

Should Glaucoma be Publicly Funded in Arguments for Funding Glaucoma Treatment?

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Abstract

Glaucoma adversely affects the visual function, impacting negatively on the individual with glaucoma (IWG)'s flourishing life. This work argues for the public funding of glaucoma. The arguments consider the plausible glaucoma's harm to the IWG through impaired visual function, especially its adverse effects on their daily activities, health, education, work, economy and overall harm to Nigerian nation.

Keywords: Basic universal healthcare, harms of glaucoma, quality of life, visual function

BACKGROUND

Glaucoma adversely affects the visual functions, rendering its victim visually disabled and, thus, negatively impacting the individuals' quality of life (QOL). Visual function is the most important sensory function of the human body, and impaired visual function or visual impairment is often detrimental to the affected individual's daily life and leads to functional disabilities and other health problems.^[1] Consequently, the QOL of the patients with glaucoma may significantly deteriorate. It is reported in a Scandinavian study that over 80% of the patients with glaucoma have negative feelings including anxiety, fear of blindness and depression at the time of their diagnosis.^[2]

There are various domains of visual function such as central vision, peripheral vision, colour perception, stereoacuity and contrast sensitivity. Glaucoma relentlessly interferes with the individual's domains of visual function and consequential progressive deterioration from normal state to bad and then to worse. Each domain of visual function has a specific role in human life and collectively they allow human to function as a complete person. The affectation of a particular domain leave patients with glaucoma disabled in that very particular domain. Glaucoma being a degenerative disease in progress soon affects the entire domains of visual function leading to an incomplete human being — handicapped human being or incapacitated human being. Precisely, a visually disabled or handicapped human being is produced.

This article considers the plausible harm glaucoma caused to its victims through impaired visual functions, especially its adverse effects on the individuals' education, economy and work. The arguments relate the harm of glaucoma to its victims to its negative impact on Nigerian society.

The advocacy for the public funding of glaucoma treatment is grounded on highlighted reasons in a sister paper under consideration including observations that many individuals with glaucoma (IWG) cannot afford glaucoma treatment, relationship between poor treatment compliance and IWG inability to afford treatment and Nigeria's lack of effective and efficient universal health insurance coverage. Other reasons are the lack of ready sponsors or funders for glaucoma, the preponderance of glaucoma in the working age group, the inverse relationship between available Nigeria's healthcare resources and Nigeria's population distribution, the negative impact of glaucoma on the IWG's QOL and the eye health professionals' concern.

The existing Nigeria's National Health Insurance Scheme (NHIS) notwithstanding, glaucoma treatment is yet to get the deserved public funding priority. At present, NHIS covers just an integral part of glaucoma treatment (only

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trabeculectomy and a few often non-available anti-glaucoma drugs). Further, the NHIS covers, at best, the insignificant population of IWG. The objective of this paper was to present the adverse effect of glaucoma on visual function vis-à-vis the QOL to ethically argue for the public funding of glaucoma treatment.

Which individual with glaucoma should benefit from publicly funded glaucoma treatment?

An IWG is the one who has glaucoma in at least one eye; however, for the purpose of accessing publicly funded treatment, an IWG should be appropriately reviewed by trained eye health workers, especially ophthalmologists. The goal of such review should be strictly towards assessing the likelihood an IWG might benefit from treatment as well as the judicious use of finite public fund. A number of clinical and investigative parameters can be used to select an IWG for public funding of glaucoma treatment among others clinical history suggestive of glaucoma, visual acuity (VA), intraocular pressure (IOP), cup-disc (CD) ratio, anterior chamber angle patency, central cornea thickness, central visual field (CVF), optic disc photography (ODP), optical coherence tomography (OCT) and the stage of glaucoma. While CVF, OCT and ODP would be reliable parameters in diagnosing, monitoring and prognosticating glaucoma, they are necessarily expensive and require training for their interpretation. On the other hand, the VA testing may not be helpful in the early stage of glaucoma, because impaired VA may not necessarily be found until advanced/late stage of glaucoma; however, the VA test is a common, user friendly, affordable yet objective and quick method for detecting eye conditions including glaucoma. The CD^[3] ratio may not only be high in glaucoma but also normal in some families and myopes. Whereas a raised IOP is worthy of monitoring/treatment, a statistically normal IOP may not necessarily exclude low/normal tension glaucoma.

