

Causes of Visual Impairment and Blindness in Arab Countries

Dr. Rodaina Khader AlTarawneh

Associate Professor of Special Education- Mu'tah University- Jordan

E-mail: rodaina@mutah.edu.jo

Abstract

This study aimed to know the most important causes of visual impairment and blindness in Arab countries. The researcher collected data from (71) articles about eye diseases and causes of loss of vision, visual impairment, and blindness in Arab countries to achieve the study's aims. The findings indicated that the main causes of visual impairment and blindness in Arab countries by their importance were Cataract, Glaucoma, Refractive Errors, Diabetic retinopathy, Macular degeneration or macular dystrophies, Corneal opacity, Hereditary and Family History, Amblyopia, Retinitis Pigmentosa, Trachoma, and Traumas.

Keywords: Visual Impairment, Blindness, The Arab Countries

Introduction

Total blindness is the inability to tell light from dark or the total inability to see. Visual impairment or low vision is a severe reduction in vision that cannot be corrected with standard glasses or contact lenses and reduces a person's ability to function at certain or all tasks. Legal blindness (which is a severe visual impairment) refers to a best-corrected central vision of 20/200 foot or 6/60 meter or worse in the better eye or visual acuity of better than 20/200 foot or 6/ 18 meter but with a visual field no greater than 20° [e.g., the side vision that is so reduced that it appears as if the person is looking through a tunnel] (Gale Encyclopedia of Medicine, 2019). According to the International Classification of Diseases 11(ICD-11), visual impairment has two groups, distance and near presenting vision impairment. The distance vision impairment includes four categories, mild presenting visual acuity worse than 6/12 m, moderate

presenting visual acuity worse than 6/18 m, severe visual acuity worse than 6/60m, blindness visual acuity worse than 3/60m, near vision impairment presenting visual acuity worse than N6 or M8 with existing correction (World Health Organization (WHO), 2021). Also, visual impairment and blindness are categorized by causes, Cortical Visual Impairment (CVI) and Ocular visual impairment. CVI is clinically defined as significant visual dysfunction caused by injury to visual pathways and structures in the brain occurring during early perinatal development. Children with CVI often present with a myriad of visual deficits depending on the location and extent of damage, including decreased visual acuity and impaired visual field function. Most striking, however, are impairments in visual processing and attention, which have a significant impact on learning, development, and independence (Martin et al., 2016). In CVI, the visual acuity is reduced because of a disease process that does not involve the ocular structures (Carden & Good, 2006). It is not the result of damage to the eye itself or the optic nerve, but the ocular visual impairment results from damage to the eye itself or the optic nerve and eye diseases (Palmer, 2003).

Globally, it is estimated that approximately 2.2 billion people live with some form of distance or near vision impairment. One billion of them have moderate or severe distance vision impairment or blindness due to unaddressed refractive error, cataract, glaucoma, corneal opacities, diabetic retinopathy, and trachoma, as well as near vision impairment caused by unaddressed presbyopia (WHO, 2021). With regards to distance vision, 188.5 million have a mild vision impairment, 217 million have moderate to severe vision impairment, and 36 million people are blind. Regarding near vision, 826 million people live near vision impairment (Fricke et al., 2018). The most important causes of visual impairment worldwide are uncorrected refractive errors, cataracts, age-related macular degeneration, glaucoma, diabetic retinopathy, corneal opacity, and trachoma (WHO, 2021). The Arab countries are developing, and the prevalence of visual impairment and blindness is high in developing countries compared to developed ones. Visual impairment and blindness impact the development of different countries (Bezabih, Workineh & Olana, 2017). For countries to develop, they must pay attention to their quality of life by preventing diseases and disabilities. According to the WHO (2021), approximately 80% of vision impairment globally is considered avoidable. This needs knowledge causes of the vision impairment to avoid

it by the preventions' programs, so this study came to know these causes. So, the study questions will be as follows:

Question 1: What are the main causes of visual impairment and blindness in Arab countries?

Question 2: What are the other causes of visual impairment and blindness in Arab countries?

Methods:

This study is a descriptive cross-sectional study, and the data was collected from 71 articles about causes of loss vision, visual impairment, blindness, and eye diseases in the Arab countries from 1986 to 2019. It was conducted from June 2019 to August 2019. The researcher used a comprehensive Arabic and English search of Pub Med, EBSCO, Research Gate, Google Scholar, and Dar Almandumah. The following search terms in Arabic and English were used: causes of loss vision, visual impairment, blindness, and eye diseases in Arab countries, and in each Arab country, in North Africa, and the Middle East. The articles in this study were selected according to the following conditions, it used the definition of WHO at different times or medical diagnosis of eye diseases, and it was conducted in the Arab countries. Table 1 shows the numbers of articles that were reviewed according to the Arab country.

Table1. Numbers of articles which were reviewed according to Arab country.

#	Country	Number	of
			articles
1	Jordan	15	
2	Egypt	13	
3	Saudi Arabian	10	
4	Eastern Mediterranean and North Africa	5	
5	Palestine	4	
6	Yemen	4	
7	Lebanon	3	
8	UAE	2	

9	Sudan	2
10	Kuwait	2
11	Somalia	2
12	Iraq	2
13	Libya	2
14	Syria	1
15	Oman	1
16	Tunisia	1
17	Sub- Saharan	1
18	Qatar	1

Findings and Discussions:

To answer question 1 " What are the main causes of visual impairment and blindness in Arab countries? The researcher used the MAXQDA 2018 to enter and analyze data. The causes of visual Impairment, Blindness, loss vision, and eye diseases were classified to the tow group, first the main causes, the second is other causes. Then the researcher identified the causes in each study. After that, the causes were arranged to descending order according to their frequency in the studies. Table 2 shows that.

