



DEMOGRAPHIC STUDIES IN RURAL EAST PAKISTAN

Second Year
May, 1967—April, 1968

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**BASED ON REGULAR REGISTRATION OF
BIRTHS, DEATHS AND MIGRATIONS.**

**PAKISTAN-SEATO CHOLERA RESEARCH
LABORATORY**

Dacca, East Pakistan

JUNE, 1969

The Pakistan-SEATO Cholera Research Laboratory is a part of the SEATO Cholera Research Program and is supported by the U. S. Agency for International Development, Department of State ; the National Institutes of Health and the National Communicable Disease Center of the Department of Health, Education and Welfare ; and by the Government of Pakistan, United Kingdom and other SEATO nations. The NIH Cholera Advisory Committee co-ordinates the research program.

These studies were supported in part by Research Agreement No. 196802 between the National Institutes of Health, Bethesda, Maryland, U. S. A., and the Pakistan-SEATO Cholera Research Laboratory, Dacca, East Pakistan.

INTRODUCTION

The Pakistan-SEATO Cholera Research Laboratory has been conducting cholera vaccine field trials in villages in Matlab Thana in Comilla District in rural East Pakistan since 1963. The basic design of these field trials has involved taking a house-to-house census in the villages under study and assigning every individual an identifying census number. The vaccines to be tested are randomly assigned to the population and administered by vaccine teams. Then, in order to identify the cholera cases occurring in the population under study, field workers visit every household in the study area daily to make enquiries about the occurrence of acute diarrheal illness and any deaths associated with acute diarrhea. A field hospital has been set up in a central location with a speedboat ambulance service, to provide treatment for all severe acute diarrheal cases.

The field trials began in 1963 and covered 23 villages with a population of 27,629 individuals. In 1964 the trial area was expanded to include an additional 35 villages and covered a total population of 60,177. In 1966 the field trial area was further expanded to cover an additional 74 villages, with a total population of 111,748 persons. A field staff of more than 200 maintains a daily household surveillance over this population.

Since the expansion of the area in March of 1966, the field staff have been maintaining a regular registration of all births, deaths and migrations which have been occurring in this population, in addition to carrying out their regular surveillance for acute diarrheal diseases. A detailed analysis of the first year of study (May 1966-April 1967) has already been published.¹ This report gives an analysis of data obtained from the second year's (May 1967-April 1968) registration with some comparisons with the first year's data.

A description of the study area, and the methods and definitions which were given in the first year's report is included in Appendix I of this report.

RESULTS

There were 111,748 persons in 132 Study Villages at the time the Census was taken in April 1966. As illustrated in Table 1, this population reached 114,561 by the middle of the second year, a rate of increase of 1.7% per year. This adjusted mid-year population has been obtained by adding the live births and immigrants and subtracting the deaths and emigrants in the population during the one and one-half year period following the census. As the Table indicates this was a relatively young population. Nearly half of the population was under the age 15 and only one-ninth of the population was over age of 50.

The data obtained from the original census in April 1966 showed an apparent deficit of children under 5 years of age with the largest deficit under the age of 1 year. A similar

¹ Demographic Studies in Rural East Pakistan, May 1966-April 1967—by Dr. W. H. Mosley, et. al., Pakistan SEATO Cholera Research Laboratory, June, 1968.

deficit of children under 5 years of age has also been found in other demographic studies in the subcontinent including the 1961 population census of Pakistan. Some demographers explain these deficits by the assumptions of misreporting of age and/or under-enumeration. We have observed that the traditional way of counting the age of children by some respondents is one year ahead of the actual chronological age, and this could contribute to such a deficit. By the middle of second year (1967-68) the adjusted population figures result in correction of the deficit in the under 1 year age group but does not compensate the whole 0-4 year age group children. It is very likely that at the end 5 years of registration this apparent deficit of children in the age group 0-4 will not be evident in the adjusted population tables.

Table 1 also reveals that the number of children in the age group 10-14 was nearly double that of those in the 15-19 year age group. This same pattern was observed in population census of Pakistan 1961, 5 years before, as a sharp fall in the number of children from age 5-9 to 10-14, and has been attributed to the aftermath of the famine of Bengal in 1943, World War II, and the political disturbance. A fall in fertility may be expected as the 15-19 age cohort moves through the reproductive years, but then a marked increase is likely as the younger cohorts enter the reproductive years.

The sex-ratio shows that there is slight preponderance of males in the age group 0-19 years. In the age group 20-34 there is large excess females. Again in age group 35 years and over there is an excess of males. The age-sex structure of this population is almost the same as it was at the time of census except in the age group 20-34 years, where the sex ratio is further diminished. This reflects the large number of males that have been continuing to move out the area for work opportunities.

Table 2 summarizes the total live births, deaths and migrations for the two consecutive twelve month study periods. The crude birth rate fell from 47.1 per 1000 in the first year to 45.4 per 1000. The crude death rate increased from 15.0 to 16.6 per 1000. Thus the crude rate of natural increase in this population fell from 3.2 to 2.9 percent.

There was an apparent significant increase in the rate of immigration and emigration in the second year. This is in large part due to the definition of migration (Appendix I). Migrants who were not definite about the period of stay were kept under observation by the field staff until the definition of "permanent" migration (6 months stay) was fulfilled. Thus, many who migrated in the last few months of the first year and were not definite about their status would not be registered as migrants till the second year. For this reason, the migration rates in the second year more accurately measure the annual migration pattern and will be comparable to future years data.

