DISABILITY FROM RESPIRATORY ILLNESS

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ACUTE respiratory illness is an important cause of disability. One study has shown that respiratory diseases accounted for 50–60 per cent of the disabling illnesses and approximately 40 per cent of the disabling days from acute illness among employed males and females (1). The term "disabling illness" is generally defined as an illness which caused an interruption in the usual daily activities. Obviously such a definition is not completely objective because personal attitudes and feelings about how illness should be cared for may determine whether a specific illness is considered disabling. It is of interest, therefore, to learn whether disabling illness is characteristic of certain people or whether such illness is distributed at random throughout the population.

This report presents the results of an inquiry into this particular problem. It is based upon the illness experience in families in two communities in Westchester County, New York, over the three-year period, 1946–1949.

DATA AND METHOD OF STUDY

The data and method of the study of acute respiratory illness in the two communities in Westchester County, New York, have been fully described in previous reports (2, 3, 4, 5). Briefly, the epidemiological field investigation of respiratory illness was based upon the periodic survey of families for the purpose of collection of illness records. All families in which there were one or more children attending grade school or high school in each of the two communities were included in the study. These families were visited every twenty-eight days during the three school years September–June, 1946–1949. On each visit to the family, inquiry was made about acute respiratory illnesses which had occurred among their members during the past four weeks. Inquiry was also made as to whether

[1] From the Milbank Memorial Fund. This is the ninth in a series of papers dealing with a study of respiratory illness.

the reported illness caused any disability or interfered with the person's usual activities.

The sample population used in this analysis consists of persons in 497 families observed for at least thirty weeks in each of the three successive school years of the study. The families may be described as simple units, that is, they included only those composed of a husband and wife and their children. From these families four population groups were drawn for special study: (1) children aged 5–9; (2) children aged 13–17; (3) husbands; and (4) wives.

Acute respiratory illness in this study includes head colds or coryza, colds with sore throat, tonsillitis, and septic sore throat, colds with chest complications such as tracheitis, bronchitis, or cough and influenza.

Table 1. Distribution of 393 children aged 5–9 and 279 children aged 13–17 according to their illness classification in specific school years, September to June, 1946–1949.

Illness Classification	First Year (1946–1947)	Second Year (1947–1948)	Third Year (1948–1949)
	Per Cent		
	age 5–9		
Total	100.0	100.0	100.0
Persons Who had:			
No Illness	13.0	16.8	22.4
Only Nondisabling Illness	11.9	12.7	10.9
Both Disabling and Nondisabling Illness	35.9	26.2	27.2
Only Disabling Illness	39.2	44.3	39.5
	age 13–17		
Total	100.0	100.0	100.0
Persons Who Had:			
No Illness	30.5	35.5	34.8
Only Nondisabling Illness	19.3	19.0	19.7
Both Disabling and Nondisabling Illness	26.2	18.6	17.6
Only Disabling Illness	24.0	26.9	27.9

Disabling Illness Experience

The population studied consisted of 497 husbands and their wives, 393 children aged 5–9, and 279 children aged 13–17. The children are classed according to age during the first year of observation.

Table 1 shows the distribution of the children aged 5–9 and those 13–17 in each of the school years according to their illness classification in the specific year. The proportion of children aged 5–9 who had no illness increased from 13 per cent in the first year to 22 per cent in the third year. The proportion for whom only nondisabling illness was reported remained remarkably constant in all three years. Also, the proportion of the total children for whom only disabling illness was reported remained fairly constant in each year. The distribution

Table 2. Distribution of 497 wives and 497 husbands according to their illness classification in specific school years, September to June, 1946–1949.

