€58,325
Productivity per hour	€5.22	€27.82	€33
Average annual working hours	1,605	1,332	1,767
Value of leisure time	€4.19	€12.40	€14.30
Share of work hours lost due to VI	0.20	0.20	0.20



11 Appendix 4: RI Patient Survey

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Patient - respondents

Disease	Bulgaria	Germany	USA
GA	17	10	30
nAMD	10	31	30
Total	**27**	**41**	**60**

Age	Bulgaria	Germany	USA	
				nAMD
50-54	**0**	3	0	0
55-59	**0**	1	3	1
60-64	**0**	2	2	2
65-69	4	8	3	6
70-74	6	7	10	9
75-79	4	8	6	6
80-84	8	11	4	4
85-89	3	1	1	2
90-94	2	0	1	0
95+	0	0	0	0
Total	**27**	**41**	**30**	30

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Which of these best describes the vision (if any) you have remaining?

	Bulgaria		Germany		USA	
	GA	nAMD	GA	nAMD	GA	nAMD
No vision	0	0	0	0	0	0
Light perception only (or shadows only)	0	0	0	0	0	0
Some useful central vision	5	4	2	8	9	8
Good central vision	2	0	1	5	5	5
Some useful peripheral vision	5	1	3	0	4	2
Good peripheral vision	3	0	2	4	1	5
I still have good overall vision	2	5	2	14	11	10
Other – please specify	0	0	0	0	0	0
	17					

Are you registered as legally blind, or partially sighted with your government or health service/health system?

	Bulgaria		Germany		USA	
	GA	nAMD	GA	nAMD	GA	nAMD
Yes	0	0	2	0	3	5
No	17	10	8	30	26	23
Unsure/Did not respond	0	0	0	1	1	2

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How long ago were you diagnosed with your condition?

	Bulgaria		Germany		USA	
	GA	nAMD	GA	nAMD	GA	nAMD
More than 6 months	5	0	2	3	0	1
More than 1 year	1	3	0	4	1	1
More than 2 years	3	2	3	3	5	3
More than 3 years	2	3	1	6	2	1
More than 5 years	3	2	1	7	7	14
More than 10 years	3	0	2	4	6	5
More than 15 years	0	0	0	3	2	1
More than 20 years	0	0	1	1	7	4

Did you notice a change in vision prior to your diagnosis?

	Bulgaria		Germany		USA	
	GA	nAMD	GA	nAMD	GA	nAMD
Yes	14	8	8	23	16	23
No	2	1	2	8	11	7
I don’t know	1	1	0	0	3	0

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Approximately how much time passed between realising there was a change in your vision and acquiring a diagnosis?

	Bulgaria		Germany		USA	
	GA	nAMD	GA	nAMD	GA	nAMD
Immediately	2	4	0	0	0	6
Under a week	0	0	0	0	4	6
1-2 weeks	0	0	0	3	0	0
2 weeks	0	1	0	0	0	5
1 month	0	1	1	8	0	0
2 months	1	2	1	3	0	0
2-3 months	0	0	0	0	0	3
3 months	2	0	1	3	2	0
3-4 months	1	0	0	0	0	0
5 months	1	0	0	0	0	0
6 months	3	0	1	3	3	0
7 months	0	0	0	1	0	0
9 months	0	0	0	0	0	1
1 year	2	0	3	1	5	2
1.5 years	1	0	0	0	0	0
1-2 years	0	1	0	0	0	0
2 years	3	0	1	1	0	1
3 years	0	0	0	1	3	0
2-5 years	0	0	0	0	1	0
3-6 years	1	0	0	0	0	4
No response/No change in vision	0	1	2	7	12	2

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Is there family history of your condition?

	Bulgaria		Germany		USA	
	GA	nAMD	GA	nAMD	GA	nAMD
Yes	2	3	3	10	16	9
No	12	6	6	13	9	15
Don't know	3	1	1	7	5	6
Prefer not to say	0	0	0	1	0	0

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Has your condition impacted on your work in any way?

	Bulgaria		Germany		USA	
	GA	nAMD	GA	nAMD	GA	nAMD
Yes	4	1	4	11	14	15
No	4	2	1	4	6	1
Prefer not to say	0	0	0	3	0	0
Already retired	9	7	4	13	8	14
Already not working	0	0	1	0	2	0

How?

	Bulgaria		Germany		USA	
	GA	nAMD	GA	nAMD	GA	nAMD
Forced you to retire early	2	2	0	1	5	9
Forced you to reduce hours	11	8	0	2	1	4
Forced you to change jobs	1	0	0	0	5	1
Increased your absence from work	3	1	3	6	1	2
Did not respond	0	0	1	2	3	1

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Has your condition impacted on your ability to drive?

	Bulgaria		Germany		USA	
	GA	nAMD	GA	nAMD	GA	nAMD
Yes- driving is increasingly more difficult	1	2	3	13	12	17
Yes- I can no longer drive	3	2	3	7	8	6
No	5	3	3	6	8	7
Prefer not to say	0	0	0	3	0	0
Not applicable	8	3	1	2	2	0

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Has your condition led you to relocate your primary residence?

	Bulgaria		Germany		USA	
	GA	nAMD	GA	nAMD	GA	nAMD
Yes – temporarily	0	1	0	0	0	0
Yes – permanently	2	0	2	4	4	7
No	15	9	8	25	26	23
Prefer not to say	0	0	0	2	0	0

Have you moved residence to?