Table 2. The Main Causes of Visual Impairment and Blindness in Arab Countries

#	Cause	Frequency in studies	Percentage in studies (%)
1	Cataract	47	66.2
2	Glaucoma	39	55.7
3	Uncorrected Refractive Errors	34	48.6
4	Diabetic Retinopathy	23	32.9
5	macular degeneration or macular dystrophies	17	24.3
6	Corneal opacity	16	22.9
7	Hereditary and Family History	14	20

8	Amblyopia	13	18.6
9	Retinitis Pigmentosa	12	17.1
9	Trachoma or trichomatous trichiasis	12	17.1
10	Trauma	11	15.7
11	Unspecified Causes	10	14.3

The findings in Table 2 indicated that the main causes of visual impairment and blindness in Arab countries were: Cataract followed by importance, Glaucoma, Refractive Errors, Diabetic retinopathy, Macular degeneration or macular dystrophies, Corneal opacity, Hereditary and Family History, Amblyopia, Retinitis Pigmentosa, Trachoma or trichomatous trichiasis and Trauma. This finding agrees with the report of the world health organization (WHO, 2019), which indicated that the global causes of visual impairment and blindness are uncorrected refractive errors, cataracts, age-related macular degeneration, glaucoma, diabetic retinopathy, corneal opacity, and trachoma. However, the order of the causes of visual impairment and blindness according to their importance in Arab countries differs from their arrangement in the WHO (2019) report. This may be due to the difference in awareness of the causes of visual impairment and blindness from one place to another, and how countries fight the causes of visual impairment and blindness, and the different prevention systems followed from one country to another.

To answer question 2 " What are the other causes of visual impairment and blindness in Arab countries?" To answer the second question, the researcher reviewed studies that dealt with the causes of visual impairment and blindness in Arab countries, and then arranged the causes according to the number of studies reported in them. Table 3 shows that.

Table 3. The other Causes of Visual Impairment and Blindness in Arab Countries

#	Causes	Frequency in studies	Percentage in studies (%)
1	Strabismus, Retinal Detachment.	9	12.9
2	Consanguineous Marriages, Optic Atrophy.	8	11.4
3	Keratoconus	7	10
4	Eyeball abnormalities and Congenital Malformations, Retinal and Vascular Pathologies, Retinopathy of Prematurity, Corneal Scar.	6	8.6
5	Posterior segment disorders, Aphakia, Neurologic, Optic nerve pathology, Post Cataract Surgery, Phthisis, Albinism.	4	5.7
6	Diabetes Mellitus, Inflammatory and surgery, Chalazion, Congenital Anomalies, Anterior Uveitis, Vitamin A Deficiency, Corneal Dystrophies, Other Corneal Disorders, Iatrogenic, Conjunctival Disease or Infections.	3	4.3
7	Macular Edema, Dry Eye Disease, Congenital Exophthalmos, Retinal Dystrophy, Retinal Degeneration, Sever Vernal Keratoconjunctivitis, Retinal Diseases, Eyelid, Blepharitis.	2	2.9
8	Abnormal Color Vision, Ocular Hypertension, Absence of Globe, Posterior Vitreous Detachment , Lacrimal System Diseases, Congenital Aniridia, Retrolental Fibroplasia, Iris Atrophy, Congenital Nystagmus, Diabetic Maculopathy, Corneal Leukoma, Choroidal Atrophy, Tumor, Rod- Cone Dystrophy, Ocular Problem, Retinal Lesion, Environmental Pollution, Corneal Degenerations, Unacceptable Therapeutic Abortions, Malnutrition, Infection, Congenital Ocular Diseases, Central	1	1.4

<p>Corneal Thickness, Malignancies, Inherited Vitreoretinopathy, Rubeosis Iridis, Vitreo-Retinal Diseases, Glaucoma due to Steroid, Cataract due to Steroid, Ocular Adnexal Diseases, Lens Disorders, Intravitreal Hemorrhage, Pinpoint Pupil, Megalocornea, Toxic Amblyopia, Retinoblastoma, Ischemic Optic Neuropathy, Acquired Corneal Diseases, Stargards Diseases, Congenital Anophthalmia, Ulcer Cornea.</p>		
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Table 3 shows other causes of visual impairment and blindness in the Arab countries; the researcher arranged these causes in descending order according to the number of studies; Appendix (1) shows these studies. In general, the causes of visual impairment and blindness differ from one place to another. This depends on the policy of each country in dealing with and preventing eye diseases. Also, the causes of visual impairment differ according to the medical care systems that countries provide to treat and prevent eye diseases. Finally, the progress in ophthalmology in the Arab countries has an important role in diagnosing, treating, and preventing eye diseases.

Conclusion

In general, the main causes of vision impairment and blindness were in the Arab countries as they are in the rest of the countries, but with a difference in their arrangement according to their importance. This study aimed to find out the main causes of visual impairment and blindness in Arab countries. The top five causes were cataract, glaucoma, uncorrected refractive errors, diabetic retinopathy, macular degeneration, or macular dystrophies. The World Health Organization (WHO) constantly develops long-term plans to combat the causes of visual impairment and blindness. Still, conditions in developing countries, including Arab countries, prevent implementing these plans; for example, poverty, wars, famines, and the lack of health care for children and the elderly make the implementation of plans difficult. It is necessary to know the causes of visual impairment and blindness because this leads to preventing their occurrence (Waked et al., 2007). Many of the Arab studies reviewed in this study referred to preventing visual impairment and blindness in the Arab world,

these methods, Regular eye examination, screening of preschool children, early management of congenital cataract and glaucoma, genetic counseling (Tabbara, 2001), raising awareness through various media about eye diseases and ways to prevent them; because the lack of awareness was the most important barriers to treat diabetic retinopathy and glaucoma (Al-Shakarchi, 2011). Early detection and treatment of cataract because the most important barrier to treating cataracts in Arab counties was the waiting list at the hospital (Al-Shakarchi, 2011). Avoid frequent use of medical lenses because they lead to inflammation or injury of the cornea; never use eye drops without a prescription. And not treating the eye diseases with folk medicine, take measles and rubella vaccinations, early detection and management of bacterial corneal ulcers, mass treatment of trachoma (Tabbara, 2001); hygiene promotion (facial cleanliness), and environmental improvement can reduce transmission of trachoma (Bashe, 2016), can improve the vision loss due to refractive errors by wearing spectacles (Tabbara, 2001).

Implication

There are two types of visual impairment, blindness being a cortical and ocular visual impairment. Cortical visual impairment (CVI) caused by injury to the visual pathways and structures that occur during early development (Carden & Good, 2003; Martín et al., 2016), and visual impairment or induced blindness About a problem with the eye or the optic nerve (Martín et al., 2016). The researcher did not find studies on cortical visual impairment in Arab countries. This requires more research and studies.

