

The 1980 Somalia Fertility and Mortality Survey of Benadir, Bay, and Lower Shebelle: A Summary of Results



The International Program of Laboratories for Population Statistics (POPLAB) of the University of North Carolina at Chapel Hill is involved in a project entitled "Birth and Death Data Collection" sponsored by the United States Agency for International Development. The basic objective of this project is to assist developing countries in collecting and analyzing data on levels and trends in fertility and mortality through the use of sample surveys. These surveys are of three types: (1) add-on, adding fertility/mortality questions to existing household surveys, (2) new, initiating new fertility/mortality surveys, and (3) broad surveys, new or add-on, which include collection and analysis of data on variables such as socioeconomic status, labor force participation, migration, use of family planning, as well as basic fertility/mortality questions. POPLAB provides technical and financial assistance in the design, organization, implementation, and analysis of all three types of surveys.

El Programa Internacional de Laboratorios para Estadísticas de Población (POPLAB) de la Universidad de Carolina del Norte en Chapel Hill, está involucrado en un proyecto titulado 'Colección de Datos sobre Muertes y Nacimientos' financiado por la Agencia Internacional para el Desarrollo. El objetivo principal de este proyecto es el de prestar asistencia a los países en desarrollo en la colección y análisis de datos sobre niveles y tendencias de fecundidad y mortalidad por medio del uso de encuestas de muestreo. Tales encuestas son de tres tipos: (1) aumentadas, es decir agregando preguntas sobre fecundidad/mortalidad a encuestas e hogares existentes, (2) nuevas encuestas de fecundidad/mortalidad, y (3) extensas, nuevas o aumentadas, las cuales incluyen colección y análisis de datos de variables tales como nivel socioeconómico, participación en el fuerza de trabajo, migración, uso de planificación familiar, además de preguntas básicas sobre fecundidad/mortalidad. El POPLAB provee asistencia técnica y financiera para el diseño, organización, implementación, y análisis de estos tres tipos de encuestas.

This report is the fourth in a series containing the major findings of demographic surveys in countries participating in the POPLAB program. The full report of the 1980-81 Somalia Fertility and Mortality Survey of Benadir, Bay, and Lower Shebelle was published by the Central Statistical Department, Ministry of National Planning, Government of Somalia in fall 1981. POPLAB gratefully acknowledges the cooperation of the Central Statistical Department in publishing this summary.

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The 1980-81 Somalia Fertility and Mortality Survey
of Benadir, Bay, and Lower Shebelle: A Summary of Results

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THE 1980-81 SOMALIA FERTILITY AND MORTALITY SURVEY OF BENADIR, BAY, AND LOWER SHEBELLE: A SUMMARY OF RESULTS

POPLAB Staff

COUNTRY BACKGROUND

The Somali Democratic Republic is situated on the easternmost tip of Africa, known as the "Horn of Africa". Somalia encompasses roughly 250,000 square miles and is comparable in size to the state of Texas. Somalia is bounded to the northwest by Djibouti, to the west by Ethiopia, and to the southwest by Kenya. Its entire northern and eastern sides are bounded by oceans. Most of the land is flat, semiarid terrain which receives less than twenty inches of rain annually. Harsh climatic conditions permit very little agriculture; the majority of Somalia's population of roughly four million inhabitants are nomads.

Demographic data about Somalia are extremely scarce. The first modern census was conducted in 1975; however, because of delays in processing the data, no final figures have been released. Prior to the census, a series of pilot surveys was conducted in selected districts and towns. Due to small sample sizes used in these surveys, the vital rates produced were erratic and unreliable. National estimates made by the United Nations indicate a crude birth rate of 49, a death rate of 20, and an infant mortality rate of 154 (United Nations, 1979: tables 14 and 21). It is expected that results from the national demographic household survey, conducted in 1980, will improve the data situation in the near future. This report summarizes data from that survey.

THE SURVEY

The 1980-81 Somalia Fertility and Mortality Survey of Benadir, Bay, and Lower Shebelle (hereafter referred to as the Demographic Survey) was conducted by the Central Statistical Department of the Ministry of National Planning. The major objective of the survey was to produce basic demographic indicators such as birth and death rates for these regions. In addition, the survey collected data on education, literacy, internal migration, and for the settled population, labor force participation and occupation. Because of differences in the questionnaires and the logistics of fieldwork, data collection was carried out in two phases: (1) September-October 1980 for those people living in Mogadishu and in other towns and villages, ("settled" population), and (2) March 1981 for the nomadic population.

The Demographic Survey was conducted in collaboration with the International Program of Laboratories for Population Statistics (POPLAB) at the University of North Carolina at Chapel Hill, U.S.A., which provided partial financial assistance as well as technical expertise through short-term visits to Somalia by members of the POPLAB staff. Administrative aspects of the survey were the responsibility of the Ministry of National Planning.

The Demographic Survey was limited to a study area comprised of the capital city, Mogadishu, (Benadir Region) and the Bay and Lower Shebelle Regions.¹ This area, indicated on the map in figure 1, was selected because of its relative importance in terms of population size and agricultural production, and because of the proximity of the latter two regions to the capital. According to preliminary data from the 1975 Census, the study area contained just over one million inhabitants, or slightly less than one-third of the nation's population. Almost three-fourths of the settled population of the study area is urban, with over half of the inhabitants living in Mogadishu. The remainder of the settled population is mostly small-scale subsistence farmers. An unknown and varying proportion of the study area's population consists of nomads.

