Visual Acuity and Field of Vision of Urban and Rural Egyptians

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THE PERCENTAGE of persons with visual defects in a community is an indication of the health awareness of its population. Care of the eye is the responsibility of the person, his family, and the community.

Education, habits, beliefs, and socioeconomic standards are all factors which influence the importance that a given person places on his vision, and hence the degree of care that he will seek to protect it. The community's responsibility is to provide facilities to insure healthful surroundings, adequate health education to inculcate good habits of living, and opportunities to improve socioeconomic conditions. Adequate medical care should be provided where necessary to meet the health needs of the population.

Because vision is so important in life, it is of the utmost concern that distribution of visual acuity and field of vision among persons in the community be studied. Such a study was made possible in Egypt through the cooperation of the National Institutes of Health, Public Health Service, and the University of Alexandria.

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Review of the Literature

A thorough review of the literature failed to reveal any study in which scientific sampling methodology and standardized equipment had been employed to measure the distribution of visual acuity and field of vision in an Egyptian community. Some studies may have been made of school children or of institutionalized populations in Egypt. No information, however, is usually available regarding the nature of the populations from which the subjects of such studies are drawn. Furthermore, the persons studied do not comprise a scientifically selected sample from which generalizations may be made. Therefore, it is impossible and improper to compare the results of such studies with those using scientific methodology.

Objectives and Methodology

This study was undertaken with the following objectives in mind:

1. To determine the distribution of acuity of vision in the population residing in the urban and rural areas selected for the study.
2. To determine the distribution of the field of vision in such urban and rural populations.
3. To determine whether differences, if any,

in acuity of vision and field of vision are associated with sex, age, or urban-rural environment.

Urban sample. In planning the study, we decided to choose two administrative districts in Alexandria to represent the urban sample. The two districts were Mansheya (1960 population 42,494) and Attarine (1960 census population 71,148). In 1965 their combined populations were estimated to be 125,000. The two districts were contiguous and included a cross section of all socioeconomic strata. These areas represented a convenient population size from which to draw a 4 percent sample of households.

This size sample was determined by estimating five persons on the average to a household. We hoped to have an urban sample of approximately 5,000 persons for the study. Households, rather than persons, were used as sampling units because it was impossible to secure listings for persons in the general population for any locality. Household is defined as those persons sharing one dwelling.

Rural sample. A rural sample was chosen from 23 villages of the Beheira Governorate. In 1965 the population of these villages, as determined by survey books of the local health authority, totaled 126,938. These survey books had up-to-date population counts; therefore, we did not need to estimate the rural population as we had done for the urban population.

The 23 villages selected also represented a convenient population size of approximately 125,000 from which to draw a 4 percent random sample of households. The same criteria regarding the size of the sample as in the urban area were applied. Furthermore, the 23 villages were within a perimeter of about 20 miles (35 kilometers) from Alexandria, and most of them were relatively easy to reach.

We planned to examine 10,000 persons—5,000 in urban areas and 5,000 in rural areas. Selection, however, was on a household sampling basis. For both theoretical and practical reasons random sampling, though more difficult to apply than other types of scientific sampling, was most suited to our study. It was fortunate that the Alexandria Department of Social Affairs had available complete listings of households in Alexandria by administrative districts and subdistricts.

A 4 percent random sample of households in each subdistrict was taken and, if the number of persons to be examined in each subdistrict was not reached, an additional sample of households was taken to reach the desired number of persons. This procedure was observed in each subdistrict in the urban areas and in each subvillage unit in rural areas.

It was presumed that the two districts selected from the urban sample did not represent Alexandria, nor did the 23 villages selected represent the rural communities in Egypt.

Equipment

Vision tester. The tester made by the Titmus Optical Co. (*A*) was used to measure visual acuity by means of a tumbling-E slide (figs. 1 and 2). This handy portable instrument weighs approximately 18 pounds (8 kilograms) and is simple to operate. It affords complete privacy, complete occlusion, and standardized lighting and distance, which may not be possible with Snellen type tumbling-E, or Landolt ring test charts. The tester operated on a 110-volt power supply, dry cell batteries, or car batteries. A transformer was needed if the supply was 220 volts.

The conversion table used for distance visual acuity tests follows:

Snellen	
English	*Metric*
20/20	6/6
20/30	6/9
20/40	6/12
20/50	6/15
20/64	6/20
20/100	6/30
20/200	6/60

Perimeter. The Schweigger hand perimeter (*B*) was used to measure the field of vision. It is a simple instrument that consists of an aluminum arc with a radius of 22 cm., which rotates around a fixed fulcrum, to which is attached a 1 cm. radius plane mirror, used for fixation. A square white target, 3 by 3 mm., is attached to a handle 40 cm. in length. The arc is graduated in degrees from 0° to 90° (figs. 3 and 4).