It is very important to raise awareness and encourage cornea donation. Eye banks are available in only a small number of Arab countries, this making corneal transplantation rare because of the lack of corneal tissue or eye banks (Tabbara, 2001).

Some Arab countries still use folk remedies and homemade eye drops, leading to visual impairment and blindness (Tabbara, 2001). This requires treating the eyes medically and not resort to other treatments.

Medical advances contribute to reducing the prevalence of visual impairment and blindness (Tabbara, 2001). This requires continuous professional development for ophthalmologists in the Arab countries to learn about the latest devices and

technologies in treating eye diseases. Also, the necessity of adequate recruitment training skills of surgeons working in Arab countries and training to use the new technology to treat eye diseases.

Finally, the prevention of visual impairment, blindness, and eye diseases requires comprehensive national plans in every Arab country to raise awareness and treat eye diseases.

References

1. Abdel Hadi, A. & Hamdy, I. (2013). Correlation between risk factors during the neonatal period and appearance of retinopathy of prematurity in preterm infants in neonatal intensive care units in Alexandria, Egypt. *Clinical Ophthalmology*, 7(2013), 831- 837.
2. Abdel Hakeem, A., Mohamed, G. & Othman, M. (2012). Retinopathy of Prematurity: A Study of Incidence and Risk Factors in NICU of Al-Minya University Hospital in Egypt. *Journal of Clinical Neonatology*, 1(2), 76-81.
3. Abdalrahman, M., AlAnwar, M. (2004). Screening study for causes of disability in a Sharqia governorate. *Psychology Journal*, 18(69-70), 24-39.
4. Abuelela, M., Aleieldin, A. & Aboelyamin, A. (2018). The Prevalence of Eye and Vision Problems among Rural Egyptians Preschooler. *World Journal of Ophthalmology & Vision Research*, 1(1), 1-5.
5. AL-Bdour, M., AL-Till, M. & Abu-Khader, I. (2002). Causes of blindness among adult Jordanians: A hospital-based study. *European Journal of Ophthalmology*, 12 (1), 5-10.
6. Al- Dulaimy, M. (2010). Distribution of blindness and low vision among patients attending out patient clinic in Tikrit Teaching Hospital 2008-2009. *Tikrit Medical Journal*, 16(1), 20-29.
7. Al Faran, M., Al-Rajhi, A., Al-Omar, O., Al-Ghamdi, S. & Jabak, M. (1993). Prevalence and causes of visual impairment and blindness in the South Western region of Saudi Arabia. *International Ophthalmology*, 17(1993), 161-165.
8. Al-Akily, S. & Bamashmus, M. (2008). Causes of Blindness among Adult Yemenis: A Hospital-based Study. *Middle East Journal of Ophthalmology*, 15(1), 3-6.

9. Al- Akily, S., Bamashmus, M. (2011). Ocular complications of severe vernal keratoconjunctivitis (VKC) in Yemen. *Saudi Journal of Ophthalmology*, 25 (2011), 291-294.
10. Al-Akily, S., Bamashmus, M. & Gunaid, A. (2011). Causes of visual impairment and blindness among Yemenis with diabetes: a hospital-based study. *Eastern Mediterranean Health Journal*, 17(11), 831- 837.
11. Al- Lahim, W., Al- Ghofili, R., Mirghani, H. & Al- Balawi, H. (2018). Evaluation of awareness and attitudes towards common eye diseases among the general population of northwestern Saudi Arabia. *The Egyptian Journal of Hospital Medicine*, 70 (11), 1983- 1989.
12. Algamdi, H. (2016). Causes of irreversible unilateral or bilateral blindness in the Al Baha region of the Kingdom of Saudi Arabia. *Saudi Journal of Ophthalmology*. 30(2016), 189- 193.
13. Alghamdi, H. & Albaghli, N. (2018). Causes of irreversible unilateral or bilateral blindness in the eastern province Saudi population of the Kingdom of Saudi Arabia. *Journal of the Bahrain Medical Society*, 30(1), 22-26.
14. AlGamra, H., AlMansouri, F., Khandekar, R., Elshafei, M., AlQahtani, O., Singh, R., Hashim, S., Mujahed, A., Makled, A. & Pai, A. (2010). Prevalence and causes of blindness, low vision and status of cataract in 50 years and older citizen of Qatar—A community-based survey. *Ophthalmic Epidemiology*, 17(5), 292-300.
15. Al-Madani, M., Al-Eajailat, S. (2013). Causes of Visual Impairment and Blindness among Elderly Patients attending Ophthalmology Clinic at King Hussein Medical Center. *JOURNAL OF THE ROYAL MEDICAL SERVICES*, 20(4), 14-18.
16. Al-Madani, M., Mdanat, A., Al- Shubaki, A. & Hammouri, Q. (2009). *JOURNAL OF THE ROYAL MEDICAL SERVICES*, 16(1), 10-15.
17. Al-Merjan, J., Pandova, M., Al-Ghanim, M., Al-Wayel, A. & Al-Mutairi, S. (2005). Registered blindness and low vision in Kuwait. *Ophthalmic Epidemiology*, 12(4), 251- 257.
18. AL Rahamneh, A. & Hawamdeh, O. (2017). The Factors Affecting Eye Patients (Cataract) In Jordan by Using the Logistic Regression Model. *Modern Applied Science*, 11(8), 39- 46.