Glaucoma treatment returns optimal visual function in an IWG if and only if it is effective, instituted early and sustained. The natural history of glaucoma is a continuum or spectrum progressing from undetectable, mild, moderate, severe to blind state.^[4,5] Therefore, the better the visual parameters, for instance, normal or near normal VA or CVF or IOP, the more the chance of preserving useful vision following treatment. All things being equal, IWG in the early stage of glaucoma would necessarily optimize the available treatment in terms of preservation of residual visual function. Contrariwise, IWG in the late stage of glaucoma may not necessarily achieve long-term preservation of residual visual function even with the available treatment.

In clinical practice, it is a tall order having all IWG accessing glaucoma care at its early stage, yet most IWG would have treatment benefit, even if marginal improvement in visual function. Therefore, considering

the cost benefit, utility, justice, impact on the QOL and finite health care resources, an IWG who should benefit from publicly funded glaucoma treatment should have the best-corrected VA of at least counting finger at 1 m and/or visual field of 5° from fixation in the glaucomatous eye at each review. The IWG with worse VA and/or visual field than suggested, in the better eye, may not necessarily benefit from the publicly funded glaucoma treatment but may be supported for visual and other rehabilitation(s) services as appropriate.

Are there communities where glaucoma treatment is publicly funded?

Many nations^[6-11] provide near universal healthcare service to their citizens. While glaucoma may not necessarily be singled out for funding, the existing healthcare plans in such geographical locations take care of the health needs of all registered citizens, the payment of token as health tax notwithstanding. In such communities, glaucoma treatment would necessarily be piggy-backed into universal healthcare service achieving the goal of life-long sight preservation in most IWG. The United Kingdom National Health Service is an example that encourages access to quality health care including glaucoma treatment^[6] at no cost at the point of delivery. This encourages IWG to have an effective and sustained treatment leading to the preservation of life-long useful vision.^[6] Further, Malaysia has an efficient, widespread and comprehensive government-run universal healthcare system being financed mainly through general revenue and taxation collected by the federal government. Notwithstanding, the private healthcare system funded principally through out-of-pocket payments from patients and some private health insurance also exists.^[7] In Saudi Arabia, the government bears the total expenditure on public health services and the services are free-of-charge notwithstanding the resultant considerable cost pressure on the government caused by increasing population, the high price of new technology and the growing awareness about health and disease among the community.^[8] The Council for Cooperative Health Insurance established by the Saudi government ensures quality healthcare services. The council essentially introduces, regulates and supervises a health insurance strategy for the Saudi healthcare market.^[9]

Similarly, the Swedish healthcare system is top-rated internationally. This is so because all inhabitants access universal healthcare program, mainly tax-funded (80%) and is equivalent to 9.9% of the gross domestic product. Sweden provides health care to anyone who needs it regardless of their ability to pay for it.^[10] In Africa, the Mauritius public healthcare system stands out. Except foreign visitors who pay out-of-pocket for their health needs, all Mauritians and permanent residents benefit from free medical service. This would be possible as nearly 9.8% of the government's total annual budget goes to the public healthcare system.^[11]

METHODOLOGY

This is essentially a normative study. An ethical based study highlighting the harms of glaucoma and arguments for funding glaucoma treatment. The relevant literatures from the library of Keele University, Staffordshire, the United Kingdom, personal library and online articles were reviewed and cited.

This paper is part of a large work, which has been divided into articles. The remaining articles under consideration for publication include background, justification and the study overview; arguments against funding glaucoma treatment and rebuttal and resource allocation and justice arguments for funding of glaucoma treatment. This paper is divided into sections including the impact of glaucoma on the visual function vis-à-vis the QOL, its harms on the IWG's daily activities, health, education, work and economy.

Employing glaucoma-impaired visual function and its negative consequences for ethical arguments towards public funding of glaucoma treatment

Glaucoma impairs visual function

Glaucoma relentlessly interferes with the domains of visual function including central vision, peripheral vision, colour perception, stereoacuity and contrast sensitivity. Regrettably, glaucoma-impaired visual function is irreversible and adversely affects the QOL. In a Nigerian study comparing 132 IWG with controls (persons without glaucoma), Onakoya *et al.*^[12] report that glaucoma does affect QOL. The study shows that the IWG do have reduced QOL as defined by the two instruments used. Early or mild glaucoma is associated with reduced QOL compared with the controls.

