Time Trends in the Incidence and Causes of Blindness in Israel

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• PURPOSE: **To evaluate time trends in the incidence and causes of new cases of blindness in Israel between 1999 and 2008.**

• DESIGN: **Descriptive, retrospective population-based study.**

• METHODS: **During the decade of the study, 19 862 inhabitants of Israel were newly registered as legally blind. Data were retrieved from the 1999 to 2008 annual reports of the National Registry of the Blind in Israel and were reviewed retrospectively. Specific rates by age, gender, calendar year, and cause of blindness were calculated. Total and cause-specific annual age-standardized rates were calculated as well. Findings were evaluated by the use of Poisson regression models.**

• RESULTS: **The age-standardized rate of incidence of newly registered legal blindness at the end of the studied decade was half of that at the beginning, declining from 33.8 per 100 000 in 1999 to 16.6 per 100 000 in 2008. The decline mainly was attributable to a decreased incidence of blindness resulting from age-related macular degeneration, glaucoma, diabetic retinopathy, and cataract.**

• CONCLUSIONS: **Contemporary interventions in ophthalmology combined with widely available universal free access to healthcare seem to be effective in causing a major reduction in the incidence of blindness. (Am J Ophthalmol 2012;153:214–221. © 2012 by Elsevier Inc. All rights reserved.)**

ACCORDING TO THE WORLD HEALTH ORGANIZAtion, in 2002, approximately 161 million people worldwide were visually impaired, of whom approximately 37 million were blind.[1] Because of the aging of the global population, worldwide trends since the early 1990s have shown a significant increase in the number of people at risk of age-related reversible and irreversible visual impairments.

More than 200 population-based studies on the causes of blindness have been carried out in more than 68 countries all over the world.[2] The leading causes of visual impairment, in order of frequency, are: cataract, uncorrected refractive errors, glaucoma, and age-related macular degeneration (AMD).[1,3] Corneal opacities, diabetic retinopathy, and blinding trachoma are other major causes. In industrialized countries, the main cause of blindness after the age of 74 years is AMD, whereas diabetic retinopathy is the leading cause in those younger than 74 years.[1]

Several methods exist for obtaining epidemiologic data on visual impairment and blindness in large populations. Each of these methods has its strengths and weaknesses. In administrative registries, data are collected as part of the routine operation of some service or program. When disabilities are studied, this method often provides useful information on the characteristics of relevant populations as well as details of the services provided. In many cases, these data are evaluated and reported annually, providing an updated source of information on trends in the incidence, prevalence, and causes of the conditions in question.

Israel is one of the few countries worldwide that maintains nationwide blindness registries, as do England, Germany, Scotland, and Australia.[4–8] The aim of this study was to evaluate the changes in the incidence and causes of legal blindness in Israel that have occurred during the last decade as recorded by the National Registry of the Blind, which is serviced by the Ministry of Social Affairs.

METHODS

DEFINITIONS OF VISUAL IMPAIRMENT AND BLINDNESS IN Israel are similar to, but not identical with, those in Western Europe, and are in accordance with the International Classification of Diseases.[9] Blindness is defined in Israel as best-corrected visual acuity (BCVA) of less than 1/60 or central visual field not more than 10 degrees in the less impaired eye. Severe visual impairment is defined as visual acuity of less than 3/60 but of 1/60 or better, or a corresponding visual field of less than 20 degrees in the less impaired eye.[10] Legal blindness encompasses both definitions.

A personal Certificate of Blindness is issued by the Israeli Ministry of Social Affairs to all individuals who meet the above definitions of legal blindness. The certifi-

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cation process begins with a complete eye examination by a senior ophthalmologist. It includes visual acuity assessment, a thorough ophthalmologic examination, and a visual field test. Patients who are considered eligible are advised to continue the registration process. The tests are then repeated by one of a select group of senior ophthalmology consultants employed by the Ministry of Welfare National Service for the Blind. If the diagnosis is confirmed, a certificate is issued. Patients denied a certificate have recourse to a national appeal committee comprising 2 senior ophthalmologists and a social worker.[4]

All data (including demographic information, year of registration, results of visual acuity and visual field tests, and cause of blindness) are collected in a national registry, and an annual report is published. The certificate entitles the holder to consultation and rehabilitation services; a guide dog; expanded national insurance and tax benefits, including total exemption from income tax and a 90% discount on property and municipal taxes; and major discounts on public transportation, phone tax, taxes on electrical appliances purchased, and car licensing. In addition, the blind person is entitled to a monthly pension and the assistance of a part-time worker.