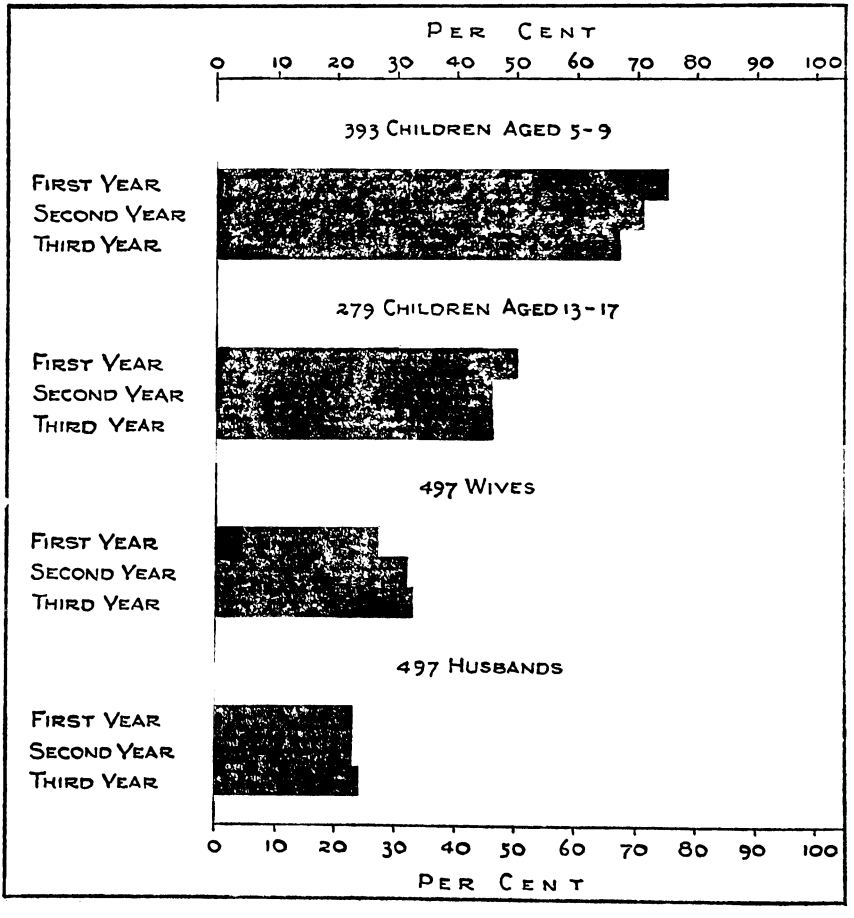
Illness Classification	First Year (1946–1947)	Second Year (1947–1948)	Third Year (1948–1949)
	Per Cent		
	WIVES		
Total	100.0	100.0	100.0
Persons Who Had:			
No Illness	28.4	29.6	31.4
Only Nondisabling Illness	44.9	38.6	36.0
Both Disabling and Nondisabling Illness	15.3	15.5	17.5
Only Disabling Illness	11.4	16.3	15.1
	HUSBANDS		
Total	100.0	100.0	100.0
Persons Who Had:			
No Illness	46.1	52.5	52.1
Only Nondisabling Illness	31.0	24.5	24.1
Both Disabling and Nondisabling Illness	8.4	10.7	10.3
Only Disabling Illness	14.5	12.3	13.5

of children aged 13–17 according to illness class was also similar from year to year.

Table 2 shows the distribution of husbands and wives according to their illness classification in specific years. Again there is relatively little change over the three-year period in the proportions in the various illness classes. For example, from 28 to 31 per cent of the wives reported no respiratory illness and from 46 to 52 per cent of the husbands were in that class.

In all four population groups studied, that is, children aged 5–9, those aged 13–17, husbands, and their wives, there was

Fig. 1. Per cent of persons at certain ages who suffered one or more disabling illnesses in specific years.



little change over the three-year period in the proportion who had one or more disabling illnesses. This fact is illustrated by Figure 1. These data lead to the question: Is disabling illness from respiratory diseases more characteristic of some people than of others, or is such illness distributed at random throughout the population? This question can be studied if a population is observed over a sufficient period of time, that is, over several successive years.

For purposes of inquiry into the question raised, two groups were drawn from the population presented in this report. One was composed of children in the age groups 5–9 and 13–17; these numbered 367. The other group was composed of 353 husbands and wives. All of the persons in each of the two groups reported one or more respiratory illnesses in each of the three years. This procedure affords a homogeneous population in that all were at risk in each year of suffering some disability from respiratory disease.

Table 3 shows for the two population groups the per cent of persons in each year who suffered some disabling illness. In each population group the proportions are quite similar year by year. From 81 to 86 per cent of the children had some disabling illness and from 42 to 50 per cent of the husbands and wives were in that classification.

Table 4 shows the observed and the expected number of persons who reported disabling illness in all three years. The expected number of persons with some disability in all three

Table 3. Per cent of persons who had one or more attacks of disabling illness at some time during the specified year, September to June, 1946–1949.[1]

Classification	Number of Persons	First Year (1946–1947)	Second Year (1947–1948)	Third Year (1948–1949)
		Per Cent		
Children	367	85.56	83.38	80.65
Husbands and Wives	353	41.93	45.89	50.14

[1] Only persons who were ill in each of three years and were therefore at risk of disability were included.

Illness Class	Children		Husbands and Wives	
	Observed Number	Expected Number	Observed Number	Expected Number
Disability at Some Time in all 3 Years	235	211.17	57	34.06
No Disability in Any of the 3 Years	8	1.69	83	55.31
Disability Some Time in Only 1 or 2 Years	124	154.14	213	263.62
Chi-Square	32.18		39.01	
P	<.001		<.001	

Table 4. Observed and expected number of persons who were disabled at some time in all three years and who were not disabled in all three years, September to June, 1946–1949.

years results from the cross-products of the proportions shown in Table 3. For example, the cross-product of the proportions noted for the children, .5754, indicates the per cent which would be expected to be disabled in all three years if disability from respiratory illness occured at random in this particular child population. Application of this per cent to the 367 children gives the expected number, 211.17. The observed number was 235. The expected number of persons with no disability in any of the three years was obtained by application of the cross-products of the per cent not disabled in each year.

The chi-square test was then applied to test the hypothesis that the difference between the observed and expected frequencies may result from the operation of chance alone.