The highlights of the way glaucoma affects the QOL among Nigerians by the study include greatest difficulty with glare and dark adaptation. These can make driving not only horrible for motorists who are glaucomatous but can also lead to accidents, especially while driving at night. Such motorists would rather experience blur distant vision because light rays from oncoming vehicle are scattered leading to poor visibility on the road. In addition, the study affirms correlation between increasing visual field defect and worsening QOL. Worsening visual field is dreaded in glaucoma because it signifies the progression of optic nerve damage and bad outcome for vision. Nonetheless, not all the IWG would experience severe visual field loss.

Furthermore, the contrast sensitivity correlates moderately with QOL among Nigerian IWG. Impaired contrast sensitivity in a progressive glaucoma implies difficulty in reading or in differentiating between objects, which have distinctive features. For instance, an IWG may have difficulty differentiating between, among others, deep blue and light blue objects. This unnecessarily makes the entire life unreal and annoying.

Additionally, the report indicates the cup-to-disc ratios, VA and visual field indices correlate with the QOL. This implies that higher cup-to-disc ratios, worsening VA and progressively narrowing visual field are the indicators of deteriorating visual function with negative impact on QOL.

Importantly, the study among Nigerians affirms that Primary Open Angle Glaucoma (POAG), the most common type of glaucoma in Nigeria, reduces the QOL even in the early stages of the disease, because there is a significant reduction in the QOL of the IWG with mild glaucoma compared with the controls. There is a clear trend of worsening QOL scores with the increasing severity of disease. The study has clinical worth in view of the correlation observed between the QOL scores and objective measures of visual function. Moreover, it should have appeal in Nigeria's funding of glaucoma treatment. The study establishes that glaucoma affects various domains of visual function in Nigerian IWG.

Elsewhere, there are studies in concordance with lessened QOL findings among Nigerian IWG. For instance, McKean-Cowdin *et al.*^[13] report greater severity of visual field loss in persons with open angle glaucoma with adverse impact on vision-related QOL. The impact was noted in persons who were previously unaware that they had glaucoma.

The authors hold that a prevention of visual field loss in the IWG is likely to reduce the loss of vision-related QOL. This essentially is the basis for glaucoma treatment, which is achievable if and only if there is early diagnosis and strict compliance to an effective glaucoma treatment. It is most likely compliance to glaucoma treatment would markedly improve should the public fund the glaucoma treatment. This would go a long way to reduce the burden of blindness from glaucoma in Nigeria. Glaucoma treatment compliance is the most unlikely among indigent IWG in an open market healthcare system.

Equally, in a study among individuals with ocular hypertension or POAG, van Gestel *et al.*^[14] report that visual field loss in progressing glaucoma is independently associated with a loss in both disease-specific and generic QOL. The study holds that it is important to prevent progression, both in early and in advanced glaucoma, especially in the IWG with inferior hemifield defects and severe defects in either eye. Furthermore, the study notes that visual functioning and generic QOL are lower in severe glaucoma than in mild glaucoma.

Glaucoma treatment slows down the disease progression, but may have its own effect on the QOL. Though uncommon, a glaucoma treatment that adversely affects the QOL is a setback to the efforts at preserving flourishing life in the IWG. However, it may be related to the side effects of anti-glaucoma drug; therefore, anti-glaucoma prescription should be reviewed periodically to detect and resolve intolerable side effects. It is counterproductive for an anti-glaucoma drug to prevent the harms of glaucoma and concurrently produce side effects that negatively affects the QOL.

Furthermore, Evans *et al.*^[15] report that the QOL is impaired to a similar extent by diseases associated with peripheral visual loss (glaucoma) and central visual loss [age related macular degeneration (ARMD)], but different domains are affected. In contrast to ARMD, mental aspects (such as cognition, emotion) appeared to be affected more than physical aspects in the IWG. Furthermore, Evans *et al.* observe that the differential impact upon the QOL might be a function of the pathology of the disease, for example potential for blindness and better ability to perform physical tasks due to the retention of central vision may explain these observations in glaucoma.