	Bulgaria		Germany		USA	
	GA	nAMD	GA	nAMD	GA	nAMD
A family members house/home	3	1	2	3	0	1
Residential care/nursing home	0	0	0	1	2	0
Other (please specify)	14	9	0	0	1 moved to condo with no stairs 1 moved closer to public transport	3 moved to one level 2 moved closer to family 1 moved to gated community

Patient Retina International Survey (9/35)

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Have you had to invest in home modifications at your primary residence due to your condition?

	Bulgaria		Germany		USA	
	GA	nAMD	GA	nAMD	GA	nAMD
Yes	6	1	5	5	19	25
No	11	9	3	25	11	5
Prefer not to say	0	0	0	0	0	0
No response	0	0	2	1	0	0

Please select all modifications you have made at your primary residence.

	Bulgaria		Germany		USA	
	GA	nAMD	GA	nAMD	GA	nAMD
High vision lamps	13	3	2	3*	16	20
Bathroom modifications	1	0	0	1	2	6
Kitchen modifications	2	0	2	1	4	7
Customised clocks/ timers	1	2	1	0	3	6
Ergonomic adaptations	0	1	1	1	0	1
Use of lighting during the daytime	11	2	4	9	14	22
Other (please specify)	1 (no changes)	6 (no changes)	5 (no changes)	19 (no changes)	1 x handrail for stairs 2 x glow tape to mark steps 1 x extra flashlights for every room	1 x handrail for stairs, 1 extra flashlights for every room

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Approximately how much have you spent in the past year on modifications you have made to your primary residence?

	Bulgaria		Germany (€)		USA ($)	
	GA	nAMD	GA	nAMD	GA	nAMD
0	4	6	3	12	11	7
20	3	0	0	0	0	0
50	1	0	0	0	2	0
50-100	1	0	0	0	0	0
100	5	1	0	1	1	8
200	1	0	1	0	0	0
200-250	0	0	0	0	0	3
200-400	0	0	0	0	5	0
300	0	2	0	0	0	1
300-500	1	0	0	2	0	0
1000	1	0	0	0	0	0
1500	0	0	0	0	0	3
1600	0	1	0	0	0	0
2000	0	0	0	0	1	1
2200	0	0	1	0	0	0
3000	0	0	0	0	0	1
5000	0	0	0	0	0	1
12000	0	0	0	0	0	1
15000	0	0	0	1 (bathroom renovation at ground level)	0	0
Other	0	0	0	0	3	0
No response	0	0	5	15	7	5

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In the past 4 weeks have you utilized any assistive resources or visual aids to support living with your condition? Please select all that apply.

	Bulgaria		Germany		USA	
	GA	nAMD	GA	nAMD	GA	nAMD
White cane	1	0	2	0	3	2
Guide dog	0	0	0	0	0	0
Digital speech to text converter	1	0	1	1	3	7
Screen reader	0	1	3	1	2	5
Magnifier	8	6	3	14	18	19
Phone, tablet, or laptop with applications or modifications to support your low vision needs	2	1	4	5	17	14
Audiobooks	2	0	4	4	7	9
None	9	4	4	14	5	7
Other	Stroller				1 x Walker	1 purchased ORCAM specialised glasses

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Approximately how much have you spent in the past 4 weeks on any assistive resources mentioned to support living with your condition?

	Bulgaria		Germany (€)		USA ($)	
	GA	nAMD	GA	nAMD	GA	nAMD
0	10	4	4	13	10	16
10	1	2	0	0	1	0
15	0	0	0	0	1	0
25	0	0	0	0	0	3
29	0	0	1	0	0	0
50	1	0	0	0	1	0
60	0	0	0	0	1	1
100	2	0	0	0	1	2
150	0	1	0	0	0	0
200	0	0	0	1	0	2
250	1	0	0	0	1	0
300	0	0	0	0	0	1
350	0	1	0	0	0	0
500	0	1	0	1	0	0
1000	2	0	0	1	0	0
1200	0	1	0	0	0	0
1500	0	0	0	0	1	0
2500	0	0	0	1	0	0
Participant misinterpreted question	0	0	0	0	5	3
No response	0	0	5	14	8	2

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How frequently do you visit an eye care professional such as an optometrist, ophthalmologist or eye doctor to monitor or treat your condition? Please select the most relevant answer.

	Bulgaria		Germany		USA	
	GA	nAMD	GA	nAMD	GA	nAMD
Once per month	1	5	3	17	3	16
Once every 2 months	2	2	1	9	1	7
Once every 3 months	1	3	3	3	5	2
Once every 4 months	0	0	0	0	0	2
Once every 6 months	4	0	0	2	13	3
Once per year	7	0	3	0	8	0
More than once per year	2	0	0	0	0	0

Patient Retina International Survey (14/35)

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How far do you have to travel for appointments to monitor or treat your condition?

	Bulgaria			Germany		USA	
	GA	nAMD	Late AMD	GA	nAMD	GA	nAMD
Less than 10 kilometers	8	4	12	4	5	15	14
Between 10 and 20 kilometers	5	5	10	3	12	10	9
Between 20 and 50 kilometers	1	0	1	1	11	3	3
More than 50 kilometers	3	1	4	2	3	2	4

How do you travel most often to your appointments to monitor or treat your condition? Please select the most appropriate answer.