The chi-square values shown in the lower part of Table 4 are statistically significant and they indicate that some factor other than a normal or expected variation is responsible for the differences between the observed and expected number of persons in the various illness classes. Evidently disability from respiratory disease is a characteristic of certain persons. The fact that this was true of both children and adults is of special interest.

Disabling illness is not only a characteristic of certain persons but may also be characteristic of certain families. This

fact may be illustrated by examination of the families of the 353 husbands and wives who suffered one or more respiratory illnesses in each of the three successive years. The fifty-seven husbands and wives who suffered some disability in all three years were in fifty-three different families. The remaining 296 were in 203 families.

Table 5. Distribution of children according to age in two groups of families.

Age Group	134 Children in 53 Families	450 Children in 203 Families
0–4	22.4	22.4
5–9	35.1	35.1
10–14	26.8	28.0
15–18	15.7	14.5

Families in each of the two groups were classed according to whether disabling illness seemed to be a family characteristic, that is, whether 50 per cent or more of the other members of the family suffered some disabling illness in each of the three years of observation. Disabling illness was found to be characteristic of thirty-eight, or 72 per cent, of the fifty-three families where one or both spouses had some disabling illness in each year. On the other hand, in only ninety-seven, or 48 per cent, of the 203 families was disabling illness found to be typical of the family members.

The difference between the two groups of families with respect to disabling illness was not due to differences in the age of the children. This is illustrated by Table 5 which shows that the age distribution of the children in the two groups was strikingly similar.

It seems reasonable to conclude that disability from respiratory illness is characteristic of certain persons, among both children and adults, and is also typical of certain families.

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References

1. Jackson, Elizabeth H.: Duration of Disabling Acute Illness Among Employed Males and Females. The Milbank Memorial Fund *Quarterly,* July, 1951, xxix, No. 3, pp. 294–330.

2. Downes, Jean: Change With Age in Susceptibility to Minor Respiratory Illness. The Milbank Memorial Fund *Quarterly,* July, 1952, xxx, No. 3, pp. 211–223.

3. Downes, Jean: Control of Acute Respiratory Illness by Ultra-Violet Lights. *American Journal of Public Health,* December, 1950, 40, No. 12, pp. 1512–1520.

4. Downes, Jean: Control of Acute Respiratory Illness by Ultra-Violet Lights. Study No. 2. The Milbank Memorial Fund *Quarterly,* April, 1951, xxix, No. 2, pp. 186–217.

5. Tucher. Doris; Coulter. Jane E.; and Downes, Jean: Incidence of Acute Respiratory Illness Among Males and Females at Specific Ages. The Milbank Memorial Fund *Quarterly,* January, 1952, xxx, No. 1, pp. 42–60.

SOME DEMOGRAPHIC ASPECTS OF A RURAL AREA IN IRAN

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DURING the year 1950, the Department of Rural Health Development[1] of the Iranian Ministry of Health conducted a survey in 173 villages of an agricultural region immediately southwest of the city of Tehran. These villages were intended to be a demonstration area for the training of public health personnel. Reliable data concerning the inhabitants of the region were not available in the official government archives; therefore, a survey of certain health and demographic aspects was indicated. This was to be the first step in the development of a broad training program.

With the help of a physician assigned to the Department by the Ministry of Health, a staff of enumerators was recruited from a group of recently graduated Persian midwives. After six weeks of seminars and lectures on the broad phases of public health and preventive medicine, eight of the midwife-trainees were selected for appointment to the staff. During the following four months these girls were given additional training both in the lecture room and in the field. Emphasis was placed on survey techniques and the reasons for collecting each type of information. A preliminary survey form was prepared and tested by field trials. After an analysis of these data, the form was modified and the general survey was started.

The information which was sought fell into three distinct categories: (a) data on individuals in each household, i.e., their occupation, age, sex, and the presence or absence of certain diseases and habits; (b) data on the environment in which members of the household lived; and (c) data on pregnancies which occurred among the women of each household during the ten years prior to the survey. This paper is primarily con-

[1] An experimental agency of the Iranian Ministry of Health working in cooperation with the University of Tehran Medical Faculty and the International Health Division of The Rockefeller Foundation.

Sheet No.	Name	Age	No. of Pregnancies 1319–28	No. of Premature	No. of Full-Term	No. of Abortions	No. of Live Births 1319–28	No. of Stillbirths	No. Living	No. Dead	No. Dying at			No. Dying in First Year from						No. of Deliveries Attended by			No. of Deliveries at		No. of Years Married	No. of Years Exposure	Observations
											<1 Month	<1 Year	>1 Year	Dysentery	Resp. Infection	Tetanus	Syphilis	Premature	Other Causes	Physician	Midwife	Other	Hospital	Home			

Figure 1. Obstetrical and infant data. (Reproduced from Health Survey Form utilized in Shahriar Area—1950.)

cerned with the last item, since, up to the time of the survey, data of this type for Iran were not available.