19. Alsaqr, A., Sharha, A., Fagehi, R., Almutairi, A., Alosaimi, S., Almalki, A. & Alluwaymi, A. (2018). The visual status of adolescents in Riyadh, Saudi Arabia: a population study. *Clinical Ophthalmology*, 12(2018), 965- 972.
20. Al-Salem, M., Arafat, A., Ismail, L. & Jaradat, M. (1996). Causes of Blindness in Irbid, Jordan. *Annals of Saudi Medicine*, 16(4), 420- 423.
21. Al-Shaalin, F., Bakrman, M., Ibrahim, A. & Aljoudid, A. (2011). Prevalence and causes of visual impairment among Saudi adults attending primary health care centers in northern Saudi Arabia. *Annals of Saudi Medicine*, 31(15), 473- 480.
22. Al- Shakarchi, F. (2011). Blindness in Iraq: Leading causes, target patients, and barriers to treatment. *Middle East African Journal of Ophthalmology*, 18(3), 199- 203.
23. Alswailmi, F. (2018). Global prevalence and causes of visual impairment with special reference to the general population of Saudi Arabia. *Pakistan Journal of Medical Sciences*, 34(3), 751-756.
24. Al-Till, M., Al-Bdour, M., & Ajlouni, K. (2005). Prevalence of Blindness and Visual Impairment among Jordanian Diabetics. *European Journal of Ophthalmology*, 15(1), 62-68. doi: 10.1177/112067210501500110
25. Al- Zubi, K., Sarayrah, F. & Al-Awaishah, M. (2017). Glaucoma Awareness and Knowledge among Jordanian People. *Global Journal of Health Science*, 9(8), 40-46.
26. Awad, K., et al. (2017). The prevalence and major causes of low vision among children in Gaza strip, Palestine. *Journal of Islamic University-Gaza- Journal of Natural Studies*, 25(2), 85- 88.
27. Aziz, S. & Taylor, A. (2008). Etiology of visual impairment in the United Arab Emirates: a hospital-based study. *Eastern Mediterranean Health Journal*, 14(6), 1477- 1479.
28. Baarah, B., Shatnawi, R. & Khatatbeh, A. (2018). Causes of Permanent Severe Visual Impairment and Blindness among Jordanian Population. *Middle East African Journal of Ophthalmology*, 25(1), 25-29.
29. Bakkar, M., Alzghoul, E., & Haddad, M. (2018). Clinical characteristics and causes of visual impairment in a low vision clinic in northern Jordan. *Clinical Ophthalmology*, Volume 12, 631-637. doi: 10.2147/opth.s153754

30. Bamashmus, M., Al-Akily, D. (2010). Profile of childhood blindness and low vision in Yemen: A hospital-based study. *Eastern Mediterranean Health Journal*, 16 (4), 425- 428.
31. Bashe, B. (2016). *Factors contributing the blindness in Manhal hospital Hargaisa, Somaliland*. Retrieved August 6th 2019 from <http://somthesis.com/wp-content/uploads/2017/06/Factors-Contributing-The-Blindness-In-Manhal-Hospital-Hargaisa-Somaliland.pdf>.
32. Bezabih, L., Workineh, T., & Olana, R. (2017). Prevalence and factors associated with childhood visual impairment in Ethiopia. *Clinical Ophthalmology, Volume 11*, 1941-1948. doi: 10.2147/opth.s135011
33. Bhatti, M., Abdullah, A., Hussain, I., Mohamed, M., Ege, A. & Ur-Rahman, H. (2018). Eye Diseases and Refractive Errors in Hargeisa, Somaliland and Implications for Human Resource Development for Eye Care. *Pakistan Journal of Ophthalmology*, 34(4), 231- 236.
34. Bener, A., Al-Bkr, S. & Billing, B. (2006). The prevalence and causes of visual Impairment and Common Ocular Disorders in the United Arab Emirates: Hospital-based Study. *Asian Journal of Ophthalmology*, 8 (2006), 105- 109.
35. Carden, S., & Good, W. (2003). *Pediatric Ophthalmology and Strabismus* (2nd ed., pp. 936- 939). New York, NY: Springer.
36. Chiang, F., Kuper, H., Lindfield, R., Keenan, T., Seyam, N., Magauran, D., Khalilia, N., Batta, H., Abdeen, Z. & Sargent, N. (2010). *PLoS ONE*, 5(7), 1-8.
37. Courtright, P., Sheppard, J., Schachter, J. & Said, M. (1989). Trachoma and blindness in the Nile Delta: current patterns and projections for the future in the rural Egyptian population. *British Journal of Ophthalmology*, 73(1989), 536- 540.
38. Elder, M. & Cock, R. (1993). Childhood blindness in the West Bank and Gaza strip: prevalence, A etiology and hereditary factors. *Eye*, 7(1993), 580- 583.
39. Eldaly, M., Salama, M., Abu Eleinen, K., Ghalwash, D., Youssef, M. & El-Shiaty, A. (2014). Blindness and Visual Impairment among Egyptian Glaucoma Patients, *Journal of Ophthalmology*, 2014, 1-3.
40. El- Gendy, N. & Abdel-Khader, A. (2018). Prevalence of selected eye diseases using data harvested from ophthalmic checkup examination of a cohort of two

- thousand Middle Eastern and north African subjects. *Journal of Ophthalmology*, 8(6), 1-6.
41. El- Gilany, A., El-Fedawy, S. & Tharwat, M. (2002). Causes of blindness and needs of the blind in Mansoura, Egypt. *Eastern Mediterranean health journal*, 8(1), 6-7.
42. Elmajri, K. (2017). A Survey of the Prevalence of Refractive Errors among Children in Lower Primary Schools in Darnah City, Libya. *Advances in Ophthalmology & Visual System*, 7(5), 1-7.
43. Elsahn, M. (2014). International Vision Screening: Results from Alexandria, Egypt. *Current Ophthalmology Reports*, 2(2014), 137- 141.
44. Erdem, S. (2019). Causes of Blindness among Syrian Refugees Living in Southeastern Turkey. *Ophthalmic Epidemiology*, 2019, Retrieved August 8 2019 from <https://www.ncbi.nlm.nih.gov/pubmed/31272275>.
45. Fricke, T., Tahhan, N., Resnikoff, S., Papas, E., Burnett, A., & Ho, S. et al. (2018). Global Prevalence of Presbyopia and Vision Impairment from Uncorrected Presbyopia. *Ophthalmology*, 125(10), 1492-1499. doi: 10.1016/j.ophtha.2018.04.013.
46. Gale Encyclopedia of Medicine. (2008). *Visual Impairment*. Retrieved July 22 2019 from <https://medical-dictionary.thefreedictionary.com/Visual+Impairmen>.
47. Haddad, M., Bakkar, M. & Abdo, N. (2017). Public awareness of common eye diseases in Jordan. *BMC Ophthalmology*, 17(2017), 1-7.
48. Haddadin, A., Ereifej, I., Zawaida, F. & Haddadin, H. (2002). Causes of visual impairment and blindness among the middle-aged and elderly in northern Jordan. *Eastern Mediterranean Health Journal*, 8(2-3), 404- 408.
49. Harb, W., Harb, G., Chamoun, N., Kanbar, A., Harb, M. & Chanbour, W. (2018). Severity of diabetic retinopathy at the first ophthalmological examination in the Lebanese population. *Therapeutic Advances in Ophthalmology*, 10 (2018), 1-8.
50. Kahloun, A., Jelliti1, B., Zaouali1, S., Attia1, S., Ben Yahia, S., Resnikoff, S. & Khairallah, M. (2014). Prevalence and causes of visual impairment in diabetic patients in Tunisia, North Africa. *Eye*, 28(2014), 986- 991.