	Bulgaria			Germany		USA	
	GA	nAMD	Late AMD	GA	nAMD	GA	nAMD
Walking	0	0	0	1	0	0	0
Public Transport	8	5	13	1	9	2	0
My Own Private Car	0	1	1	4	7	12	16
Someone else's private car	7	3	10	3	12	16	13
Taxi (or equivalent)	2	1	3	1	3	0	1

Patient Retina International Survey (15/35)

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Does someone accompany you to your appointments to monitor or treat your condition?

	Bulgaria		Germany		USA	
	GA	nAMD	GA	nAMD	GA	nAMD
No, I travel and attend my appointments on my own	3	5	3	12	9	4
Yes, for all of my appointments	8	2	5	14	13	18
Yes, for about three quarters of my appointments	1	2	0	1	1	2
Yes, for about half of my appointments	1	1	2	3	4	2
Yes, for about one quarter of my appointments	4	0	0	1	3	4

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Approximately how much of your own money did you spend on appointments to monitor your condition in the past year? This may include consultation fees and imaging of your eye. This does not include any treatment costs.

	Bulgaria		Germany (€)	
	GA	nAMD	GA	nAMD
0	2	1	4	7
50	2	0	0	0
80	0	0	0	1
100	1	1	0	0
120	0	0	1	1
150	5	0	0	0
170	1	0	0	0
200	3	0	0	2
250	0	2	0	2
300	1	1	0	1
400	0	2	0	0
500	2	1	0	1
650	0	1	0	0
744	0	0	0	1
1000-1500	0	0	0	1
1200	0	1	0	0
1500	0	0	0	1 (on taxis)
No Answer	0	0	5	13

Patient Retina International Survey (17/35)

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Approximately how much of your own money did you spend on appointments to monitor your condition in the past year? This may include consultation fees and imaging of your eye. This does not include any treatment costs.

	USA ($)	
	GA	nAMD
0	4	7
15	1	0
50	2	0
70-80	2	0
100	4	0
150-200	0	7
200	0	2
300	2	0
400-500	0	3
800	0	1
1000	0	2
1200	0	2
1000-1500	2	0
2500	0	2
3500	0	1
4500	1	0
Insurance covered/ CoPay/ Deductable	10	1
N/A	2	2

Note: Due to the variety of responses the table was split over two pages

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Have you had a surgical procedure to treat your condition, for example an eye injection?

	Bulgaria		Germany		USA	
	GA	nAMD	GA	nAMD	GA	nAMD
Yes	1	9	2	29	4	30
No	16	1	8	2	25	0
No response	0	0	0	0	1	0

How many surgical procedures have you had in the past year?

	Bulgaria		Germany		USA	
	GA	nAMD	GA	nAMD	GA	nAMD
0	16	2	8	3	3	2
1-2	2	1	0	1	1	2
3-4	0	1	1	6	0	4
5-6	0	2	1	3	0	4
7-9	0	2	0	8	0	2
10-12	0	1	0	5	0	11
13+	0	1	0	2	0	5
Did not respond	0	0	0	3	0	0

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Approximately how much money have you spent on surgical procedures for your condition in the past year?

	Bulgaria		Germany (€)		USA ($)	
	GA	nAMD	GA	nAMD	GA	nAMD
It was free as it was covered by my own private health insurance	0	1	1	15	3	11
It was free as it was covered by national health insurance	1	1	4	13	4	7
Other- please specify	16 (1,000x1, 1,600x1 (FACO+ IOL), 0x14)	• 1,800 • 1,250 • 600 • 500 (x2) • 300 • 100 • has not had an injection in the last 1 year, previously 7 injections	3 (350x1, 0x2)	3 (100x2, 10x1)	23 Did not respond	• 7,500 • Covered by insurance 240/month • After health insurance, cost me $400 per injection • 500 (x2) • 40 • 1,200 • Eyelea provides free injections for the last 4 months. Before that it was $1,800 per month out of pocket • free through the Veterans Benefits • $3,000 copayments after Medicare advantage plan payment • 2 NA

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Approximately how much per year do you spend on appointments/consultations with eye care professionals?

	Bulgaria		Germany (€)	
	GA	nAMD	GA	nAMD
0	6	6	5	12
50	1	0	0	0
150	4	1	0	0
200	3	1	0	0
250	1	0	0	1
300	1	0	0	0
350	0	0	1	0
400	0	1	0	0
500	1	0	0	1
600	0	0	0	1
1000	0	0	1	0
2000	0	1	0	0
3360	0	0	0	1
19200	0	0	0	1
No answer	0	0	3	13

Patient Retina International Survey (21/35)

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Approximately how much per year do you spend on appointments/consultations with eye care professionals?

	USA ($)	
	GA	nAMD
0	9	6
15	1	0
25	1	0
45	1	0
50	2	0
75	1	0
80	3	0
80-100	0	3
100	4	0
150-200	0	5
200	1	0
250	0	1
250-300	0	2
300	1	0
500	0	2
600	0	1
700	1	0
1000	1	2
1200	0	2
1400	1	0

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Approximately how much per year do you spend on appointments/consultations with eye care professionals? (continued)

	USA ($)	
	GA	nAMD
1500	1	0
2000	0	1
4000	0	1
8000	0	1
10000	0	1
Deductible/ CoPay	2	2

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Approximately how much per year do you spend on medications or supplements for your condition?

