

# Causes of blindness and needs of the blind in Mansoura, Egypt

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أسباب العمى واحتياجات العميان في المنصورة، جمهورية مصر العربية

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**الخلاصة:** أجريت دراسة حول 113 من العميان في المنصورة، جمهورية مصر العربية، لتوضيح أسباب وعوامل الاحتطار التي تؤدي إلى العمى، والاحتياجات الصحية والرعاية الاجتماعية التي يحتاجها العميان. في ثلثي الحالات حدث العمى قبل سن العاشرة من العمر. وكانت عوامل الاحتطار التي تؤدي للعمى قد أبلغ عنها في أكثر من نصف الحالات المدروسة. فالأسباب الخلقية شكلت ما يقرب من نصف الحالات، وأكثر الحالات شيوعاً للعمى الثنائي الجانب كان من الممكن تجنبها. ولم تكن الرعاية الصحية والاجتماعية لهذه المجموعة كافية، رغم أن ما يزيد على نصف أفرادها يمكن أن يستفيدوا من تدابير علاجية إضافية. والحاجة ماسة إلى وضع تشريع لرأب (ترقيع) القرنية وإنشاء سجل للعميان والقيام بمسح اجتماعي شامل في جميع أنحاء البلاد حول وفيات العمى. ويمكن للتثقيف الصحي للجمهور مع تقديم الرعاية الصحية الفعالة للعميان أن يساعد على التخلص من أسباب العمى التي يمكن تجنبها.

**ABSTRACT** A study of 113 blind people in Mansoura, Egypt highlighted the causes and risk factors for blindness, and health and social care needs of the blind. In two-thirds of cases, blindness occurred before 10 years of age. Risk factors for blindness were reported by more than half the study population. Congenital causes accounted for almost half the cases. The commonest causes of bilateral blindness were corneal opacities, cataract and glaucoma. Almost three-quarters of causes were avoidable. Health and social care for this group was inadequate and more than half would benefit from further management. Legislation for keratoplasty, a registry of blind people, and a nationwide community survey on the epidemiology of blindness are needed urgently.

## Causes de cécité et besoins des personnes aveugles à Mansoura (Egypte)

**RESUME** Une étude réalisée sur 113 personnes aveugles à Mansoura (Egypte) a mis en évidence les causes et les facteurs de risque de cécité, ainsi que les besoins des personnes aveugles en matière de soins de santé et de prise en charge sociale. Dans les deux tiers des cas, la cécité est survenue avant l'âge de 10 ans. Des facteurs de risque de cécité ont été signalés par plus de la moitié de la population de l'étude. Les causes congénitales représentaient près de la moitié des cas. Les causes de cécité bilatérale les plus courantes étaient les opacités cornéennes, la cataracte et le glaucome. Près de trois quarts des causes étaient évitables. Les soins de santé et la prise en charge sociale pour ce groupe étaient insuffisants et une prise en charge plus complète serait profitable à plus de la moitié de ces personnes. Une législation pour la kératoplastie, un registre de cécité et une enquête communautaire nationale sur l'épidémiologie de la cécité sont nécessaires de toute urgence.

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## Introduction

Although each case of blindness has its individual history, the common features of these histories provide us with the opportunity to interrupt the cycle of disease and inadequate care that leads to blindness. An epidemiological or statistical approach will identify these features, permit assessment of the magnitude and severity of the problem, and identify the primary disease entities responsible. Such information allows programmes to be targeted at the most important problems and provides data against which such interventions can be evaluated [1].

Functionally, blindness is defined as loss of vision sufficient to prevent an individual from being self-supporting in an occupation, making that individual dependent on other persons, agencies or devices in order to live. Efforts to treat and prevent blindness must be made by all available means. The World Health Organization (WHO) estimates that 75% of cases of blindness in developing countries are avoidable [2].

Although most causes of blindness could be prevented, the rates of blindness in developing countries are often 10–20 times greater than those in industrialized countries, because of the absence of preventive measures, inadequacy of health services and the high prevalence of major blinding diseases. The human suffering caused by blindness is obvious. Less obvious, but becoming increasingly recognized, are its social and economic consequences, especially in developing countries where most blind people live [3]. Blindness is not only a personal tragedy, but also a major socioeconomic burden on any community. Preventable causes of blindness have long been a public health problem of universal interest [4].

