A comparison of random and self-selected samples of urban and rural residents, by affection and etiology

Blindness Prevalence Rates in Egypt

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IN every screening of a population, randomly sampled or otherwise, in which the cooperation of the person is sought, the sample finally screened is to some degree self-selected and thus biased. Every refusal to cooperate detracts to some degree from the representativeness originally desired.

At one extreme, therefore, would be a sample without refusals and with a known sampling error. At the other extreme would be a sample whose members are completely self-selected, nonrepresentative, and without any known sampling error. To what extent do these samples differ in their prevalence rates of a specific disease, defect, or disability? If we were investigating the prevalence rate of a disability such as blindness in the community, how would the method of sampling (randomization or self-selection) influence the relationship of one prevalence rate to the other or the relationship of the composition by age, sex, urban-rural residence, affection, etiology, visual acuity, or field of vision of one sample to the other?

In a previous paper (*1*) we compared differences in blindness prevalence rates found in (*a*) a 4 percent random sample of households (consisting of approximately 11,000 persons of all ages and socioeconomic levels) visually screened in some urban and rural areas in and around Alexandria, Egypt, with (*b*) those of a self-selected sample of approximately 145,000 persons in the same geographic areas. The crude blindness prevalence rate for the random sample (29.7 per 1,000 examined) was almost 2½ times that for the self-selected sample. The self-selected sample was characterized by smaller percents of older males and females in urban and rural areas—percents that were statistically significant—as were the smaller percents of females in both areas in the self-selected sample.

In view of the fact that, in general, age-specific blindness prevalence rates among the elderly are higher than among the young and that overall rates for females are higher than those for males, the aforementioned differences in composition by age and sex might explain the differences in the crude prevalence rates of the two samples. The greatest percent decrease in rates, when the random sample rates were compared with those of the self-selected sample, occurred among the young and in the rural areas.

Objectives

The objectives of this study, based on the data secured in the investigation mentioned previously, were to determine

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Mrs. Helen Moorhead, Office of Biometry and Epidemiology, National Eye Institute, reviewed the classification of causes of blindness of those persons found to be blind in this study. Her review insured the comparability of diagnostic classification with that produced by the Model Reporting Area for Blindness Statistics in the United States.

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whether two samples from the same population in Egypt, one drawn randomly and the other self-selected, differed significantly in affection-specific and etiology-specific rates for blindness prevalence even after age adjustment, by sex and urban-rural residence. A subsequent paper will attempt to determine if significant differences exist between the two kinds of samples in the distribution of visual acuity and field of vision.

This investigation was ancillary to a long-term study with these objectives: (*a*) to determine, by scientific sampling and vision screening, baseline blindness prevalence and incidence rates and causes of blindness in some urban and rural areas in Egypt and their relationship to age, sex, and urban-rural residence and (*b*) to set up a blindness register in these areas based on voluntary self-selection of a population for vision screening so that necessary restorative and rehabilitative services could be provided to those screened and confirmed as blind. That study has been described elsewhere (*2*).

In determining baseline prevalence rates, it is absolutely essential that the sample selected be random and, therefore, be representative of the population from which it is drawn. However, in setting up a blindness register with the purpose of identifying as many blind as possible in order to offer them services, the sample is usually self-selected.

Methods

Data for this study were obtained during phases 1 and 2 of the Blindness Register Demonstration Project in Egypt (*2*). The urban and rural areas in the study each had a population as of April 1965, when the study was started, of about 127,000.

The definition of blindness used is that of the U.S. Model Reporting Area for Blindness Statistics (a group of States with blindness registers that have voluntarily agreed to a common definition of blindness and to uniform methods of data collection and classification of causes of blindness so that the data secured will be as comparable as possible). The definition is "Visual acuity of 20/200 (6/60) or less in the better eye with best correction, or visual acuity of more than 20/200 if the widest diameter of the field of vision subtends an angle no greater than 20 degrees."