Trial lenses. A box of trial lenses containing a set of concave lenses from −0.50 to −10.00 D (diopters) and a set of convex lenses from +0.50 to +10.00 D was provided each team. With these lenses the acuity of vision could be

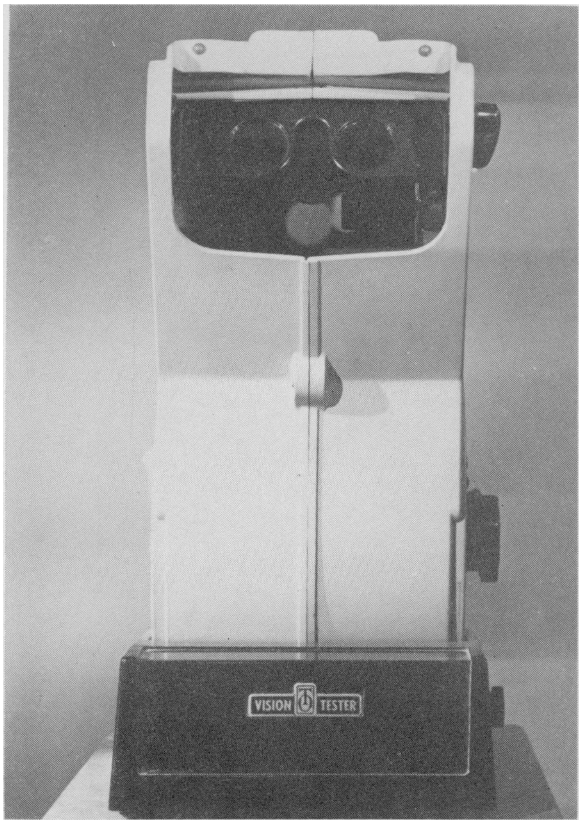

Figure 1. Titmus vision tester, front view

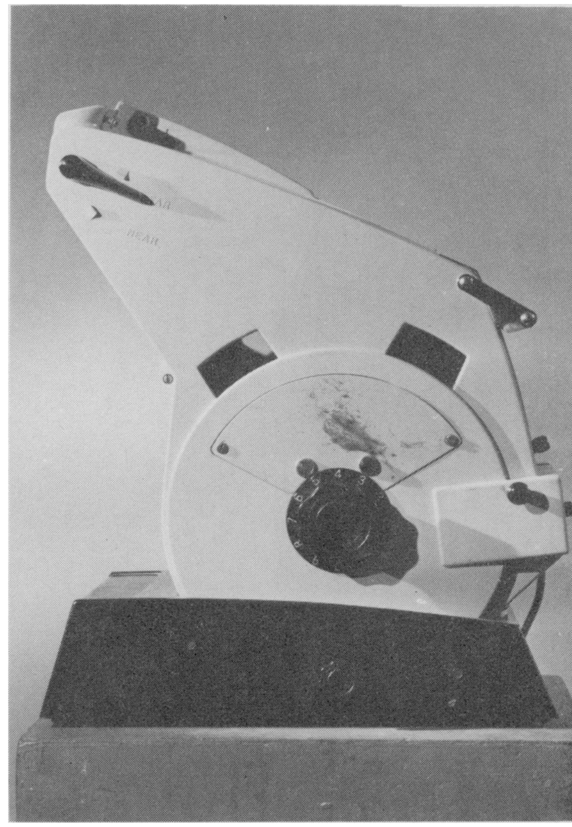

Figure 2. Titmus vision tester, side view

corrected to at least 6/30. No lenses to correct astigmatism were provided.

Ophthalmoscope–retinoscope unit. To examine the fundus oculi, a battery-operated ophthalmoscope (*C*) was used; it had an attachment for attaching a retinoscope to the battery handle. The optical system of the ophthalmoscope with the lenses ranging from +20 to −20 D is similar to that of the May model ophthalmoscope. The retinoscope was used to estimate the power of the correcting lens and to determine the axes of the cylindrical correction, if any.

Each of the six teams doing fieldwork had this equipment. A team consisted of a physician (a junior ophthalmologist if available) to operate the optical screener, perimeter, ophthalmoscope, and retinoscope; a social worker to orient persons in the household beforehand concerning the purpose of the study and the examinations to be carried out and to record the necessary data on the form; and a porter to carry the equipment from house to house. In addition, an ophthalmologist was available for consultation, for confirmation of blindness of persons referred by the vision screeners as blind, and to perform other necessary duties.

Methods of Testing

Visual acuity. The vision tester was placed on a table, connected to the power supply or to a battery by a cable, and the height of the instrument was adjusted so that the person could sit or stand comfortably during the test. The instrument was placed so that glaring or excessive light from a window did not shine in the subject's eyes or directly on the lens.

The tumbling-E is seldom used in visual acuity examinations in Egypt. Therefore, before the examination, big tumbling-E charts or a large wooden E were shown to the persons to be examined, and the test was demonstrated.

Each eye was examined separately, starting with the right eye. The person was examined with his eyeglasses on if he had any. The best