It can be assumed that the vast majority of blind individuals in Israel are diagnosed and registered, thanks to universal free access to widely available healthcare in Israel, including all ophthalmologic services,[4] and the considerable advantages conferred by their registration. The application procedure for blind certification and the access to rehabilitation services are facilitated by the work of volunteers assisting blind people in 20 stations nationwide, that is, in all tertiary clinical centers, at the national insurance centers and governmental welfare offices, and in community centers and libraries for the blind.

We analyzed the aggregated data of new certificates of legal blindness issued in Israel, as well as the causes of blindness by age and gender, from 1999 through 2008. The data were derived from the annual reports of the National Registry of the Blind. Information on the sizes of the relevant population subgroups at risk during that period was obtained from the Israel Central Bureau of Statistics database. Annual age- and sex-specific rates of all-cause and disease-specific rates of legal blindness were calculated.

Annual age-standardized rates were calculated from the standard world population for the year 2000, using a direct standardization method. Poisson regression models were used to establish time trends of all-cause and disease-specific rates of blindness, according to age and gender. The dependent variable was the annual rate of all-cause or cause-specific blindness, and the independent variables were calendar year, age group, and gender. Interactions between calendar year and sex or age also were examined.

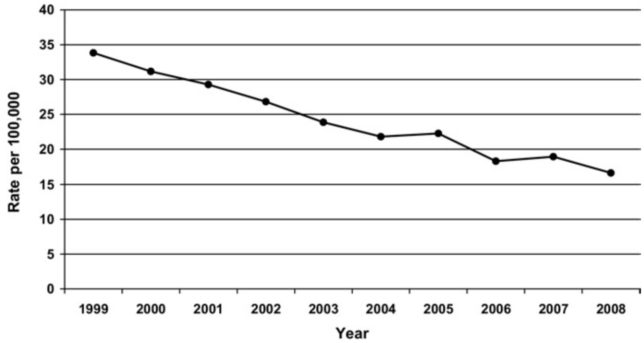

FIGURE 1. Graph showing annual age-standardized rates of certification of blindness in Israel during the decade 1999 through 2008.

RESULTS

BETWEEN 1999 AND 2008, A TOTAL OF 19 862 NEWLY CERTIfied people were registered in the National Registry of the Blind in Israel. There was a continuous decline in the total annual age-standardized rate of blindness certification per 100 000 residents, from 33.8 in 1999 to 16.6 in 2008 (Figure 1). This represents a drop of 51% throughout that decade.

The population size in Israel (in millions) and distribution of causes of blindness during the decade 1999 through 2008 is shown in Table 1. The leading causes of blindness certification in Israel in the years 1999 and 2008 were AMD, accounting, respectively, for 20.9% (511) and 28.7% (440) of cases; diabetic retinopathy, 12.5% (306) and 13.2% (202); glaucoma, 13.9% (340) and 12.1% (185); and cataract, 9.8% (240) and 5.1% (78). The general population sex and age distribution is shown in Table 2, whereas the age and sex distributions of the certified population in these years is shown in Tables 3 and 4, respectively. The annual age-standardized incidence rates of blindness resulting from the leading causes are shown in Figure 2.

Table 5 presents the mean annual percentage decline, with 95% confidence limits, in the incidence of blindness for the total population as well as by gender and age groups, derived from the Poisson regression models. The overall mean annual decline was 7.5% and did not differ by gender ($P = .88$). The greatest decline was observed in the age group 41 to 80 years, whereas the smallest decline was seen in the oldest age group (> 80 years). Mean annual changes in the age- and sex-adjusted incidence rates for the leading causes of blindness between 1999 and 2008 are shown in Table 6. The decline in incidence of blindness resulting from AMD, diabetic retinopathy, glaucoma, and cataract was highly significant ($P < .001$), whereas the decline in the incidence of blindness resulting from untreatable causes such as retinitis pigmentosa (RP) was modest and not statistically significant ($P = .06$).