	Bulgaria		Germany (€)	
	GA	nAMD	GA	nAMD
0	0	0	0	7
25	0	0	0	1
40	0	0	0	1
50	0	1	1	1
60-80	0	0	0	1
100	0	0	0	1
144	0	0	0	1
150	3	1	0	1
160	2	0	0	0
200	7	1	0	1
240	1	0	0	0
250	0	2	0	1
260	2	0	0	0
264	0	0	1	0
300	1	0	0	0
385	0	0	1	0
300-400	1	0	0	0
400	0	1	0	0
450	0	0	0	1
500	0	1	2	0

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Approximately how much per year do you spend on medications or supplements for your condition?

	Bulgaria		Germany (€)	
	GA	nAMD	GA	nAMD
800-1000	0	0	0	1
1000	0	1	1	0
1250	0	1	0	0
2000	0	0	0	1
6000	0	0	0	1
12000	0	0	0	1
No Answer	0	0	4	10

Patient Retina International Survey (25/35)

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Approximately how much per year do you spend on medications or supplements for your condition?

	USA ($)	
	GA	nAMD
0	2	0
20	1	0
50	2	0
15-90	0	3
60	1	0
100	4	2
125	0	1
150	3	3
150-300	1	0
180	0	2
200	3	3
250-275	0	3
300-350	0	5
350	2	0
400	1	0
500	3	2
500-600	1	0
600	1	1
800	1	0
1000	1	1

Patient Retina International Survey (26/35)

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Approximately how much per year do you spend on medications or supplements for your condition?

	USA ($)	
	GA	nAMD
1200	1	0
1300	1	0
1500	0	1
4000	0	1
5000	1	0

Patient Retina International Survey (27/35)

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How much do you spend per year on low vision rehabilitation services?

	Bulgaria		Germany (€)		USA ($)	
	GA	nAMD	GA	nAMD	GA	nAMD
0	16	8	4	14	22	29
150	0	0	0	0	1	0
200	0	0	0	0	1	0
250	0	0	1	1	0	0
300	0	0	0	0	2	0
450	0	1	0	0	0	0
500	1	0	0	0	0	0
1000	0	1	0	0	0	0
1600	0	0	1	0	0	0
No Response	0	0	4	16	4	1

Has your condition led you to have an accident in the past year such as a slip, trip, fall, burn, car/ bicycle/vehicle crash?

	Bulgaria		Germany		USA	
	GA	nAMD	GA	nAMD	GA	nAMD
Yes	8	3	2	6	12	11
No	9	6	8	24	18	18
No response	0	1	0	1	0	1

Patient Retina International Survey (28/35)

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How many accidents in the past year?

	Bulgaria		Germany		USA	
	GA	nAMD	GA	nAMD	GA	nAMD
0	9	0	0	0	0	0
1	1	0	1	4	4	3
2	0	1	0	1	3	0
3	2	1	1	0	2	3
4	3	0	0	0	0	3
5	0	0	0	0	1	0
6	0	0	0	0	0	1
6-7	0	0	0	0	1	0
8	1	0	0	0	0	0
10	1	1	0	0	1	1
50	0	1	0	0	0	0

What was the impact?

	Bulgaria		Germany		USA	
	GA	nAMD	GA	nAMD	GA	nAMD
No damage or injury	10	7	8*	2	3*	0
Minor injury- did not require hospital treatment	4	1	2	4	7	10
Major injury-requiring emergency day care	2	2	0	0	0	1
Major injury-requiring hospital stay	1	0	0	0	2	0

* These were the same respondents who reported no accidents** a further ten also selected no damage or injury but the same 10 had also indicated no accidents etc.

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Does your condition require you to receive additional assistance for any of the following daily tasks? Please select all that apply.

	Bulgaria		Germany		USA	
	GA	nAMD	GA	nAMD	GA	nAMD
Housekeeping- cleaning the house/doing the laundry	7	1	3	5	2	4
Gardening	2	1	2	3	1	1
Personal hygiene and/or grooming	5	0	0	1	4	0
Clothes shopping	6	1	2	2	7	5
Grocery shopping	10	2	2	3	8	6
Shopping for medical supplies or medications	8	2	1	1	2	3
Transport to or from medical appointments	7	3	2	10	16	16
Reading the mail or any personal administration documents to the care recipient	7	3	1	1	9	5
No- I do not receive any assistance for any of the above tasks	5	5	6*	20	11	8

Patient Retina International Survey (30/35)

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Who provides this assistance to you? Please select all that apply.

	Bulgaria		Germany		USA	
	GA	nAMD	GA	nAMD	GA	nAMD
My spouse or partner	2	3	7	14	15	14
My child/children/grandchildren	16	7	5	8	10	7
My brother/sister	1	2	1	0	0	2
My niece/nephew	1	1	0	0	0	1
My neighbor or friend	2	2	1	4	6	6
A formal care provider who is paid	0	0	0	0	0	1
Nursing care provider	0	0	0	0	0	0
Other-please specify	0	1 (no)	1 indicated no help	4 did not respond, 8 indicate no help	1 indicated daughter in law	0

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Does your condition prevent or restrict you from enjoying any hobbies or interests you had prior to developing your condition? Please select all that apply.