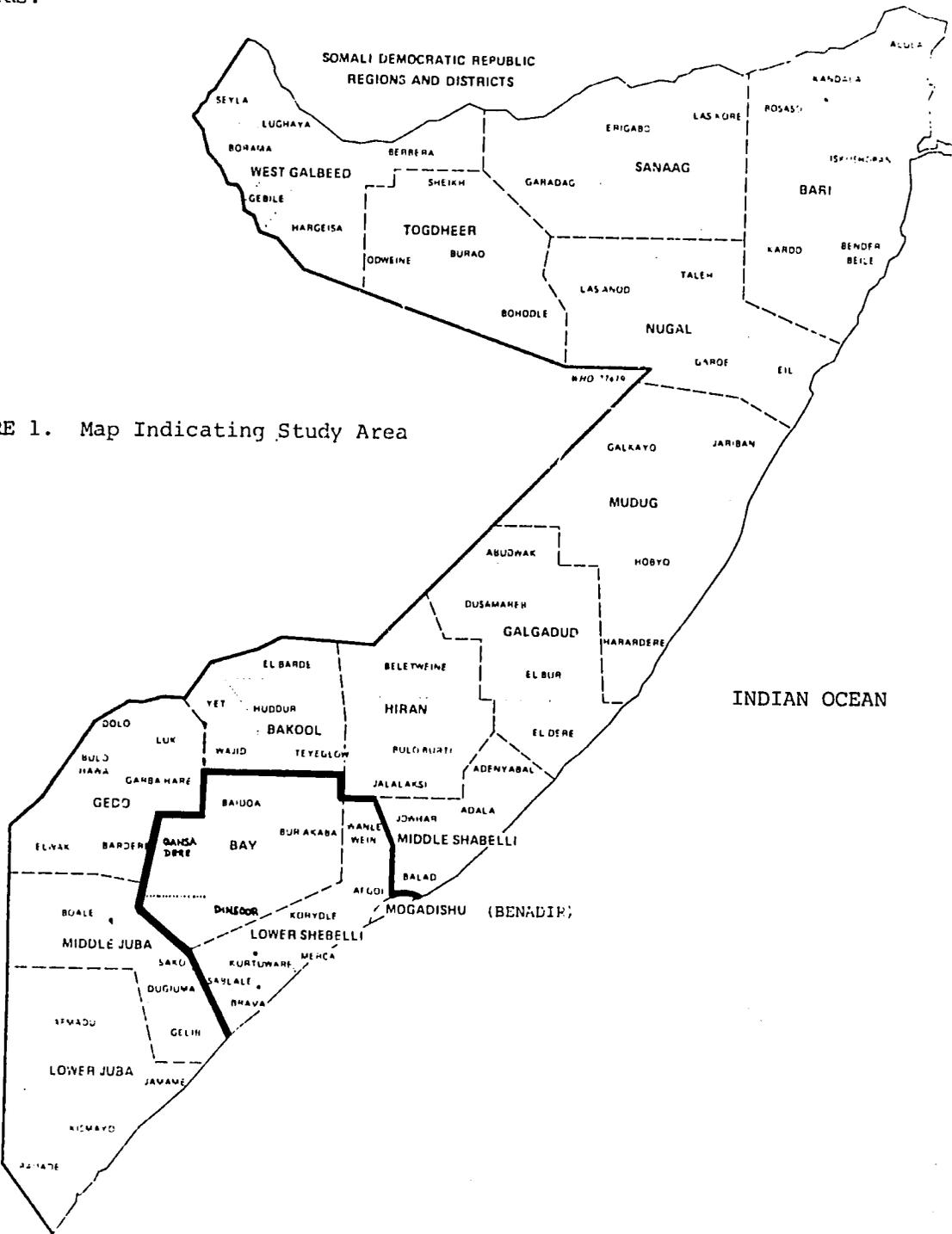


FIGURE 1. Map Indicating Study Area

¹There are sixteen regions in Somalia.

Two questionnaires were used in the Demographic Survey: one for the settled population, and the other for the nomads. However, the content of the two differed only slightly. Both included basic information such as age, sex, marital status, and literacy. In addition, all respondents were asked about the survivorship of their parents, from which mortality estimates can be derived, and all adult women were asked a series of questions on fertility: the number of sons and daughters she had ever given birth to, as well as the date, sex, and survivorship status of her last live birth. The questionnaire used in the survey of the settled population included questions about labor force participation and occupation. Both questionnaires were printed and administered in the Somali language.

The self-weighting sample of 7,219 settled households was a stratified multi-stage area sample with primary sampling units which were administrative entities in urban areas and groups of one or more villages in rural areas. The sampling frame was a list of these units, together with the estimated number of households located in each. The response rate for the settled survey population was 93 percent. The 432 households which comprise the sample of nomads were enumerated at waterholes. The nomadic population relies on these watering holes to water their animals during the dry seasons. Therefore, the sample of the nomad population was not self-weighting since the probability of selection was related to the length of time between watering, which in turn, depends on the type of animals being herded. The size of the sample of nomads was much smaller than anticipated due to the early onset of heavy rains which adversely affected data collection efforts.

Data collection for the settled population was carried out by five teams, each comprised of five to six interviewers. Each team had one supervisor and its own vehicle and driver. Almost half of the twenty-nine interviewers were regular employees of the Ministry of National Planning and had prior experience in conducting interviews. The other half of the interviewers were secondary school students. Interviewing of nomads was conducted by twelve interviewers organized into three teams with one supervisor each. In order to ensure an unbiased sample, fieldworkers camped on site, near the sampled waterpoints.

After undergoing several manual editing procedures, the data were entered onto magnetic tape and passed through a computer editing process. Analysis of the data depended heavily on indirect techniques for the estimation of demographic parameters, such as birth and death rates. Due to the small sample size, only rough estimates are available for the nomadic population. Thus, in this report, findings have been presented separately for the settled and nomadic populations.