TABLE 1. Population Size in Israel (in Millions) and Distribution of Causes of Blindness during the Decade 1999 through 2008

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Population (millions)	6.13	6.29	6.44	6.57	6.69	6.81	6.93	7.05	7.18	7.31
Newly blind (n)	2445	2329	2263	2117	1959	1879	1951	1666	1721	1533
Causes, % (n)[a]										
AMD	20.9 (511)	21.6 (503)	23.5 (532)	24.6 (521)	28 (549)	33 (620)	29 (566)	29.1 (485)	27.4 (472)	28.7 (440)
Diabetic retinopathy	12.5 (306)	13.1 (305)	14.1 (319)	14.5 (307)	14.4 (282)	14.8 (278)	16 (312)	14.2 (237)	13.4 (231)	13.2 (202)
Glaucoma	13.9 (340)	14.3 (333)	13.1 (296)	11.7 (248)	11.8 (231)	11.4 (214)	11 (215)	12.4 (207)	11.9 (205)	12.1 (185)
Cataract	9.8 (240)	9.9 (231)	8.8 (199)	7.1 (150)	7.9 (155)	4.4 (83)	6 (117)	6.4 (107)	6.2 (107)	5.1 (78)
Retinitis pigmentosa	7 (171)	6 (140)	5.6 (127)	6.4 (135)	5.7 (112)	7 (132)	6 (117)	7.7 (128)	7.2 (124)	7.8 (120)

AMD = age-related macular degeneration.
[a]Number of certified patients.

We found a significant interaction between calendar year and age for AMD ($P < .001$) and for diabetic retinopathy ($P = .002$). The greatest decline in the incidence of blindness resulting from AMD was observed in the younger age group (≤ 65 years). For diabetic retinopathy, the greatest decline was observed in the age group of 41 to 65 years, whereas the change in the incidence of blindness in the youngest (≤ 40 years) and the oldest (≥ 81 years) age groups was not statistically significant (Table 7).

To assist with possible explanations for the decline in the rates of blindness, we examined differences in the mean annual percentage decline in blindness for specific periods in which considerable changes occurred. There was no significant mean decline in the age- and sex-adjusted annual rates of blindness resulting from AMD between 1999 and 2003 (−1.3%; 95% confidence interval [CI], −4.2% to 1.6%), whereas the mean annual decline after 2003 was remarkable (−12.2%; 95% CI, −14.9% to −9.4%). Likewise, the mean adjusted annual decline in the rate of blindness resulting from diabetic retinopathy after 2004 was 3 times greater than the mean annual decline observed between 1999 and 2004 (−15.0%; 95% CI, −20.6% to −9.4% vs. −4.6%; 95% CI, −7.5% to −1.7%). In contrast, a steep decline in the mean incidence of blindness resulting from glaucoma was observed during the years 1999 through 2002, whereas the decline thereafter was more modest (−12.6%; 95% CI, −17.8% to −7.4% vs. −6.1%; 95% CI, −9.4% to −2.9%).

The annual number of blind certificates issued for children younger than 5 years varied from 54 to 75 children, constituting 2.6% to 3.6% from the yearly total blindness certification. The equivalent numbers for those 6 to 18 years of age were 59 to 118 and 3% to 5.1%, respectively. RP accounted for 0.8% to 2.9% of yearly blindness in people younger than 18 years, and optic atrophy accounted for 1.1% to 2.1% of yearly blindness in that population. The number of blind minors was too small to draw any conclusions.

DISCUSSION

THE RESULTS OF THIS STUDY CLEARLY SHOW A DECLINE IN the incidence of blindness from all treatable or potentially preventable causes (glaucoma, diabetic retinopathy, AMD, and cataract) in Israel over the last decade. This is the first report of such a dramatic decline, which is much more pronounced than that found for the same population in previous years.[4,10,11] The observed decline closely follows the chronology of the introduction of new treatment methods in Israel.

As in other developed countries, the main contributor to blindness in Israel between 1999 and 2008 was AMD, accounting for 28.7% of the incidence of blindness in 2008.[1] The decline in incidence of AMD reported here may be attributable to the nationwide use of anti–vascular endothelial growth factor (VEGF) agents, which play a pivotal role in the treatment of neovascular (wet) AMD and were introduced into extensive clinical practice in Israel in 2004.[12,13] Although an estimated 80% of the patients with AMD have the nonneovascular (dry) form, the wet form is responsible for almost 90% of severe visual loss resulting from AMD, and the effective treatment of neovascular AMD can explain the reduction of the blindness incidence rate.[14] Although the data about the subpopulations (wet and dry) of AMD blindness application are not applicable, we assume that most of the certified AMD patients had wet AMD. As in other developed countries, intravitreal anti-VEGF therapy is in widespread clinical use in Israel as a first-line therapy for wet AMD.[15,16] Coping with the demand that followed the introduction of this novel treatment has required an increase in the number of ophthalmologists who practice