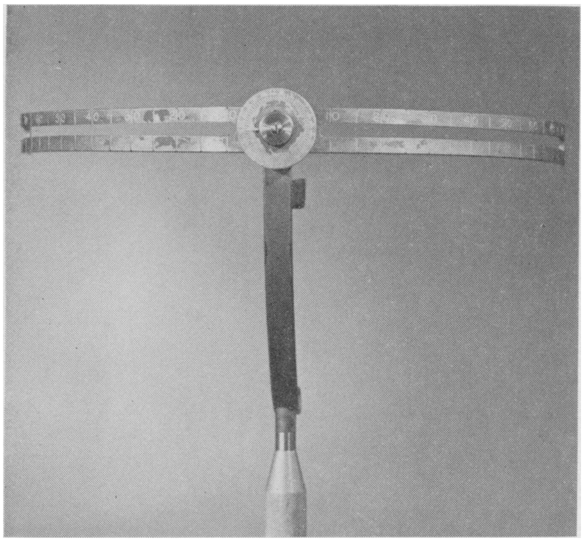

Figure 3. Schweigger hand perimeter, front view

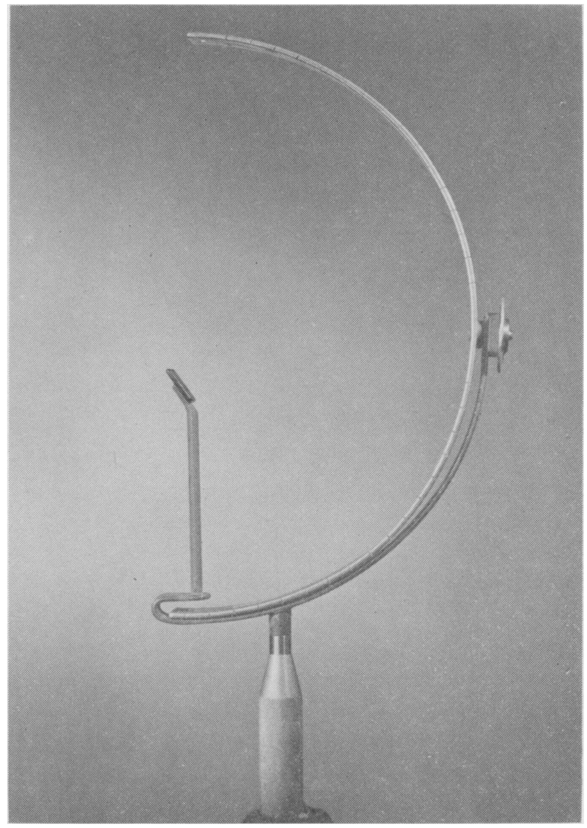

Figure 4. Schweigger hand perimeter, side view

visual acuity of each eye was determined by starting with a visual acuity of 6/60 (20/200) and by successive steps to determine the best visual acuity. If the better eye had a visual acuity of 6/60 or less, correcting lenses were added after retinoscopy to improve the visual acuity to at least 6/30. If the person's visual acuity was 6/60 or less in the better eye with best correction, he was referred to the ophthalmologist as blind for confirmation of the findings and, if confirmed as blind, for possible determination of the cause. It was impossible to use the vision tester with children under 5 years of age, and they were excluded from the test. Other persons who had difficulty in understanding what was expected of them were examined clinically by an ophthalmologist, and visual acuity was measured by use of wall charts.

Field of vision. The field of vision was determined for those persons whose vision was better than 6/60 in the better eye. The procedure of the test was explained to the person beforehand. For each eye a determination was made of the angle subtended by the widest diameter of the field of vision. If each eye subtended an angle no greater than 20° or if one eye subtended such an angle and the other eye had a visual acuity of 6/60 or less, such persons were referred to the ophthalmologist as blind.

In this paper data are presented for field of vision for each eye separately; therefore, no inferences can be drawn concerning the overall binocular field of vision.

Reliability tests. During most of the survey six teams were in the field, and it was obvious that some provision had to be made to determine variability among the testers as it was related to vision screening. Attempts were made before and during the project as personnel changed to provide the necessary training in use of equipment so that standardized methodology would result. It was evident that such attempts could not completely eliminate variability. We decided before starting the study that the degree of agreement should be not less than 80 percent among vision testers testing the same set of persons. If there were indications that screeners were tending to approach this limit, immediate steps were taken to ascertain the reason and to give additional training if necessary.

In order to implement the reliability tests, which were conducted monthly, 10 nonblind persons were selected and examined independently by the vision screeners. The percentage of agreement was computed for each individual screener, and an average of such percentages was obtained. The reliability tests obtained each month resulted in a degree of agreement above the minimum and were regarded as satisfactory.

When tests of significance were applied to the results in this study, significance was tested at the 5 percent level.

Results

Urban and rural samples by age and sex. Table 1 shows the distribution of persons screened visually in urban and rural areas by age and sex. In practically every age group the number of females greatly exceeded the number of males. Females traditionally are more homebound than males, and in the age group 20 to 39, the disparity between the number of males and females examined was even greater. In the older age groups, the difference in numbers examined between the two sexes may be due in part to the known difference in expectation of life, but the main reason is probably that men are less likely to be at home during the daytime in urban areas. The differences in the numbers of males and females in urban areas were not found in the rural areas, because in the rural areas more men were available for examination.

Visual acuity. The percentage distribution of visual acuity in the right and left eyes of all males and females, aged 5 years or older, examined in urban areas is shown in table 2. Up to the age of 45 years, urban males with 6/6 acuity of vision predominated, with percentages ranging from 36.2 to 56.2 in the right eye and from 32.8 to 53.7 in the left eye. After the age of 45 years the percentage dropped rapidly to 7.0 in the right eye and 6.1 in the left eye in the age group 60 years and older. For each eye more than 75 percent of the sample had an acuity of vision of 6/12 or more. Employers in Egypt accept 6/12 as the average level of vision needed for employment in most jobs.