Survey Technique

1. *Sampling.* Each of the villages, varying in population from 50 to 3,500, with an average of 260 inhabitants, was visited initially by one of the two sanitarians on the staff. The location of family units was determined, and each dwelling was assigned a number which was clearly marked on the wall or gate with red paint. When the enumerators arrived in the village, they interviewed only those families who lived in households marked with the number five or multiples of five. Frequently, one of the selected families was absent at the time of the survey. In this case the enumerators were instructed to pick at random one of the households numerically closest, above or below, the missing one and to revert to the original sequence with the next family interviewed. Data were obtained from any member of the family present at the time but included information on those absent as well. For the most part the respondents were adult women, but other members of the family who happened to be present helped to verify the data. Each household was visited only once during the survey.

2. *Recording.* That portion of the form dealing with pregnancies and their outcome is reproduced in Figure 1. Here were recorded the names of any women in the household who had had pregnancies, or who might have had pregnancies (i.e., those who were married though childless) during the ten years prior to the survey. The rest of the process was merely a matter of placing numerical figures in the appropriate columns. Under "Observations," pertinent comments or explanations were noted either in the local language (Farsee) or in English, depending on the enumerator's bilingual capacity.

3. *Qualifications.* It will be noted that only those pregnancies which occurred within the ten-year period prior to the survey were recorded. This time span was, in a sense, a compromise. It was felt that memory of events would be better for this period than for the entire reproductive life, and that

the number of pregnancies would be sufficiently large to be statistically significant. While greater accuracy might have been achieved by utilizing a one-year or two-year period prior to the survey, the advantage of having larger numbers and a more solid baseline outweighed the disadvantages. It is true that in lumping together all of the data from the ten-year period, two broad assumptions were made: first, that conditions pertaining to pregnancies and their outcome remained relatively constant; second, that the population was stable. Each of these assumptions seems reasonable, both in the light of general information about the region and in view of the fact that the objective of the study was to obtain data which would indicate an "order of magnitude" rather than an absolute quantification. It was recognized that the survey method, of itself, could provide no more than a general conception of existing conditions, but that this was better than nothing and would have to suffice until the local government could organize its own system for collecting reliable statistics.

4. *Definitions.* As far as definitions were concerned, it was obvious that the concepts of prematurity, abortion, and stillbirth had to be those defined by the women themselves rather than by standards adopted in countries where more and better medical care is available. *Prematurity,* for instance, depended on the mother's subjective interpretation as to whether or not a given infant happened to have been born smaller or earlier than expected. *Abortions* were even harder to pin down. Sometimes the products of conception were not recognized as such when passed. At other times, an unduly copious flow at the regular menstrual period might have been considered an abortion when, in fact, it was not. It is probable, however, that the frequency of abortions occurring in this population was much greater than the actual number stated. No attempt was made to distinguish between abortions and miscarriages.

If a baby breathed after delivery, it was considered to be a *live birth,* regardless of how soon thereafter it died. *Stillbirths* were defined as babies of normal or subnormal size who never

breathed after delivery. The "*number living*" referred to children who were born during the ten-year period and who were still alive. Conversely, the "*number dead*" referred to those who were born alive during the period and subsequently died.

The various categories on the cause of death of infants were quite unsatisfactory. The majority were recorded as having died of "other causes," and only in a few cases was there any reliable indication of a specific etiological agent. Autopsies are rare even in urban centers; thus, no pathological diagnoses were established.

When it came to the subject of assistance at the deliveries, the categories of physicians included both graduate doctors and "Behdars" (assistant doctors), who are limited by law to practice in localities with a population of less than 10,000. Graduate midwives are almost nonexistent in the area, and it was necessary to consider a midwife to be any woman who assisted at deliveries for profit. Among "others" were included deliveries which were either unattended or were assisted by a neighbor on a gratuitous basis.

5. *Statistical Considerations.* In obtaining the numerators for the infant mortality rates, there probably were errors in interpreting actual age at which a child died. A most important source of bias, in the direction of underreporting, resulted when the mother thought a child was "about one year old" at the time of death. Failing more specific details, these deaths were automatically included in the group dying at more than one year rather than in the infant group. An unknown degree of bias in the same direction involved children who died in infancy and were completely forgotten by the mother—thus not recorded. This probably occurred more often in the early portion of the ten-year period, memory of which was less precise. Failure to include such infants affected the reported birth rate, but, more profoundly, the infant mortality rate. A third source of bias arose from the fact that infants born a short period prior to the survey had not been exposed a full year to the risk of dying.

It will be noted that there are occasional discrepancies in the totals. This is due to the fact that whenever information regarding a particular item was lacking or doubtful, a question mark was recorded instead of an actual figure. In compiling the results, any questionable item was excluded from both the numerator and denominator. This procedure in no way affects the general validity of the rates but leads to totals which are not consistent throughout.

Results

In a consideration of birth rates, factors such as age distribution of the population, sex ratios, and marital status must be taken into account for they have a direct bearing on the number of children produced.

Age Distribution. The distribution of the surveyed population by age and sex is shown in Table 1. The errors implicit in any census were undoubtedly present; e.g., there was the usual "heaping" at ages which were multiples of five, and the number of children under one year of age was probably underreported. Also, there was an even greater degree of inaccuracy regarding the age of older persons than would be expected in a more enlightened population. Hence, it seemed advisable to group together all those with a stated age of 45 or over. When

Table 1. Distribution of population, by age groups and sex.