TABLE 2. Population Size, Sex, and Age Distribution in Israel during the Decade 1999 through 2008 (in Thousands)

	1999		2000		2001		2002		2003		2004		2005		2006		2007		2008	
Age (y)	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male
0 to 5	363.3	383.3	373.4	394.0	382.5	403.8	390.3	411.6	398.3	419.3	405.7	427.2	411.9	433.8	417.4	440.0	424.7	447.0	432.7	455.4
6 to 18	703.3	740.5	716.4	754.0	728.4	766.3	738.0	776.3	746.9	785.3	757.1	795.8	768.6	807.9	781.3	821.5	794.8	836.2	808.7	850.5
19 to 40	980.0	983.6	1006.1	1011.2	1028.9	1035.7	1049.2	1057.9	1067.6	1079.5	1086.0	1099.6	1104.9	1120.1	1124.1	1140.1	1143.0	1158.8	1161.2	1178.5
41 to 65	731.9	674.6	758.2	698.7	782.1	721.0	802.3	739.8	818.3	755.5	833.2	770.8	849.3	787.0	866.6	804.3	885.3	822.8	905.1	842.3
66 to 80	256.9	194.5	263.0	198.7	268.0	201.8	272.8	205.1	277.6	208.9	280.9	212.7	282.5	216.0	283.4	219.0	283.7	221.2	283.9	222.7
81+	68.1	45.2	69.7	45.9	72.6	48.0	75.8	50.7	79.4	53.2	84.4	55.8	89.8	58.4	95.1	60.9	99.5	63.2	103.1	65.2
Total per sex per year	3103.5	3021.7	3186.8	3102.5	3262.5	3176.6	3328.4	3241.4	3388.1	3301.7	3447.3	3361.9	3507.0	3423.2	3567.9	3485.7	3631.0	3549.2	3694.7	3614.6
Total (male+female) per year	6125.2		6289.3		6439.1		6569.8		6689.8		6809.2		6930.2		7053.6		7180.2		7309.3	

TABLE 3. Age Distribution of the Certified Blind Population in Israel during the Decade 1999 through 2008

	1999		2000		2001		2002		2003		2004		2005		2006		2007		2008	
Age (y)	Total (n)	%	Total (n)	%	Total (n)	%	Total (n)	%	Total (n)	%	Total (n)	%	Total (n)	%	Total (n)	%	Total (n)	%	Total (n)	%
0 to 5	59	2.40%	54	2.3%	74	3.3%	75	3.5%	50	2.6%	51	2.7%	64	3.3%	42	2.5%	57	3.3%	55	3.6%
6 to 18	109	4.50%	118	5.1%	79	3.5%	78	3.7%	59	3.0%	83	4.4%	88	4.5%	66	4.0%	76	4.4%	64	4.2%
19 to 40	215	8.8%	169	7.3%	152	6.7%	153	7.2%	123	6.3%	123	6.5%	142	7.3%	123	7.4%	129	7.5%	128	8.3%
41 to 65	592	24.2%	543	23.3%	555	24.5%	514	24.3%	472	24.0%	360	19.1%	385	19.7%	319	19.1%	358	20.8%	345	22.5%
66 to 80	939	38.4%	899	38.6%	835	36.9%	782	36.9%	724	37.0%	670	35.7%	667	34.2%	558	33.5%	568	33.0%	457	29.8%
81+	531	21.7%	546	23.4%	568	25.1%	515	24.4%	530	27.1%	592	31.6%	605	31.0%	558	33.5%	533	31.0%	484	31.6%
Total per year	2445		2329		2263		2117		1958		1879		1951		1666		1721		1533	

TABLE 4. Sex Distributions of the Certified Blind Population in Israel during the Decade 1999 through 2008