To the best of our knowledge, in Dakahlia Governorate there are no available statistics on the magnitude of the problem, causes, risk factors, or health and social care provided to the blind. This study aimed to highlight the causes of and risk factors for blindness as well as the health and social care needs of blind people registered at two schools and one non-governmental organization caring for the blind.

## Methods

A descriptive study was carried out in Mansoura, the capital city of Dakahlia Governorate in the north-east of the Nile Delta, Egypt, during 2001. Three institutions concerned with social care for the blind were included in the study: Al-Noor society, Al-Noor school and Al-Azhar school for the blind.

- Al-Noor society is a nongovernmental organization that provides social and financial support to the blind. Thirty-six blind people (90% of those registered) were involved in the study.
- Al-Noor school is an educational rehabilitation centre, directed by the Ministry of Social Affairs, which provides accommodation and schooling for the blind. All 28 students registered were enrolled in the study.
- Al-Azhar school is a formal educational institute that teaches Islamic principles to the blind, basically memorizing and reciting the Quran. Forty-nine blind students (94.2% of those registered) were enrolled in the study.

An exploratory visit to each institute was carried out. The objectives and approach of the study were discussed with the personnel in charge to obtain their support, and a plan of visits was agreed.

A structured questionnaire was used to collect data, which included: sociodemographic data; history relating to blindness and any risk factors; health and social care; and impact of blindness on the daily activities and social life of participants. The social score was calculated using the method of Fahmy and El-Sherbini [5].

Blindness was defined according to the WHO criteria: visual acuity of counting fingers three metres (3/60) or less in the better eye with best possible correction or visual field of 10 degrees or less [6].

Each participant in the study was interviewed and given a complete ophthalmological examination to determine the cause of blindness, whether congenital or acquired, avoidable or not, as well as the need for further management.

All forms were reviewed and any missing data were obtained. Data entry, processing and statistical analysis were carried out using SPSS (version 9.5). The chi-squared test of significance was used to compare results from different groups.  $P < 0.05$  was considered to be statistically significant.

## Results

A total of 113 blind people were included in the study. The greatest proportion (43.4%) were from Al-Azhar school, 76.1% were in the age group 5-19 years and 85.8% were single. Males constituted 73.5% of the study sample. About two-thirds (66.4%) of the participants were from rural areas. Only 9.7% were illiterate; the remainder were enrolled at various educational establishments (Table 1).

Blindness occurred during infancy in just over a quarter of cases, and during childhood and adolescence in about two-thirds of cases (Table 2). More than half of

Table 1 Sociodemographic characteristics of the study population

Characteristic	No.	%
Total	113	100
<i>Institute</i>		
Al-Noor society	36	31.9
Al-Noor school	28	24.8
Al-Azhar school	49	43.4
<i>Age group (years)</i>		
5-9	5	4.4
10-14	56	49.6
15-19	25	22.1
≥20	27	23.8
<i>Sex</i>		
Male	83	73.5
Female	30	26.5
<i>Marital status</i>		
Single <sup>a</sup>	97	85.8
Married	14	12.4
Widowed	2	1.8
<i>Residence</i>		
Rural	75	66.4
Urban	38	33.6
<i>Education<sup>b</sup></i>		
Illiterate	11	9.7
Primary and preparatory	85	75.2
Secondary	17	15.0

<sup>a</sup>All were below 20 years age.

<sup>b</sup>All children were enrolled in education.

the participants (51.3%) reported one or more risk factors for blindness; among these, eye infection (24.8%), systemic disease (18.6%) and eye trauma/injury (17.7%) were the most common.

Table 3 shows the visual acuity of both eyes for the sample. About 10% of the

Table 2 History of blindness and risk factors for blindness

Variable	No.	%
<i>Age at onset (years)</i>		
< 2	29	25.7
2-9	45	39.8
≥10	39	34.5
<i>Onset</i>		
Sudden	16	14.2
Gradual	97	85.8
<i>Course</i>		
Progressive	104	92.0
Stationary	9	8.0
<i>Presence of risk factors</i>		
Yes	58	51.3
No	55	48.7
<i>Risk factors<sup>a</sup></i>		
Eye infection	28	24.8
Systemic disease <sup>b</sup>	21	18.6
Eye trauma/injury	20	17.7
Neonatal incubator	5	4.4
Positive family history	5	4.4
Head trauma	3	2.7
Exposure to excess heat	2	1.8
Use of traditional eye remedies	2	1.8
Foreign body in eye	1	0.9
Welding	1	0.9

<sup>a</sup>Only 58 (51.3%) of participants reported one or more risk factors.