Age Group	Total		Males		Females	
	Number	Per Cent	Number	Per Cent	Number	Per Cent
Under 1	382	4.2	195	4.3	187	4.2
1–4	1,164	12.9	579	12.7	585	13.1
5–9	1,315	14.6	673	14.7	642	14.4
10–14	1,043	11.5	550	12.0	493	11.1
15–19	839	9.3	395	8.6	444	10.0
20–24	733	8.1	294	6.4	439	9.9
25–34	1,137	12.6	558	12.2	579	13.0
35–44	1,010	11.2	560	12.2	450	10.1
45+	1,400	15.5	768	16.8	632	14.2
Undetermined	7	0.1	6	0.1	1	–
Total	9,030	100.0	4,578	100.0	4,452	100.0

a given age seemed disparate with physical appearance, the individual was asked about personal memory of well-known historic events which would tend to verify or invalidate the statement.

Table 1 reveals that 42.9 per cent of the female population were of childbearing age (i.e., 15 to 44). The fact that only 14.2 per cent of the females were 45 years of age and over indicates that the population was essentially young.

Sex Ratios. When one compares the male-female ratio in each age group, as shown in Table 2, one notes that in Iran there are relatively fewer males than females between the ages of 15 and 34 and that the ratio reverses sharply for the age groups 35 and over. There are several plausible explanations. There may have been a shift to the older age groups on the part of males who misstated their actual age in order to avoid military conscription. Another possibility is that the predominance of males in the older groups represents the true state of affairs and that the women from the rural area under study

Table 2. Number of males per 100 females for selected populations, in Iran, Egypt, and India, by age groups.

Age Group	Iran Village Survey, 1950	Egypt 1937[1]	Egypt Village Survey, 1950[2]	India 1931[3]	India Assam Tea Estates, 1950[4]
Under 1	104.3	99.5	75.0	98.9	94.1
1–4	99.0	92.6	116.7	97.6	
5–9	104.8	100.6	114.3	109.9	102.5
10–14	111.6	117.4	140.0	113.6	122.1
15–19	89.0	112.7	72.7	101.1	90.8
20–24	67.0	95.5	95.2	97.7	73.5
25–34	96.4	88.5	77.6	107.5	103.4
35–44	124.4	106.2	119.2	114.7	142.2
45+	121.5	96.5	83.9	108.8	158.1
Total Group	102.8	100.2	95.6	106.4	109.6

[1] Based on figures taken from: United Nations Statistical Office Demographic Yearbook 1949–50. New York, 1950. Table 4, page 104.

[2] Sindbis Health Center, Egypt. Annual Report for 1950 by Dr. J. M. Weir to The Rockefeller Foundation. Unpublished data.

[3] Based on figures taken from: United Nations Statistical Office Demographic Yearbook 1949–50. New York, 1950. Table 4, page 127.

[4] A. B. Gilroy. The Age and Sex Composition of Tea Estate Populations in Assam. Typewritten report. The Ross Institute of Tropical Hygiene, India and Pakistan Branch (1950).

may actually die earlier than the males. Conclusive evidence one way or the other is lacking, but the social and economic environment is such that women over the age of 45 have, in a sense, outlived their usefulness and may consequently receive less consideration when afflicted by illness or other vicissitudes of old age. Also, one wonders whether the relatively smaller number of females in the 35-plus age groups might not reflect a high maternal mortality.

The relative dearth of males in the 15 to 24 age groups might possibly be explained on any one of three bases: (1) A considerable proportion may have actually been in uniform; (2) The very threat of military service may have prompted some to misstate their age; (3) Conditions in the villages are such that there has been an apparent migration of young males toward the urban centers in order to find employment.

For purposes of comparison, Table 2 also shows the sex ratios in different age groups for Egypt and India, as reported in

Table 3. Marital status of surveyed population ten years of age and over, by age groups and sex.

Age Group	Males					Females				
	Total	Single	Married	Widowed	Divorced	Total	Single	Married	Widowed	Divorced
	NUMBER									
10–14	550	550				493	484	9		
15–19	395	386	9			444	210	230	2	2
20–24	294	182	111	1		439	16	409	7	7
25–34	558	79	472	5	2	579	5	556	13	5
35–44	560	8	543	6	3	450	1	405	42	2
45+	773	4	741	25	3	633	4	306	310	13
Total	3,130	1,209	1,876	37	8	3,038	720	1,915	374	29
	PER CENT									
10–14	100.0	100.0				100.0	98.2	1.8		
15–19	100.0	97.7	2.3			100.0	47.2	51.8	0.5	0.5
20–24	100.0	61.9	37.8	0.3		100.0	3.6	93.2	1.6	1.6
25–34	100.0	14.2	84.6	0.9	0.3	100.0	0.9	96.0	2.2	0.9
35–44	100.0	1.4	97.0	1.1	0.5	100.0	0.2	90.0	9.3	0.5
45+	100.0	0.5	95.9	3.2	0.4	100.0	0.6	48.3	49.0	2.1
Total Group	100.0	38.6	59.9	1.2	0.3	100.0	23.7	63.0	12.3	1.0

official censuses and for two areas where special studies were made (an Egyptian village and tea estates in Assam, India). The figures were essentially comparable, and it was interesting to note that the ratios of males to females in the 15 to 24 age groups were fairly similar to those noted in the Iran village survey.