Visual acuity and field of vision in this study were determined by examination of patients by a trained physician or an ophthalmologist. Senior ophthalmologists supervised the teams and not only confirmed the determination of blindness but also the specific affection and etiology in each case. Acuity of vision was measured by the Titmus optical vision tester using a tumbling E slide; field of vision was measured by the Schweigger hand perimeter. The equipment and methodology have been described in detail elsewhere (*3*).

Phase 1

Phase 1 of the study was concerned with prevalence rates derived from study of random samples of urban and rural populations. The two districts selected as the urban sampling frame did not represent Alexandria nor did the 23 villages selected as the rural sampling frame represent all villages in the area around Alexandria. It is to the populations of these sampling frames that the results from the samples may be generalized. The goal was to have approximately 5,000 persons in each of the urban and rural samples. Households, rather than persons, were used as sampling units because it was impossible to secure listings for any locality of persons in the general population.

Fortunately, the Alexandria Department of Social Affairs had complete up-to-date listings of households in Alexandria by districts and subdistricts. The population of the rural sample was determined by population counts of the local health authority. A household was defined as those persons sharing one dwelling unit. Because census data showed that an average Egyptian household consisted of five persons, samples of approximately 1,000 urban households and 1,000 rural households were randomly selected. These households constituted, in effect, a sample of approximately 4 percent from each area. All age groups were represented in the sample studied, except for the great majority of those under 5 years of age for whom it was difficult to get reliable data under conditions of the survey. All examinations were given in the homes.

Phase 2

Phase 2 was concerned with prevalence rates as derived from study of self-selected samples of the urban and rural populations. After phase 1 had been completed, an attempt was made to set up a blindness register covering the total population in the urban and rural areas selected for study in phase 1. On the average, an 18-month interval separated the starting dates for phases 1 and 2. Publicity, offering visual examinations (exactly like those given to members of the random

samples in phase 1) to any interested residents, was directed to the urban and rural areas. Examination teams set up conveniently located clinics for this purpose and also made these examinations available at times suitable for those who found it inconvenient to come during working hours.

Results

In phase 1 only 18 of some 1,000 urban households refused to cooperate. In the rural areas not a single household failed to cooperate. It is estimated that in phase 2 about 60 percent of the urban population self-selected themselves to be examined; in the rural area the estimate is about 53 percent.

Table 1 shows the percent distribution by age, sex, and urban-

Table 1. Percentage distribution of persons examined in urban and rural areas, by age group and sex in phase 1 (random sample) and in phase 2 (self-selected sample)

Age group (years)	Urban			Rural			Total		
	Male	Female	Both sexes	Male	Female	Both sexes	Male	Female	Both sexes
Phase 1									
Number screened	2,087	3,062	5,149	2,879	2,956	5,835	4,966	6,018	10,984
Under 10	16.7	12.4	14.2	12.6	10.4	11.5	14.3	11.5	12.8
10–19	33.4	32.5	32.9	31.2	28.0	29.6	32.2	30.3	31.1
20–29	12.4	17.6	15.5	12.3	17.9	15.1	12.3	17.7	15.3
30–39	12.4	16.0	14.6	15.9	21.4	18.7	14.4	18.7	16.8
40–49	11.5	9.8	10.5	13.8	11.1	12.4	12.8	10.4	11.5
50–59	8.0	6.6	7.2	8.6	7.0	7.8	8.4	6.8	7.5
60 or older	5.5	5.0	5.2	5.6	4.2	4.9	5.5	4.6	5.0
Phase 2									
Number screened	40,716	36,112	76,828	36,201	31,325	67,526	76,917	67,437	144,354
Under 10	17.6	19.1	18.3	12.6	9.4	11.1	15.3	14.6	14.9
10–19	42.2	35.9	39.2	38.3	28.8	33.9	40.4	32.6	36.7
20–29	11.2	13.2	12.2	13.8	19.3	16.3	12.4	16.0	14.1
30–39	10.2	13.6	11.8	16.0	19.2	17.5	13.0	16.2	14.5
40–49	10.7	8.7	9.7	9.8	9.6	9.7	10.3	9.1	9.7
50–59	5.1	6.2	5.6	6.2	7.6	6.8	5.6	6.9	6.2
60 or older	2.9	3.4	3.1	3.3	6.0	4.6	3.1	4.6	3.8