Among the urban females a marked decrease occurred in visual acuity starting with 45 years. In general, the percentage of urban females with an acuity of 6/6 was less than the corresponding percentage of urban males for all age groups. The difference between males and fe-

Table 1. Distribution of persons screened visually in urban and rural areas, by age and sex

Age group (years)	Males		Females		Total	
	Number	Percent	Number	Percent	Number	Percent
Urban	2, 082	100. 0	3, 057	100. 0	5, 139	100. 0
5–9	343	16. 5	376	12. 3	719	14. 0
10–14	422	20. 3	515	16. 8	937	18. 2
15–19	276	13. 3	479	15. 7	755	14. 7
20–24	147	7. 0	268	8. 8	415	8. 1
25–29	112	5. 4	271	8. 9	383	7. 5
30–34	132	6. 3	252	8. 2	384	7. 5
35–39	128	6. 1	239	7. 8	367	7. 1
40–44	116	5. 6	167	5. 5	283	5. 5
45–49	124	6. 0	133	4. 4	257	5. 0
50–54	87	4. 2	127	4. 1	214	4. 2
55–59	80	3. 8	76	2. 5	156	3. 0
60 and older	115	5. 5	154	5. 0	269	5. 2
Rural	2, 879	100. 0	2, 950	100. 0	5, 829	100. 0
5–9	369	12. 7	303	10. 3	667	11. 4
10–14	577	20. 0	500	16. 9	1, 077	18. 5
15–19	322	11. 2	327	11. 1	649	11. 1
20–24	159	5. 5	231	7. 8	390	6. 7
25–29	194	6. 7	297	10. 1	491	8. 4
30–34	216	7. 5	333	11. 3	549	9. 4
35–39	242	8. 4	301	10. 2	543	9. 3
40–44	230	8. 0	203	6. 9	433	7. 4
45–49	166	5. 8	125	4. 2	291	5. 0
50–54	142	4. 9	133	4. 5	275	4. 7
55–59	106	3. 7	73	2. 5	179	3. 1
60 and older	161	5. 6	124	4. 2	285	4. 9

males in the percentage with 6/6 visual acuity in urban areas was statistically significant for each eye.

Table 3 shows the percentage distribution of acuity of vision in the right and left eyes of all males and females, aged 5 years or older, examined in rural areas. There was a statistically significant decrease in the percentage of rural males with acuity of vision of 6/6 compared with males of urban areas (from 43.5 percent in the urban sample to 22.0 in the rural sample for the right eye, and from 39.9 in the urban sample to 18.6 in the rural sample for the left eye). There was a decrease with age of those males with 6/6 visual acuity, reaching 2.5 percent for the right eye, and 3.1 percent for the left eye for those aged 60 years or over.

Only 58.1 percent of the rural males had an acuity of vision of 6/12 or more in the right eye (as compared with 76.7 percent in urban areas) and 56.6 percent in the left eye (as compared with 76.3 percent in urban areas). The difference in percentages with 6/12 visual acuity between persons in urban and rural areas was statistically significant. We believe this diminution of visual acuity is caused by greater exposure to eye infections of rural residents who have fewer facilities for proper treatment and medical care. This decreased visual acuity is probably aggravated by less education in the proper care of the eyes as well as by the relatively lower socioeconomic standard.

Among females in the rural area, there was also a marked decrease in visual acuity starting with age 45 years (table 3). In general, for all age groups, the percentage of those with acuity of 6/6 was less than the corresponding percentage of rural males. This loss of vision may be explained by the fact that females receive relatively less medical care in both urban and rural areas. For each eye, the difference between males and females in rural areas was also statistically significant.

Among females in urban areas, however, 69 percent had an acuity of vision of 6/12 or more in the right eye and 69.5 percent in the left eye compared with 43.6 percent for the right eye and 40.7 percent for the left eye for females in

Table 2. Percentage distribution of acuity of vision of males and females in urban areas