51. Khairallah, M., Kahloun, R., Flaxman, S., Jonas, J., Keeffe, J., Leasher, J., Naidoo, K., Pesudovs, K., Price, H., White, R., Wong, T., Resnikoff, S., Taylor, H., Bourne, R. & Vision Loss Expert Group. (2014). Prevalence and causes of vision loss in North Africa and the Middle East: 1990–2010. *British Journal of Ophthalmology*, 98(5), 605- 611.
52. Khandekar, R., Kishore, H., Mansu, R. & Awan, H. (2014). The Status of childhood blindness and functional low vision in the Eastern Mediterranean Region in 2012. *Middle East African Journal of Ophthalmology*, 21(4), 336-343.
53. Khandekar, R., Mohammed, A., Negrel, A. & Al Riyami, A. (2002). The prevalence and causes of blindness in the Sultanate of Oman: The Oman Eye Study (OES). *British Journal of Ophthalmology*, 86(9), 957- 962.
54. Khurma, S., Ghzawi, K., Aqeel, M., Abu- Ghazzah, Y., Khatib, R., Nawasrah, O., Al -Soud, N. & Mashaqbah, M. (2012). Causes of Blindness among Patients Seen at the Jordanian Hospital in Gaza. *JOURNAL OF THE ROYAL MEDICAL SERVICES*, 19(3), 44- 49.
55. Maaita, J., Sunna, L., Al-Madani, M. & Horrani, S. (2003). Eye diseases in children in Southern Jordan. *Saudi Medical Journal*, 24(2), 154- 156.
56. Mansour, A., Kassas, K., Chaya, M., Hourani, T., Sibai, A. & Alameddine, M. (1997). National survey of blindness and low vision in Lebanon. *British Journal of Ophthalmology*, 81(1997), 905-906.
57. Martín, M., Santos-Lozano, A., Martín-Hernández, J., López-Miguel, A., Maldonado, M., Baladrón, C., Bauer, C. & Merabet, L. (2016). Cerebral versus Ocular Visual Impairment: The Impact on Developmental Neuroplasticity. *Front. Psychol.*, 7(1958), 1-9.
58. Mousa, A., Courtright, P., Kazanjian, A. & Bassett, K. (2014). Prevalence of Visual Impairment and Blindness in Upper Egypt: A Gender based Perspective. *Ophthalmic epidemiology*, 2014, 1-7.
59. Mourad, M., Rihan, R., Moustafa, M. & Mansour, A. (2018). Prevalence of different eye diseases excluding refractive errors Presented at the outpatient clinic in Beheira eye Hospital. *The Egyptian Journal of Hospital Medicine*, 71(2), 2484- 2489.

60. Muhsen, S., Alkhalaileh, F., Hamdan, M. & AlRyalat, S. (2018). Central corneal thickness in a Jordanian population and its association with different types of Glaucoma: cross-sectional study. *BMC Ophthalmology*, 18(2018), 1-7.
61. Naidoo, H., et al. (2014). Prevalence and causes of vision loss in sub-Saharan Africa: 1990–2010. *British Journal of Ophthalmology*, 98(2014), 612- 618.
62. Ngondi, J., Ole-Sempele, F., Onsarigo, A., Matende, I., Baba, S., Reacher, M., Matthews, F., Brayne, C., Emerson, P. (2006). Prevalence and Causes of Blindness and Low Vision in Southern Sudan. *PLoS Medicine*, 3(12), 2416-2423.
63. Ngondi, J., Reacher, M., Matthews, F., Ole-Sempele, F., Onsarigo, A., Matende, I., Baba, S., Brayne, C. & Emerson, P. (2007), The epidemiology of low vision and blindness associated with trichiasis in southern Sudan, *BMC Ophthalmology*, 2007(8), 7-12.
64. Palmer, C. (2019). *Children with Cortical vision Impairment: Implications for Education*. Retrieved August 23, 2019 from [faculty.sfasu.edu > spe516 > cvi_palmer_info](http://faculty.sfasu.edu/spe516/cvi_palmer_info).
65. Pandova, M., Al- Merjan, J. & Sadeq, Q. (2019). Registered blindness in Kuwait - 15 years of dynamic changes. *Ophthalmic Epidemiology*, 26(2), 75-83.
66. Parrey, M. & Alswelmi, F. (2017). Prevalence and causes of visual impairment among Saudi adults. *Pakistan Journal of Medical Sciences*, 33(1), 167- 171.
67. Rabiou, M., et al. (2013). Prevalence and causes of visual Impairment and blindness, cataract surgical coverage and outcomes of cataract surgery in Libya. *Ophthalmic Epidemiology*. 20(1), 26- 32.
68. Rabiou, M., Al Bdour, M., Abu Ameerh, M., & Jadoon, M. (2015). Prevalence of Blindness and Diabetic Retinopathy in Northern Jordan. *European Journal of Ophthalmology*, 25(4), 320-327. doi: 10.5301/ejo.5000557
69. Saad, A., El- Bayoumy, B. (2007). Environmental risk factor for refractive error among Egyptian school children. *Eastern Mediterranean Health Journal*, 13(4), 819- 828.
70. Safi, S, et al. (2018). Burden of vision loss in the Eastern Mediterranean region, 1990-2015: findings from the Global Burden of Disease 2015 study. *international Journal of Public Health*, 63(1), 199- 210.