FINDINGS

Age and Sex Distribution

The distribution of the settled population by age and sex is depicted graphically in figure 2. The broad base of this population pyramid is indicative of relatively high fertility. Another indication of the "youthfulness" of the settled population is that 44 percent of the population is under the age of 15 years. The alternating jagged "steps" of the population pyramid above age 35, are due to an extreme preference on the part of respondents to report ages that end in zero. This digit preference, or

FIGURE 2. Population Pyramid by Five-Year Age Groups, De Facto Settled Population

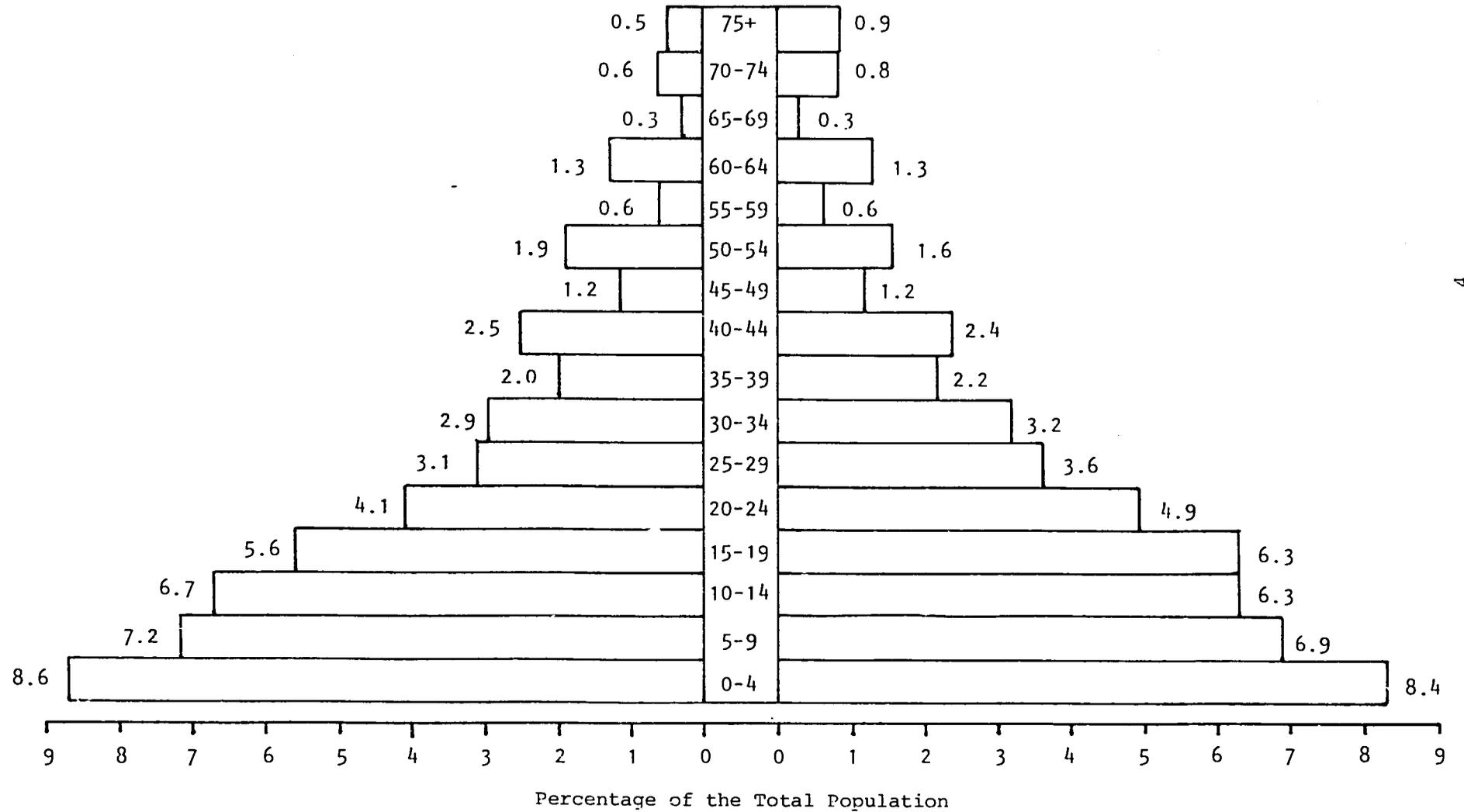
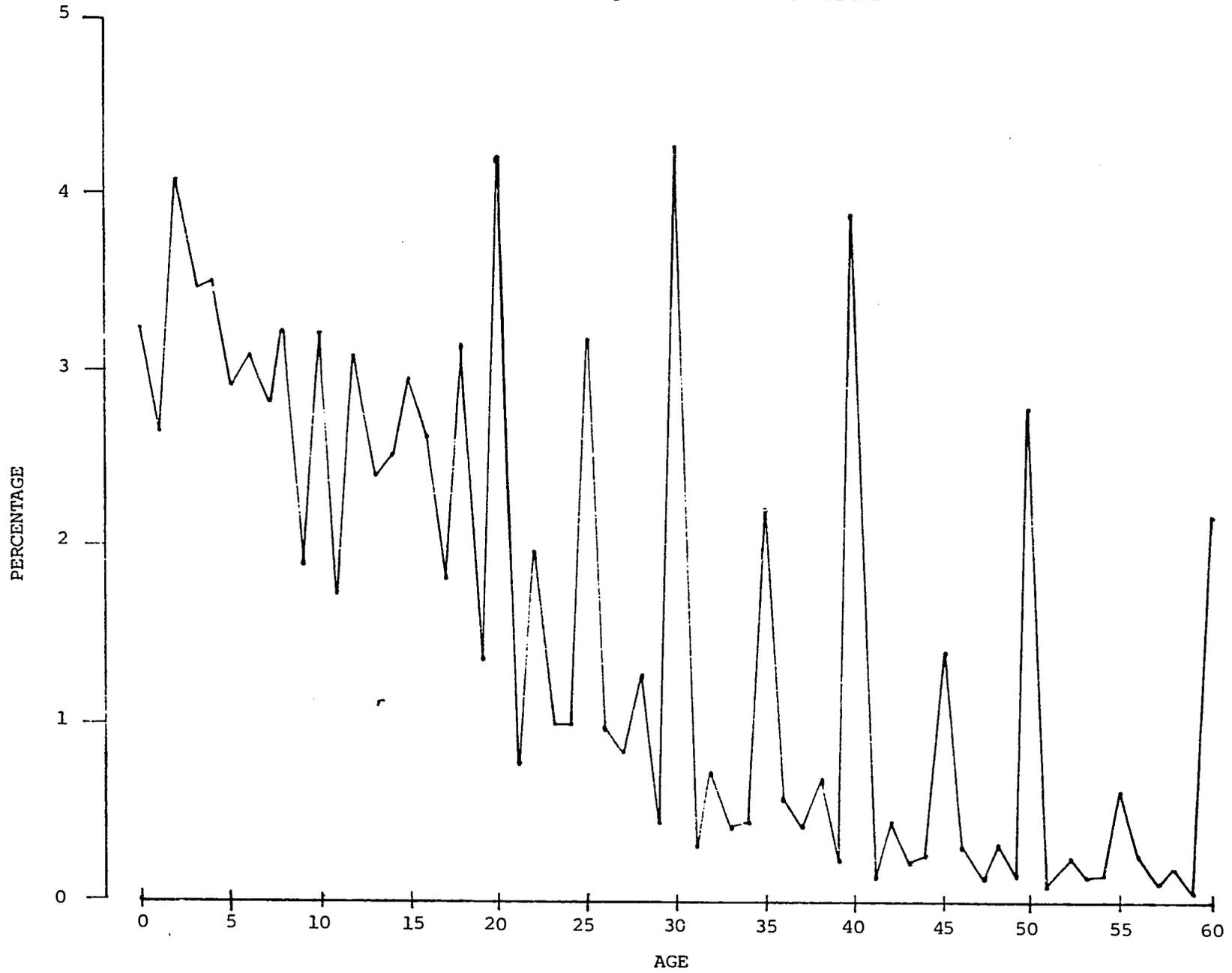