In their study, Hyman *et al.*^[16] observe that open-angle glaucoma is a leading cause of visual impairment worldwide and that the visual impairment caused by glaucoma can affect the QOL and functional ability, especially in individuals with severe glaucoma.

The aforementioned studies variously indicate glaucoma interfering with visual function and the beneficial effect of glaucoma treatment on visual function even if there was only marginal visual function improvement in the IWG. Besides, it is instructive from these studies that preserving good vision in the IWG has high hope in sustaining general health-related QOL.

Harms of glaucoma to daily activities and health, education, work, economy

Daily activities and health

Visual impairment has far reaching implications on human lives. A visually impaired individual has difficulty coping with the basic daily activities: movement around in the house, cooking, eating, toileting, bathing and cutting of nails. A blind individual may unknowingly wear untidy clothes. The most severely affected activities by visual impairment include driving, reading, threading needle but most would still cope with feeding and wearing of clothes.^[17] Limitations to normal daily activities essentially make life miserable and uninteresting.

Glaucoma can interfere with the IWG's perception of colours, impacting negatively on life activities such as an IWG unknowingly buying overripe banana or being cheated at market by unknowingly paying one thousand naira note (Nigeria's currency) in place of twenty naira note or short-changed in a business transaction. The world of an IWG with impaired vision is not real any longer and sadly enough the impaired vision is irreversible. Additionally, glaucoma can impair the IWG's ability to appreciate the dimensions of objects as two or three or misjudge the depth of a space (stereoacuity) leading to an IWG missing steps while moving along the staircase or enter a ditch while attempting to cross over it leading to injuries.

Generally, visual impairment, its causative disease notwithstanding, is notorious for its negative impact on QOL, especially among old people. For instance, in separate studies

Kelly^[18] and Haymes *et al.*^[19] report difficulties in the activities of daily living as the impact of visual impairment among older adults. A study by Ayanniyi *et al.*^[17] reports similar findings among 130 visually impaired Nigerians. The study covers age range 19–95 years, representing a general impact of visual impairment across age groups. In addition, the study reports glaucoma (29, 22.3%) as the second leading cause of visual impairment after cataract (82, 63.1%) underscoring the need for Nigeria to fund glaucoma to reduce visual impairment and its attendant challenges to the IWG's daily activities.

Visual impairment has negative impact on the IWG's health by the way of not being gainfully employed leading to inability to afford balanced diet. Nigerian glaucoma blind may suffer malnutrition as she becomes dependent on family (probably too poor to help) and a society without social welfare services for glaucoma blinds leading to untoward hardship. The lack of balanced diet can predispose to diet-related diseases including malnutrition leading to low bodily immunity and then infection.

Moreover, a visually impaired individual may have challenges in maintaining personal hygiene, for instance cutting finger and toe nails. Furthermore, a blind individual would not detect contaminated meals or drinks, which on consumption cause diseases. Visual impairment caused by glaucoma would be taxing for an individual who has been leading a very active life, because it predictively exposes to a life of inactivity, boredom, obesity, social isolation and loneliness,^[18,20] lower life satisfaction, anxiety, depression and suicide.^[21] Cognitive impairment, dementia and increased mortality are not rare after becoming blind.^[11] Evans *et al.*^[22] have reported increase in the need for residential or institutional nursing care and increase in the use of healthcare services among visually impaired. This undoubtedly underscores the economic burden caused by glaucoma.

Following visual impairment the estimated loss of wellbeing is staggering; an Australian 2004 study estimated loss of wellbeing attributable (years of healthy life lost as a result of disability, YLD) to visual disorders was 40,068 years, and the net cost of loss of wellbeing was 4.82 billion Australian Dollars (AUD).^[23] Moreover, many studies have reported falls, hip fracture and other accidents among the elderly who are visually impaired.^[24-26] The treatment for wounds and bone fractures in the elderly who are visually impaired is not only daunting but also an added cost.