<sup>b</sup>Diabetes mellitus (5), hypertension (4), neurological (8), multiple (2), others (2).

participants had no perception of light in either eye.

Acquired causes of blindness accounted for 51.3% of the total. The commonest causes of acquired blindness were corneal

Table 3 Visual acuity of the study sample

Visual acuity	Right eye		Left eye	
	No.	%	No.	%
No perception of light	11	9.7	12	10.6
Hand movement	27	23.9	23	20.4
Counting fingers	37	32.7	37	32.7
1/6 to 3/6	38	33.6	41	36.3

opacity (32.8%), cataract (17.2%), optic atrophy (13.8%) and glaucoma (12.1%). The commonest causes of congenital blindness were cataract (37.9%) and glaucoma (29.1%). Overall, bilateral corneal opacity, bilateral cataract and bilateral glaucoma were the leading causes of blindness (17.7%, 14.2% and 14.2% respectively) (Table 4).

Blindness due to avoidable causes was significantly higher among participants of low or very low social class and more likely to occur at the age of 10 years or more (Table 5).

Further management would be beneficial in 58.4% of cases. Surgical treatment (for glaucoma, cataract, retinal detachment or brain tumour) and keratoplasty were the commonest interventions needed (24.8% and 17.7% respectively). Health insurance was the source of health care for more than 80% of participants. Only 31.9% were satisfied with the health care they received (Table 6).

Most of the sample had low self-esteem (Table 7). All lived with their families. More than 80% could move independently inside the home and 72.6% fed themselves. The major impact of blindness was on education, relations with friends and role within the family.

About 90% of participants perceived the community as either helpful and supportive or compassionate.

Table 4 Causes of congenital and acquired blindness in the study population

Cause	Congenital		Acquired		Total	
	No.	%	No.	%	No.	%
Subtotal	55	100 (48.7% of total)	58	100 (51.3% of total)	113	100
Bilateral corneal opacity	1	1.8	19	32.8	20	17.7
Bilateral cataract	6	10.9	10	17.2	16	14.2
Bilateral glaucoma	16	29.1	7	12.1	23	14.2
Bilateral optic atrophy	6	10.9	8	13.8	14	12.4
Bilateral retinal degeneration	5	9.1	2	3.4	7	6.2
High myope	5	9.1	–	–	5	4.4
Bilateral congenital nystagmus	5	9.1	–	–	5	4.4
Bilateral retinal detachment	–	–	4	6.9	4	3.5
Retinopathy	2	3.6	1	1.7	3	2.7
Macular degeneration (CRAO)	1	1.8	2	3.4	3	2.7
Congenital enophthalmos	2	3.6	–	–	2	1.8
Bilateral congenital keratoconus	2	3.6	–	–	2	1.8
Retrolental fibroplasia	–	–	2	3.4	2	1.8
Albinism	2	3.6	–	–	2	1.8
Complication after cataract extraction	–	–	2	3.4	2	1.8
Hypermetropia	1	1.8	–	–	1	0.9
Congenital aniridia and cataract	1	1.8	–	–	1	0.9
Cataract and retinal detachment	–	–	1	1.7	1	0.9

CRAO = central retinal artery occlusion.

## Discussion

Blindness is a serious disability for the individual, his or her family and the community. There is an urgent need for data on blindness and the blind to enable better planning of eye health care services. WHO has always been conscious of the fact that blindness and visual disability are a public health problem. However, for a long time, the magnitude of this problem could not be assessed and meaningful global prevention

activities could not be initiated because of lack of epidemiological data and information [7].