FIGURE 3. Percentage Distribution of the De Facto Settled Population by Single Year of Age, Both Sexes Combined



"age heaping" is shown in figure 3, which illustrates the distribution of the settled population by single year of age. Almost 50 percent of respondents between ages 10 and 60 reported an age that ended in either zero or five. The overall Myers' index of digit preference (Shryock and Siegel, 1971), is 30.4 for the settled population.

Although the overall sex ratio of the settled population is 96 males per 100 females, the ratio varies considerably by age. While females are predominant in the twenties and thirties, the sex ratio rises at older ages. This rise in the sex ratio is due to greater outmigration of males, and a tendency for women to report their ages as lower than they really are.

Due to the small sample size, only broad generalizations can be made reliably regarding the composition of the nomadic population. Digital preference in age reporting seems to be even more pronounced among nomads than for the settled population. Nomadic society tends to be predominantly male, with an overall sex ratio of 140 males per 100 females. This high sex ratio is probably due to "outmigration" of women from a nomadic to a settled way of life and is partially responsible for the low sex ratio of the settled population.

Marital Status

As indicated in table 1, virtually all Somali women and over 95 percent of Somali men get married at some point in their lives. While three-fourths of the settled

TABLE 1. Percent Never-Married Among Settled and Nomadic Males and Females by Age Group

Age Group	SETTLED POPULATION		NOMADIC POPULATION			
	Males	Females	Males	<i>N</i>	Females	<i>N</i>
15-19	98	72	96	(86)	65	(58)
20-24	71	24	83	(88)	5	(55)
25-29	39	7	51	(46)	2	(47)
30-34	15	2	27	(83)	0	(66)
35-39	7	1	3	(31)	0	(33)
40-44	5	--	3	(66)	0	(78)
45-49	2	0	6	(19)	0	(21)
50-54	2	--	0	(64)	0	(32)
55-59	1	--	
60+	2	--	
Mean Age at Marriage	26.4	20.3	27.8		18.6	

Note: A zero denotes an empty cell, while a dash(--) denotes a value of less than one-half of a percent. Two dots (..) indicate that the information is not available. The unweighted sample sizes (*N*) are given for the nomads to present an idea of the sampling error involved.

SOURCE: Data for this table and all following tables in this report are from the 1980-81 Somalia Fertility and Mortality Survey of Bonadir, Bay, and Lower Shebelle.

women are married by the time they reach age 20-24, almost three-fourths of the male settled population are single at this age. Data for nomads are subject to very high sampling errors and should be interpreted with caution. The average age at first marriage, calculated by Hajnal's method (Shryock and Siegel, 1971) is about 26 for the male settled population and 20 for the female settled population; 28 for male nomads and 19 for female nomads. (Thus there is a rather large age difference between husbands and wives.)

Although marriage is universal among the Somali population, it is not particularly stable. By the time they reach their late forties, 60 percent of ever-married, settled males and half of ever-married, settled females have been married more than once. Comparable figures for nomads are slightly lower.

Fertility

For the settled population of the study area, fertility was measured by comparing two pieces of information: the average number of children ever born to a woman, and the proportion of women who gave birth in the year preceding the survey. Results show a crude birth rate of 49 per thousand population, and a total fertility rate of 7.1 births per woman. Details are given below. Only rough estimates of nomad fertility are available.

Estimates of lifetime fertility were derived from data on the number of children ever born to adult women interviewed in the survey. Each woman aged 12 or over² was asked a series of seven questions; i.e., the number of her own sons and daughters who live with her, who live somewhere else, and who have died; the seventh question on the total number of children she had ever given birth to was essentially a consistency check.

The data show that by the time settled women finish childbearing, they have given birth to over seven children (table 2). Nomadic women have lower lifetime fertility and report an average of only six children at age 45-49. For each sector, the average number of children ever born increases with age, peaking at age group 45-49, after which it declines rapidly. This is a common phenomenon and is usually presumed to occur because older women forget to report all of their live births.