Age Range (y)	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Male										
0 to 5	32	32	37	35	27	29	38	24	32	29
6 to 18	59	59	52	43	38	43	59	38	42	35
19 to 40	128	99	76	74	63	68	72	71	67	67
41 to 65	297	271	278	263	257	181	214	158	185	190
66 to 80	412	431	373	349	340	332	309	259	259	213
81+	260	268	274	252	241	269	266	245	254	229
Total	1188	1160	1090	1016	966	922	958	795	839	763
Total %	48.6	49.8	48.2	48.0	49.30	49.0	49.0	48.0	48.7	49.8
Female										
0 to 5	27	22	37	40	23	22	26	18	25	26
6 to 18	50	59	27	35	21	40	29	28	34	29
19 to 40	87	72	76	79	60	55	70	52	62	61
41 to 65	295	272	277	251	215	179	171	161	173	155
66 to 80	527	467	462	433	384	338	358	299	309	244
81+	271	277	294	263	289	323	339	313	279	255
Total	1257	1169	1173	1101	992	957	993	871	882	770
Total %	51.4	50.2	51.8	52.0	50.70	51.0	51.0	52.0	51.3	50.2

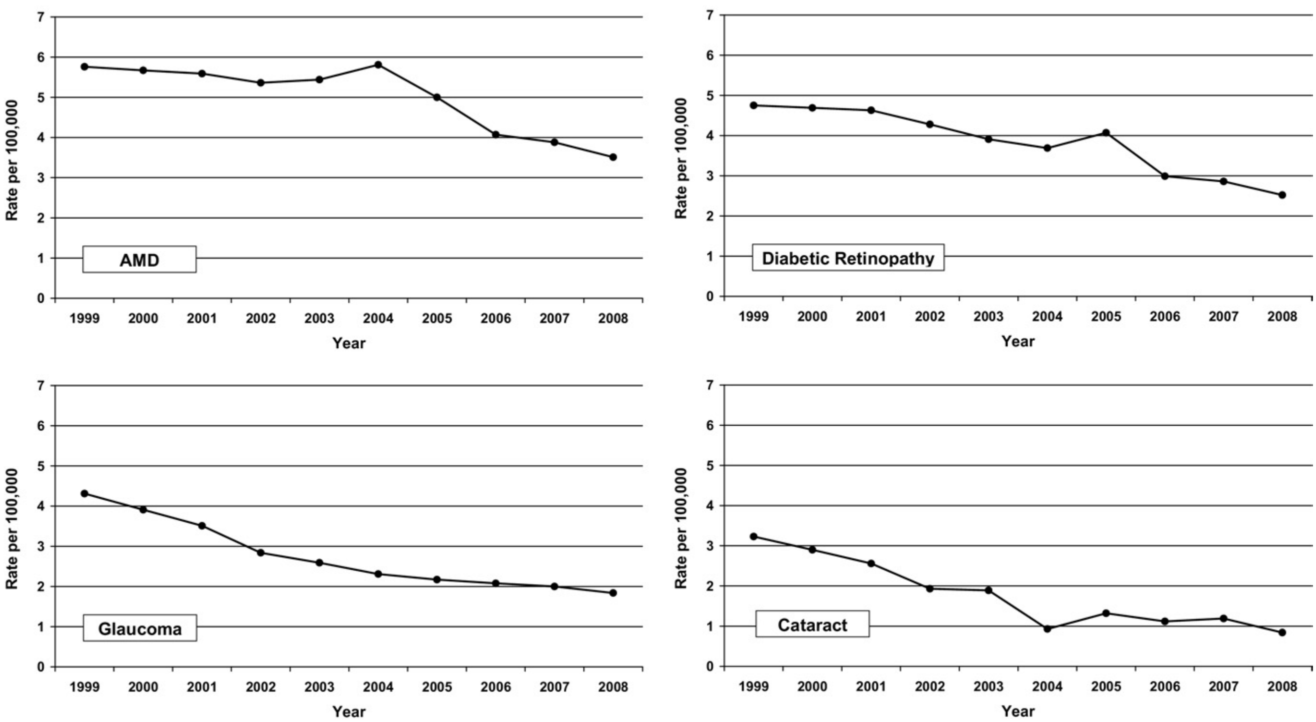

FIGURE 2. Graphs showing annual age-standardized rates of certification of blindness in Israel resulting from specific causes: (Top left) age-related macular degeneration (AMD), (Top right) diabetic retinopathy, (Bottom left) glaucoma, and (Bottom right) cataract.

routine intravitreal injections. As expected, large-scale use of anti-VEGF therapy reduced the incidence of AMD-induced blindness dramatically.[17]