Remarkably, neither all the IWG experience glaucoma's adverse effects in equal proportion nor glaucoma is solely responsible for adverse QOL in many IWG with impaired vision. It is possible that the IWG have comorbidities that even put them in severe distress than only glaucoma-impaired vision would suggest. Nonetheless, it is plausible that should such IWG have no added visual impairment, the nasty experiences would have been lessened. On aggregate, to make life worthwhile for all, that is those IWG who would

be facing only the challenges associated with glaucoma-impaired vision and those who may be unfortunate to have comorbidities, it is reasonable to prevent glaucoma-impaired vision through the public funding of glaucoma treatment in Nigeria.

Education

The development of a society is related to its level of literacy. Good sight is a prerequisite learning tool, because learning and vision are inseparable entity. Estimate indicates that 80% of what we learn come through the visual processing of information.^[27-29] Learning is an important visual taxing activity that has far reaching effect on human and world development. Learning activities such as reading, writing and demonstration depend on normal visual function: VA, visual field, colour perception, depth perception and contrast appreciation. Through normal visual function, the learners can appreciate what the teachers write, draw or demonstrate.

Glaucoma-impaired vision is a serious challenge to learning and a known cause of poor academic performance and outright school dropouts across the globe.^[30] This necessarily affects the IWG self-development through learning. An IWG may have difficulty recognizing colour contrasts such as black letters on a white background or colour prints against various coloured background, a situation which negatively affects learning. The aggregate-impaired educational developments of the IWG translate to huge loss to Nigeria by the way of loss in productivity and development.

The adverse effects of glaucoma are equally found in children including students; for instance, in a survey of ocular health among school children in Ilorin, Nigeria, Ayanniyi *et al.*^[31] report the features of glaucoma among eight pupils, one of whom had already lost vision to glaucoma in one eye. The pupil was eight years old at the time of the survey and would face long blind years in case she loses vision in the fellow eye. Being blind from glaucoma at a very tender age has negative implication on the pupils' education, especially in a resource-limited Nigeria. It would be as bad as dropping out of school and remain illiterate, with unfulfilled life dreams, becoming socially dependant and even suffer untimely death. Should there be a Nigeria's funded glaucoma treatment in place, the pupil would have benefited from such disease, which would have saved her, her family and society from the adverse impact of glaucoma.

Equally of concern is the fact that most Nigerian schools do not conduct pre- and post-school admission eye screening (test) for the pupils;^[32] otherwise, the glaucomatous eye should have been detected and treatment instituted ahead of the pupil going blind. However, the parents probably might have not been able to afford or sustain her glaucoma treatment underscoring the need for Nigeria's funding of glaucoma treatment to prevent avoidable glaucoma blindness and its impact on Nigerians.

Occupation

Glaucoma-impaired visual function has serious implication on career choice and/or survival in a chosen vocation. The IWG who suffer from impaired colour vision would not be able to sustain careers in vocations that require the recognition of colours to flourish as professionals. For instance, the vocations such as graphic art, creative art and driving^[33,34] require working with colours. Similarly, chemistry teachers and students as well as Nigerians engaged in traditional dye industry may not be able to cope with their work should they suffer from glaucoma-impaired colour vision. Glaucoma colour vision defects may require the affected professional to quit the job, which necessarily exposes the IWG to further challenges occasioned by abandoning the means of livelihood.

On the other hand, glaucoma colour vision defect in a driver may endanger many lives including the driver, passengers and unlucky passers-by. Imagine a glaucomatous driver who has impaired colour vision, making him to mistake a red traffic light for green; such mistake can cause an accident that would claim many lives. Suppose such a driver continues driving to cross a rail line when he is actually supposed to stop for an oncoming train to pass, it would lead to an inevitable fatal collision of train with the vehicle causing human and material losses. This graphic illustration is much more relevant to localities where traffic indicators at many road and rail crosses may be defective. Glaucoma colour vision defect would have taken many lives in such a terrible accident. Equally, a glaucomatous driver who suffers from constricted visual field may also cause a problem of similar magnitude especially at a T-junction, and such a driver would not be able to appreciate any oncoming vehicle from either side of the road and this may lead to an accident.