Although rural settled women seem to start childbearing earlier than urban women, by the time they reach their thirties, they report having had fewer live births on average than urban women. By the end of the childbearing period, at age 45-49, nomadic women have the lowest lifetime fertility, followed by rural settled women, women in Mogadishu, and finally, women living in urban areas outside Mogadishu. It has been documented in other cultures that nomadic women have lower fertility than settled women (Henin, 1965). This is often presumed to be a necessity in a migratory society in which women would have difficulty caring for and transporting more than one young baby at a time. However, it is somewhat surprising to find the highest fertility among urban women. Although it is possible that figures for rural women were underreported for some reason, data on recent fertility also reflect the same pattern of higher urban fertility.

²Although the questionnaire included women aged 12 and over, the analysis is based on women aged 15 and over since no women under age 15 reported any births.

TABLE 2. Average Number of Children Ever Born Per Woman
by Age of Woman and by Sector

Age Group of Woman	S E C T O R							(N)
	Total Settled	Rural Settled	Mogadishu	Other Urban	Bay Region Settled	L. Shebelle Region Settled	Nomads*	
15-19	0.15	0.23	0.11	0.16	0.15	0.22	0.2	(58)
20-24	1.19	1.47	0.99	1.49	1.16	1.67	1.4	(55)
25-29	2.82	2.85	2.68	3.22	2.61	3.28	2.3	(47)
30-34	4.14	4.19	3.98	4.61	3.99	4.60	3.7	(66)
35-39	5.94	5.67	5.87	6.46	5.78	6.13	4.6	(33)
40-44	6.64	6.37	6.54	7.25	6.58	6.86	5.0	(78)
45-49	7.35	6.63	7.51	7.79	7.54	6.91	6.1	(21)
50-54	6.49	5.99	6.80	6.58	6.42	6.06	5.1	(32)
55-59	6.69	6.51	7.06	5.94	5.83	6.61	..	
60+	6.11	5.92	6.23	6.11	5.81	6.16	..	

*Due to the small sample size, data for nomads were carried out to only one decimal place. Information for women aged 55 and over is not available. The unweighted number of nomadic women respondents, *N*, is given in parentheses.

All adult women in the sample were asked to report the month and year in which they had their last live birth, if any. From this information, it is possible to calculate age-specific fertility rates by identifying those women whose last birth occurred in the twelve months prior to the date they were interviewed. Rates calculated in this manner are shown in column (2) of table 3. Unfortunately, the sample size for nomads was too small to calculate any measure of recent fertility; therefore, the data in table 3 refer to settled women only.

These reported rates appear to be rather low and do not confirm the much higher level of fertility implied by the average numbers of children ever born presented previously in table 2. The total fertility rate (bottom row of column 2, table 3) can be interpreted as the total number of births an average woman would have by age 50 if fertility rates remain constant over time. The total fertility rate should then be roughly equivalent to the average number of children ever born to women aged 45-49. It is evident that the total fertility rate, as reported, is considerably lower than the average number of children ever born to women 45-49, e.g., 6.0 vs. 7.3 for the entire study area. Underreporting of recent fertility, as found in this survey, is common and is presumed to be due to misperception of time on the part of the respondent. In societies where the dating of events is inexact and/or unimportant, there is often a tendency to push the date further back into time. For example, a woman with a nine or ten-month old infant may tell the interviewer that the baby is about a year old. If she does not know the date of birth, the interviewer may write down a date of birth that excludes the baby from births that occurred in the previous twelve months.

TABLE 3. Calculation of Brass' P/F Method to Adjust Reported Age-Specific Fertility Rates, Settled Population

Age Group	Average Number of Children Ever Born P (1)	Reported Age-Specific Fertility Rates f (2)	Cumulated Age-Specific Fertility F^* (3)	P/F (4)	Adjusted Age-Specific Fertility Rates** (5)
15-19	.1477	.0586	.1176	1.2556	.0701
20-24	1.1925	.2389	.9727	1.2260	.2859
25-29	2.8159	.2782	2.3402	1.2033	.3329
30-34	4.1423	.2264	3.5700	1.1603	.2709
35-39	5.9386	.1869	4.5770	1.2975	.2236
40-44	6.6384	.1242	5.2254	1.2704	.1486
45-49	7.3484	.0802	5.8742	1.2510	.0960
Total x 5	-	5.9820	-	-	7.1400

*Calculated with the AFEMO Computer program (National Academy of Sciences, 1981a) using equations from National Academy of Sciences (1981b).

**The multiplier used was the average of the P/F ratios at ages 20-24, 25-29, and 30-34, or 1.1965.

William Brass (1975) has developed a method of adjusting reported age-specific fertility rates for underreporting of births due to misperception of the timing of events. In short, the *pattern* of reported fertility rates by age is accepted as valid, while the *level* is adjusted to reflect the lifetime fertility of women at younger ages. The results of applying this method to data for settled women are given in column (5) of table 3. The adjusted total fertility rate of 7.1 children per woman is much closer to the average lifetime fertility of women 45-49, (i.e., 7.3). When the adjusted age-specific rates are multiplied by the number of women at each age group, a crude birth rate of 48.7 results.

Similarly, adjusted age-specific fertility rates, by sector, are given in table 4. The total fertility rates follow the same pattern as the data on lifetime fertility, with a low rate in rural areas and the highest rate in urban areas outside Mogadishu. Estimated crude birth rates are 45 in rural areas, 49 in Mogadishu, and 50 in other urban areas. Fertility rates in the Bay Region are uniformly lower than in the Lower Shebelle Region.

TABLE 4. Age-Specific Fertility Rates as Adjusted by Brass' P/F Technique by Sector, Settled Population Only

Age Group	S E C T O R				
	Rural	Mogadishu	Other Urban	Bay	Lower Shebelle
15-19	.081	.060	.080	.078	.088
20-24	.277	.256	.363	.259	.368
25-29	.336	.324	.316	.316	.366
30-34	.235	.278	.283	.251	.275
35-39	.159	.250	.235	.185	.212
40-44	.123	.160	.148	.176	.119
45-49	.049	.123	.089	.119	.049
Total x 5	6.302	7.250	7.563	6.921	7.385
Implied Birth Rate	44.6	48.6	50.3	46.5	51.2

Mortality

The Demographic Survey utilized several methods to estimate mortality parameters for the settled population of the study area. Information on recent deaths was used to construct "direct" measures of mortality similar to those which might result from a vital registration system. However, the crude death rate resulting from this information is only seven per thousand population which is implausibly low.