Age group (years)	Acuity of vision, right eye							Acuity of vision, left eye						
	6/6	6/9	6/12	6/15	6/20	6/30	6/60 or less	6/6	6/9	6/12	6/15	6/20	6/30	6/60 or less
Males	43. 5	21. 0	12. 2	6. 1	4. 9	3. 5	8. 8	39. 9	24. 0	12. 4	4. 7	5. 9	4. 2	8. 9
5–9	43. 5	28. 9	11. 6	4. 1	4. 4	1. 4	6. 1	39. 0	28. 6	12. 2	3. 5	6. 7	5. 0	5. 0
10–14	54. 0	23. 5	7. 8	4. 7	3. 8	1. 2	5. 0	49. 5	28. 7	7. 8	4. 3	2. 4	2. 4	4. 9
15–19	56. 2	19. 2	8. 3	5. 1	3. 2	2. 2	5. 8	52. 2	23. 2	10. 5	2. 5	4. 4	2. 5	4. 7
20–24	55. 8	20. 4	12. 9	2. 7	2. 0	1. 4	4. 8	53. 7	21. 8	11. 6	2. 7	2. 0	0. 0	8. 2
25–29	49. 1	12. 1	8. 0	8. 9	4. 5	4. 5	8. 9	47. 3	13. 4	13. 4	9. 8	7. 1	1. 8	7. 1
30–34	51. 5	18. 2	9. 1	4. 6	3. 0	3. 0	10. 6	44. 7	24. 2	12. 9	1. 5	6. 8	2. 3	7. 6
35–39	44. 5	15. 6	16. 4	5. 5	4. 7	4. 7	8. 6	41. 4	21. 9	14. 0	4. 7	5. 5	3. 1	9. 4
40–44	36. 2	15. 5	20. 7	6. 9	6. 0	2. 6	12. 1	32. 8	19. 8	12. 1	9. 5	6. 1	9. 5	10. 3
45–49	21. 8	24. 2	16. 9	9. 7	8. 1	5. 6	13. 7	18. 6	24. 2	20. 2	5. 6	12. 0	6. 4	12. 9
50–54	26. 4	19. 5	23. 0	10. 3	4. 6	8. 1	8. 1	21. 8	28. 7	14. 9	8. 1	9. 2	3. 4	13. 8
55–59	15. 0	16. 3	18. 8	17. 5	10. 0	3. 7	18. 7	15. 0	22. 5	18. 7	11. 2	10. 0	3. 8	18. 8
60 and older	7. 0	13. 9	14. 8	8. 7	13. 0	16. 5	26. 1	6. 1	11. 3	18. 3	3. 5	11. 3	16. 5	33. 0
Females	32. 7	23. 5	12. 8	6. 9	8. 2	4. 7	11. 2	29. 8	26. 8	12. 9	6. 4	6. 5	5. 9	11. 7
5–9	38. 0	29. 0	13. 5	3. 7	6. 3	4. 2	5. 3	34. 8	30. 6	12. 8	6. 1	4. 5	5. 9	5. 3
10–14	46. 8	27. 8	10. 1	6. 2	2. 9	1. 4	4. 8	45. 4	29. 5	8. 4	4. 5	4. 1	2. 9	5. 2
15–19	41. 3	24. 8	13. 2	4. 2	3. 8	3. 1	9. 6	35. 7	31. 9	12. 9	4. 0	5. 0	3. 6	6. 9
20–24	41. 4	22. 4	10. 5	6. 3	6. 3	3. 8	9. 3	38. 4	29. 5	10. 5	4. 8	7. 1	4. 1	5. 6
25–29	33. 2	23. 6	11. 4	8. 5	8. 5	4. 1	10. 7	30. 3	23. 2	17. 0	8. 8	5. 9	5. 9	8. 9
30–34	27. 9	22. 2	11. 9	9. 5	11. 5	3. 2	13. 9	26. 2	28. 6	14. 7	7. 1	4. 8	5. 1	13. 5
35–39	24. 7	24. 3	13. 8	8. 9	12. 1	5. 4	11. 3	21. 3	29. 7	4. 2	7. 5	8. 4	4. 6	14. 2
40–44	23. 3	17. 4	19. 1	9. 0	9. 6	7. 2	14. 4	19. 7	23. 9	15. 6	6. 6	9. 6	10. 2	14. 4
45–49	15. 8	27. 8	13. 5	6. 0	12. 0	8. 3	16. 5	12. 0	27. 1	13. 5	12. 0	7. 5	10. 5	17. 3
50–54	9. 5	16. 5	18. 1	13. 4	13. 4	6. 3	22. 8	7. 1	5. 0	16. 5	8. 6	12. 6	13. 4	26. 8
55–59	11. 8	15. 8	15. 8	7. 9	26. 3	5. 3	17. 1	15. 8	13. 2	11. 8	11. 8	10. 5	9. 2	27. 6
60 and older	30. 7	6. 5	13. 6	9. 7	16. 9	18. 2	31. 8	2. 0	. 5	13. 6	7. 1	13. 0	13. 0	44. 8

Table 3. Percentage distribution of acuity of vision of males and females in rural areas