	Bulgaria		Germany		USA	
	GA	nAMD	GA	nAMD	GA	nAMD
Yes - watching sport	4	2	2	2	3	5
Yes - playing sport	3	1	2	6	7	6
Yes - watching movies	12	3	2	5	8	8
Yes - playing card games	1	1	1	2	3	4
Yes - playing board games	0	0	2	1	7	4
Yes – travelling	7	1	1	7	10	9
Yes – cooking	3	2	0	4	5	3
Yes - socialising	7	0	0	2	4	8
Yes – driving	5	3	5	19	15	15
Yes – cultural activities	0	1	0	3	4	4
Yes – religious activities	0	0	0	0	1	3
Yes – other, please specify	4 (3 x reading, 1 x computer work)	3 (2 x reading, 1 x herbal medicine)	2 x reading	5 (3 x reading, 1 x hiking, 1 x piano)	14 (8 x reading, 4 x arts and crafts, 1 x hiking, 1 x playing music)	14 (6 x crafts, 4 x reading, 2 x playing music, 1 x hunting, 1 x bird watching)
No	3	3	3	3	8	6

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Has your condition caused you to experience any of the following?

	Bulgaria		Germany		USA	
	GA	nAMD	GA	nAMD	GA	nAMD
Anxiety	12	5	3	5	15	16
Depression	5	3	3	6	11	14
Social isolation	10	2	1	1	4	9
Financial stress	5	2	0	1	3	6
Loss of confidence	8	1	1	5	13	11
Loss of independence	8	1	3	6	10	16
None of the above	2	4	3	13	11	6
Prefer not to say	0	1	0	0	1	2

Have you sought professional support or guidance to help with any of the experiences, for example anxiety, depression, social isolation, stress? Professional support may come from a counsellor, a psychologist, psychiatrist, or therapist.

	Bulgaria		Germany		USA	
	GA	nAMD	GA	nAMD	GA	nAMD
Yes	1	2	1	1	6	4
No	16	8	9	30	23	25
I am waiting for an appointment	0	0	0	0	0	0
Prefer not to say	0	0	0	0	1	0

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Approximately how much do you spend per year on professional support or guidance to help you manage any of the experiences referred to for example anxiety, depression, social isolation, stress?

	Bulgaria		Germany (€)		USA ($)	
	GA	nAMD	GA	AMD	GA	nAMD
0	16	6	1	1	17	24
50	1	0	0	0	0	0
200	0	1	0	0	0	0
500	0	1	0	0	1	0
600	0	0	0	0	1	0
1500	0	0	0	0	1	0
2000	0	0	0	0	0	1
3000	0	0	0	0	0	1
No response	0	1	0	0	8	4
Other	0	1x Health Insurance	0	0	1x Health Insurace, 1x Cost of Antidepresseant	0

Patient Retina International Survey (34/35)

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Do you live with any of the following other conditions? Please select all that apply.