Table 2. Percentage distribution of urban and rural residents confirmed as blind, by age group and sex in phase 1 (random sample) and in phase 2 (self-selected sample)

Age group (years)	Urban			Rural			Total		
	Male	Female	Both sexes	Male	Female	Both sexes	Male	Female	Both sexes
Phase 1									
Number blind	25	48	73	89	164	253	114	212	326
Under 10	8.0	.....	2.7	2.2	0.6	1.2	3.5	0.5	1.5
10–19	4.0	4.2	4.1	5.6	4.9	5.1	5.3	4.7	4.9
20–29				5.6	2.4	3.6	4.4	1.9	2.8
30–39	8.0	10.4	9.6	6.7	9.1	8.3	7.0	9.4	8.6
40–49	12.0	10.4	11.0	7.9	11.6	10.3	8.8	11.3	10.4
50–59	24.0	25.0	24.7	25.8	30.5	28.8	25.4	29.2	27.9
60 or older	44.0	50.0	47.9	46.1	40.8	42.7	45.6	42.9	43.9
Phase 2									
Number blind	229	344	573	398	895	1,293	627	1,239	1,866
Under 10	0.4	.....	0.2	1.8	0.3	0.8	1.3	0.2	0.6
10–19	6.6	0.6	3.0	4.0	3.6	3.7	5.0	2.8	3.5
20–29	6.6	2.0	3.8	7.3	3.1	4.4	7.0	2.8	4.2
30–39	3.0	3.8	3.5	8.5	5.8	6.7	6.5	5.3	5.7
40–49	10.0	4.9	7.0	10.8	7.9	8.8	10.5	7.1	8.2
50–59	20.1	19.5	19.7	21.1	26.5	24.8	21.7	24.5	23.3
60 or older	53.3	69.2	62.8	46.5	52.8	50.8	49.0	57.3	54.5

rural residence of those examined in the random sample and the self-selected sample.

In phase 1 the percent of persons under 20 years that were examined was significantly less than in phase 2, while the percent of those 50 years and over was significantly greater. Furthermore, the percent of females examined in phase 1 significantly exceeded the similar percent examined in phase 2. These differences would be in the direction of explaining why a higher crude blindness rate would be expected in phase 1 than in phase 2.

Table 2 shows the percent distribution of persons confirmed as blind by age, sex, and urban-rural residence in both phases. Table 3 presents, in percent distribution, unadjusted and age-adjusted blindness prevalence rates per 1,000 persons examined for major affection groups by urban-rural residence and sex in the

Table 3. Unadjusted and age-adjusted blindness prevalence rates per 1,000 persons examined in phase 1 (random sample) and phase 2 (self-selected sample), by affection group, residence, and sex