Age group (years)	Acuity of vision, right eye							Acuity of vision, left eye						
	6/6	6/9	6/12	6/15	6/20	6/30	6/60 or less	6/6	6/9	6/12	6/15	6/20	6/30	6/60 or less
Males	22.0	19.3	16.8	11.4	10.9	8.2	11.4	18.6	21.3	16.7	9.3	11.7	8.6	13.8
5–9	15.7	21.4	19.5	10.7	14.0	13.2	5.5	16.5	21.7	16.8	9.0	14.3	15.4	6.3
10–14	27.2	21.5	17.2	11.6	10.1	6.2	6.2	20.5	25.0	16.8	10.0	10.4	9.0	8.3
15–19	52.6	18.9	19.3	10.9	6.5	6.5	5.3	29.5	25.8	14.9	8.4	8.1	4.6	8.7
20–24	28.3	20.7	11.9	14.5	10.7	3.8	10.1	27.7	18.9	16.3	5.0	14.5	8.2	9.4
25–29	33.7	17.5	18.6	15.5	11.9	4.1	8.7	20.1	21.1	21.1	9.3	9.8	7.2	11.3
30–34	24.5	23.2	18.5	10.2	5.6	6.9	11.1	18.1	19.0	19.4	6.0	11.6	8.8	17.1
35–39	26.4	19.8	16.1	8.7	9.9	7.4	11.6	22.3	22.3	19.4	9.1	9.9	5.4	11.6
40–44	20.9	20.0	13.5	11.3	13.0	9.1	12.2	16.5	18.7	15.2	15.6	12.2	7.4	14.4
45–49	19.3	19.9	15.7	11.4	9.6	7.8	16.3	15.1	24.1	16.9	7.8	15.7	5.4	15.0
50–54	10.5	18.7	19.0	14.1	14.1	11.3	18.3	7.7	13.4	18.3	9.9	14.1	12.0	24.6
55–59	6.6	17.9	14.1	12.3	17.9	12.3	18.9	7.5	17.0	12.3	11.3	13.2	12.3	26.4
60 and older	2.5	6.8	12.4	8.1	14.3	13.0	42.9	3.1	13.0	10.6	8.7	11.2	6.2	47.2
Females	11.2	16.4	16.0	13.0	14.8	12.4	15.6	9.2	15.4	16.1	11.6	16.8	13.5	17.4
5–9	9.9	21.8	13.2	10.2	14.9	19.1	6.9	10.2	19.1	16.8	9.2	17.5	19.5	7.6
10–14	13.8	21.0	17.6	13.4	15.4	11.6	7.2	11.8	20.4	19.8	10.8	17.2	10.8	9.2
15–19	17.1	19.9	17.4	14.1	11.3	8.9	11.3	14.7	18.7	16.8	12.8	15.9	7.3	13.8
20–24	14.7	17.3	17.8	19.9	11.3	9.5	9.5	10.8	18.6	13.0	19.5	15.2	12.5	10.4
25–29	14.1	17.9	18.9	15.5	12.1	11.4	10.1	10.4	23.2	19.5	12.1	14.1	8.8	11.8
30–34	8.7	20.7	19.2	13.5	15.0	10.5	12.3	8.1	12.6	20.4	11.4	18.6	14.1	14.7
35–39	11.3	17.6	16.9	15.6	16.3	9.6	12.6	10.0	12.3	17.3	12.9	16.9	13.0	17.6
40–44	11.8	8.4	10.3	14.8	15.8	18.7	20.2	6.4	10.3	13.8	11.3	20.2	19.7	18.2
45–49	3.2	6.4	17.6	16.8	23.2	13.6	19.2	1.6	6.4	14.4	12.0	20.0	18.4	27.2
50–54	4.5	3.8	9.8	10.5	23.3	13.5	34.6	4.5	6.8	6.0	10.5	17.3	17.3	37.6
55–59	1.4	2.7	6.9	5.5	15.1	16.4	52.0	1.4	2.7	6.8	4.1	19.2	15.1	50.7
60 and older	------	1.6	1.6	4.0	10.5	13.7	68.6	------	.8	3.2	4.0	8.9	17.7	65.3

rural areas. Both differences for right and left eyes between urban and rural females were statistically significant.

Field of vision. Tables 4 and 5 show field of vision data by age and sex for the right and left eyes of urban and rural dwellers. Only persons who were not binocularly blind received field of vision examinations. Included in the tables are data on examinations of eyes of nonblind persons as well as the better eye of monocularly blind persons. The total number of eyes examined, therefore, cannot be compared with the total number of people in table 1.

Most urban males under age 45 had a 90° field of vision, except for right eye results of the 5- to 9-year age group (table 4). In the urban areas the age group 45 years and older showed some restriction in visual field and most of them had an 80° field of vision. At about this age, the percentage of the group with field of vision between 20° and 70° started to increase and rose sharply in the oldest age group, 60 years and older. Among all males, 92.4 percent had a field of vision of 70° or more in the right eye, and 91.5 percent had a field of vision of 70° or more in the left eye. The difference between the right and left eyes was not statistically significant.

Among urban females, the highest percentage had a field of vision of 90° for almost all groups through age 34 years (table 4). In general the trend is more or less like that in the males, with a slightly lower percentage of those having a field of vision of 90°. The difference, however, between the percentages of males and females with a field of vision of 70° or more in either eye was statistically significant. The percentage of those with field of vision between 20° and 70° increased at age 40 and rose sharply in the oldest age group as was the case with urban males. In the right eye, 90.2 percent had a field of vision of 70° or more, and in the left eye, 89.4 percent. The difference between the right and left eyes was not statistically significant.

The percentage distribution of field of vision for the right and left eyes of males and females in rural areas is shown in table 5. In no age group for either sex and either eye did those with a 90° field of vision have the highest percentage. In fact, the percentages of those males with a 90° field of vision for each eye were less in the rural than the urban areas for the corresponding age groups indicating, in general, greater field of vision restriction in the rural group. The difference between the percentage of urban and rural males with fields of vision of 70° or more is statistically significant. There was a marked increase in the oldest age group in percentage of rural males with field of vision between 20° and 70°. Of the males examined in the rural areas, 87.1 percent had a field of vision of 70° or more for the right eye and 85.9 percent for the left eye. The difference between the right and left eyes was not statistically significant.

As with rural males, the percentage of rural females with a field of vision of 90° was no longer the highest in either eye (table 5). The field of vision restriction was greater in the rural female than in the rural male when measured by the percentage having a field of vision of 70° or more. There was a statistically significant difference between the field of vision of males and females in either eye in rural areas. In all age groups of rural females, percentages decrease markedly for those having a field of vision of 90° for either eye compared with females in urban areas. The difference between the percentage of urban and rural females with a vision of 70° or more was statistically significant. In the right eye, 81.8 percent of the rural females had a field of 70° or more; in the left eye 81.1 percent had a field of vision of 70° or more. This difference between the right and left eye was not statistically significant.

There are fewer medical facilities in the rural areas; therefore, a larger percentage of persons with incipient visual disorders, including those affecting field of vision, go without treatment.