Blindness can occur as a result of a number of infectious and non-communicable diseases, as well as injuries. Depending on the cause, up to 80% of blindness and serious visual loss could be avoided (prevented or treated). The main causes of avoidable blindness and serious visual impairment worldwide include cataract, trachoma and glaucoma [8]. Despite the

Table 5 Distribution of avoidable and non-avoidable causes of blindness in the study population

Variable	Non-avoidable		Avoidable		Significance test
	No.	%	No.	%	
Total	30	26.5	83	73.5	
Sex					
Male	19	22.9	64	77.1	$\chi^2 = 2.14, P = 0.14$
Female	11	36.7	19	63.3	
Marital status					
Single	28	28.9	69	71.1	$\chi^2 = 1.9, P = 0.17$
Ever married	2	12.5	14	87.5	
Residence					
Urban	12	31.6	26	68.4	$\chi^2 = 0.74, P = 0.39$
Rural	18	24.0	57	76.0	
Age at onset (years)					
<2	14	48.3	15	51.7	$\chi^2 = 19.6, P < 0.00$
2-9	15	33.3	30	66.7	
≥10	1	2.6	38	97.4	
Social class of the family					
High and middle	13	44.8	16	55.2	$\chi^2 = 6.7, P = 0.01$
Low and very low	17	20.2	67	79.8	

fact that the majority of blindness is avoidable (treatable or potentially preventable) [9], a large proportion of those affected remain blind because of lack of access to affordable eye care.

In this study, 73.5% of the causes of blindness were avoidable (preventable and/or curable). The prevalence of avoidable causes of blindness was significantly higher in participants from older age groups than younger age groups, and among families of low or very low social status compared with families of high or middle social classes. These findings are in agreement with others [10,11] who concluded that blind people had an inferior social background. They were more likely to live in crowded homes, their parents

Table 6 Health needs and source of health care of the study sample

Health needs and care	No.	%
Need further management	66	58.4
Medical treatment	9	8.0
Surgical treatment <sup>a</sup>	28	24.8
Glasses	6	5.3
Keratoplasty	20	17.7
Argon laser	3	2.7
Satisfied with current health care	36	31.9
Source of current health care		
Free services	15	13.3
Health insurance	91	80.5
Multiple sources	7	6.2

<sup>a</sup>For glaucoma, cataract, retinal detachment and brain tumour.

Table 7 Social aspects of blindness in the study sample

Social aspect	No.	%
<i>Self-esteem</i>		
See self as disabled	81	71.7
Doubt about self-capabilities	89	78.8
Unsatisfied with life	100	88.5
<i>Daily living activities</i>		
Able to identify belongings, persons or places	64	56.6
Move independently in the home	91	80.5
Home arrangements are suitable	69	61.1
Go outside home alone	9	8.0
Live with family	113	100
Income support from outside the family	42	37.2
Feed oneself	82	72.6
Dress oneself	65	57.5
Go for recreation independently	8	7.1
<i>Impact on blind person and social relations</i>		
Education affected	99	87.6
Job affected	21	18.6
Marriage affected	11	9.7
Social role affected	50	44.2
Affects role within family	78	69.0
Affects relations with friends	80	70.8
Affects practice of hobbies <sup>a</sup>	23	20.4
<i>Perceived attitude of community</i>		
Helpful and supportive	99	87.6
Compassionate	3	2.7
Rejecting	1	0.9
Passive	10	8.9

<sup>a</sup>e.g. computers, music.

were more likely to be less educated, and the father was more likely to be a manual worker or farmer. This inferior background, together with parents' lack of

awareness of early health care, may have played a role in the causation of blindness and in the quality of eye health care they received.

In recent years, the incidence of acquired causes of blindness has decreased considerably as a result of improvements in the control of infective conditions. In contrast, the incidence of cataract, glaucoma and congenital and developmental anomalies is increasing [12]. In the Western world, inherited genetic diseases are a major cause of blindness in children [13].

In this study, congenital causes accounted for 48.7% of causes of blindness. The most common congenital anomalies detected were bilateral cataract, bilateral glaucoma, bilateral optic atrophy and bilateral retinal degeneration. This is in agreement with Kamel et al. [10] who commented that the cause was either the untreated congenital condition or the postoperative complications following its surgical treatment. Congenital anomalies accounted for 77% of causes of blindness in Saudi Arabia [14] and for 41% in Jordan [4].