Regrettably, many Nigerian drivers are not aware that they have glaucoma or sometimes evade standard motor driving licensing test,^[35,36] even when they are aware of their impaired vision.^[36] In a study to determine the eye health status among 42 male Nigerian drivers, Ayanniyi and Chikwe^[37] report that only 4 (9.5%) ever had eye test to obtain motor driving license. Notably, the study observes that good vision is essential for driving to enable a driver to judge distance, to read road signs and appreciate the traffic lights and to respond appropriately to challenges on the road while driving.

Moreover, an ethical dilemma has been reported by some Nigerian ophthalmologists in a middle-aged driver and co-staff of the same institution who is visually impaired by an advanced glaucoma yet driving institutional automobiles.^[38] The implication of the report though, regrettable, is that many anonymous visually impaired glaucomatous drivers are driving on Nigerian roads. It is plausible that many accidents on Nigerian roads are caused by such drivers who might have been visually impaired by glaucoma. Generally, health conditions that affect motorist's well-being can be costly to society. For instance, Andreas

Lubitz, a co-pilot, allegedly crashed Germanwings in French Alps killing all 150 people on board having suffered from suicidal depression and unknown eye disease.^[39]

Furthermore, farming is important to Nigeria's economy. The Nigerian population is skewed to rural areas with over half of the Nigerians being engaged in farming activities. Glaucoma-impaired visual function in farmers does interfere with farming activities. Interestingly, one can recall a farmer who suffers from glaucoma-impaired visual function and presented in our clinic and who included in his complaints that he sadly ended uprooting half of his planted crops while weeding his farm because he could not properly identify and separate planted crops from the weeds. Regrettably, the glaucoma was at its advanced stage and medical treatment could not assist the farmer again. Many farmers across Nigerian communities suffer from glaucoma with its associated impaired visual functions. The aggregate of farmers who are rendered non-productive by glaucoma blindness is a setback towards achieving food sufficiency, because it depletes capable manpower for food production.

Disturbingly, virtually every vocation is affected when individuals engaged in such specific occupations have impaired visual function. In a study among 130 visually impaired Nigerians — 22.3% caused by glaucoma — Ayanniyi *et al.*^[17] report reduction in the workforce for public service, farming and artisan following visual impairment. The driving and teaching vocations were absolutely affected by visual impairment and both increased the magnitude of dependants 40 times. Remarkably, many blinds, especially indigent glaucoma blinds, end up leading a miserable life and often resort to the street begging for alms to survive.

Economy

Another notable reason for Nigeria to fund glaucoma treatment is the huge economic gain that can accrue from preventing glaucoma blindness. In the first instance, an IWG who enjoys near normal vision would be able to flourish, be productive and contribute to the economy rather than becoming a dependant. A blind IWG is essentially visually handicapped and would need assistance to survive. For instance, it necessarily costs more to provide the same quality of education given to sighted individuals than to glaucoma blinds, because it would require specialized resources. Nigeria would gain money by preventing the IWG going blind through funding of glaucoma treatment. Frick and Foster^[40] report that lost vision accounts for estimated 7.5 billion United States Dollars (USD) in annual lost productivity globally.

In the same vein, a blind IWG is essentially a dependant who rather than contribute to the economy depends on family and society. The living expenses of the blinds have to be borne by family and society and even, in exceptional cases where glaucoma blinds are endowed to cater for their living

expenses would still require people's assistance for services that they could ordinarily have rendered to themselves. Often, Nigerian indigent blinds beg for alms, because there is no reliable social security system for the blind people.^[41]

Meanwhile, of serious public health and economic concerns is the fact that glaucoma is Nigeria's leading cause of irreversible blindness. This is so because glaucoma prevalence is on the increase proportionately to increasing total and elderly populations. In a study on the 'economic impact of POAG in Australia', Dirani *et al.*^[42] observe that the prevalence of glaucoma in Australia is expected to increase from 208,000 in 2005 to 379,000 in 2025 because of the aging population. This has implication on glaucoma treatment as estimate indicates that health system costs over the same time period increased from 355 million AUD to 784 million AUD. Equally, total costs (health system costs, indirect costs and costs of loss of well-being) would increase from 1.9 billion AUD to 4.3 billion AUD. The finding is instructive and relevant to Nigeria in view of its equally growing and aging population because it would be cost-effective for Nigeria to fund glaucoma treatment than to allow it untreated and risk plausible huge economic loss from necessary blindness.