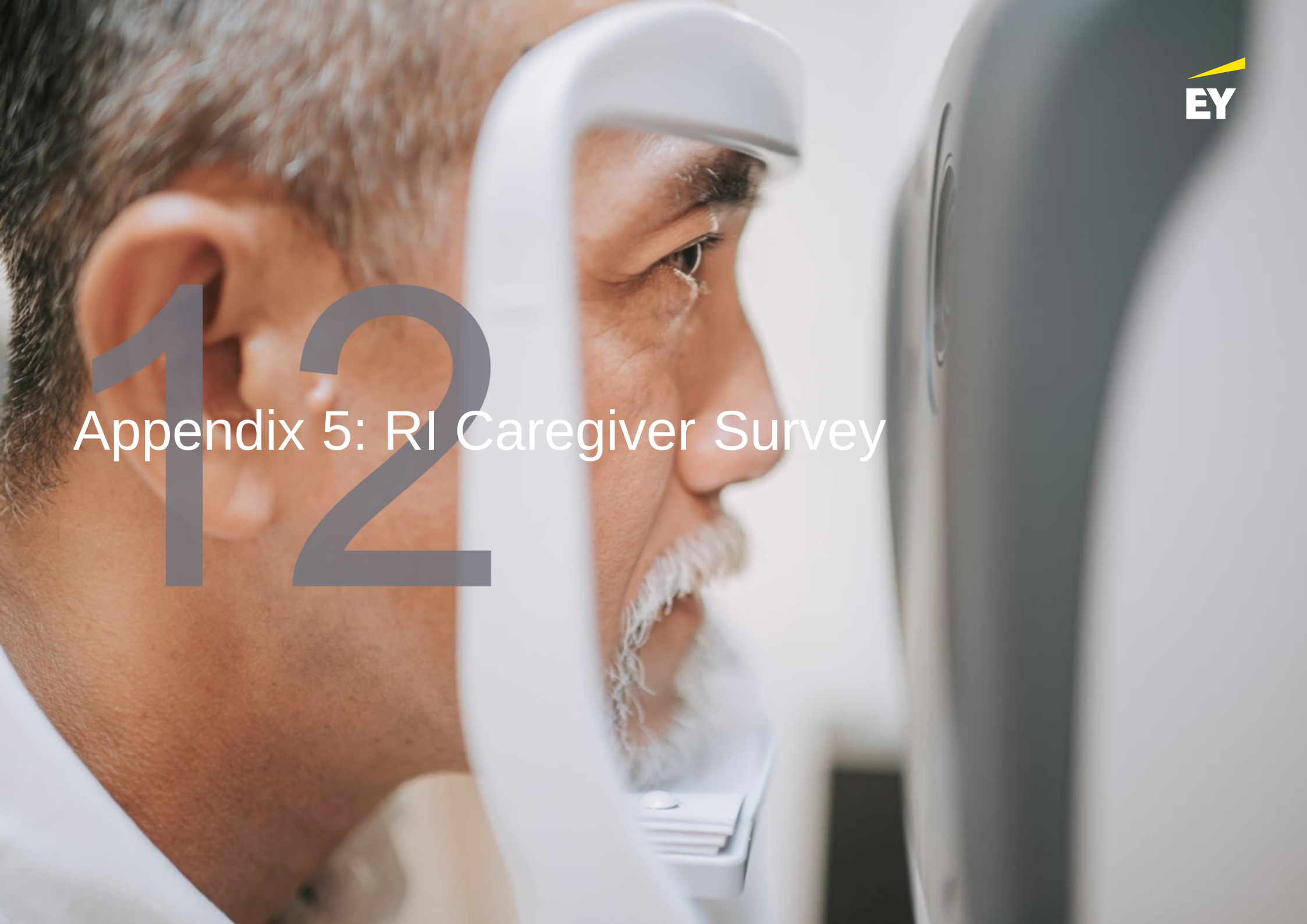
	Bulgaria		Germany		USA	
	GA	nAMD	GA	nAMD	GA	nAMD
Diabetes	5	5	0	1	2	11
Renal disease (Kidney disease)	5	3	0	1	1	1
Dementia (this includes Alzheimer's Disease)	0	1	0	0	0	0
Congestive Heart Failure	12	1	0	2	0	1
Stroke	0	2	0	1	0	0
Pulmonary conditions	3	1	0	3	0	3
Parkinson's Disease	0	0	0	0	0	0
Multiple Sclerosis	0	0	0	1	0	0
Osteoporosis	1	4	1	6	7	4
Cancer	4	1	0	1	3	1
Deafness	1	1	0	0	7	3
Other- please specify	1x nodes of the thyroid gland	1 x Benign prostatic hyperplasia	High blood pressure (x1), osteoarthritis (x1), lumbar spine syndrome (x1)	High Blood pressure (x4), rheumatism (x2), Lyme disease (x1), osteoarthritis (x1), rectal inflammation (x1)	Arthritis (x3) Leukopenia (x1) Atrial Fibulation (x1) Neuropathy (x1) Hyperparathyroidism (x1) Chrons (x1), Osteoarthristis (x1), Lupus (x1)	Coronary artery disease (x1), graves disease (x1), arthritis (x1), cardiac issues (x1), high blood pressure (x1), edema (x1), GI tract problems (x1)

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Do you live with any of the following other vision complications?

	Bulgaria		Germany		USA	
	GA	nAMD	GA	nAMD	GA	nAMD
Refractive Error myopia (near-sightedness), hyperopia (farsightedness), astigmatism (distorted vision at all distances), and presbyopia (loss of the ability to focus up close)	14	9	4	12	18	12
Diabetes Related Retinopathy	0	0	0	0	0	0
Diabetes Related Macular Edema	0	1	0	0	0	0
Glaucoma	1	2	3	1	3	4
Cataract	1	2	2	5	10	13
Uveitis	0	0	0	0	0	1
Other- please specify	1 x none	1 x none	1 x none 2 x did not answer	6 x none 8 x did not answer	2 x IRDs	Dry eye (x1), Fuchs disease (x1), IRD (x1), Prosthetic in one eye (x1)



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Appendix 5: RI Caregiver Survey

Caregiver Retina International Survey (1/14)

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Caregiver – respondents

Disease	Bulgaria	Germany	USA
GA	16	5	4
nAMD	7	15	14
Total	**23**	**20**	**18**

Age	Bulgaria	Germany	USA
18-24	1	0	0
25-34	2	0	0
35-44	1	0	1
45-54	6	6	4
55-64	8	4	5
65-74	2	5	4
74-84	3	5	4
Total	**23**	**20**	**18**

Type of residence	Bulgaria	Germany	USA
City	18	9	8
Town	5	2	8
Village	0	7	0
Rural Area	0	2	2
Total	**23**	**20**	**18**

Caregiver Retina International Survey (2/14)

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Caregiver – respondents

Relationship to patient	Bulgaria	Germany	USA
Spouse	4	7	9
Parent	17	11	9
Sibling	1	0	0
Aunt/Uncle	1	0	0
Neighbour/Friend	0	2	0
Total	**23**	**20**	**18**

How long have you been providing care to the care recipient?

