POPULATION PROJECTIONS OF LIBYA : 1964-1984

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Introduction

For economic, social and educational planning of a country, one needs estimates of future population figures. For Libya some population projections (for Libya as a whole) for the period 1964-85 have been made by some authors earlier. (Zaghloul, 1970; Zachariah, 1970). In the present paper also a set of population projections are made for Libya as a whole for the period 1964-84. The present paper differs in some respects from the earlier papers, though the main approach utilized in this paper is similar to the one used by others.

The projection of population can be made by one of the three methods : i) Use of mathematical growth curves ii) Component method of projection iii) and, Economic method. The Component method is more efficient than the other two. In the present paper we adopt component method of projection.

Population undergoes change as a result of births, deaths and migration. By knowing these figures for each year, we can compute the birth rate, death rate and net migration rate. To obtain population in the future, we use the initial population as of a certain date normally coinciding with the Census date and apply the future rates of births, deaths, and migration to this population. This is briefly the principle underlying the component method of projection. The method is given

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in detail susequently. The projections in this paper are made for total population (citizens and aliens).

Before proceeding into projections proper we need to discuss the availability of data, accuracy of data and future patterns vital rates.

AVAILABLE DATA

Data on births and deaths can be obtained through three sources (1) Censuses (2) Vital registration (3) Sample surveys. For Libya the first two are available in some measure but survey data are poor. Various reasons contribute for this. In the following some sources of demographic data for Libya are examined.

Four censuses are taken in Libya, in the years 1931, 1936, 1954 and 1964. The 1931 census was taken on a de facto basis whereas the 1936 census was taken on a de jure basis. The de facto population was also given in the report for 1936 census but the method by which this value is obtained is not explained in the report. The last two censuses of 1954 and 1964 are taken on de jure basis. This citizen and total population as enumerated in these four censuses is shown in Table 1.

Vital registration system only started in recent years for the entire country. As is usually the case in most developing countries vital registration is often incomplete. The crude birth rates and death rates for four years 1964-67 are shown in Table 2. Though there is evidence of improvement in vital registration over the years the rates appear to be underestimates.

One sample survey was conducted in Benghazi which incudes some demographic aspects among other socio-economic variables (Mukherji, 1970).

EVALUATION OF DATA

Census data : The first two censues 1931 and 1936 are taken under difficult conditions and also are likely to be affected by various errors,

most significantly errors of omission and sometimes double counting. However, it appears that the 1936 census is relatively more accurate.

In Table 1 we see, that the rate of population growth during 1936-54 is much lower than that for 1954-64 (and also 1931-36). This could be due to various possible errors including underenumeration of 1954 population. The population of Libya has grown by 44% during the ten years 1954-64 which is not plausible. This high rate of growth during 1954-64 can be explained by the following factors :

(1) Underenumeration of 1954 census population and/or

(2) Excessive increase in 1964 census population due to return migration of Libyans and/or

(3) Improvement in census coverage, reporting etc ... in 1964 compared to 1954, and/or

(4) A drastic decline in mortality and/or a significant increase in birth rate during the period 1954-64.

It is difficult to specify which of these factors are mainly responsible for the enormous increase of population between the two census dates. This problem needs a special study through which the contribution of each is exactly determined by utilizing other available data along with the census data.

Here only a rough idea of the effect of some of these factors is obtained and then an estimate of true intercensal growth rate is derived.

The 1954 census has suffered from underenumeration and to a lesser extent overenumeration due to double counting. It is stated in the 1954 census " Nevertheless, making a liberal allowance for all possible errors of underenumeration and duplication it would be correct, that the total de jure population of Libya in mid 1954 was somewhere between 1 and 1.1 million persons, including close to 47000 aliens" (United Kingdom of Libya, 1954,p.viii). It appears from the following discussion that the upper limit of 1.1 million appears to be more correct.

The age distribution of 1954 census and 1964 census both for males and females show one direction in which the underenumeration might have taken place (Table3). The percentage distribution for males and females for the two censuses is shown below :

Age group	1954		1964	
	Males	Females	Males	Females
0-4	14.02	15.21	17.76	18.65
5-9	12.70	13.35	14.90	15.45

The percentage of the population in the age group 0-4 and 5-9 in 1954 is low compared to 1964. Let us assume for the time being that the percentage population as reported in 1964 are more or less true and that these proportions have not changed during 1954-64. Further assuming that the underenumeration in 1954 is entirely due to underenumeration of children in the age group 0-10 we can obtain the corrected population of Libya in 1954. The underenumeration in 1954 of the total population is equal to $\frac{1}{2}$ (17.76 + 14.90 — 14.02 — 12.70 + 18.65 + 15.45 — 15.21 — 13.35) = 5.7. The adjusted population in 1954 can be obtained as

$$P_{1954} = \frac{1041599}{1-.057} = 1104559 \qquad \ldots (1)$$

The above figure is close to the upper limit of the population mentioned in 1954 Census Report (quoted earlier).