Similarly, Nigeria's funding of glaucoma treatment plausibly would save the society huge financial burden if one extrapolates Kymes *et al.*'s^[43] findings to Nigeria. They report that over the people's expected lifetime, the cost of managing visually impaired POAG individual is higher than people without glaucoma by 1688 USD or approximately 137 USD per year. This probably is due to the fact noted in the study that compared with other Medicare beneficiaries, glaucoma diagnosis was not found to be associated with significant risk of comorbidities before the development of visual impairment. Thus, glaucoma-related visual impairment is better prevented, because it necessarily pushes the IWG into further additional health or financial stress.

A good reason for Nigeria to fund glaucoma treatment is the plausibility of reducing the cost of glaucoma treatment. It can be argued that the cost per any particular product can be reduced if such product is mass-produced. The cost of such product can even be further reduced if there is a projection into the future and the raw materials for such product are purchased in bulk. This can be true in such situations when the raw materials are storable or non-perishable and where inflation is increasing or stable. Suppose the average cost of anti-glaucoma drugs to an average IWG is £20 (N6000) per month in an open market. It is possible to markedly reduce such amount, say by half (£10, N3000), should Nigeria decide to purchase in bulk. Alternatively, cost reduction is plausible if Nigeria purposefully establishes pharmaceutical plants or encourages the local production of anti-glaucoma products. Nigerian domestication of companies producing anti-glaucoma products promises further benefits including job opportunities and taxes that can boost Nigeria's economy.

Similarly, Nigeria can get a price reduction or payment deferment by partnering with companies producing anti-glaucoma drugs and equipment. For instance, some companies producing laser and OCT do partner some eye care facilities globally. Whereas OCT is useful in investigating, diagnosing and monitoring glaucoma, lasers are useful in treating glaucoma only that both are very expensive. A particular laser equipment becomes outdated or inactive after a period of time (shelf life). It would be a win-win situation for both Nigeria and such companies, because there would be Nigeria ready market for the products and Nigeria would prevent glaucoma blindness at lower cost.

Regulating the cost of anti-glaucoma products necessarily makes glaucoma more cost effective, because the real cost of anti-glaucoma products would be far less than what they would have been in an open market scenario. Moreover, indigenous companies producing anti-glaucoma products can boost economy through tax remittance. Should the companies even enjoy tax waiver, many Nigerians would be gainfully employed saving Nigeria the social costs of unengaged yet active citizens, especially welfare allowance. Of course, having a secure job is psychologically appealing and can translate to good health to citizens with overall benefit to society. Glaucoma funding would necessarily increase job opportunities for skilled and unskilled Nigerians.

Meanwhile, Nigeria is endowed with conditions that can attract companies engaging in anti-glaucoma products should Nigeria be willing to fund glaucoma treatment through partnership. For instance, Nigeria has land where such company can be sited free of charge, and there is cheap skilled and unskilled labour market and a predictable climate.

Admittedly, Nigeria has been rendering some social welfare in healthcare such as payment of salary of healthcare professionals in public service, erection and maintenance of public health facilities, training of healthcare professionals and the establishment of NHIS where government pays large percentage of the insurance fee with only 10% being paid by the beneficiaries. Nonetheless, there is always room for improvement. The society is better when there is improvement leading to development. Nigeria's funding of glaucoma treatment would further enhance Nigeria's social welfare rating and add more value to Nigerians' lives.

It is doubtful whether a disease such as glaucoma with frightening indices, especially irreversible impaired vision, early and sustained treatment for any visual benefit should be subject to cruel market forces in a country ravaged by poverty and unemployment. Such an approach would necessarily expose the vulnerable citizens who cannot afford treatment and Nigeria is the worst for it through high burden of dependant blind people on society.

CONCLUSION

Untreated glaucoma rapidly destroys visual function domains including VA, visual field, colour vision, depth perception and contrast appreciation leading to impaired vision or blindness. This impacts negatively the IWG's ability to flourish and diminished QOL because of disrupted basic daily activities, health, learning, work and economy. Glaucoma treatment can prevent glaucoma blindness and its associated negative impacts on the IWG. Glaucoma should be publicly funded for social justice and huge socio-economic gains.

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