MORTALITY

Table 3 shows the distribution of deaths by age and sex and the age specific death rates. Overall 34.3% deaths were in children under the age of 1 year and an additional 22.4% of

the deaths were in children ages 1-4. The infant mortality rate is 125 per 1000. The rate fell sharply to 29 per 1000 in children 1-4 and reached the lowest level of 2 per 1000 in the 10-14 year age group. From age group 15-19 to 35-39 the death rate is more or less constant around 4 per 1000. In the older population the death rate rose gradually until age 69 then there was a sharp rise in over 70.

There is no marked difference in the overall male and female death rates. Females of age 1-4 have an excess mortality over their male counterpart. This may be due to the cultural pattern of the society in that parents are more cautious about the son's health. Females age 15-39, where the fertility is high have a mortality rate of 4.3 per 1000 and the males of similar age showed a mortality rate of 3.5 per 1000 which was 19% less than their female counterpart. This may be in part due to the effect of a high maternal mortality existing in the population. This has been estimated at 7 per 1000 live births by Gesche and Ahmed.²

Table 4 shows a more detailed examination of 653 infant deaths. This reveals 34.5% of the infant deaths occurred in the first week of life, 54.1% in the first month of life. The neonatal mortality rate was 68.0 per 1000 live births.

Table 5 shows the distribution of deaths by four week periods in the age groups under 1, 1-4, 5-39 and over 40. This suggests that there was a moderate seasonal trend in deaths with a large proportion of deaths during the month of October through January. This pattern is best defined in the age group under 1. This seasonal pattern in infant deaths is a reflection of the fact that these are the months when the largest number of births are occurring and not that the neonatal death rate increased during this period.

Since the deaths have been registered by non-medical personnel, it is not possible to adequately define the causes of death in this population. As found in Table 6 acute febrile illness was the most common factor associated with nearly one-sixth of the deaths. This was most frequent in children under 1. Gastrointestinal disease including acute and chronic diarrheas and dysenteries were the next most common symptoms associated with death, being most frequent in children 1-4 years of age. Respiratory diseases were also seen frequently in children under 1 year and in elderly people. Accidents caused 91 deaths with most of the cases due to drowning, especially in the monsoon season. Among specific causes of death, measles and small pox accounted for 154 deaths being most frequent in the children under 5.

The points of significance in this second year of observation are that the infant death rate is slightly higher having risen from 111 to 125 per 1000. This is largely due to an increase in deaths under the age of 7 days, where the death rate rose from 33.5 to 43.2 per 1000. This rise is probably in part a reflection of better registration of live births and deaths, and probably does not represent a real increase in these events. The major reason for the rise in crude death

² Preliminary Report of Maternal Mortality in Rural East Pakistan by Dr. M. Gesche and Dr. S. Ahmed., (in preparation).

rate in the second year may be explained by small pox. The deaths attributed to measles and small pox rose from 57 in the first year to 154 in the second year. Most of these deaths were specifically due to small pox since Matlab experienced a major small pox epidemic in the second year. Thus, a small pox epidemic, and improved reporting of neonatal deaths accounts for most of the increase in mortality seen in second year.

FERTILITY

During this twelve-month period the field workers reported the termination of 5614 pregnancies. Table 7 give the outcome of the pregnancies and the age of the mother. The 5614 pregnancies resulted in 5207 live births; 2653 were males, 2554 were females, giving a sex-ratio at birth of 103.8 males per 100 females. Forty-two of these pregnancies resulted in twins, giving a ratio of one set of twins per 134 pregnancies. A still-birth has been defined as a pregnancy terminating in a dead baby in the seventh month of pregnancy or later as reported by the mother. There were 222 still-births including twins, and 220 pregnancies terminated at less than seven month as abortions or miscarriage. The majority of the abortions were spontaneous. Only 15 pregnancies were reported to have been terminated in induced abortions, all because of illegitimate pregnancy. The actual frequency of abortions, spontaneous or induced, is unknown since no attempt is made to identify every pregnancy. The number of live births reported fell from 5308 in the first year to 5207 in the second year, although the total number of pregnancies reported terminating actually increased from 5477 in the first year to 5614 in the second year. This increase is primarily due to a larger number of pregnancies reported terminating in abortions. This probably reflects the better coverage of abortions rather than a real increase in fetal wastage.

As shown in Table 8 there was again in the second year a distinct seasonal pattern of births, with pregnancies terminating most frequently in months of October through January. Forty-four percent of the pregnancies terminated during this 4 month period. This seasonal trend in births was consistent irrespective of whether this was first or subsequent pregnancy for the mother.

Table 9 shows the seasonal distribution of pregnancies terminating in miscarriage or abortion and still-birth. Abortions or miscarriages were reported most frequently occurring in the months of June through September, four months ahead of the season for live births. The peak season of still-births was September through December, one month ahead of the peak season of births. Since most abortions in the first trimester remain undetected, this seasonal relationship of reported abortions and still-births to live births, suggests that there is actually a similar seasonal pattern of conception for all these events.

Table 10 summarizes the number of previous pregnancies by age group of the 5614 women who reported the termination of pregnancy. In age group 10-14, 90% of these women had never experienced any pregnancy previously. This figure fell sharply to 59% in age group 15-19, and to 12% in age group 20-24 where the average number of previous pregnancies was

2.2. By 25-29 they had an average of 4.3 previous pregnancies. This continued to increase till age 45-49 where women has an average of 8.5 pregnancies prior to the delivery of the presently reported birth. Overall 60% of these women have had 3 or less pregnancies previously.

Table 11 gives the distribution of these 5614 women according to the number of children now living. It can be seen that women aged 20-24 had on the average 1.48 living children prior to the delivery, whereas by the time they approached the end of their child bearing years in the age 40-49, they had on the average 5 previous living children prior to the present birth. Nearly 25% of these mothers had no living children prior to this delivery, and 75% of these pregnancy terminations happened to the mothers of lower parity group (3 or less living children).