Among the overall causes of blindness in the present study, bilateral corneal opacity was the leading cause (17.7%), followed by bilateral cataract (14.2%) and bilateral glaucoma (14.2%), and bilateral optic atrophy (12.4%). In Egypt, the causes of blindness vary from one study to another depending on the nature of the blind population studied.

- In Mansoura, Emara et al. [15] found that, among hospitalized blind people, cataract accounted for 59.3% of blindness, followed by corneal scar (10.7%), retinal detachment (6.4%) and myopic degeneration (4.4%).
- In Alexandria, Kamel et al. [10] reported that the main causes of blindness

among blind students were congenital anomalies, followed by infection, then trauma.

- Among patients presenting to the Alexandria Specialized Medical Committee for Eye Diseases [16], cataract was responsible for 39.5% of blindness, optic nerve atrophy for 26.2%, retinal detachment for 25.4%, glaucoma for 19.7%, corneal opacity for 9.8% and diabetic retinopathy for 9%.
- El-Gammal et al. [11] reported that the commonest causes of visual impairment in Al-Azhar university hospital were infective eye diseases (32.1%), degeneration including cataract (17.6%), glaucoma (7.6%), trauma (5.4%), congenital anomalies (2.8%) and neoplastic causes (1.2%).
- In Ismailia, Helmy [17] reported that corneal scar was the leading cause of blindness (13.4%), followed by retinal degeneration (4.9%) and senile macular degeneration.
- Among patients attending ophthalmic outpatient clinics in Shibin El-Kom, cataract was the leading cause of blindness (46%), with corneal scar next (22.3%), then myopic degeneration (12.6%) and glaucoma (9.2%) [18].

From the above studies, it can be concluded that cataract and corneal scar are the leading causes of blindness in Egypt.

In Saudi Arabia, the leading causes of blindness were cataract (52.8%), followed by glaucoma, trachoma, corneal scar and iatrogenic causes [19,20]. In Jordan, tapeoretinal degeneration was the leading cause (17.6%), followed by bilateral glaucoma (16%), diabetic retinopathy and corneal scarring [4]. In rural Nigeria, glaucoma and the sequelae of congenital cataract were the leading causes of bilateral blindness [21].

In the industrialized world, inherited diseases and blindness associated with prematurity and birth injuries are the major causes of blindness in children. Diseases of the retina, including diabetic retinopathy and optic nerve atrophy, predominate in the age group 20–60 years. After the age of 65, age-related macular degeneration, glaucoma and cataract are the major causes [9,13].

Corneal blindness is more common in developing than industrialized countries [3]. The most likely causes of bilateral ulcers are measles, vitamin A deficiency, the use of harmful traditional eye medicines (TEMs), and ophthalmia neonatorum, while trauma, herpes simplex, bacterial and fungal infection are likely to be responsible for the majority of unocular corneal scars [22]. Other causes of corneal blindness are surgical procedures that permanently damage the cornea and improper use of ophthalmic preparations containing corticosteroids [23].

Corneal opacities, the leading causes of bilateral blindness in this study, are both preventable and curable. All the cases, apart from one, are acquired. These established cases of corneal scars are in need of corneal transplantation.

Cataract, the second leading cause of blindness in this study, is primarily a disease of ageing (senile cataract). It is not subject to primary prevention in most cases. However, effective surgery for removal of the lens and its replacement have been developed and refined [24]. Apart from the primary risk factor of age, some environmental, physical and nutritional risk factors have been associated with earlier onset and progression of cataracts. These include exposure to ultraviolet-B light, diabetes, hypertension, corticosteroid therapy, smoking, protein-calorie malnutrition and dehydration [25].



Glaucoma and diabetic retinopathy should be included among the avoidable causes of blindness as some forms of treatment are available [9]. Age is the most constant risk factor for glaucoma. A family history of glaucoma is also a risk factor, with approximately 13%–26% of cases having a genetic component. Other putative risk factors include diabetes, myopia and hypertension [24].

A striking finding in this study was the early onset of blindness among the study sample. About two-thirds (65.5%) of participants lost their sight before 10 years of age. This may be due to the high percentage of congenitally determined causes of blindness, in addition to the nature of the age group studied, i.e. the majority (68.2%) were students of school age.