71. Tabbara, K. (2001). Blindness in the eastern Mediterranean countries. *British Journal of Ophthalmology*, 85(2001), 771- 775.
72. Tabbara, K. & Ross- Degan, D. (1986). Blindness in Saudi Arabia. *Journal of the American Medical Association*, 255(24), 3378- 3384.
73. Waheeb, S.& Alshehri, K. (2016). Incidence of retinopathy of prematurity at two tertiary centers in Jeddah, Saudi Arabia. *Saudi Journal of Ophthalmology*, 30(2016), 109- 112.
74. Waked, N., Saad, A., Mehanna, C., Sleilaty, G. & Kortbaoui, R. (2007). Prevalence, causes, and risk factors for blindness and visual impairment among nursing home residents in Lebanon. *Journal Français d'Ophthalmologie*, 30(5), 497- 502.
75. World Health Organization(WHO). (2019). *World report on vision*. Retrieved 5 June 2021, from <https://www.who.int/publications/i/item/9789241516570>
76. World Health Organization (WHO). (2021). Blindness and vision impairment. Retrieved 5 May 2021, from <https://www.who.int/news-room/fact-sheets/detail/blindness-and-visual-impairment>.
77. Yamamah, G., Abdel Alim, A., Mostafa, Y., Ahmed, R. & Mahmoud, A. (2015). Prevalence of Visual Impairment and Refractive Errors in Children of South Sinai, Egypt. *Ophthalmic Epidemiology*, 22(4), 246- 252.

Appendix

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1	Cataract	(Abuelela et al., 2018; Al-Akily & Bamashmus, 2008; Al-Akily & Bamashmus, 2011; Al- Akily et al., 2011; Al- Bdour et al., 2002; ; Al-Dulaimy, 2010; Al Faran et al., 1993; Al Gamra et al., 2010; Al-Lahim et al, 2018; Al- Madani et al., 2009; Al- Madani & El- Eajailat, 2013; Al Rahamneh & Hawamdeh, 2017; Al- Salem et al., 1996; Al-Shaaln et al., 2011; Al-Shakarchi, 2011; AlSwailmi , 2018; Al- Till et al., 2005; Awad et al, 2017; Aziz & Taylor, 2008; Bakkar et al., 2018; Bamashmus & Al-Akily, 2010; Bashe, 2016; ; Bhatti et al., 2018; Chiang et al., 2010; Elder & Cock, 1993; El Gendy & Abdel-Kader, 2018; El- Gilany et al., 2002; Erdem, 2019; Haddad et al., 2017; Haddadin et al., 2002; Kahloun et al., 2014; Khairallah et al., 2014; Khandekar et al., 2002; Khandekar et al., 2014; Khurma et al., 2012; Mansour et al., 1997; Mourad et al., 2018; Mousa et al., 2014; Naidoo et al.,

		<p>2014; Ngondi et al., 2006; Ngondi et al., 2007; Parrey & AlSwelmi, 2017; Rabiou et al., 2013; Rabiou et al., 2015; Safi et al., 2018; Tabbara & Ross- Degnan, 1986; Tabbara, 2001; Yamamah et al., 2015).</p>
<p>2</p>	<p>Glaucoma</p>	<p>(Abuelela et al., 2018; Al-Akily & Bamashmus, 2008; Al-Bdour et al., 2002; Al- Dulaimy, 2010; AlGamra et al., 2010; Alghamdi, 2016; Alghamdi & Albaghli, 2018; Al-Lahim et al, 2018; Al- Madani et al., 2009; Al- Madani & El- Ejailat, 2013; Al- Salem et al., 1996; Al-Shaaln et al., 2011; AlSwailmi , 2018; Al- Zubi et al., 2017; Aziz & Taylor, 2008; Bamashmus & Al-Akily, 2010; Baarah et al., 2018; Bakkar et al., 2018; Bashe, 2016; Bhatti et al., 2018; Eldaly et al., 2014; Elder & Cock, 1993; El- Gilany et al., 2002; El Gendy & Abdel- Kader, 2018; Haddad et al., 2017; Haddadin et al., 2002; Kahloun et al., 2014; Khairallah et al., 2014; Khandekar et al., 2002; Khurma et al., 2012; Muhsen et al., 2018; Naidoo et al., 2014; Ngondi et al., 2007; Pandova et al., 2019; Parrey & AlSwelmi, 2017; Rabiou et al., 2013; Rabiou et al., 2015; Safi et al., 2018; Waked et al., 2007).</p>

3	Uncorrected Refractive Errors	(Abuelela et al., 2018; Al- Bdour et al., 2002; Al Faran et al., 1993; Al-Akily & Bamashmus, 2008; Al-Lahim et al, 2018; Al- Madani & El- Ejailat, 2013; Al Saqr et al., 2018; Al-Shaaln et al., 2011; Al-Shakarchi, 2011; AlSwailmi , 2018; Baarah et al., 2018; Bakkar et al., 2018; Bamashmus & Al-Akily, 2010; Bener, Al- Baker & Billing, 2006; Bhatti et al., 2018; Chiang et al., 2010; El- Gilany et al., 2002; Elmajari, 2017; Elsahn, 2014; Erdem, 2019; Haddadin et al., 2002; Kahloun et al., 2014; Khairallah et al., 2014; Khandekar et al., 2014; Maaita et al., 2003; Mansour et al., 1997; Mousa et al., 2014; Naidoo et al., 2014; Parrey & AlSwelmi, 2017; Rabiou et al., 2015; Saad & El-bayoumy, 2007; Safi et al., 2018; Tabbara, 2001; Tabbara & Ross- Degnan, 1986).
4	Diabetic Retinopathy	(Al-Akily & Bamashmus, 2008; Al- Akily et al., 2011; Al-Bdour et al., 2002; Al-Lahim et al, 2018; Al- Madani & El-Ejailat, 2013; Al- Salem et al., 1996; Al-Shaaln et al., 2011; Al-Shakarchi, 2011; AlSwailmi, 2018; Al- Till et al., 2005; Baarah et al., 2018; Bashe, 2016; El- Gilany et al., 2002; Haddad et al., 2017; Haddadin et al., 2002; Harb et al., 2018;