Table 12 reveals that women approaching the end of their child bearing years had on the average 2.5 children born alive but dead at the time of report. Overall one-half of these women had seen at least one child die prior to this birth.

The age specific birth rate is presented in Table 13. There were 5207 live births and 31,197 women in age group 10-49 irrespective of their marital status. Thus, there were nearly 170 live births per 1000 women. The maximum births occurred in the age group 20-24 with a rate of 334 per 1000 women followed by 297 births per 1000 at age 25-29. The age specific birth rate pattern in first year was similar to this second year except in the age group 30-39 where the rate had fallen from 200 per 1000 in the first year to 172 in the second year.

MIGRATION

The migration rates* by age and sex presented in Table 14 indicate that on the whole the area has a net out-migration at the rate of 1.23% per year of which the males' net out-migration was 2.02% and that of females' was 0.31%. For males the net out-migration was age selective. The peak net rate was approximately 7.5% in the age group 15-19 followed by 6.0% at age 20-24. For females the age group 10-19 showed high rates for movement in as well as movement out but the resultant net migration rate was insignificant. The large emigration of young men was reflected in age sex distribution of the population which revealed a deficit of males in 20-34 age group. Table 15,16,17, and 18 present a more detailed evaluation of migration in respect to cause, sex and age.

Male immigration

Table 14 showed that the overall immigration rate for males was 3.36%. The peak rate, in age group 15-19 was more than 6% per year. Table 15 indicates that one-third of the 1,956 male immigrants were people who were returning to their village home. Dependent

* Migration rate = Migration into or Migration out/Mid year population of the area.
Net Migration rate = (Migration into—Migration out)/Mid-year population of the area.

children constitute one-fourth of the male immigrants. Some students migrated into this area, mostly in the age group 5-24. As this is a non-industrialised rural area, migration for work and occupation into this area is not significant.

Female immigration

The picture of immigration of the females as presented in Table 16 is quite different than males. The overall immigration rate of females was 3.64% per year (Table 14). The highest rate was 14.5% at age 15-19 followed by 5.05% at age 10-14. Most of these women were married to men of this area and joined their husband's family. As shown in Table 16, nearly one-third of the women who moved into this area during the year came because of marriage. Divorce (only 3 cases were widows) also played a significant role in female movement most frequently occurring in ages 10-24. More than one-third of the females immigrated as dependents, distributed through all ages; 56% were below the age 10, 18% were 10-19 and the rest was above 19. By contrast, among male dependent immigrants, the figures were 83%, 17% and zero percent respectively. Women returning home as immigrants were not as frequent as their male counterpart. Migration into this area for work and occupation is negligible for females, as for males.

Male emigration

Table 14 reveals that mean rate of male emigration was 5.38% per year, 2% higher than that of immigration. The highest rate of emigration was 13.8% at age 15-19 and then it slowly declined with increasing age. For the age groups 15-49, the emigration rate of males was nearly double that of immigration of males in the same age. As shown in Table 17, this excess outflow of males was primarily due to youngmen moving the urban areas for work, representing more than half of the total male emigrants. The second major reason for male emigration was dependency, accounting for nearly one-fifth of total 3,127 male emigrants. This group is counterbalanced by immigrant dependents, which show a similar pattern in respect to age. Males migrating for studies have an equal movement both for emigration and immigration.

Female emigration

As with immigration, in emigration there also exists a different pattern among males and females, however, females emigrants had a pattern similar to females immigrants. As illustrated in Table 14 it was observed that the average rate of emigration of females is 4.0 per 100 females per year. This is highest in age 15-19 with rate 11.57% followed by age 10-14 where the rate is 7.99%. The foremost cause of female emigration, as presented in Table 18 was dependency and included more than two-fifths of the total 2288 female emigrants. The next major cause of female emigration was marriage which accounted for 28.6% of the total emigration, occurring most frequently in age group 10-19.

In summary there was a significant net male migration out of the study area reflecting movement to urban areas for work and occupation. This was primarily in the 15-39 year age group. Although there was substantial in and out migration of females, with dependency and marriage being major causes, the net migration was negligible.

ACKNOWLEDGEMENTS

We wish to acknowledge the co-operation of Dr. Md. Asiruddin, Director of Health Services, East Pakistan and Dr. A. Mazid, Civil Surgeon, Comilla and Dr. N. R. Majumder, District Health Officer, Comilla and the support of Dr. R. A. Phillips, Director, Pakistan-SEATO Cholera Research Laboratory in making the study possible.

Our grateful acknowledgements are also due to Mr. Syed Babur Hossain, Mr. Abul Kasem Sheikh and Mr. Sayedur Rahman of Statistical Unit for their help in the data processing work and to the field staff at Matlab for their untiring efforts especially in respect of the regular registration of the vital events.

TABLE 1
ADJUSTED MID-YEAR POPULATION
Year 1967-68

Age	Male	Female	Total	Sex Ratio
<1	2,325	2,263	4,754	102.7
1-4	7,429	7,250	14,513	102.5
5-9	10,988	10,424	21,412	105.4
10-14	8,386	7,212	15,598	116.3
15-19	4,308	4,020	8,328	107.2
20-24	3,015	4,610	7,625	65.4
25-29	3,240	4,668	7,908	69.4
30-34	3,368	3,858	7,226	87.3
35-39	3,278	2,823	6,101	116.1
40-44	2,769	2,349	5,118	117.9
45-49	2,174	1,657	3,831	131.2
50-54	2,093	1,810	3,903	115.6
55-59	1,255	920	2,175	136.4
60-64	1,370	1,205	2,575	113.7
65-69	770	513	1,283	150.1
70+	1,360	851	2,211	159.8
TOTAL	58,128	56,433	114,561	103.0