Discussion

No data were available on acuity of vision on a communitywide basis in developing countries including Egypt. Hence, information obtained in this study—in which all groups of the population were represented and where standard techniques and equipment were used—was of special significance.

The study showed that for both right and

Table 4. Percentage distribution of field of vision of males and females in urban areas

Age group (years)	Field of vision, right eye: 90°	80°–	70°–	Less than 70° but more than 20°	Number of persons	Field of vision, left eye: 90°	80°–	70°–	Less than 70° but more than 20°	Number of persons
Males	41.0	36.0	15.4	7.6	1,899	41.8	32.8	16.9	8.5	1,896
5–9	32.0	43.8	19.6	4.6	322	34.7	33.7	25.2	6.4	326
10–14	42.9	36.6	13.0	7.5	401	39.9	37.9	12.0	10.2	401
15–19	51.5	32.7	10.8	5.0	250	50.9	29.3	14.1	5.7	263
20–24	45.7	37.2	15.0	2.1	140	53.3	28.2	13.3	5.2	135
25–29	53.9	22.6	18.6	4.9	102	62.5	21.2	11.5	4.8	104
30–34	53.4	29.6	8.5	8.5	118	50.0	30.3	11.5	8.2	122
35–39	42.7	33.3	17.1	6.8	117	46.6	31.0	15.5	6.9	116
40–44	40.2	37.3	12.7	9.8	102	38.5	36.5	19.2	5.8	104
45–49	33.6	40.2	13.1	13.1	107	34.2	38.0	17.6	10.2	108
50–54	33.7	35.0	20.0	11.3	80	29.3	34.7	25.3	10.7	75
55–59	27.7	36.9	18.5	16.9	65	30.8	33.8	21.5	13.9	65
60 and older	18.8	30.6	29.4	21.2	85	16.9	29.9	26.0	27.2	77
Females	38.0	35.0	17.2	9.8	2,713	36.4	34.9	18.1	10.6	2,699
5–9	37.9	34.8	15.5	11.8	356	35.1	37.1	16.8	11.0	356
10–14	41.2	34.7	16.1	8.0	490	39.4	33.4	17.6	9.6	488
15–19	44.3	37.4	10.4	7.9	433	41.5	34.5	15.7	8.3	446
20–24	46.1	32.9	14.0	7.0	243	46.3	30.8	18.6	4.3	253
25–29	40.5	36.0	13.6	9.9	242	37.6	39.7	15.0	7.7	247
30–34	43.3	36.4	13.8	6.5	217	43.1	36.2	12.4	8.3	218
35–39	36.3	38.7	17.9	7.1	212	34.6	41.5	15.1	8.8	205
40–44	28.0	33.5	23.1	15.4	143	24.5	30.8	25.9	18.8	143
45–49	22.5	35.1	31.6	10.8	111	27.2	31.9	28.2	12.7	110
50–54	23.5	39.8	25.5	11.2	98	19.3	38.7	28.0	14.0	93
55–59	25.4	19.1	36.4	19.1	63	23.6	36.4	16.4	23.6	55
60 and older	15.2	24.8	35.2	24.8	105	11.8	20.0	30.6	37.6	85

Table 5. Percentage distribution of field of vision of males and females in rural areas

Age group (years)	Field of vision, right eye 90°	80°–	70°–	Less than 70° but more than 20°	Number of persons	Field of vision, left eye 90°	80°–	70°–	Less than 70° but more than 20°	Number of persons
Males	17. 9	37. 6	31. 6	12. 8	2, 551	19. 4	39. 6	26. 9	14. 1	2, 481
5–9	13. 4	40. 4	23. 0	23. 2	344	11. 7	37. 0	29. 3	22. 0	341
10–14	16. 8	38. 1	32. 4	12. 7	541	27. 4	41. 2	16. 5	14. 9	529
15–19	23. 9	40. 0	29. 8	6. 2	305	22. 4	46. 3	23. 8	7. 5	294
20–24	16. 1	43. 4	32. 8	7. 7	143	18. 8	41. 7	33. 3	6. 2	144
25–29	22. 6	37. 8	31. 1	8. 5	177	19. 2	39. 0	29. 6	12. 2	172
30–34	18. 2	28. 7	43. 2	9. 9	192	18. 4	35. 2	33. 5	12. 9	179
35–39	19. 2	38. 3	31. 8	10. 7	214	16. 8	41. 6	26. 6	15. 0	214
40–44	22. 3	39. 6	28. 2	9. 9	202	18. 8	39. 6	30. 5	11. 1	197
45–49	22. 3	34. 5	30. 2	12. 9	139	22. 0	36. 2	31. 2	10. 6	141
50–54	14. 6	34. 5	41. 4	9. 5	116	14. 0	34. 6	37. 4	14. 0	107
55–59	12. 8	36. 0	37. 2	14. 0	86	14. 1	37. 2	35. 9	12. 8	78
60 and older	4. 4	30. 4	32. 6	32. 6	92	8. 2	32. 9	27. 1	31. 8	85
Females	12. 5	36. 9	32. 4	18. 2	2, 489	11. 8	34. 5	34. 8	18. 9	2, 434
5–9	12. 4	37. 6	27. 7	22. 3	282	11. 8	34. 3	33. 9	20. 0	280
10–14	13. 2	36. 2	32. 3	18. 3	464	14. 8	38. 1	33. 9	13. 2	454
15–19	16. 2	36. 9	34. 8	12. 1	290	14. 2	36. 9	35. 8	13. 1	282
20–24	13. 4	35. 4	31. 1	20. 1	209	12. 1	36. 7	30. 4	20. 8	207
25–29	11. 6	37. 8	37. 5	13. 1	267	13. 7	31. 7	35. 1	19. 5	262
30–34	13. 7	33. 2	30. 8	22. 3	292	10. 9	32. 8	35. 9	20. 4	284
35–39	14. 1	38. 8	36. 5	10. 6	263	11. 7	36. 7	35. 5	16. 1	248
40–44	6. 8	41. 4	25. 3	26. 5	162	4. 2	30. 7	36. 1	29. 0	166
45–49	6. 9	42. 6	35. 6	14. 9	101	5. 6	36. 2	37. 4	19. 8	91
50–54	9. 2	28. 7	32. 2	29. 9	87	8. 4	25. 3	33. 8	32. 5	83
55–59	5. 7	51. 4	34. 3	8. 6	35	16. 7	27. 8	33. 3	22. 2	36
60 and older	7. 7	28. 2	25. 6	38. 5	39	4. 6	18. 6	41. 9	34. 9	43