Marital Status. Table 3 shows the marital status of the surveyed population of ten years of age and over. The important feature bearing directly on the birth rate is that in the age group 45 and over, all but 0.6 per cent of those still living were, or had been, married. It is also apparent that even with a law prohibiting marriage before the age of 16, the females marry earlier than the males. In the 20–24 age group only 3.6 per cent of the females were still single, as contrasted with 61.9 per cent of the males. Another striking feature is the number of widowed females in the age group 45 and over. In part this may be explained by the hypothesis that in the eyes of potential husbands, widows over the age of 45 present a less appealing prospect than their younger sisters.

It should also be mentioned that both divorce and polygamy are permitted by the Moslem religion, subject to certain conditions. Actually the proportion of divorces and the number of married men with more than one wife is low, probably owing to economic factors.

Other Factors. There are, of course, numerous additional factors which affect the over-all birth rate. These include social customs, the practice of contraception, age-specific mortality rates among the females, morbidity of certain diseases, nutritional status, and others. The relative importance of these factors was not studied.

Data Relating to Pregnancies, Births, and Infant Deaths

It was found that 1,616 of the women surveyed had had one or more gestations during the ten-year period prior to the survey. The data relating to these gestations are shown in Table 4.

The observed birth rate of 51.4 per 1,000 population is in

marked contrast to the rate of 20 for the entire country reported in the official statistics of the Iranian Government. The former rate, however, which represented an average annual rate over the ten-year period prior to the survey, checked closely with the observed number of children in the surveyed population under the age of one year after a deduction was made for infant mortality. Even the relatively high observed rate of 51.4 per 1,000 population is probably understated for at least two reasons: (1) Only those women who survived could be interrogated; thus, live births occurring during the ten-year period to women who died prior to the survey were automatically excluded. There is evidence (Table 1) that this

Table 4. Data relating to pregnancies, births, and infant deaths among sampled population during the ten years prior to the survey.[1]

Total Number of Pregnancies during the Period	5,146	
Number of Full-Term	4,567	
Number of Abortions	438	
Number of Prematures	134	
Number Undetermined	7	
Number of Live Births during the Period	4,645	BIRTH RATE: $\frac{4,645}{9,030} \times \frac{1,000}{10} = 51.4$ per 1,000 Population
Stillbirths	93	STILLBIRTH RATIO: $\frac{93}{4,645} \times 1,000 = 20.0$ per 1,000 Live Births
Number of Children Living (of Live Births during Period)	2,992	
Number of Children Dead (of Live Births during Period)	1,656	
Number Dying Under 1 Month	402	NEONATAL MORTALITY RATE: $\frac{402}{4,645} \times 1,000 = 86.5$ per 1,000 Live Births
Number Dying Under 1 Year	1,007	INFANT MORTALITY RATE: $\frac{1,007}{4,645} \times 1,000 = 216.8$ per 1,000 Live Births
Number Dying Over 1 Year	649	

[1] Based on data from 1,616 women who had had one or more pregnancies during the period.

was frequently the case, although no factual data on age-specific death rates were collected. (2) Undoubtedly there were some live births which escaped the mothers' memory.

The ratio of the number of abortions to the total number of pregnancies is much lower than might be expected, by comparison with data for the United States. It is conceded that a considerable number of abortions occurring to these rural women went unnoticed or were ignored.

The relatively low stillbirth ratio may represent a faulty memory on the part of the mother and may be tied in with the fact that there were slightly fewer multiple births than expected. In the case where one of twins was a live birth and the other was stillborn, the latter was liable to be ignored.

The neonatal and infant mortality rates were actually lower than expected on the basis of prior hearsay which had suggested that the infant mortality rate might range from 300 to 500 per 1,000 live births. Although the number of infant deaths was undoubtedly underreported, the degree of underreporting is difficult to estimate. There is reason to believe that infant mortality is higher in other parts of Iran, particularly in the South, although there are no supporting factual data. It should be emphasized here that the rates in this survey are indicative of the surveyed area only and do not apply necessarily to the country as a whole.

Causes of Deaths Among Infants. As mentioned previously, the data relating to the causes of death among infants were in a sense unsatisfactory, for in more than 50 per cent of the cases the exact cause was not specified. It is perhaps unreasonable to hope that accurate data in this regard could be obtained under the circumstances prevailing in the rural areas. The lack of medical care militated against both diagnosis and treatment and the causes of the majority of deaths had to be recorded in the mother's own words: blueness, choking, fever, etc.

About 3 per cent of the infant deaths were ascribed to tetanus, probably of the newborn. This figure seems low when one considers that 99 per cent of the deliveries took place in

Table 5. Relationship between number of pregnancies and woman exposure-years.