TABLE 2
SUMMARY OF BIRTHS, DEATHS AND MIGRATIONS
MAY, 1966-APRIL, 1967 AND MAY, 1967 APRIL, 1968

Events	Number		Rate/1,000		Percentage Change	
	1966-67	1967-68	1966-67	1967-68		
Live Births	5,308	5,207	47.1	45.4	(-)	3.6
Deaths	1,694	1,906	15.0	16.6	(+)	10.7
Immigration	1,877	4,009	16.7	35.0	(+)	109.6
Emigration	3,537	5,415	31.4	47.3	(+)	50.6

TABLE 3

DISTRIBUTION OF PERSONS WHO DIED, ACCORDING TO THEIR SEX AND AGE AT THE TIME OF DEATH WITH AGE SPECIFIC DEATH RATE
MAY, 1967—APRIL, 1968

Age	Male	Female	Both Sexes	Rate/1,000 Male	Rate/1,000 Female	Rate/1,000 Both Sexes
<1	337	316	653	127*	124*	125*
1-4	183	243	427	25	34	29
5-9	55	53	108	5	5	5
10-14	13	19	32	2	3	2
15-19	9	14	23	2	3	3
20-24	10	18	28	3	4	4
25-29	14	21	35	4	4	4
30-34	15	18	33	4	5	5
35-39	12	14	26	4	5	4
40-44	23	18	41	9	8	8
45-49	24	13	37	11	8	10
50-54	37	27	64	18	15	16
55-59	28	23	51	22	25	23
60-64	35	36	71	26	30	28
65-69	34	23	57	44	45	44
70+	132	88	220	97	112	100
TOTAL :	962	944	1,906	16.5	16.7	16.6

*Infant mortality calculated using number of live births from May, 1967-April, 1968 as denominator.

TABLE 4

DISTRIBUTION OF INFANT DEATHS BY AGE AT TIME OF DEATH, AND SEX
Year 1967-68

Age	Male	Female	Both Sexes	Rate/1,000		
				Male	Female	Both Sexes
Neonatal						
0-7 days	119	106	225	44.9	41.5	43.2
8-29 days	75	53	128	28.3	20.8	24.6
Post Neonatal						
1-12 months	143	157	300	53.9	61.5	57.6
TOTAL :	337	316	653	127.1	123.8	125.4

TABLE 5

DISTRIBUTION OF PERSONS WHO DIED FROM MAY, 1967 TO APRIL, 1968
BY 4-WEEK PERIODS AND AGE.

Months	Week No.	A G E				All Ages
		Under 1	1-4	5-39	40 & above	
May 1-May 28	1-4	44	39	20	36	139
May 29-June 25	5-8	50	29	19	32	130
June 26-July 23	9-12	48	18	20	34	120
July 24-Aug. 20	13-16	36	36	20	30	122
Aug. 21-Sept. 17	17-20	43	26	22	35	126
Sept. 18-Oct. 15	21-24	43	31	16	38	128
Oct. 16-Nov. 12	25-28	53	29	25	49	156
Nov. 13-Dec. 10	29-32	63	41	35	46	185
Dec. 11-Jan. 7	33-36	72	35	21	51	179
Jan. 8-Feb. 4	37-40	61	30	21	51	163
Feb. 5-March 4	41-44	48	33	19	55	155
March 5-April 1	45-48	37	40	21	39	137
April 2-April 30	49-52	55	40	26	45	166
TOTAL :		653	427	285	541	1906

TABLE 6

DISTRIBUTION OF PERSONS WHO DIED DURING ONE YEAR PERIOD ACCORDING TO THEIR AGE AT DEATH AND REPORTED CAUSE OF DEATH
YEAR 1967-68

Cause	A G E					All Ages
	Under 1	1-4	5-14	15-39	40 +	
Fever (all forms)	101	76	25	24	72	298
Acute Diarrhea	8	5	4	4	3	24
Other G. I. Disease	12	75	16	8	91	202
Respiratory Disease	56	25	4	13	65	163
Measles & Smallpox	25	83	27	11	8	154
Accidents	8	39	18	13	13	91
Unknown	343	16	1	8	11	379
Others	100	108	45	64	278	595
All Causes	653	427	140	145	541	1,906

TABLE 7

DISTRIBUTION OF WOMEN WHO EXPERIENCED PREGNANCY FROM
MAY, 1967 TO APRIL, 1968 ACCORDING TO THEIR AGE ON APRIL, 1967
AND THE RESULT OF PREGNANCY

Age \ Result	Miscarriage or abortion (<7m)	Stillbirth (7—9m)	Twin Stillbirth (7—9m)	Live Birth (Male)	Live Birth (Female)	Twin Live Births (Both Male)	Twin Live Births (Both Female)	Twin Live Births (Male and Female)	Twin Male Live Birth and Stillbirth	Twin Female Live Birth and Stillbirth	TOTAL
10—14	8	6	—	48	37	—	—	—	—	—	99
15—19	45	51	—	561	521	3	2	1	—	—	1,184
20—24	55	45	3	705	692	6	2	1	1	1	1,511
25—29	44	60	—	700	715	3	—	4	2	—	1,528
30—34	40	33	—	361	320	2	2	4	—	—	762
35—39	21	16	—	173	182	—	—	2	—	—	394
40—44	5	8	—	40	46	—	1	2	—	—	102
45+	2	—	—	20	12	—	—	—	—	—	34
All Ages	220	219	3	2,608	2,525	14	7	14	3	1	5,614