Time	Bulgaria	Germany	USA
More than 6 months	3	0	0
More than 1 year	4	1	2
More than 2 years	7	2	1
More than 3 years	3	4	2
More than 5 years	3	4	5
More than 10 years	2	6	5
More than 15 years	0	2	1
More than 20 years	1	1	2
Total	**23**	**20**	**18**

Caregiver Retina International Survey (3/14)

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Types of Care

	Bulgaria	Germany	USA
Housekeeping- cleaning the house/doing the laundry	12	10	13
Gardening	2	11	3
Personal hygiene and/or grooming	3	1	3
Clothes shopping	9	13	11
Grocery shopping	15	15	16
Shopping for medical supplies or medications	11	12	16
Transport to or from medical appointments	15	12	18
Transport to or from social events	2	13	15
Transport to or from cultural events	5	10	8
Transport to or from religious services or events	1	2	8
Reading the mail or any personal administration documents to the care recipient	11	13	16
Providing care in the form of managing the health of care recipient	3	7	11
Providing care in the form of sourcing and providing information to the care recipient about their health and healthcare	2	9	16
Other- please specify	0	1 (Psychological and emotional support)	2 (Helping to complete bills, legal documents, and other necessary tasks that involve reading x1, Paying bills, managing finances, filling out applications for SSI and welfare x 1)

Caregiver Retina International Survey (4/14)

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How much of your own money did you spend in the past 4 weeks providing care in the form of driving to complete the daily tasks described?

	Bulgaria (BGN)		Germany (€)		USA ($)	
	GA	nAMD	GA	nAMD	GA	nAMD
0	4	3	1	5	0	0
10	0	0	0	1	0	2
20	2	0	0	1	0	0
30	2	0	2	0	0	0
40	1	0	0	0	0	0
50	2	2	1	2	1	3
60	1	0	0	1	0	0
100	4	1	0	3	1	5
120	0	0	0	0	1	0
200	0	0	0	0	0	1
500	0	0	0	0	0	1
600	0	1	0	0	0	0
Not Quantifiable/Unsure	0	0	1	2	1	2

Caregiver Retina International Survey (5/14)

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How much of your own money did you spend in the past 4 weeks providing care in the form of the daily tasks described? Please exclude any driving related costs.

	Bulgaria (BGN)		Germany (€)		USA ($)	
	GA	nAMD	GA	nAMD	GA	nAMD
0	2	5	4	11	1	3
20	0	0	0	2	0	1
30	1	0	0	0	1	0
40	1	0	1	0	0	1
50	0	0	0	2	0	3
100	3	1	0	0	0	2
150	2	0	0	0	0	0
200	2	1	0	0	0	1
300	3	0	0	0	0	0
350	1	0	0	0	0	0
400	1	0	0	0	0	0
500	0	0	0	0	1	1
Household/ Unsure	0	0	0	0	1	2

Caregiver Retina International Survey (6/14)

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Did you take any time off work to provide care in the form of the daily tasks described in the past 4 weeks?

	Bulgaria		Germany		USA	
	GA	nAMD	GA	nAMD	GA	nAMD
0	13	7	4	12	3	8
1-2 hours	0	0	1	0	0	0
3-4 hours	0	0	0	1	0	1
4-8 hours	0	0	0	1	0	2
1 day	1	0	0	1	0	1
2+ days	2	0	0	0	1	2

Caregiver Retina International Survey (7/14)

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Do you provide transport to the care recipient for their eye healthcare appointments?

	Bulgaria		Germany		USA	
	GA	nAMD	GA	nAMD	GA	nAMD
Yes	12	3	4	13	4	12
No	4	4	1	2	0	2

How often do you provide transport each month or year for your care recipients eye healthcare appointments? (please respond per year)

	Bulgaria		Germany		USA	
Per Year	GA	nAMD	GA	nAMD	GA	nAMD
0	2	3	1	4	0	0
1 time	10	0	0	0	2	0
2 times	2	0	0	0	0	3
3-4 times	1	1	1	0	1	2
5-6 times	0	1	2	1	0	1
7-11 times	0	1	0	2	1	1
12+ times	1	1	0	7	0	5
As often as needed	0	0	1	1	0	2

Caregiver Retina International Survey (8/14)

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How often do you provide transport each month or year for your care recipients eye healthcare appointments? (please respond per year)

	Bulgaria		Germany		USA	
Per Year	GA	nAMD	GA	nAMD	GA	nAMD
0	2	3	0	4	0	0
1x	10	0	0	0	2	0
1-2x	0	0	0	0	0	1
2x	2	0	0	0	0	2
3x	0	1	1	0	0	2
4x	1	0	0	0	1	0
4-8x	0	0	0	0	0	1
5x	0	1	0	0	0	0
6x	0	0	2	1	0	0
6-12x	0	0	0	0	0	1
8x	0	0	0	0	0	0
10x	0	1	0	1	1	1
11x	0	0	0	1	0	0
12x	1	1	0	2	0	2
15x	0	0	0	0	0	0
20x	0	0	0	0	0	1
20-25x	0	0	0	1	0	0
25x	0	0	0	1	0	0
25-30x	0	0	0	1	0	0
50x	0	0	0	0	0	1
As often as needed	0	0	1	1	0	2

Caregiver Retina International Survey (9/14)

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Approximately how far do you travel in total to support the care recipient for eye healthcare appointments? Please include the distance travelled from your location to that of the care recipient. Please also include the return journey.