Major affection group [1]	Male			Female			Both sexes		
	Percent	Unadjusted rate	Age-adjusted rate	Percent	Unadjusted rate	Age-adjusted rate	Percent	Unadjusted rate	Age-adjusted rate
Phase 1									
Urban total	*25*	12.0	9.8	*48*	15.7	14.0	*73*	14.2	12.3
Glaucoma (excluding congenital)	4.0	.5	.4	6.2	1.0	.9	5.5	.8	.8
Myopia	16.0	1.9	1.7	10.4	1.6	1.4	12.3	1.7	1.7
Keratitis	32.0	3.8	3.2	31.2	4.9	4.4	31.5	4.5	3.9
Cataract	36.0	4.3	3.2	37.5	5.9	4.9	37.0	5.2	4.1
Uveitis				2.1	.3	.2	1.4	.2	.1
Retinal degeneration				2.1	.3	.4	1.4	.2	.2
Other retinal affections	4.0	.5	.4	4.2	.7	.5	4.1	.6	.5
Optic nerve atrophy	4.0	.5	.5	4.2	.7	1.0	4.1	.6	.6
Unknown	4.0	.5	.4	2.1	.3	2.1	2.7	.4	.4
Rural total	*89*	30.9	24.3	*164*	55.5	50.7	*253*	43.4	36.2
Glaucoma (excluding congenital)	9.0	2.8	2.0	6.1	3.4	3.1	7.1	3.1	2.5
Keratitis	49.4	15.3	12.3	57.3	31.8	28.8	54.5	23.6	19.8
Cataract	31.5	9.7	6.9	34.8	19.3	17.7	33.6	14.6	11.8
Uveitis	1.1	.3	.4				.4	.2	.2
Retinal degeneration	3.4	1.0	.9				1.2	.5	.4
Other retinal affections	1.1	.3	.2				.4	.2	.1
Optic nerve atrophy	3.4	1.0	1.2				1.2	.5	.7
All other affections	1.1	.3	.4	1.8	1.0	1.1	1.6	.7	.7
Phase 2									
Urban total	*229*	5.6	7.1	*344*	9.5	10.7	*573*	7.5	8.8
Glaucoma (excluding congenital)	13.5	.8	1.0	9.9	.9	1.1	11.3	.8	1.0
Myopia	7.0	.4	.5	6.4	.6	.7	6.6	.5	.6
Keratitis	22.3	1.2	1.5	19.8	1.9	2.1	20.8	1.5	1.8
Cataract	25.3	1.4	1.9	52.6	5.0	5.6	41.7	3.1	3.8
Uveitis	2.6	.1	.2	2.9	.3	.3	2.8	.2	.2
Retrolental fibroplasia	6.6	.4	.4	2.0	.2	.2	3.8	.3	.3
Retinal degeneration	1.3	.1	.1	1.4	.1	.1	1.4	.1	.1
Other retinal affections	7.1	.4	.5	.6	.1	.1	3.5	.3	.3
Optic nerve atrophy	.4	[2] 0	[2] 0	1.4	.1	.2	1.0	.1	.1
Multiple affections				.3	[2] 0	[2] 0	.2	[2] 0	[2] 0
Unknown	2.6	.1	.2	1.7	.2	.2	2.1	.2	.2
All other affections	10.5	.6	.8	.9	.1	.1	4.7	.4	.4
Rural total	*398*	11.0	12.1	*895*	28.6	21.5	*1,293*	19.1	17.2
Glaucoma (excluding congenital)	9.8	1.1	1.2	9.5	2.7	2.0	9.6	1.8	1.6
Myopia	1.5	.2	.2	.8	.2	.2	1.0	.2	.2
Keratitis	54.0	5.9	6.3	54.3	15.5	12.1	54.2	10.4	9.4
Cataract	28.4	3.1	3.6	32.0	9.1	6.4	30.9	5.9	5.2
Uveitis	1.3	.1	.2	1.3	.4	.3	1.3	.2	.2
Retinal degeneration	1.8	.2	.2	.4	.1	.1	.8	.2	.2
Other retinal affections	.5	.1	.1	.2	.1	.1	.4	.1	.1
Optic nerve atrophy	1.0	.1	.1	.3	.1	.1	.5	.1	.1
Multiple affections	.5	.1	.1				.2	[2] 0	[2] 0
Unknown	.2	[2] 0	[2] 0	.7	.2	.1	.5	.1	.1
All other affections	1.0	.1	.1	.3	.1	.1	.5	.1	.1

[1] "Standard Classification of Causes of Severe Vision Impairment and Blindness," 1965 revision.
[2] Rate less than 0.05.
NOTE: Number of persons in various population subgroups is italicized.

two phases. The unadjusted rates were age-adjusted using, as a standard population, the age distribution of persons comprising both phases.

It was believed that age adjusting might make more meaningful any comparisons between the rates based on random and self-selected samples. For instance, although self-selection has been shown (*1*) to result in decreased percents of older men and women in urban and rural areas and in decreased percents of females in both areas when compared with random selection, it is conceivable that the smaller percents may be true for some specific affections and not for others. The question then is to determine whether age adjustment decreases the difference significantly between rates based on random selection and those based on self-selection and, if so, for what affections and etiologies.