For this reason, mortality levels for the settled population were estimated using two "indirect" techniques which circumvent the common problem of dating events in time. They rely on data that are conceptually simpler and usually more accurately reported by respondents. Unfortunately, similar estimates could not be made for nomads.

Estimates of child mortality were made from data on the proportion dead among children ever born and produced an estimated infant mortality rate of 160 per thousand births. Adult mortality levels were estimated using data on the proportion dead of respondents' parents (orphanhood statistics). These two pieces of data were combined to construct life tables for males and females, referring to a period roughly eight to ten years before the survey, or approximately 1970-72. The results indicate an expectation of life at birth of 44 years for males and 49 years for females. The crude death rate for the settled population is estimated at 17.8 per thousand population. The analyses used to derive these estimates are described in more detail below.

Infant mortality rates were estimated from data on the proportion dead among children ever born to women in particular age groups which can be considered as an approximation of the probability of dying between birth and certain ages of childhood. Specifically, Brass (1975) has shown that the proportion dead of children born to women aged 20-24 is roughly equivalent to the probability of dying between birth and age 2, and the

proportions dead for children of women aged 25-29 and 30-34 are equivalent to the probabilities of dying before ages 3 and 5, respectively. The model used to convert the proportions dead among children into precise survivorship probabilities must take into account the prevailing fertility pattern. Of the several models available, the Sullivan (1972) method was used here.

The results of this analysis are shown in table 5. The estimates of infant mortality range from a low of 136 per thousand births to a high of 181, depending on the age of woman and the mortality pattern of the region used as a model. Of the four regions, the West model was selected, in part, because it provides estimates that are intermediate to those of other regions, and also because the West model is recommended in the absence of specific information about the mortality pattern.

TABLE 5. Estimates of Infant Mortality Rates by Sex Using Data on Proportions Dead Among Children Ever Born, Sullivan's Model, Settled Population

Age Group of Women (1)	Proportion Dead Among Ever Born (2)	Time Reference of Estimate (Number of Years Prior to Survey) (3)	Infant Mortality Rate Per 1,000 Births by Mortality Region			
			NORTH (4)	SOUTH (5)	EAST (6)	WEST (7)
	<u>BOTH SEXES</u>					
20-24	.200	2	161	156	181	171
25-29	.210	4	138	141	166	154
30-34	.236	6	136	144	175	156
	<u>SONS</u>					
20-24	.220	2	181	174	203	193
25-29	.221	4	149	152	179	166
30-34	.246	6	146	153	187	168
	<u>DAUGHTERS</u>					
20-24	.179	2	140	138	158	149
25-29	.197	4	125	130	152	140
30-34	.226	6	125	135	162	144

The data indicate infant mortality rates of 171, 154, and 156 from data for women aged 20-24, 25-29, and 30-34, respectively. Although the rates imply that infant mortality has risen in recent years, this is probably due to either age misreporting of women, the effect of higher mortality for children of younger women, discussed before, or both. A more likely conclusion is that infant mortality has remained fairly constant

in the six years before the survey. The rates for the three age groups were averaged to give an overall estimate of 160 infant deaths per thousand births. As expected, rates for males exceeded those for females by a margin of 15-30 percent. Averaging the rates for the three age groups gives an infant mortality rate of 176 for males and 144 for females.

Similar mortality data by sector are presented in table 6. Examining only the average infant mortality for the three age groups of women reveals expected differences with the highest rate (181) in rural areas, an intermediate rate (162) in other urban areas, and the lowest rate (147) in Mogadishu. No significant difference exists between the rate for Bay Region (173) and Lower Shebelle Region (174). It should be remembered that these estimates are not exact and that they represent an average of mortality levels for the period roughly 1974-78. It is possible that infant mortality has declined to some extent since then.

TABLE 6. Estimates of Infant Mortality Rates by Sector Using Data on Proportions Dead Among Children Ever Born, Sullivan's Method, Settled Population

		Proportion Dead Among Children Ever Born	Estimated Infant Mortality Rates West Model	Average Estimated Infant Mortality Rates West Model
RURAL	Age Group of Women			
	20-24	.214	174	181
	25-29	.265	187	
30-34	.285	183		
MOGADISHU	20-24	.191	168	147
	25-29	.179	135	
	30-34	.205	139	
OTHER URBAN	20-24	.204	171	162
	25-29	.219	158	
	30-34	.240	157	
BAY REGION	20-24	.198	167	173
	25-29	.239	174	
	30-34	.272	179	
LOWER SHEBELLE REGION	20-24	.213	174	174
	25-29	.249	176	
	30-34	.267	172	

As stated previously, the level of adult mortality for the settled population was estimated indirectly using information on whether or not the *parents* of respondents were alive. The theory behind the method is as follows: the proportion of respondents in a particular age group whose mothers are still alive is an "indication" of the birth probability that a woman would survive from the age at which she gave birth, to that age, plus the mid-point of the age interval of the respondents. However, in order to make these statistics on proportions surviving more useful, they must first be converted into probabilities of surviving from one exact age to another. Several models for carrying out this transformation exist; the one used in this analysis was developed by Brass (1975).