Male Live Births = 2,653
Female Live Births = 2,554

Total Live Births = 5,207 Sex Ratio at Birth—103.8

TABLE 8

DISTRIBUTION OF WOMEN WHO EXPERIENCED PREGNANCY, ACCORDING
TO THE MONTH OF TERMINATION
YEAR 1967-68

Month of Termination	Pregnancy				All Pregnancies	Pregnancy				All Pregnancies
	1	2,3	4-7	8+		1	2,3	4-7	8+	
	No.	No.	No.	No.		%	%	%	%	
1967 May	82	108	155	61	406	8.4	6.9	7.0	7.2	7.2
June	69	98	149	62	378	7.0	6.3	6.7	7.3	6.7
July	80	96	125	36	337	8.2	6.1	5.6	4.2	6.0
Aug.	74	98	154	54	380	7.5	6.3	7.0	6.4	6.8
Sep.	75	132	158	54	419	7.6	8.4	7.1	6.4	7.5
Oct.	132	200	287	89	708	13.5	12.8	12.9	10.5	12.6
Nov.	106	174	255	95	630	10.8	11.1	11.5	11.2	11.2
Dec.	101	187	251	100	639	10.3	12.0	11.3	11.8	11.4
1968 Jan.	91	125	190	82	488	9.3	8.0	8.6	9.6	8.7
Feb.	63	120	188	77	448	6.4	7.7	8.5	9.1	8.0
Mar.	65	147	158	70	440	6.6	9.4	7.1	8.2	7.8
Apr.	43	78	150	70	341	4.4	5.0	6.8	8.2	6.1
TOTAL :	981	1,563	2,220	850	5,614	100.0	100.0	100.0	100.0	100.0

TABLE 9

DISTRIBUTION OF "FETAL WASTAGE" ACCORDING TO THE MONTH OF
OCCURANCE
YEAR 1967-68

Month		Abortions or Miscarriage (<7m)	Still births :	Total fetal wastage :
1967	May	20	23	43
	June	43	20	63
	July	24	6	30
	Aug.	21	8	29
	Sept.	21	23	44
	Oct.	19	25	44
	Nov.	14	18	32
	Dec.	8	32	40
1968	Jan.	9	19	28
	Feb.	20	29	49
	March	11	14	25
	April	10	5	15
TOTAL :		220	222	442

TABLE 10
DISTRIBUTION OF WOMEN WHO EXPERIENCED PREGNANCY FROM MAY 1967 TO
APRIL 1968 ACCORDING TO THEIR AGE ON APRIL 1967 AND TOTAL NUMBER OF
PREVIOUS PREGNANCIES

Age	Number of Previous Pregnancies												Total	Mean
	0	1	2	3	4	5	6	7	8	9	10	11	12+	
10-14	90	9	—	—	—	—	—	—	—	—	—	—	—	99
15-19	694	345	108	23	9	3	2	—	—	—	—	—	—	1184
20-24	175	389	395	280	129	91	37	9	4	1	—	—	1	1511
25-29	17	89	169	274	323	256	188	114	53	24	14	3	4	1528
30-34	3	14	31	50	92	130	144	124	73	59	19	12	11	762
35-39	1	5	9	21	22	46	59	67	64	47	25	14	14	394
40-44	1	—	1	4	6	7	16	9	19	11	14	6	8	102
45+	—	—	—	—	2	1	4	3	5	7	2	5	5	34
All Ages	981	851	713	652	583	534	450	326	218	149	74	40	43	5614
%	17.47	15.16	12.70	11.61	10.38	9.51	8.02	5.80	3.88	2.65	1.32	.71	.77	
Cumulative %	17.47	32.63	45.33	56.94	67.33	76.84	84.86	90.66	94.54	97.19	98.51	99.22	99.99	

TABLE 11
DISTRIBUTION OF WOMEN WHO EXPERIENCED PREGNANCY FROM MAY 1967 TO
APRIL 1968 ACCORDING TO THEIR AGE ON APRIL 1967 AND NUMBER OF LIVING
CHILDREN

Age	Number of Living Children											Total	Mean
	0	1	2	3	4	5	6	7	8	9	10	11 +	
10-14	97	2	—	—	—	—	—	—	—	—	—	—	.02
15-19	862	265	42	13	2	—	—	—	—	—	—	—	.33
20-24	307	513	448	170	51	21	—	—	1	—	—	—	1.48
25-29	59	182	352	449	282	139	47	15	3	—	—	—	2.92
30-34	8	39	94	167	193	147	65	37	6	4	2	—	3.92
35-39	3	18	38	60	64	75	67	49	16	3	1	—	4.60
40-44	1	1	6	17	19	16	16	15	5	6	—	—	4.97
45+	—	1	—	5	5	3	9	3	1	4	2	1	5.74
All Ages	1337	1021	980	881	616	401	204	119	32	17	5	1	5614
%	23.82	18.19	17.46	15.69	10.97	7.14	3.63	2.12	.57	.30	.09	.02	
Cumulative %	23.82	42.01	59.47	75.16	86.13	93.27	96.90	99.02	99.59	99.89	99.98	100.00	

TABLE 12

DISTRIBUTION OF WOMEN WHO EXPERIENCED PREGNANCY FROM MAY 1967 TO
APRIL 1968 ACCORDING TO THEIR AGE ON APRIL 1967 AND TOTAL NUMBER OF
CHILDREN BORN ALIVE BUT DEAD AT THE TIME OF REPORT

Age	Number of Children Died											Total	Mean
	0	1	2	3	4	5	6	7	8	9	10	11 +	
10-14	95	4	—	—	—	—	—	—	—	—	—	—	.04
15-19	1006	147	27	3	1	—	—	—	—	—	—	—	.18
20-24	933	385	126	47	14	6	—	—	—	—	—	—	.57
25-29	566	474	293	104	56	19	15	1	—	—	—	—	1.17
30-34	180	215	155	133	39	24	10	3	2	1	—	—	1.71
35-39	66	122	87	50	45	11	11	1	—	2	—	1	1.93
40-44	17	25	23	15	7	6	3	3	—	—	1	—	2.33
45 +	4	11	3	9	2	2	2	—	—	—	1	—	2.47
All Ages	2867	1383	714	361	164	68	41	8	2	4	1	1	5614
%	51.06	24.63	12.72	6.43	2.92	1.21	.73	.14	.04	.07	.02	.02	
Cumulative %	51.06	75.69	88.41	94.84	97.76	98.97	99.70	99.84	99.88	99.95	99.97	99.99	