It is evident from table 3 that the unadjusted rates based on a self-selected sample are generally lower than similar rates based on a random sample. Even when the rates are age-adjusted, thus eliminating the effect of age on the unadjusted or crude rate, the self-selected sample rates are lower than those of the random sample rates. Age adjusting does, however, generally decrease the differences between the two sets of rates by decreasing phase 1 rates and increasing those of phase 2.

Rates for females exceeded those for males for cataract and keratitis in both urban and rural areas, irrespective of method of sampling. This was true for both the unadjusted and adjusted rates. Cataract and keratitis had the highest unadjusted and age-adjusted rates respectively in both phases among urban males and females. In rural areas for

Table 4. Unadjusted and age-adjusted blindness prevalence rates per 1,000 persons examined in phase 1 (random sample) and phase 2 (self-selected sample), by etiology group, residence, and sex

Major etiology group [1]	Male			Female			Both sexes		
	Percent	Unadjusted rate	Age-adjusted rate	Percent	Unadjusted rate	Age-adjusted rate	Percent	Unadjusted rate	Age-adjusted rate
Phase 1									
Urban total	*25*	12.0	9.8	*48*	15.7	14.0	*73*	14.2	12.3
Infectious diseases	32.0	3.8	3.2	31.2	4.9	4.3	31.5	4.5	4.0
Diabetes	4.0	.5	.4	4.2	.7	.6	4.1	.6	.5
Senile degeneration	36.0	4.3	3.2	37.5	5.9	4.9	37.0	5.2	4.2
Prenatal influence	4.0	.5	.3	2.1	.3	.4	2.7	.4	.4
Unknown to science	4.0	.5	.4	6.2	1.0	.9	5.5	.8	.7
Not reported or determined	20.0	2.4	2.3	18.8	2.9	2.7	19.2	2.7	2.5
Rural total	*89*	30.9	24.3	*164*	55.5	50.7	*253*	43.4	36.2
Infectious diseases	49.5	15.3	12.3	57.3	31.8	28.8	54.5	23.6	19.8
Injuries, poisonings				1.2	.7	.8	.8	.3	.3
Senile degeneration	30.3	9.4	6.6	33.6	18.6	17.0	32.4	14.1	11.3
Vascular diseases	1.1	.3	.3				.4	.2	.1
Prenatal influence	5.6	1.7	1.7	1.8	1.0	1.0	3.2	1.4	1.4
Unknown to science	9.0	2.8	2.0	6.1	3.4	3.1	7.1	3.1	2.5
Not reported or determined	4.5	1.4	1.4				1.6	.7	.8
Phase 2									
Urban total	*229*	5.6	7.1	*344*	9.5	10.7	*573*	7.5	8.8
Infectious diseases	24.0	1.4	1.6	20.6	2.0	2.1	22.0	1.6	1.9
Injuries, poisonings	4.4	.2	.3	2.6	.2	.3	3.3	.2	.2
Diabetes				2.0	.2	.2	1.2	.1	.1
Senile degeneration	35.4	2.0	2.7	52.0	5.0	5.6	45.4	3.4	4.1
Prenatal influence	8.3	.5	.6	8.1	.8	.8	8.2	.6	.7
Unknown to science	13.1	.7	1.0	9.0	.8	1.0	10.6	.8	.9
Not reported or determined	14.8	.8	.9	5.5	.5	.6	9.2	.7	.9
Rural total	*398*	11.0	12.1	*895*	28.6	21.5	*1,293*	19.1	17.2
Infectious diseases	54.3	6.0	6.3	54.6	15.6	12.2	54.5	10.4	9.4
Injuries, poisonings	1.0	.1	.1	.8	.2	.2	.8	.2	.2
Senile degeneration	27.9	3.1	3.5	31.8	9.1	6.4	30.6	5.9	5.2
Vascular diseases				.1	[2] 0	[2] 0	.1	[2] 0	[2] 0
Prenatal influence	3.0	.3	.4	1.0	.3	.2	1.6	.3	.3
Unknown to science	10.8	1.2	1.4	9.6	2.7	2.0	10.0	1.9	1.7
Not reported or determined	3.0	.3	.4	2.0	.6	.5	2.3	.4	.4

[1] "Standard Classification of Causes of Severe Vision Impairment and Blindness," 1965 revision.
[2] Rate less than 0.05.
NOTE: Number of persons in various population subgroups is italicized.

each sex, the unadjusted and adjusted prevalence rates for keratitis were highest in phases 1 and 2 followed by those for cataract. The rank of these two affection groups was reversed in the urban areas.