	Bulgaria (Km)		Germany (Km)		USA (Miles)d	
Per Year	GA	nAMD	GA	nAMD	GA	nAMD
Less than 10	8	2	1	1	1	0
Between 10 and 20	4	3	3	4	3	7
Between 20 and 50	2	1	0	4	0	4
More than 50	2	1	1	4	0	3
Did not respond	0	0	0	2	0	0

Do you take time off work to attend appointments with the care recipient specifically for monitoring or treating their eye health?

	Bulgaria (Km)		Germany (Km)		USA (Miles)	
Per Year	GA	nAMD	GA	nAMD	GA	nAMD
Yes, for all appointments	6	0	0	2	1	7
Yes, for about three quarters of appointments	1	0	0	2	0	1
Yes, for about half of appointments	0	2	0	0	0	0
Yes, for about one quarter of appointments	0	0	1	0	1	1
No, I do not take time off work to attend appointments	9	5	4	11	2	5

Caregiver Retina International Survey (10/14)

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Has providing care led to any of the following?

	Bulgaria		Germany		USA	
	GA	nAMD	GA	nAMD	GA	nAMD
Reduced working hours- if selected- how many hours less **per month** do you work?	1 (4 hours)	0	0	0	1 (32 hours)	1 (N/A)
Changing job	0	0	0	0	0	0
Increased absence from work- if selected-how many hours less **per month** do you work	3 (6 hours)	0	0	2 (8 hours, 10 hours)	0	2 (16 hours, 2 hours)
Quitting work	0	0	0	0	0	2
None of the above	10	6	5	12	3	8
Prefer not to say	3	1	0	1	0	1

Caregiver Retina International Survey (11/14)

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Have you had to provide financial assistance to the care recipient in the form of a gift that you do not expect returned? How much of your own money do you spend supporting the care recipient each month?

	Bulgaria		Germany		USA	
Per Month	GA	nAMD	GA	nAMD	GA	nAMD
0	3	4	3	10	2	4
10	0	0	0	0	0	1
40-50	0	0	0	0	0	1
50	1	0	1	0	0	1
70	0	0	0	1	0	0
100	3	0	0	2	1	2
150	1	0	0	1	0	0
200	2	1	0	0	0	1
300	2	1	0	0	0	0
350	1	0	0	0	0	0
400	2	0	0	0	0	0
500	1	1	0	0	1	0
Did not respond/ Unsure	0	0	1	1	0	2

Caregiver Retina International Survey (12/14)

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Does your government or health service/health system provide any support to you as a care provider to someone living with a vision impairment?

	Bulgaria		Germany		USA	
	GA	nAMD	GA	nAMD	GA	nAMD
Yes	0	0	0	2 (1-TK, 1-AOK)	1 (Grant)	1 (VA)
No	16	7	5	12	3	13
Did not repsond	0	0	0	1	0	0

Caregiver Retina International Survey (13/14)

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Has providing care led to any of the following?

	Bulgaria		Germany		USA	
	GA	nAMD	GA	nAMD	GA	nAMD
Anxiety	5	4	0	3	0	4
Depression	0	0	0	1	1	1
Social isolation	1	0	0	3	0	0
Reduced time with your family	4	0	0	5	0	1
Reduced time with your friends	0	0	0	7	0	1
Reduced time for your leisure, hobbies and interests	0	0	1	6	0	0
Reduced time for your health care	0	0	0	2	0	1
Feelings of guilt	0	0	0	0	1	1
Financial stress	0	0	0	2	0	1
Loss of confidence	0	0	0	0	0	0
Caused some strain on the relationship between you and the care recipient	0	0	1	1	1	1
Caused some improvement on your relationship with the care recipient	0	0	1	2	0	2
None of the above	6	3	2	4	0	0
Prefer not to say	0	0	0	1	0	1
Other-please specify	0	0	0	0	0	1 (all the above at times)

Caregiver Retina International Survey (14/14)

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Have you sought professional support or guidance to help with any of the experiences for example anxiety, depression, social isolation, stress? Professional support may come from a counsellor, a psychologist, psychiatrist, or therapist.

	Bulgaria		Germany		USA	
	GA	nAMD	GA	nAMD	GA	nAMD
Yes	2	0	0	1 (Approx. €8,000/year)	0	3 ($1,200, $250, $400)
No	14	7	5	14	4	11

Has providing care led to other impacts on your daily living?

	Bulgaria		Germany		USA	
	GA	nAMD	GA	nAMD	GA	nAMD
Yes	3	0	3	6	4	12
No	13	7	2	8	0	2

Reliance Restricted

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Disease burden impact assessment of GA and wAMD in Bulgaria, Germany and the USA

06 October 2022

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Dear Avril,

In accordance with the terms of our contract signed 3 June 2021, we have assisted you in the provision of an assessment of the disease burden of both GA (Geographic Atrophy/Dry AMD) and wAMD (Wet AMD) in Bulgaria, Germany and the USA.

Limitations of Scope

We have not, except to such extent as you requested and we agreed in writing, sought to verify the accuracy of any data, information and explanations provided by yourselves, and you are solely responsible for this data, information and explanations. We have therefore relied on any information provided by you to be accurate and complete in all material respects.

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We appreciate the opportunity to have provided our services to Retina International. Should you have any queries or comments regarding this report or if we may be of any further assistance, please do not hesitate to contact me on +353 1 221 2611.

Yours sincerely



Simon MacAllister
Partner


EY
Building a better
working world