TABLE 13
AGE SPECIFIC BIRTH RATE PER 1,000 WOMEN
 Year 1967-68

Age of Mother	No. of Women	Live Births	Rate/1,000 Women
10—14	7,212	62	8.6
15—19	4,020	934	232.3
20—24	4,610	1,538	333.6
25—29	4,668	1,388	297.3
30—34	3,858	788	204.3
35—39	2,823	361	127.9
40—44	2,349	104	44.2
45—49	1,657	32	19.3
TOTAL :	31,197	5,207	166.9

TABLE 14
MIGRATION RATE FOR THE YEAR 1967-68 BY AGE AND SEX

Age	Male (%)		Female (%)		Total (%)		Net (%)		
	In	Out	In	Out	In	Out	Male	Female	Total
0—4	2.61	2.90	2.75	3.17	2.68	3.04	(-)0.29	(-)0.42	(-)0.36
5—9	2.25	2.68	2.01	2.59	2.13	2.64	(-)0.43	(-)0.58	(-)0.51
10—14	3.21	5.19	5.05	7.99	4.06	6.48	(-)1.98	(-)2.94	(-)2.24
15—19	6.34	13.83	14.50	11.57	10.28	12.74	(-)7.49	(+)2.93	(-)2.46
20—24	6.00	12.04	4.75	4.95	5.25	7.75	(-)6.04	(-)0.20	(-)2.50
25—29	6.30	9.78	3.30	3.38	4.53	6.01	(-)3.48	(-)0.08	(-)1.48
30—34	4.66	7.10	2.33	2.20	3.42	4.48	(-)2.44	(+)0.13	(-)1.06
35—39	3.26	6.28	1.38	1.66	2.39	4.15	(-)3.02	(-)0.28	(-)1.76
40—44	3.43	5.49	1.15	1.49	2.38	3.65	(-)2.06	(-)0.34	(-)1.27
45—49	2.44	4.19	1.03	1.99	1.83	3.24	(-)1.75	(-)0.96	(-)1.41
50—54	2.53	2.96	1.33	1.66	1.97	2.36	(-)0.43	(-)0.33	(-)0.39
55—59	1.35	2.39	0.98	2.07	1.20	2.25	(-)1.04	(-)1.09	(-)1.05
60—64	1.68	1.68	1.49	1.41	1.59	1.55	0.0	(+)0.08	(+)0.04
65+	1.03	1.64	2.71	1.69	1.69	1.66	(-)0.61	(+)1.02	(+)0.03
TOTAL:	3.36	5.38	3.64	4.05	3.50	4.73	(-)2.02	(-)0.31	(-)1.23

Negative sign in parentheses indicates net Out-Migration from the area and conversely Positive sign indicates net In-Migration.

TABLE 15

DISTRIBUTION OF MALES WHO MIGRATED INTO THE AREA ACCORDING
TO THEIR AGE AND CAUSE OF MIGRATION

Year 1967-68.

Cause Age :	Marriage	Divorce & Widowhood	Study	Work & occupation	Dwelling facilities	Returning home	Others	Migrated as dependents	Not reported	Total
0-4	—	—	—	—	1	3	7	242	2	255
5-9	—	—	18	2	8	19	7	181	12	247
10-14	—	—	55	20	18	81	5	77	13	269
15-19	1	—	100	29	16	98	2	12	15	273
20-24	2	—	33	16	16	78	6	1	29	181
25-29	1	—	7	25	27	109	7	—	28	204
30-34	3	—	1	12	22	80	8	—	31	157
35-39	—	—	—	15	20	48	1	—	23	107
40-44	1	—	—	11	11	48	2	—	22	95
45-49	1	—	1	2	6	34	2	—	7	53
50-54	—	—	—	9	9	24	—	—	11	53
55-59	—	—	—	3	2	8	—	—	4	17
60-64	—	—	—	5	8	6	2	—	2	23
65+	—	—	—	4	4	10	1	—	3	21
TOTAL :	9	—	215	153	163	646	50	513	202	1956
P. C.	0.5	—	11.0	7.8	8.6	33.0	2.6	26.2	10.3	100.0

TABLE 16

DISTRIBUTION OF FEMALES WHO MIGRATED INTO THE AREA ACCORDING
TO THEIR AGE AND CAUSE OF MIGRATION

Year 1967-68

Cause. Age :	Marriage.	Divorce & Widowhood.	Study.	Word & Occupation.	Dwelling facilities.	Returning home.	Others.	Migrated as dependents.	Not reported.	Total.
0-4	—	—	—	—	3	4	8	242	5	262
5-9	—	—	3	1	3	16	5	172	10	210
10-14	199	21	5	4	15	27	5	75	13	364
15-19	347	52	—	—	23	61	19	59	22	583
20-24	38	23	—	—	26	42	10	55	25	219
25-29	7	9	—	—	20	41	2	63	12	154
30-34	8	3	—	1	14	19	1	29	15	90
35-39	2	1	—	—	8	7	2	12	7	39
40-44	3	—	—	1	5	7	2	8	1	27
45-49	1	—	—	—	8	3	1	4	—	17
50-54	1	—	—	—	8	3	—	7	5	24
55-59	—	—	—	—	3	2	—	1	3	9
60-64	—	—	—	—	6	4	1	3	4	18
65+	—	—	—	—	8	13	1	6	9	37
TOTAL :	606	109	8	7	150	249	57	736	131	2053
P. C.	29.5	5.3	0.4	0.3	7.3	12.1	2.8	35.8	6.4	100.0