It thus seems that, although age adjusting acts in the direction of decreasing differences between the prevalence rates of phases 1 and 2, it does not remove all differences. It will remain to be seen whether the differences that are not removed completely are those that could be attributed to chance alone.

Table 4 shows the percent distribution of unadjusted and age-adjusted blindness prevalence rates per 1,000 persons examined for major etiology groups by urban and rural residence and sex in each phase. This table reflects the etiological antecedents of the affections tabulated in table 3. In urban areas, whether the sample was random or self-selected, senile degeneration had the highest unadjusted and adjusted prevalence rates in each sex, followed by those for infectious diseases, including trachoma. This finding is not surprising because almost all cases of cataract were considered to have senile degeneration as the etiology, just as almost all cases of keratitis were considered to be due to infectious diseases. It should be recalled that in urban areas cataract and keratitis had the highest prevalence rates. Rates for those affections were greater among females than among males in each phase as they were for their respective etiologies.

In rural areas in each phase, infectious diseases had the highest prevalence rate in each sex, followed by that of senile degeneration. This ranking of etiologies is the reverse of that in the urban areas. In rural as in urban areas, rates for females for infectious diseases and senile degeneration exceeded those for males.

Statistical significance of the difference in prevalence rates between the two samples was tested with the *t*-test at the 5 percent level. Table 5 presents differences in unadjusted and in age-adjusted blindness prevalence rates between the random sample and the self-selected sample per 1,000 persons examined by major affection group, urban-rural residence, and sex.

In urban areas the age-adjusted rate (all affections combined) for the random sample is not significantly greater than that of the self-selected sample for each sex, although this finding is not true for the unadjusted rates. However, for each sex the phase 1 rates for keratitis and optic nerve atrophy are significantly greater than the similar rates for phase 2. In urban areas the age-adjusted keratitis rate for phase 2 was 53.1 percent lower for males than the similar rate for phase 1; for females the decrease was 52.3 percent.

In rural areas the overall age-adjusted phase 1 rate, as well as the unadjusted one, was significantly greater than that of phase 2 for each sex. The rates for each sex for keratitis and cataract in

Table 5. Differences between random and self-selected samples in unadjusted and age-adjusted blindness prevalence rates per 1,000 persons examined by urban-rural residence, sex, and affection group

Major affection group [1]	Differences [2] in urban samples in—				Differences [2] in rural samples in—			
	Unadjusted rates		Age-adjusted rates		Unadjusted rates		Age-adjusted rates	
	Male	Female	Male	Female	Male	Female	Male	Female
Glaucoma (excluding congenital)	−0.3	0.1	−0.6	−0.2	**1.7**	0.7	0.8	**1.1**
Myopia	**1.5**	**1.0**	**1.2**	.7	−.2	−.2	−.2	−.2
Keratitis	**2.6**	**3.0**	**1.7**	**2.3**	**9.4**	**16.3**	**6.0**	**16.7**
Cataract	**2.9**	.9	1.3	−.7	**6.6**	**10.2**	**3.3**	**11.3**
Uveitis	−.1	0	−.2	−.1	.2	−.4	.2	−.3
Retrolental fibroplasia	−.4	−.2	−.4	−.2	[3]	[3]	[3]	[3]
Retinal degeneration	−.1	.2	−.1	.3	.8	−.1	.7	−.1
Other retinal affections	.1	.6	−.1	.4	.2	−.1	.1	−.1
Optic nerve atrophy	.5	.6	**.5**	**.8**	**.9**	−.1	1.1	−.1
Multiple affections	[3]	[4] 0	[3]	[4] 0	−.1	[3]	−.1	[3]
Unknown	.4	.1	.2	.1	[4] 0	−.2	[4] 0	−.2
All other affections	−.6	−.1	−.8	−.1	.2	.9	.3	**1.0**
Total	**6.4**	**6.2**	2.7	3.3	**19.9**	**26.9**	**12.2**	**29.2**