TABLE 7. Calculations to Estimate Adult Mortality Using Data on Paternal and Maternal Orphanhood and the Brass Method, Settled Population

A. MALE MORTALITY (*Paternal Orphanhood*)

Age of Respondent (1)	Proportion With Father Still Alive (Not Orphaned) (2)	Central Age <i>N</i> (3)	Probability of Surviving from Age 32.5 to Age 35+ <i>N</i> $l(35+N)/l(32.5)$ (4)	Level of Mortality in West Model Life Tables (5)	Time Reference of Estimates (Number of Years Before the Survey) (6)
15-19	.7954	20	.7702	14.5	8
20-24	.6847	25	.6608	13.6	10
25-29	.5805	30	.5355	13.1	12
30-34	.4492	35	.3800	12.0	13
35-39	.3181	40	.2468	12.0	15
40-44	.2325	45	.1927	16.4	17
45-49	.1980	50	.0974	--	17

B. FEMALE MORTALITY (*Maternal Orphanhood*)

Age of Respondent (1)	Proportion With Father Still Alive (Not Orphaned) (2)	Central Age <i>N</i> (3)	Probability of Surviving from Age 32.5 to Age 35+ <i>N</i> $l(35+N)/l(32.5)$ (4)	Level of Mortality in West Model Life Tables (5)	Time Reference of Estimates (Number of Years Before the Survey) (6)
15-19	.8818	20	.8772	14.9	8
20-24	.8167	25	.8193	13.9	10
25-29	.7200	30	.7277	12.1	12
30-34	.6365	35	.6506	11.9	13
35-39	.5380	40	.5499	11.8	14
40-44	.4439	45	.4482	12.4	15
45-49	.3911	50	.3816	15.2	15

NOTE: Values of the average age of parents at the birth of their children used in the above table were 28.1 for women and 35.2 for men. The "levels" of mortality refer to levels in Coale and Demeny (1966) model life tables, West Region, and were determined using an estimate of the proportion surviving to exact age 2 (l_2) of .784 for males and .816 for females. The lower the "level" of mortality, the higher the mortality rates.

The raw data in the form of survivorship proportions as well as the transformed survivorship probabilities for the settled population are given in table 7 separately by sex. The table can be interpreted as follows: almost 80 percent of respondents aged 15-19 report that their fathers are still alive. This is transformed into a probability for males of surviving from age 32.5 to age 55 of .7702 (column 4). In making these transformations, the average age of childbearing for *women* (28.1) was calculated from the distribution of births in the past year by age group of mothers. The average age of *fathers* at the birth of their children was estimated by taking the difference between the average age at marriage of males and females ($26.4 - 20.3 = 6.1$) and adding it to the mean age of mothers ($6.1 + 28.1 = 34.2$). The level of adult mortality can be interpreted in terms of the mortality levels in the West family of model life tables (Coale and Demeny, 1966) that each survivorship statistic implies. (See column 5.) Except for the last age group, these levels are relatively constant for the period 12-15 years before the survey. More recently, they show an increase, an indication of decline in mortality.³

It is possible to combine the results from the analyses of adult and childhood mortality to produce overall mortality statistics for the settled population of the study area. Unfortunately, due to the nature of the input data, it is impossible to estimate the level of mortality at the precise time of the survey, and indeed, it is difficult to determine the time reference of any overall statistics since each piece of the whole refers to a somewhat different point in time. However, in this analysis, life tables that refer to a period approximately eight to ten years before the survey, (the early 1970s) were generated.

The life tables were produced by combining the estimates of child mortality (the proportion surviving to age 2, which was .784 for males and .816 for females) with an "average" level of adult mortality. (In this case the level indicated by respondents aged 20-24 was selected because it refers to a recent period of time and is an intermediate level.) The resulting life tables are shown in table 8 for males and table 9 for females.

These life tables indicate that the average expectation of life at birth is 44 years for males and almost 50 years for females. Because infant mortality is so high, babies of both sexes who survive their first year of life have a longer life expectancy than they did at birth. When the death rates in the $M(x)$ column (column 4) are multiplied by the distribution of the population by age and sex, a total of 598 deaths results. This yields an estimated crude death rate of 17.8 per thousand for the settled population. This is about two and one-half times greater than the crude death rate of 7 based on direct reporting of deaths, and is a more plausible estimate.

³The higher the level of mortality in the model life tables, the lower the mortality rates.

TABLE 8. Male Life Table, Settled Population

Age Interval (x)-($x+n$) (1)	Proportion Dying in Interval per Thousand $Q(X)$ (2)	Number Dying in Interval $D(X)$ (3)	Central Death Rate per Thousand $M(X)$ (4)	Number Living Age X $l(X)$ (5)	Number of Person-Years Lived in Interval $L(X)$ (6)	Number of Person-Years Lived at Age X and Over $T(X)$ (7)	Average Number of Years Left to Live at Age X (Expectation of life) $E(X)$ (8)
Under 1	181.49	18,149	197.08	100,000	92,092	4,382,295	43.8
1-4	82.24	6,732	21.86	81,851	307,923	4,290,203	52.4
5-9	25.85	1,942	5.24	75,119	370,742	3,982,281	53.0
10-14	19.75	1,445	3.99	73,178	362,275	3,611,540	49.4
15-19	27.97	2,007	5.67	71,732	353,646	3,249,266	45.3
20-24	35.95	2,506	7.32	69,726	342,363	2,895,620	41.5
25-29	40.30	2,709	8.22	67,219	329,325	2,553,257	38.0
30-34	44.73	2,886	9.15	64,511	315,339	2,223,933	34.5
35-39	49.99	3,081	10.25	61,625	300,422	1,908,595	31.0
40-44	55.72	3,262	11.46	58,544	284,565	1,608,174	27.5
45-49	67.57	3,735	13.99	55,282	267,073	1,323,608	23.9
50-54	86.41	4,454	18.06	51,547	246,600	1,056,535	20.5
55-59	115.36	5,433	24.48	47,093	221,883	809,936	17.2
60-64	158.52	6,604	34.43	41,660	191,791	588,053	14.1
65-69	220.18	7,719	49.48	35,056	155,984	396,262	11.3
70-74	304.53	8,325	71.85	27,337	115,875	240,278	8.8
75-79	415.66	7,903	104.94	19,012	75,305	124,403	6.5
80+	1,000.00	11,110	226.28	11,110	49,098	49,098	4.4

NOTE: This table was generated using data on survivorship of parents of respondents aged 20-24 and data on survivorship of children ever born to women aged 20-34. Values of alpha and beta for males were .3963 and .9505, respectively, and the value of l_2 used was .784. The West region of model life tables was selected.