TABLE 17

DISTRIBUTION OF MALES WHO MIGRATED OUT OF THE AREA ACCORDING
TO THEIR AGE AND CAUSE OF MIGRATION
Year 1967-68

Cause. Age :	Marriage.	Divorce & Widowhood.	Study.	Work & Occupation.	Dwelling facilities.	Returning home.	Others.	Migrated as dependents.	Not reported.	Total.
0-4	—	—	—	—	6	—	4	271	—	281
5-9	—	—	20	25	10	—	17	221	4	297
10-14	1	—	61	210	17	—	36	101	9	435
15-19	—	—	92	398	43	—	39	12	12	596
20-24	1	—	46	271	11	—	21	1	12	363
25-29	1	—	10	239	37	—	19	—	11	317
30-34	—	—	1	166	47	—	16	—	9	239
35-39	—	—	—	134	52	—	15	—	5	206
40-44	—	—	—	103	37	—	7	1	4	152
45-49	—	—	—	66	11	—	11	—	3	91
50-54	—	—	—	37	14	—	10	—	1	62
55-59	—	—	—	15	7	—	7	—	1	30
60-64	—	—	—	6	8	—	9	—	—	23
65+	—	—	—	13	12	—	8	1	1	35
TOTAL :	3	—	230	1683	312	—	219	608	72	3127
P. C.	0.1	—	7.4	53.8	10.0	—	7.0	19.4	2.3	100.0

TABLE 18

DISTRIBUTION OF FEMALES WHO MIGRATED OUT OF THE AREA
ACCORDING TO THEIR AGE AND CAUSE OF MIGRATION
Year 1967-68

Cause Age :	Marriage	Divorce & Widowhood	Study	Work & Occupation	Dwelling facilities	Returning home	Others	Migrated as dependents	Not reported	Total
0-4	—	—	1	—	12	—	14	272	3	302
5-9	17	—	7	1	16	—	20	207	2	270
10-14	373	19	16	8	21	—	25	106	8	576
15-19	217	55	9	8	35	—	36	93	12	465
20-24	25	23	2	4	39	—	18	106	11	228
25-29	14	4	—	3	29	—	11	96	1	158
30-34	4	3	—	5	17	—	7	45	4	85
35-39	—	—	—	—	13	—	4	29	1	47
40-44	2	—	—	2	8	—	4	17	2	35
45-49	1	1	—	—	12	—	4	13	2	33
50-54	—	—	—	—	7	—	5	15	3	30
55-59	—	—	—	2	5	—	4	6	2	19
60-64	—	—	—	2	5	—	1	7	2	17
65+	1	—	—	—	6	—	5	10	1	23
TOTAL :	654	105	35	35	225	—	158	1022	54	2288
P. C.	28.6	4.6	1.5	1.5	9.8	—	6.9	44.7	2.4	100.0

THE STUDY AREA

Matlab is located in the deltaic area of East Pakistan which is intersected by innumerable tidal rivers and canals, branches of the large rivers, Ganges, Brahmaputra and Meghna. The climate is sub-tropical, with the Tropic of Cancer passing through the area. There are three seasons: monsoon; cool, dry; and hot, dry. Most of the annual average rainfall of 85 inches falls during the monsoon which extends from June through September. It rains almost daily and most of the area is flooded. This is followed by the cool, dry season extending until February. During this time there is little rain; the days are pleasant and warm and the evenings cool. The hot, dry season begins in March and ends with the beginning of the monsoon.

The people are almost entirely indigenous Bengalis. Over three quarters are Muslim. The great majority of the remainder are Hindu. Less than 25% are literate. The principal occupations are agriculture and fishing, the latter being mainly a Hindu occupation. Most of the farmland is given to rice, the dietary staple, and jute, the cash crop.

Villages have an average population of 1,000 persons. Each village is divided into many *baris*, a unit of two or more patrilineally-related families. Each family has its own one- or two-room house with a mud floor, jute stick walls and a thatched grass or galvanized iron roof. The houses in *baris* are arranged around a central courtyard. The average population density approaches 1,700 per square mile. During the monsoon when most of the land is under water, the actual population density is much higher.

METHODS

The census was taken in March and April 1966 by four teams, each consisting of two trained field workers. Each village was assigned a census number and the workers went from house to house collecting the basic information from each family on a simple form (Appendix II). For this study, a family was defined as a hearth unit, i.e. a group which eat together. There were commonly several patrilineally-related families living around a single courtyard in a unit called a *bari*.

Families were identified by the name of the family head and the location. The family members were listed by name, age and sex. Efforts were made to obtain a reasonably accurate age by beginning with the age of the youngest child in the family and then obtaining the ages of the older children and of the parents and other members. The census workers made an effort to correct any obvious discrepancies in the ages reported by the informants. No effort was made, however, to verify the reported ages by such means as dating of historical events.

At the completion of this census, census books were made up in triplicate from the family census sheets arranged in geographical order. Every individual was assigned a census number consisting of the village number and an individual serial number within the village.

One copy of the census book was returned to the field worker who used them to issue individual family census cards to every family. At this time any discrepancies which were noted by the field workers were reported to the central office and corrected.