[1] "Standard Classification of Causes of Severe Vision Impairment and Blindness," 1965 revision.
[2] Minus sign indicates that the self-selected sample rate exceeds the random sample rate.
[3] Rates in both random sample and self-selected sample are zero.
[4] Difference between the random sample rate and self-selected sample rate is less than 0.05.
NOTE: Differences in boldface type are statistically significant at the 5 percent level.

Table 6. Differences between random and self-selected samples in unadjusted and age-adjusted blindness prevalence rates per 1,000 persons examined, by urban-rural residence, sex, and etiology group

Major etiology group [1]	Differences [2] in urban samples in—				Differences [2] in rural samples in—			
	Unadjusted rates		Age-adjusted rates		Unadjusted rates		Age-adjusted rates	
	Male	Female	Male	Female	Male	Female	Male	Female
Infectious diseases	**2.4**	**2.9**	1.6	**2.2**	**9.3**	**16.2**	**6.0**	**16.6**
Injuries, poisonings	−.2	−.2	−.3	−.3	−.1	−.5	−.1	.6
Diabetes	.5	.5	.4	.4	[3]	[3]	[3]	[3]
Senile degeneration	**2.3**	.9	.5	−.7	**6.3**	**9.5**	**3.1**	**10.6**
Vascular diseases	[3]	[3]	[3]	[3]	.3	[4] 0	.3	[4] 0
Prenatal influence	0	−.5	−.3	−.4	**1.4**	.7	**1.3**	.8
Unknown to science	−.2	.2	−.6	−.1	**1.6**	.7	.6	1.1
Not reported or determined	**1.6**	**2.4**	**1.4**	**2.1**	**1.1**	−.6	**1.0**	−.5
Total	**6.4**	**6.2**	2.7	3.3	**19.9**	**26.9**	**12.2**	**29.2**

[1] "Standard Classification of Causes of Severe Vision Impairment and Blindness," 1965 revision.
[2] Minus sign indicates that the self-selected sample rate exceeds the random sample rate.
[3] The rates in both random sample and self-selected sample are zero.
[4] The difference between the random sample rate and self-selected sample rate is less than 0.05.
NOTE: Differences in boldface type are statistically significant at the 5 percent level.

phase 1 were significantly greater than those in phase 2. The overall adjusted male rate for phase 2 was 50.2 percent lower than the male rate in phase 1; for females the similar decrease was 57.6 percent. Comparable decreases for unadjusted rates were, for males, 64.4 percent, and for females, 48.5 percent. Concerning specific affection groups, the adjusted phase 2 rate for cataract for males was decreased 47.8 percent, for females, 63.8 percent; and for keratitis, it decreased 48.8 percent in males and 58.0 percent in females.

It would appear from the foregoing results that only for keratitis are the age-adjusted, affection-specific rates for each sex in urban and rural areas significantly greater in phase 1 than in phase 2. Other adjusted, affection-specific rates, such as for cataract, myopia, optic nerve atrophy, and so forth, may be significantly greater in phase 1 for one sex or the other and for either urban or rural areas. Finally, for still other affections, there are no significant differences between the phases for either sex in urban or rural areas.

Table 6 shows the differences between random and self-selected samples in unadjusted and in age-adjusted blindness prevalence rates per 1,000 persons examined by major etiology group, urban-rural residence, and sex. In urban areas there are no statistically significant differences for either sex between the overall age-adjusted rates (all etiologies combined) of the random or self-selected samples. This is also true for the overall adjusted rates for major affections in table 5. The age-adjusted rate for etiology "not reported or determined" (the etiology usually given for optic nerve atrophy) was significantly greater in each sex for random sampling than that for self-selected sampling. In this instance, the rate for the self-selected sample was decreased in males 60.9 percent and in females, 77.8 percent.