Total Years of Exposure[1]	Ages at the Time of the Survey												Total			Total No. of Women in Survey
	14–23			24–33			34–43			44–55						
	No. of Woman Exposure-Years	No. of Pregnancies	Pregnancies per Woman Exposure-Year	No. of Woman Exposure-Years	No. of Pregnancies	Pregnancies per Woman Exposure-Year	No. of Woman Exposure-Years	No. of Pregnancies	Pregnancies per Woman Exposure-Year	No. of Woman Exposure-Years	No. of Pregnancies	Pregnancies per Woman Exposure-Year	No. of Woman Exposure-Years	No. of Pregnancies	Pregnancies per Woman Exposure-Year	
0	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00	162
1	68	16	0.24	1	0	0.00	1	1	1.00	4	2	0.50	74	19	0.26	7
2	130	55	0.42	18	8	0.44	6	3	0.50	16	2	0.12	170	68	0.40	8
3	282	108	0.38	21	11	0.52	24	14	0.58	51	12	0.24	378	145	0.38	12
4	284	123	0.43	36	23	0.64	12	6	0.50	32	2	0.06	364	154	0.42	9
5	285	108	0.38	115	50	0.43	30	14	0.47	510	81	0.16	940	253	0.27	18
6	606	252	0.42	150	68	0.45	84	35	0.42	36	5	0.14	876	360	0.41	14
7	266	115	0.43	287	129	0.45	70	24	0.34	105	22	0.21	728	290	0.40	10
8	360	133	0.37	408	172	0.42	80	28	0.35	56	8	0.14	904	341	0.38	1
9	144	53	0.37	414	176	0.43	261	78	0.30	171	47	0.27	990	354	0.36	1
10				3,980	1,641	0.41	3,540	1,233	0.35	1,250	252	0.20	8,770	3,126	0.36	8
Total	2,425	963	0.40	5,430	2,278	0.42	4,108	1,436	0.35	2,231	433	0.19	14,194	5,110	0.36	2,0

[1] Calculated to the nearest whole year.

N. B. The above rates represent a composite of the total experience of each of the women surveyed and should not be confused with intermediate duration-specific data.

the home and were attended by untrained village women who had no concept of cleanliness in obstetrical practice.

Pregnancy Data

In addition to the data regarding pregnancies, births, infant mortalities, etc., information was collected as to the number of years of the ten-year period during which each woman was actually married and living with her husband. The purpose was to arrive at a figure which would express the fecundity of the village women in terms more precise than the usual crude or age-specific fertility rates. This rate was intended to be a rough measure of the capacity of the rural women to conceive —a physiological rather than a demographic expression of fertility. The numerator was composed of pregnancies instead of live births. The denominator was in terms of the number of woman exposure-years, taking into consideration only those years during the ten-year span in which each woman was actually married and was at the same time between the ages of 14 and 45 inclusive. The latter was arbitrarily selected as the normal reproductive period. In accordance with these criteria the data were subdivided in order to compare the pregnancy experience of women in four different age groups. The tabulations are shown in Table 5. Of the 2,076 women entered in the records for possible inclusion in this aspect of the study, 162 were recorded as not having been exposed to pregnancy during the period. This left a total of 1,914 women who amassed 14,194 woman exposure-years. Of these women, 311 never recognizably conceived while the remaining 1,603 women provided 5,110 pregnancies. As shown in Table 5, this represents an average of 0.36 pregnancies per woman exposure-year. Expressed in other terms, this figure indicates that the average woman, if constantly exposed during her entire reproductive life, would have eleven pregnancies.

The table also shows a higher pregnancy rate among women who were in the 24–33 age group *at the time of the survey* than among the others. The lowest rate was found in the oldest age

group despite the fact that 40 per cent of the exposed women in the group had had a full ten years of exposure during the given period. Here it should be emphasized that women who were not exposed at any time during that interval were excluded from the calculations.

There is probably a bias inherent in the methodology leading to rates which run too low in the youngest age group and too high in the oldest. These difficulties could be avoided in any future study by obtaining data on the age of the women at the time of each pregnancy as well as at the time of the survey. With such information at hand, one could obtain not only more exact rates for age-specific pregnancy but also an estimate of the spacing of pregnancies in different age groups and for different periods of exposure.

Interestingly, except for the first year of exposure where the numbers involved were too small to be significant, the *rate* of pregnancies per exposure-year remained almost constant within each separate age group, regardless of the number of years exposed. The aggregate of all age groups did indicate a drop at the fifth year, owing to the disproportionately large number of married women in the 44–55 age group who probably stated their age as 50 and were thus credited with five years of exposure provided that they had been living constantly with their husbands during the first half of the previous decade. Since the pregnancy rates were lowest in this age group, the average was heavily weighted. By substituting a calculated five-year "moving average" the distortion can be eliminated. It is clear that there is need for caution in interpreting the stated age in an older population of this type.