Sudden loss of vision was reported by 14.2%. This may indicate a serious vascular disorder and should be recognized as an ocular emergency. Longstanding loss of vision may not be recoverable and may be a precursor to cerebrovascular accident. With permanent bilateral vision loss, one should suspect a vertebrobasilar anomaly or space-occupying lesion [26]. Other causes of sudden loss of vision are vitreous haemorrhage, head trauma and diabetes [27].

In this study, 51.3% of the study population reported one or more risk factors for blindness. Eye infection, systemic disease and eye trauma/injury were the commonest factors reported (24.8%, 18.6% and 17.7% respectively). Other factors were neonatal incubator care, positive family history of blindness, head trauma, exposure to excess heat and the use of TEMs.

It has long been known that trachoma and associated bacterial infections of the eye are extremely widespread in Egypt, and account for a major proportion of visual

disability [28]. However, El-Gammal [29] pointed out that trachoma no longer has a significant effect on eyesight in Egypt. He also demonstrated that although bacterial conjunctivitis is still present, it is less severe and has fewer complications, due to the recent development of proper treatment.

Eye trauma is an important cause of blindness. Even with optimal treatment the risk of severe visual impairment is considerable [30]. Injury as a cause of blindness is increasing, owing to rapid industrialization. People working in factories and workshops are prone to eye injuries through exposure to dust, airborne particles, flying objects, gases, fumes and radiation (usually welding flash) [9]. Chemical injury, whether accidental or criminal, can result in complication such as corneal scarring, cataract and staphylococcal infection. Late presentation to hospital and poor emergency care can contribute to poor outcome [31].

TEMs come in many forms including herbal medicines, lime juice, urine, toothpaste, kerosene and breast milk. Corneal ulceration may be caused by the caustic, physical or thermal trauma of TEM or by secondary infection with fungi or bacteria [32].

Blind people experience many losses, e.g. self-esteem, physical integrity, mobility, techniques of daily living, recreation, career and vocational goals or job opportunity, financial security, and personal independence as well as social adequacy [33]. Even though 90.3% of the participants in this study perceived the community as either helpful and supportive or compassionate, the majority saw themselves as disabled (71.7%), doubted their self-capabilities (78.8%) and were unsatisfied with life (88.5%). Furthermore, only 31.9% were satisfied with the current

health care they receive. An important finding was that 58.4% were in need of further management. The majority needed surgical treatment for glaucoma, cataract and retinal detachment. Keratoplasty for corneal scar could restore eyesight to 17.7% of those studied. These findings reflect the inadequate health care provided to this group. Although the majority are covered by the school health insurance, the service provided did not appear to be satisfactory.

All of the participants in this study live with their families, who support them financially and provide a suitable home environment in most cases. Movement outside the home alone and independent recreation are the daily living activities most affected by blindness.

The loss of self-esteem, together with the effect on daily living activities and the negative impact on education and marriage chances, will be reflected in the psychological status of the blind person. Kumar et al. [34] reported that blindness leaves a person in a state of physical, psychosocial and economic dependence. Aberrant mental attitudes and even frank illness can develop as a result of blindness.

In rural areas of the developing world, blindness is an obstacle to females; education is almost impossible and marriage is out of the question. When blindness occurs after marriage, it has a disruptive effect on

the family, with the blind wife often being deserted by her husband. In general, blind women live isolated from society [35].

Although this study was not a community survey, it does highlight the relative importance of different causes in the etiology of blindness. A nationwide population survey to estimate the magnitude of the problem and the epidemiology of blindness in the community is highly recommended. Such a survey would facilitate implementation of the global initiative for the elimination of avoidable blindness "Vision 2020 the right to sight", launched by WHO [36]. This initiative aims to eliminate avoidable blindness as a public health problem by 2020 and mitigate the consequences of blindness in developmental, social, economic and quality of life terms.

There is an urgent need to legislate for keratoplasty as part of organ transplantation. Genetic counselling and screening of family members will reduce the congenital causes of blindness. A registry of blind persons would permit analysis of trends over time and could assist in identifying a population to which services could be directed. Health education and adequate use of health services are needed to reduce the avoidable causes of blindness. The role of school health services should be strengthened. Blind persons are in need of physical, social, psychological and vocational rehabilitation.

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