left eyes, males of urban areas had significantly better visual acuity than males of rural areas. The main cause for such difference is due to the greater exposure to eye infections in the rural areas and to the scarcity of services—preventive or curative—available in rural areas. This difference could also be explained partly by the fact that people in rural areas are less educated than those in urban areas and, as a result, often fail to take proper care of their eyes. In general the lower socioeconomic and educational levels of people of rural areas, together with difficult transportation from village to city, contribute to delays in seeking medical advice and care.

Results also indicated that females in urban areas had significantly better visual acuity than females in rural areas. The reasons applying to males also applied to females.

Males had significantly better visual acuity than females in both urban and rural areas. Since men are the breadwinners of the family in Egypt, they are more likely to seek medical advice. Because their jobs may require a certain degree of visual acuity, they are more likely to have their vision corrected by glasses.

Field of vision data showed a marked decrease in the percentage of females in rural areas having a field of vision of 90°. The drop was from 38.0 percent to 12.5 percent in the right eye, and from 36.4 percent to 11.8 percent in the left eye. A similar, but somewhat smaller, decrease was also observed in males in rural areas—from 41.0 percent to 17.9 percent in the right eye, and from 41.8 percent to 19.4 percent in the left eye.

The fewer medical facilities available and inadequate care of eyes are believed to account for the poorer field of vision in both males and females in the rural areas. As a result, visual disorders of people in rural areas generally are not detected or treated early.

Summary

A survey of the visual acuity and field of vision of the population was conducted in selected urban and rural areas in Egypt. The objectives were to determine the distributions of

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measurements of these two factors and to determine whether differences, if any, were associated with sex, age, or an urban-rural environment.

Two contiguous urban districts in Alexandria with an estimated population of about 125,000 and 23 villages located within a radius of some 20 miles of Alexandria that had a combined population of about 125,000 were selected as the urban and rural frames from which to sample.

Complete household listings were available and, estimating that there were five persons in the average household, 4 percent random samples of households were drawn to yield about 5,000 persons for examination in the urban areas and a similar number in the rural areas. Because of difficulty in testing the visual acuity in the young, all children under 5 years of age were excluded from study. Standardized portable equipment was used to measure visual acuity and field of vision in the home.

The results of the study showed that visual acuity and field of vision decreased markedly in males and females in urban and rural areas starting at about 45 years of age. For both males and females the visual acuity and field of vision of persons in urban areas were significantly better than those of persons in rural areas. Both of these visual measurements in males were significantly better than in females.

EQUIPMENT REFERENCES

(*A*) Titmus vision tester. Titmus Optical Co., Inc., Petersburg, Va.

(*B*) The Schweigger hand perimeter. Matelene Co., New York, N.Y.

(*C*) Ophthalmoscope-retinoscope unit. National Electric Instrument Division, Engelhard Hanovia, Inc., Elmhurst, N.Y.

Tearsheet Requests

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Rubella Vaccine Licensed

The first license in the United States to produce a live attenuated German measles (rubella) virus vaccine has been approved by Secretary of Health, Education, and Welfare Robert H. Finch. The license was given to Merck Sharp & Dohme, West Point, Pa.

Scientists of the National Institutes of Health developed the HPV–77 rubella virus used in the vaccine. It was grown in a duck embryo cell culture system evolved by Merck virologists.

The vaccine has been administered to more than 18,000 children and adults in community testing in this country and abroad. Additional vaccines are expected to be licensed as testing and evaluation programs are completed.

"This initial licensing," Secretary Finch said, "brings to fruition a 7-year Government and industry effort to develop and make available a vaccine against German measles before 1970."

Reflecting recent recommendations of the Public Health Service Advisory Committee on Immunization Practices, primary emphasis will be placed on immunizing school-age children, who account for approximately 75 percent of rubella cases. These children, in turn, expose women of childbearing age to the virus. The vaccine is not recommended for routine use in women of childbearing age because its safety has not been established for use in pregnant women.

Because major outbreaks of the disease tend to occur in 7- to 10-year cycles, medical scientists believe a significant upswing in German measles cases will occur late in 1970 or early in 1971.