The decline in the incidence of blindness caused by glaucoma in our study correlates with that in a recent publication from Scotland, which demonstrates a downward trend in the rates of blind registration resulting from glaucoma by 31% in the years 2000 through 2009, compared with the previous decade.[7] These data attributed to improvement in patient compliance, medical treatment, and early diagnosis and management. In our study, the decline is probably a result of the widespread use of prostaglandin analogs, initially as a second-line and shortly thereafter as first-line therapy, starting with latanoprost,

TABLE 5. Mean Percentage Change in Annual Incidence Rate of Blindness in Israel According to Gender and Age

	% Change	95% CI	*P* Value
Total[a]	−7.5	−8.0 to −7.0	<.001
Gender[b]			
Male	−7.4	−8.1 to −6.7	<.001
Female	−7.5	−8.2 to −6.8	<.001
Age group (y)[c]			
< 40	−6.4	−7.6 to −5.1	<.001
41 to 65	−9.5	−10.5 to −8.4	<.001
66 to 80	−8.6	−9.4 to −7.8	<.001
81+	−5.0	−5.9 to −4.1	<.001

CI = confidence interval.
[a]Controlling for age group and gender.
[b]Controlling for age group.
[c]Controlling for gender.

TABLE 6. Mean Percentage Change in Annual Incidence Rate of Cause-Specific Blindness in Israel

Cause of Blindness	% Change[a]	95% CI	*P* Value
AMD	−4.7	−5.7 to −3.6	<.001
Diabetic retinopathy	−6.3	−7.8 to −4.9	<.001
Glaucoma	−9.4	−10.9 to −7.8	<.001
Cataract	−14.5	−16.6 to −12.5	<.001

AMD = age-related macular degeneration; CI = confidence interval.
[a]Controlling for age and gender.

TABLE 7. Mean Percentage Change in Annual Incidence of Cause-Specific Blindness in Israel by Age Group

Cause/Age Group (y)	% Change[a]	95% CI	*P* Value
AMD			
≤ 65	−12.0	−17.6 to −6.3	<.001
66 to 80	−7.2	−8.9 to −5.6	<.001
81+	−2.5	−3.9 to −1.2	.002
Diabetic retinopathy			
≤ 40	−6.3	−15.4 to 2.8	.2
41 to 65	−9.3	−11.4 to − 7.2	<.001
66 to 80	−4.2	−6.4 to −2.1	<.001
81+	0.02	−5.4 to 5.4	.9

AMD = age-related macular degeneration.
[a]Controlling for gender.

which became available in Israel soon after 1998.[18] Improved adherence no doubt helped to retard the progression of glaucomatous neuropathy, which probably was aided further by the newer combination drugs. Moreover, the Israeli population was shown to adhere to medical treatment of other chronic diseases, a fact that may play a role in the decline in blindness resulting from glaucoma.[19]

The third cause of blindness (in order of frequency) in Israel is diabetic retinopathy. The decline in the incidence of blindness resulting from this disease is in line with the declining rates of diabetic retinopathy in the Western world observed over the last 3 decades.[20] This decrease is probably attributable to earlier detection of diabetes and improved control of diabetic retinopathy risk factors (hyperglycemia, hypertension, and dyslipidemia), as well as earlier identification and treatment of patients with diabetic retinopathy.[21–23] Another possible factor is the increasing use of more aggressive treatments for diabetic retinopathy, such as scatter and focal photocoagulation, intraocular steroids, and anti-VEGF therapy.[24,25]

Our analysis also shows a decline in the incidence of blindness caused by cataract. This finding can be explained readily by the considerable increase in the number of cataract surgeries performed nationwide, which almost doubled during the reported decade, from 23 771 operations in 1999 to 49 920 in 2008.[26] The reasons for this increase are the availability of complementary medical insurance and the change in reimbursement policy. Cataract surgery in Israel is now largely an ambulatory procedure, performed in public and private hospitals and in secondary care clinics. The service is readily available throughout the country, with practically no waiting list. The reasons why blindness resulting from cataract nevertheless still occurs should be investigated formally so that further interventions and public education measures can be introduced.

We cannot explain the minimal and nonsignificant decline in the incidence of RP over the study years. However, the negligible decline in the incidence of RP lends credence to the findings about the precipitous reduction in blindness resulting from preventable and treatable diseases, given the fact that unlike the aforementioned eye diseases, this disease is not responsive to preventive or therapeutic measures.