TABLE 9. Female Life Table, Settled Population

Age Interval (x)-($x+n$) (1)	Proportion Dying in Interval per Thousand $Q(X)$ (2)	Number Dying in Interval $D(X)$ (3)	Central Death Rate per Thousand $M(X)$ (4)	Number Living Age X $l(X)$ (5)	Number of Person-Years Lived in Interval $L(X)$ (6)	Number of Person-Years Lived at Age X and Over $T(X)$ (7)	Average Number of Years Left to Live at Age X (Expectation of life) $E(X)$ (8)
Under 1	156.42	15,642	169.14	100,000	92,480	4,949,320	49.5
1-4	63.75	5,378	16.66	84,358	322,748	4,856,842	57.6
5-9	19.69	1,555	3.98	78,980	391,013	4,534,094	57.4
10-14	14.99	1,160	3.02	77,425	384,225	4,143,081	53.5
15-19	21.19	1,616	4.28	76,265	377,284	3,758,857	49.3
20-24	27.19	2,030	5.51	74,649	368,169	3,381,575	45.3
25-29	30.43	2,210	6.18	72,619	357,569	3,013,407	41.5
30-34	33.76	2,377	6.87	70,409	346,101	2,655,839	37.7
35-39	37.74	2,567	7.69	68,032	333,740	2,309,739	34.0
40-44	42.11	2,757	8.60	65,464	320,429	1,975,999	30.2
45-49	51.23	3,213	10.52	62,707	305,505	1,655,570	26.4
50-54	65.90	3,921	13.63	59,495	287,677	1,350,065	22.7
55-59	88.83	4,937	18.59	55,574	265,528	1,062,394	19.1
60-64	123.93	6,275	26.42	50,637	237,498	796,866	15.7
65-69	176.09	7,812	38.62	44,362	202,280	559,368	12.6
70-74	251.35	9,187	57.49	36,550	159,785	357,088	9.8
75-79	356.92	9,766	86.89	27,364	112,401	197,304	7.2
80+	1,000.00	17,597	207.26	17,597	84,903	84,902	4.8

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NOTE: This table was generated using data on survivorship of parents of respondents aged 20-24 and data on survivorship of children ever born to women aged 20-34. Values of alpha and beta for females were .1925 and .8559, respectively, and the value of l_2 used was .816. The West region of model life tables was selected.

LITERACY, MIGRATION, AND LABOR FORCE PARTICIPATION

In the Demographic Survey, literacy was measured by asking the question, "Can this person read and write?"; however no test of this reading/writing ability was administered to respondents. Responses to this question indicate that 46 percent of the settled population aged 10 and over were literate. (See table 10.) This proportion varied greatly by age of respondent from a high of 64 percent literate at age group 10-14 to a low of 22 percent at ages 50 and above. Presumably, this enormous increase in literacy at younger ages is due to the government's efforts to improve literacy.

There are also very wide differentials in literacy by sex of respondent with 60 percent of men aged 10 and over reporting that they could read and write, as compared to only 30 percent of women. This sex differential is smallest at the youngest ages where three-fourths of boys are literate, compared to only half of the girls. The differential is largest at ages 50 and above with literacy rates of 42 percent for men and only 3 percent for women. Again, the narrowing of the sex differential at younger ages is no doubt due to the government's literacy campaign which included girls and women.

TABLE 10. Percent Literate by Age Group and Sex, Settled Population

Sex	A G E G R O U P									
	Total	10+	10-14	15-19	20-24	25-29	30-34	35-39	40-44	45-49
Males	63	72	73	70	65	57	61	55	54	42
Females	29	55	49	35	25	15	13	10	10	3
TOTAL	46	64	60	51	43	35	36	33	32	22

Literacy rates also varied considerably by residential sector being high in Mogadishu, lower in other urban areas, and lowest in rural areas. Only 13 percent of nomadic men and less than 1 percent of nomadic women aged 10 and above reported themselves as literate.

The Demographic Survey of the settled population included several questions concerning migration, including the district in which the person was born and the number of years the person had lived in the place of current residence. It is apparent from these data that migration of the settled population is not common. Over 80 percent of the people living in Bay Region and about three-fourths of those living in Lower Shebelle, were born in the *district*⁴ in which they resided at the time of the survey. Even for Mogadishu, an area of high immigration, the figure was 56 percent. In the study area, a total of 65 percent of the settled population reported that they had *always* lived in the village or town where they currently resided.

⁴There are 81 districts in Somalia.

Nomads were asked a different set of questions about migration, namely, the district where they spend most of the year and the district where they stayed during the last dry season. Despite their migratory existence, the results indicate that in the dry seasons at least, nomads are fairly immobile. Eighty-seven percent reported that they spent most of the year in the study area and 84 percent said that they were in either Bay or Lower Shebelle during the previous dry season, (roughly six months before the survey).

The questionnaire used in the survey of the settled population included several questions about the labor force participation of adults, i.e., whether they were currently employed, and if so, the occupation and industrial sector in which they were employed. Responses to these questions indicate that 80 percent of men and 30 percent of women between 20 and 50 years of age⁵ were gainfully employed in the month prior to the interview. This proportion varies considerably with age of respondent, being lowest at 20-24 and highest in the 40's. The proportion of men employed is consistently about three times that of women at each age group. Forty percent of the labor force are employed in the agricultural sector as farmers or farm managers. The next largest occupational category is salesmen and shop-owners, who account for 12 percent of the labor force. Skilled laborers (tailors, carpenters, mechanics, etc.) and professionals (teachers, doctors, pharmacists, etc.) make up 15 and 13 percent of the labor force, respectively.

⁵These ages were chosen because it was felt that those younger than 20 could still be in school, while those older might have stopped working.

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