Conversion of Data into Standard Measurements of Fertility. The problem arises as to how to compare these data with fertility studies carried out in other parts of the world. In the first place, the manner in which the original material was recorded does not permit age-specific analysis in the strict sense of the word, for the age groups pertained to women at the time the survey was made, while the pregnancies covered

a span of the preceding ten years. For purposes of internal comparison, however, a rough measure of differential fertility at various stages in the reproductive life is afforded.

With the aid of a few broad assumptions it is possible to compare these data with other studies. If one may assume that the observed ratio of live births to pregnancies was constant

Table 6. Methodology and data used in computing the gross reproduction rate.

Age Group at Time of Survey	Observed Number of Pregnancies in the Ten-Year Period[1]	Calculated No. of Live Births per Year (2) × 0.903 ÷ 10	Calculated No. of Female Births (3) × 0.49[2]	No. of Females in the Population	Annual Births of Daughters per Woman (4) ÷ (5)	No. of Years in Age Group	Annual Births of Daughters per Woman, per Age Group (6) × (7)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
14–23	963	86.96	42.61	930	0.04582	10	0.4582
24–33	2,278	205.70	100.79	617	0.16335	10	1.6335
34–43	1,436	129.67	63.54	459	0.13843	10	1.3843
44–55	433	39.10	19.16	461	0.04156	12	0.4987
Total	5,110			2,467			3.9747

Crude Birth Rate: $\frac{\text{Total live births}}{\text{Total population}} = \frac{4,645}{9,030} \times \frac{1}{10} \times 1,000 = 51.4$ (From Table 4)

Number of children 0–4 years per 1,000 women 15–44 inclusive $= \frac{1,546}{1,912} = 808.6$ (From Table 1)

General Fertility Rate: $\frac{\text{Total live births}}{\text{Females 15–44}} = \frac{4,645}{1,912} \times \frac{1}{10} \times 1,000 = 242.9$

Gross Reproduction Rate: Number of female children born per woman assuming span of reproductivity of 14–45 inclusive = 3.97

[1] Taken from Table 5. Since women with an undetermined number of years of exposure were omitted, the total does not agree with that in Table 4.

[2] Data used in calculating fertility rates:

Ratio of births to pregnancies over the 10-year period $= \frac{\text{Total live births}}{\text{Total pregnancies}} = \frac{4,645}{5,146} = 90.3$ per cent (From Table 4)

Sex Ratio (children under 1) $= \frac{\text{Females}}{\text{Total}} = \frac{187}{382} = 0.490$ per cent (From Table 1)

throughout the reproductive period, regardless of age, one can apply this ratio to the observed number of pregnancies and calculate the probable number of live births occurring in each age group. In this way a gross reproduction rate can be computed as shown in Table 6. This was found to be 3.97.

There were insufficient data to calculate a net reproduction rate.[2] The latter takes into account the age-specific mortality of females after birth, which, in turn, can only be derived from a life table. Since there is no life table for Iran, an attempt was made to interpose survival data for females from another country which might be considered similar to Iran in so far as conditions affecting mortality are concerned. For this purpose Egypt was chosen. Data for 1936–38 from Egypt[3] were applied to the Iranian survey figures and an estimated net reproduction rate of 2.24 was derived. Arbitrarily this figure seemed high and the method was tested by applying life table data, also from Egypt (1927–1937), but from a different source.[4] This resulted in a net reproduction rate of 1.72. Still another net reproduction rate, namely 1.25, was obtained by using the 1951 age-specific death rates and calculated survival figures for females in the Egyptian village Sindbis (total population, 4,232).[5]

It is obvious that the results varied widely depending on which set of survival data was utilized. Each source has its own claim to accuracy. For this reason it seems presumptuous to select one and, by applying it to the survey data, draw con-

[2] To paraphrase, the *Gross Reproduction Rate* is an estimate of the average number of live female births produced per woman, assuming that she is alive during her entire reproductive period. The *Net Reproduction Rate* is a refinement of the *GRR,* which takes into account the fact that many females neither reach nor live through the entire reproductive period, with the result that relatively fewer live female births are produced. The appropriate calculations are based on age-specific birth and mortality rates.

[3] Survivors at Specified Ages for Each Sex. United Nations Statistical Office DEMOGRAPHIC YEARBOOK 1951. New York, 1951. Table 28, pp. 512–513.

[4] Kiser, Clyde V.: The Demographic Position of Egypt. The Milbank Memorial Fund *Quarterly,* October, 1944, XXII, No. 4, pp. 383–408.

[5] Sindbis Health Center, Egypt. Annual Report for 1951 by Dr. J. M. Weir to The Rockefeller Foundation. Unpublished data.

clusions as to the net fertility of the women in this particular rural area of Iran. It is preferable, under the circumstances, to postpone calculation of a net fertility rate until such time as accurate statistics on survival are available in Iran itself.

Summary

1. Certain demographic data derived from a survey of 173 villages in a small rural area of Iran are discussed.

2. These data include an analysis of the population by age, sex, and marital status, as well as informants' reports on pregnancies, births, and infant deaths during the ten-year period prior to the survey.

3. Comparative data on both pregnancy and fertility rates are presented.

4. The findings are referable to the surveyed population during the period in question and not to Iran as a whole.

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