Among the large number of population-based prevalence reports on visual impairment published over the last 30 years, there are no reported long-term registry-based data.[2] Only one of these, a recent report from England and Wales, also noted a considerably smaller number of new blindness certificates issued during the period April 2007 through March 2008 compared with April 1999 through March 2000.[5]

A notable finding of our study was that the decline in both the all-cause and the cause-specific rates of blindness was smallest in the oldest (81+) age group. This probably can be attributed to a number of factors, including inferior accessibility of older persons to ophthalmic facilities as a result of comorbidities and handicaps, absence of family support, negligence or inattention by care providers, and a less aggressive treatment attitude of the ophthalmologist or primary care physician resulting from an erroneous belief that the very old will not benefit from ophthalmic care. These age-related disparities in ophthalmic care should be addressed by promoting awareness of the problem and by directing efforts to provide appropriate diagnostic ophthalmic care for old people.

The reduction in the incidence of blindness in Israel over the studied decade may be attributable not only to the introduction of new treatment methods, but also to their universal availability and accessibility. The improved therapeutic measures would have been far less effective without the free universal access to medical services provided throughout the country and the relative abundance of ophthalmologists (approximately 1 ophthalmologist per 10 000 people).[27] The medical services are financed by a universal progressive medical tax on income and minimal patient participation, which is waived for people who cannot afford it.

Attempts to compare our result with those of other epidemiologic studies are complicated by the nonuniform definitions and study designs. The definition of blindness in Israel, for example, is less strict than that of the World Health Organization (BCVA $<$ 20/400), but is more strict than the definition in the United States (BCVA $\leq$ 20/200).[11]

In this study, we present the results of a decade-long analysis of national data on new cases of blindness for which certification was issued in Israel. The records stored in the National Registry of the Blind in Israel contain relevant data on the population of the entire country. An obvious advantage of having such a registry is that accurate cause-specific data are acquired without the need for designated surveys.[28] Moreover, the World Health Organization stresses the importance of collecting within-country data on causes of visual impairment for use in priority setting and resource allocation.[1] Such registry-based cross-sectional studies have potential limitations, resulting from delays between the onset of certifiable visual loss and registration. However, because the present analysis was carried out over the course of 10 years, the delay between the development of blindness and its recording would have a negligible effect on the results. Possible underreporting can not explain the steady consistent decline in the incidence of reported blindness. Nevertheless, the considerable incentives and benefits that accrue to individuals certified as blind are likely to reduce the number of unregistered blind people.

It should be noted that our analysis is based on the definition of legal blindness, which is based principally on the BCVA and the visual field. Our findings therefore do not reflect the burden of impaired vision or blindness resulting from uncorrected refractive error, which is potentially an important cause of visual impairment that can be reversed by treatment or avoided by preventive efforts.

An inherent limitation of this study has to do with the reliance of reports from a registry, using aggregated information with rigid reporting categories, limiting the capacity for in-depth analysis. Moreover, blindness certificates are not reviewed routinely, because the vast majority of them are for irreversible eye diseases. This inevitably places limits on the ability to study trends of blindness in subgroups not included in the selection, such as those differing by ethnicity or socioeconomic status.[29]

In summary, the incidence of new cases of certificated blindness in Israel was almost halved over the decade from 1999 to 2008. The decline was attributable to a decreased rate of all major treatable causes of blindness, namely AMD, glaucoma, diabetic retinopathy, and cataract. These encouraging findings reflect the introduction of effective new treatments, universal access to health care, and changes in reimbursement policy. The results also point to age-related disparities in access to effective ophthalmic care.

ALL AUTHORS HAVE COMPLETED AND SUBMITTED THE ICMJE FORM FOR DISCLOSURE OF POTENTIAL CONFLICTS OF Interest, and none were reported. Involved in Originating study (M.B.); Design and conduct of study (A.S., A.C., M.B., O.K.-L.); Collection (A.S., M.K.), analysis and interpretation (A.S., A.C., M.B., O.K.-L.) of data; and Preparation (A.S.), review (A.C., M.B., O.K.-L.), and approval (A.S., A.C., M.B., M.K., O.K.-L.) of manuscript. The Sheba Medical Center Institutional Review Board (IRB) committee waived the need for IRB approval because the study was designed as a retrospective population study based on anonymous registries. The authors thank Y. Corcia, I. Gleitman, and M. Gozovsky from the Services for the Blind, Israel Ministry of Social Affairs, for providing the data on which this article is based.

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Biosketch

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