In rural areas the overall age-adjusted rate (all etiologies combined) shows, as was evident for major affections in table 5, that in each sex random selection results in a significantly higher age-adjusted rate than does self-selection. Statistically significant differences are found in each sex between the random sampling and self-selected sampling rates for the specific etiologies of infectious diseases (the usual etiology for keratitis), senile degeneration (the usual etiology for cataract), and prenatal influence. For infectious diseases the male age-adjusted rate based on self-selection was 48.8 percent lower than the rate based on random sampling, the female rate, 57.6 percent. For senile degeneration the male rate was 47.0 percent lower, the female rate 62.4 percent; for prenatal influence, the decrease in rate was 76.5 percent for males, for females, 80.0 percent.

The differences in etiology-specific, age-adjusted prevalence rates between random sampling and self-selected sampling reflect to a large extent, especially in rural areas, the differences shown in table 5 for affection-specific, age-adjusted prevalence rates.

Discussion

It is evident from the data that the blindness prevalence rates for certain specific affections and etiologies of self-selected samples are statistically significantly lower

than of those randomly selected, even when age-adjusted rates are compared. This difference is generally true whether the sex be male or female, and it also holds true for urban and rural residents for keratitis, for urban residents for optic nerve atrophy, and for rural residents for cataract. It is also true for urban residents for etiologies "not reported or determined" and for rural residents for infectious diseases, senile degeneration, and prenatal influence.

The data indicate that those affections ranking first and second in prevalence rates in a random sample are also those that are first and second in prevalence rates in a self-selected sample, although at a reduced magnitude. The same phenomenon appears in the prevalence rates of specific etiologies.

In urban areas the prevalence rate for cataract is the highest, whether unadjusted or age-adjusted, for each sex, followed by that for keratitis. In rural areas, the situation is reversed with keratitis having the highest rate for each sex, followed by that for cataract. The prevalence rates for specific etiologies of these affections mirror the same facts.

It would thus appear that, for the more prevalent affections, even after adjusting for age differences in populations at risk, the self-selection process among the blind acts in the direction of excluding a significant percent of keratitic blind and, except for urban residents, of cataractic blind. The decrease in rates appear to be more marked among females than among males. This decrease means a smaller proportion of the blind females, compared with the males, self-select themselves for visual examination. Why those with certain affections should stay away from visual examination in greater proportions than those with other affections is not known. Whether such decreases exist because those not coming for examination may represent minimum or maximum visual impairment within the definition of blindness or those that for one reason or another are unable or unwilling to report for examination is not clear. At any rate, it is clear that age does not appear to be the factor solely responsible for the lower self-selection rates.

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SAID, MOHYI-ELDIN (University of Alexandria, Egypt), GOLDSTEIN, HYMAN, KORRA, AHMAD, and EL-KASHLAN, KHALIL: ***Blindness prevalence rates in Egypt. A comparison of random and self-selected samples of urban and rural residents, by affection and etiology. Health Services Reports, Vol. 88, January 1973, pp. 89–96.***

The results of a house-to-house vision screening survey of a 4 percent random sample of households (consisting of approximately 11,000 persons of all ages and socioeconomic levels) in some urban and rural areas in and around Alexandria, Egypt, were compared with the results of a self-selected sample of approximately 145,000 persons in the same geographic area. A total of 326 persons were confirmed as blind by an ophthalmologist in the random sample (blindness prevalence rate of 29.7 per 1,000 examined) and 1,866 were so confirmed in the self-selected sample (blindness prevalence rate of 12.9 per 1,000 examined).

The self-selected sample was characterized by statistically significant decreases in age-adjusted blindness prevalence rates due to keratitis in each sex in both urban and rural areas and to cataract in rural areas when compared with similar rates derived from the randomly selected sample. Similar findings were in evidence for each sex for the specific etiologies underlying keratitis and cataract, namely, infectious diseases and senile degeneration.

Those affections that were first and second in magnitude of rate in each sex in both urban and rural areas in the random sample maintained their respective rank but with reduced magnitude in the self-selected sample. Similar findings for their respective etiologies were in evidence.