Surveillance for births and deaths was maintained by several levels of workers. A local female resident of each village was recruited to visit each household daily and enquire regarding births and deaths. A male field assistant supervised from 3 to 5 of these lady field workers. These men, with the equivalent of a high-school education (matriculates), visited each family an average of twice weekly and registered all the births and deaths and migrations on standard forms (Appendices III, IV, and V). Supervision of this phase of work was maintained by Sanitary Inspectors who visited each household approximately twice a month to check on the completeness of birth and death registration. In turn, these workers were supervised by the Field Surveillance Supervisor and his Deputy who were responsible for the co-ordination of the field work.

DEFINITIONS

Only regular residents of the villages under study were included in the census. This excluded temporary visitors or guests who were present at the time the census was obtained. An individual who had a regular job outside the village but returned to his village home a minimum of one time a month was considered a resident. Likewise, migratory workers such as fishermen who were gone for six months of the year but return for the remaining six months were also considered as residents. An individual who regularly lived outside the village and returned to the village to visit less than one time a month was not considered a resident.

These same definitions applied to the registration of births and deaths in this area. All births which occurred to individuals included in the census, irrespective of the places of occurrence of births, were registered and included in the calculation of the birth rates to the study population. Births which occurred within the study villages to temporary visitors were (duplicated) registered but were excluded from the calculation of birth rates. Similarly, all deaths among residents included in the census were registered, regardless of place of occurrence for the calculation of death rates. Deaths that occurred within the study area, but not to residents included in the census were registered but were excluded in the calculation of death rates.

In the registration of migrations, an emigrant was an individual who was originally listed on the census as a resident, but had permanently moved out of the study villages. Likewise, an immigrant was an individual who permanently moved into the study villages from outside the area. Permanent migrations between the 132 villages which were within the study area were noted by the field workers but were not classified as migrations into or out of the area. There was no registration of transient visitors. A permanent "out-migrant" was by definition one who did not return to the village for 6 consecutive months or who returned to his home less than 1 time a month. The same time limitation applied to immigrants. Because of this time requirement, there was often a delay in submitting migration reports, if the individual (or his family) were uncertain as to the permanency of the migration. This was particularly true when a person left in search of a job.

Appendix II

PAKISTAN-SEATO CHOLERA RESEARCH LABORATORY VACCINE TRIAL

Family Census Sheet

Head of the family _____ (N A M E) _____ Identifying information of the Household _____
 Village _____ Union _____ Thana _____ P. O. _____ Dist. _____

Serial No.	Immunization Schedule						Ind. No.	Name	Age	Sex	Prev.		Inc.		Remarks
	Type	Date	Type	Date	Type	Date					Type	Date	Yes	No.	
							1								
							2								
							3								
							5								
							6								
							7								
							8								
							9								
							10								
							11								
							12								
							13								
							14								

PAKISTAN-SEATO CHOLERA RESEARCH LABORATORY

Birth Report

Census No. _____ Serial No. _____

Name of newborn _____ (Leave blank if no name given)

Sex _____ This birth was: Single _____ Twin _____ Triplet _____

Date of birth : Day _____ Month _____ Year _____

Father's name _____ Census No. _____ Age _____

Mother's name _____ Census No. _____ Age _____

Previous deliveries to mother (Do not include this birth) : _____

How many other children now living ? _____

How many other children born alive, now dead ? _____

How many children born dead ? _____

Place where birth occurred : _____

(Village, P. O., Thana)

Usual residence of mother : _____

(Village, P. O., Thana)

Is infant now well ? Yes _____ No _____ if no describe illness : _____

Is mother now well ? Yes _____ No _____ if no describe illness : _____

Remarks : _____

Reported by : _____ Date _____

Instructions : This form is to be completed for :

1. All births that occur within the vaccine trial villages. If a mother from outside the trial area comes to a trial village to have her baby, complete this report and indicate in the Remarks that the mother is not a resident of the trial area.
2. All births to residents of the trial villages. If a mother in the census goes to another village (or Dacca) to have her baby, when she returns the birth is to be registered.

If the baby is born alive, but then dies, a birth report, and a death report must be completed.

If a baby is born dead only a birth report is to be completed, with the statement BORN DEAD in the Remarks line.

PAKISTAN-SEATO CHOLERA RESEARCH LABORATORY

Death Report

Census No. _____ Serial No. _____

Name of deceased _____ Age _____ Sex _____

Date of death: Day _____ Month _____ Year _____

Place where death occurred: _____
(Village, P. O., Thana)

Usual residence of deceased : _____
(Village, P. O., Thana)

Was illness associated with diarrhea: Yes _____ No _____

If diarrheal illness, was culture obtained: Yes _____ No _____

Describe events leading up to death: _____

Remarks : _____

Reported by _____ Date _____

Instructions :

This form is to be completed for :

1. All deaths that occur within the trial villages. If a person from outside the trial area dies in a trial village, indicate in the Remarks section that he is not a resident.
2. All deaths that occur to residents of the trial area who are in the census, regardless of where the death takes place.

Appendix V

PAKISTAN-SEATO CHOLERA RESEARCH LABORATORY

Report of Migration Into/Out of census area

Census No.	Name.	Age.	Sex.

For persons *leaving* the trial area :

Date of moving: Day _____ Month _____ Year _____

Reason for leaving: _____

Where to : _____

For persons coming into trial area :

Date of arriving: Day _____ Month _____ Year _____

Reason for coming: _____

Where from: _____

Instructions :

This form is only to be completed on persons coming in, or moving out of the trial area. Persons moving from one village (or one house) to another *within* the trial area should only be indicated in the field census books that they have left their original home, and they should be entered in the census book at their new location.

For a person, or family leaving the trial area, list all individuals above, and give date and reason for moving.

For a person, or family arriving in the census trial area, list their names, ages and sex, and the date of arrival. Also complete a family census sheet and send in with this form. The sheet will be copied in the office, census numbers will be assigned, and a copy will be returned to the field for insertion in the field book.

Reported by : _____

Date : _____