		Kahloun et al., 2014; Khurma et al., 2012; Naidoo et al., 2014; Parrey & AlSwelmi, 2017; Rabiou et al., 2013; Rabiou et al., 2015).
5	macular degeneration or macular dystrophies	(Al-Akily & Bamashmus, 2008; Al- Bdour et al., 2002; Al-Madani & El- Ejailat, 2013; Al-Shakarchi, 2011; Baarah et al., 2018; Bakkar et al., 2018; Chiang et al., 2010; El- Gilany et al., 2002; Haddadin et al., 2002; Khairallah et al., 2014; Naidoo et al., 2014; Rabiou et al., 2015; Safi et al., 2018; Tabbara, 2001; Tabbara & Ross- Degnan, 1986; Waked et al., 2007).
6	Corneal opacity	(Abuelela et al., 2018; Al-Akily & Bamashmus, 2008; Aziz & Taylor, 2008; Baarah et al., 2018; Bakkar et al., 2018; El-Gilany et al., 2002; Erdem, 2019; Haddadin et al., 2002; Kahloun et al., 2014; Khandekar et al., 2002; Mousa et al., 2014; Ngondi et al., 2006; Ngondi et al., 2007; Parrey & AlSwelmi, 2017; Rabiou et al., 2015; Tabbara & Ross- Degnan, 1986).
7	Hereditary and Family History	(Abdallahman & AlAnwar, 2004; Al- Bdour et al., 2002; Al-Madani et al., 2009; Alghamdi, 2016; Alghamdi & Albaghli,

		2018; Al- Salem et al., 1996; Al-Shaaln et al., 2011; Haddad & El- Najjar, 1998; Khandekar et al., 2014; Elder & Cock, 1993; Pandova et al., 2019; Saad & El- Bayoumy, 2007; Yamamah et al., 2015).
8	Amblyopia	(Abuelela et al., 2018; Al-Akily & Bamashmus, 2008; Alghamdi, 2016; Alghamdi & Albaghli, 2018; Al Saqr et al., 2018; Aziz & Taylor, 2008; El Gendy & Abdel-kader, 2018; Elsahn, 2014; Khurma et al., 2012; Maaita et al., 2003; Parrey & AlSwelmi, 2017; Yamamah et al., 2015).
9	Retinitis Pigmentosa	(Al-Akily & Bamashmus, 2008; Al- Bdour et al., 2002; Alghamdi & Albaghli, 2018; Al- Merjan et al., 2005; Al- Salem et al., 1996; Al-Shakarchi, 2011; Baarah et al., 2018; Bakkar et al., 2018; Elder & Cock, 1993; Khurma et al., 2012; Pandova et al., 2019).
10	Trachoma or trachomatous trichiasis	(Al-Dulaiimy, 2010; Bashe, 2016; Bener, Al- Baker & Billing, 2006; Chiang et al., 2010; Courtright et al., 1989; Khandekar et al., 2002; Mousa et al., 2014; Naidoo et al., 2014; Ngondi et al., 2006; Ngondi et al., 2007; Tabbara, 2001; Tabbara & Ross- Degnan, 1986).

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11	Trauma	(Al-Akily & Bamashmus, 2008; Al- Bdour et al., 2002; Alghamdi, 2016; Alghamdi & Albaghli, 2018; Al-Shakarchi, 2011; Baarah et al., 2018; Bhatti et al., 2018; Khandekar et al., 2014; Khurma et al., 2012; Tabbara, 2001; Tabbara & Ross- Degnan, 1986).
12	Unspecified Causes	(Abdalahman & AlAnwar, 2004; Al-Akily & Bamashmus, 2008; Al- Bdour et al., 2002; Baarah et al., 2018; Bakkar et al., 2018; El- Gilany et al., 2002; Haddadin et al., 2002; Khurma et al., 2012; Ngondi et al., 2006; Tabbara & Ross- Degnan, 1986).
13	Strabismus	(Abuelela et al., 2018; Al- Bdour et al., 2002; Al- Salem et al., 1996; Al Saqr et al., 2018; Bakkar et al., 2018; Bhatti et al., 2018; Elsahn, 2014; Maaita et al., 2003; Yamamah et al., 2015;
14	Retinal Detachment	(Al-Akily & Bamashmus, 2008; Al-Shakarchi, 2011; Baarah et al., 2018; Bakkar et al., 2018; El- Gilany et al., 2002; Kahloun et al., 2014; Khurma et al., 2012; Mousa et al., 2014; Yamamah et al., 2015).

15	Consanguineous Marriages	(Alghamdi, 2016; Al- Salem et al., 1996; Elder & Cock, 1993; Haddad & El- Najjar, 1998; Khandekar et al., 2014; Pandova et al., 2019; Yamamah et al., 2015).
16	Optic Atrophy	(Al- Merjan et al., 2005; Al-Shakarchi, 2011; Baarah et al., 2018; Bakkar et al., 2018; Elder & Cock, 1993; El- Gilany et al., 2002; Tabbara, 2001; Tabbara & Ross- Degnan, 1986).
17	Keratoconus	(Al-Akily & Bamashmus, 2008; Al-Akily & Bamashmus, 2011; Al- Bdour et al., 2002; Bakkar et al., 2018; Bamashmus & Al-Akily, 2010; El- Gilany et al., 2002; Parrey & AlSwelmi, 2017).
18	Eyeball abnormalities and Congenital Malformations	(Al- Merjan et al., 2005; Baarah et al., 2018; Chiang et al., 2010; Maaita et al., 2003; Rabiou et al., 2015; Tabbara & Ross- Degnan, 1986;
19	Retinal and Vascular Pathologies	(Alghamdi, 2016; Al-Madani et al., 2009; Al- Madani & El- Eajailat, 2013; Baarah et al., 2018; Bamashmus & Al-Akily, 2010; Elder & Cock, 1993).
20	Retinopathy of Prematurity	(Abdel Hadi & Hamdy, 2013; Abdel Hakeem, Mohamed & Othman, 2012; Al- Merjan et al., 2005; Baarah et al., 2018; Bakkar et al., 2018; Waheeb & Alshehri, 2018).

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21	Corneal Scar	(Al- Salem et al., 1996; Al-Shakarchi, 2011; Chiang et al., 2010; Rabiou et al., 2013; Tabbara, 2001; Tabbara & Ross-Degnan, 1986).
22	Posterior segment disorders	(Aziz & Taylor, 2008; Chiang et al., 2010; Rabiou et al., 2013; Rabiou et al., 2015;
23	Aphakia	(Al-Akily & Bamashmus, 2008; Aziz & Taylor, 2008; Chiang et al., 2010; Mousa et al., 2014).
24	Neurologic	(Alghamdi, 2016; Alghamdi & Albaghli, 2018; Chiang et al., 2010; Rabiou et al., 2015).
25	Optic nerve pathology	(Abuelela et al., 2018; Al-Madani et al., 2009; Al- Madani & El- Ejailat, 2013; Haddadin et al., 2002).
26	Post Cataract Surgery	(El- Gilany et al., 2002; Mousa et al., 2014; Parrey & AlSwelmi, 2017; Rabiou et al., 2015).
27	Phthisis	(Al- Merjan et al., 2005; Chiang et al., 2010; Erdem, 2019; Tabbara & Ross- Degnan, 1986).
28	Albinism	(Al- Merjan et al., 2005; Bakkar et al., 2018; El- Gilany et al., 2002).
29	Diabetes Mellitus	(Alghamdi, 2016; Alghamdi & Albaghli, 2018 Bashe, 2016).

29	Inflammatory and Surgery	(Alghamdi, 2016; Alghamdi & Albaghli, 2018; Chiang et al., 2010).
30	Chalazion	(Abuelela et al., 2018; Bener et al., 2006; Mourad,i Rihan, Moustafa & Mansour, 2018).
31	Congenital Anomalies	(Al- Bdour et al., 2002; Al- Merjan et al., 2005; Tabbara & Ross- Degnan, 1986).
32	Anterior Uveitis	(Al-Akily & Bamashmus, 2008; Al-Shakarchi, 2011; Aziz & Taylor, 2008).
33	Vitamin A Deficiency	(Bashe, 2016; Khandekar et al., 2014; Tabbara, 2001).
34	Corneal Dystrophies	(Al-Akily & Bamashmus, 2008; Al-Shakarchi, 2011; Khurma et al., 2012).
35	Other Corneal Disorders	(Al- Bdour et al., 2002; Bhatti et al., 2018; Khandekar et al., 2014).
36	Iatrogenic	(Alghamdi, 2016; Alghamdi & Albaghli, 2018; Tabbara & Ross- Degnan, 1986).
37	Conjunctival Disease or Infections	(Abuelela et al., 2018; Bhatti et al., 2018; Mourad et al., 2018).

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	38	Socioeconomic status	(Al-Shakarchi, 2011; Bashe, 2016; Saad & El- Bayoumy, 2007).
	39	Macular Edema	(Harb et al., 2018; Kahloun et al., 2014).
	40	Dry Eye Disease	(Haddad et al., 2017; Yamamah et al., 2015).
	41	Congenital Exophthalmos	(El- Gilany et al., 2002; Yamamah et al., 2015).
	42	Retinal Dystrophy	(Al-Shakarchi, 2011; Baarah et al., 2018).
	43	Retinal Degeneration	(El- Gilany et al., 2002; Tabbara, 2001).
	44	Ptosis	(Abuelela et al., 2018; Yamamah et al., 2015).
	45	Sever Vernal Keratoconjunctivitis	(Al-Akily & Bamashmus, 2011; Maaita et al., 2003).
	46	Retinal Diseases	(Alghamdi & Albaghli, 2018; Haddadin et al., 2002).
	47	Eyelid	(Abdel Hadi & Hamdy, 2013; Mourad et al., 2018).
	48	Blepharitis	(Abuelela et al., 2018; Mourad et al., 2018)
	49	Abnormal Color Vision	(Abuelela et al., 2018).
50		Ocular Hypertension	(El Gendy & Abdel-kader, 2018).
	51	Absence of Globe	(Mousa et al., 2014).
	52	Posterior Vitreous Detachment	(Bakkar et al., 2018).
	53	Squint	(Yamamah et al., 2015)

54	Lacrimal System Diseases	(Mourad et al., 2018).
55	Congenital Aniridia	(El- Gilany et al., 2002).
56	Retrolental Fibroplasia	(El- Gilany et al., 2002).
57	Iris Atrophy	(Bakkar et al., 2018).
58	Congenital Nystagmus	(El- Gilany et al., 2002).
59	Diabetic Maculopathy	(Al- Akily et al., 2011).
60	Corneal Leukoma	(Al-Akily & Bamashmus, 2008).
61	Choroidal Atrophy	(Bakkar et al., 2018).
62	Tumor	(Alghamdi & Albaghli, 2018).
63	Rod- Cone Dystrophy	(Bakkar et al., 2018).
64	Ocular Problem	(Saad & El- Bayoumy, 2007).
65	Retinal Lesion	(Tabbara & Ross- Degnan, 1986).
66	Environmental Pollution	(Saad & El- Bayoumy, 2007).
67	Corneal Degenerations	(Al- Madani & El- Ejailat, 2013).
68	Unacceptable Therapeutic Abortions	(Khandekar et al., 2014).
69	Malnutrition	(Khandekar et al., 2014).
70	Infection	(Khandekar et al., 2014).
71	Congenital Ocular Diseases	(Alghamdi, 2016).
72	Central Corneal Thickness	(Muhsen et al., 2018).

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73	Malignancies	(Baarah et al., 2018).
74	Inherited Vitreoretinopathy	(Baarah et al., 2018).
75	Rubeosis Iridis	(Kahloun et al., 2014).
76	Glaucoma due to Steroid	(Al-Akily & Bamashmus, 2011).
78	Cataract due to Steroid	(Al-Akily & Bamashmus, 2011).
79	Ocular Adnexal Diseases	(Bhatti et al., 2018).
80	Lens Disorders	(Bhatti et al., 2018).
81	Intravitreal Hemorrhage	(Kahloun et al., 2014).
82	Pinpoint Pupil	(Abuelela et al., 2018).
83	Megalocornea	(Abuelela et al., 2018).
83	Toxic Amblyopia	(Khurma et al., 2012).
84	Retinoblastoma	(Khurma et al., 2012).
85	Ischemic Optic Neuropathy	(Khurma et al., 2012).
86	Acquired Corneal Diseases	(Khurma et al., 2012).
87	Stargards Diseases	(Khurma et al., 2012).
88	Congenital Anophthalmia	(Khurma et al., 2012).
89	Ulcer Cornea	(Abuelela et al., 2018).