The analyses of the age-sex distribution of 1954 and 1964 cesuses indicate that certain improvements must have resulted in 1954 census though there is no firm estimate of it. One can get a lower limit to the improvements in age reporting of 1964 through the relative improvement in the reporting of children under one year of age. The two censuses report persons under one year of age as shown below :

	1954	1964
Persons under one year	32160	55143
Total poptlation	1088875	1564369
% under one year	2.95	3.52

Assuming that the ratio of persons under one year has not changed between 1954 and 1964 we can obtain a measure of relative improvement of reporting in this segment of the population as $\frac{3.52 - 2.95}{2.95} \times 100 = 19.3\%$. Thus roughly speaking we can say that 19.3% of births occurring prior to the 1964 census date are enumerated in 1964 census as a result of better reporting in 1964. This amounts to roughly 1% of 1964 population if we assume a birth rate of 46 per thousand around the year 1964. Thus after discounting this amount from 1964 population for comparison with 1954 census we get

$$P_{1964} = 1515501 \times .99 = 1500345 \qquad (2)$$

Now we need an estimate of Libyan return migrants reported in 1964 census and not present in 1954 census. The socioeconomic survey conducted in Benghazi estimated an amount of 59,009 persons returning home by 1969 (Mukherji, 1970,p.8). The Housing Department of Libyan Arab Republic gave an estimate of 54.000 persons as return migrants for the whole of Libya during 1954-63 (Doxiadis and associates). In the 1964 census about 36,958 persons are reported to have been born outside Libya. (Kingdom of Libya 1964,p.74). It is very difficult to isolate from this the number of the persons who are return migrants, during 1954-64. Even if we assume that all these persons are return migrants between 1954-64 the figure of 36,958 appears to be on the low side as compared to the earlier estimates. In absence of any firm figure for the return migrants who are not reported in 1954 but reported in 1964, we take a rough estimate of 54,000. Therefore a further deflation of 1964 population is made

$$P'_{1964} = P_{1964} - 54{,}000 = 1{,}446{,}346 \quad \ldots (3)$$

In order to estimate the intercensal growth rate we use the formula

$$P'_{1964} = P_{1954}(1+r)^{10} \quad \ldots (4)$$

where r is annual rate of growth.

The solution of equation (4) gives .0275 as the value of r. This value of r is reasonable. This is only an approximate way of obtaining r and other methods with slightly different estimates of migration, improvements in reporting etc also yield a value of r near to .0275.

Age distribution : The reported age distribution of males and females in the two censuses is shown in Table (3). A detailed study of the accuracy of age distribution and the corresponding smoothing methods are available else where (Srivastava, 1970). Here only a couple of points relevant to our study will be discussed.

From Table (3) we note that the population in the age group 0—10 in 1954 is low compared to the corresponding figures in 1964. The reasons that could lead to this difference are already discussed. The other significant observation is the dip in the proportions in the age group 15-25 both for males and females in the two Censuses. Various reasons could be advanced for this dip ranging from mortality to age reporting preferences.

One way of measuring accuracy of age reporting is to obtain age ratio scores, sex ratio scores and joint scores. A study utilizing these measures has already been done by some authors (Srivastava, 1970, Zachariah, 1970) and it was found from these studies that while reporting of age has improved in 1964 the magnitude of this improvement is not much. Further, these measures are themslves not likely to give a correct picture in the case of Libya and other countries where systematic overreporting of ages exists at all ages above 15 or so.

For the purpose of projecting population beyond 1964, we need to

remove the reporting errors in age distribution and obtain a smooth sex-age distribution for Libya Many methods of smoothing the age distribution for Libya are available. For our projections we use the smoothed afe - sex distribution obtained by graphical method (Zaghloul, 1970). This is also shown in Table (3).

Sex ratio : The sex-ratio (number of males per 100 females) for Libya in 1964 by regions is shown in Table (4). The sex-ratio of a population will be affected by migration and mortality changes which are normally unequal for males and females. The sex ratio at birth is around the value of 105 for most of the countries. The range for this is 102 to 107 (United Nations, 1955). The excess births of males is generally brought down as a result of higher level of male mortality than that of female mortality. Thus the overall sex ratio is expected to be around 100.

The ratio of 108 for Libya in 1964 is therefore higher than the expected value. Even the sex ratios observed in 1954, 1936 and 1931 are 108.0, 106.2 and 109.4 respectively (Pan, 1949). This happens due to three reasons : (1) Underenumeration of females (2) Higher mortality of females than males (3) Differential migration. In 1954 Libyan population must have experienced a slight net emigration and in 1964 a net immigration, the later being more significant. As migration is mostly male dominated, it cannot explain the 1954 high sex ratio. Most of the Libyans who returned to Libya by 1964 are settled in the metropolitan area of Tripoli (Charkiewicz, 1968). The sex ratio in 1964 was high not only for Tripoli but also for all other areas of Libya (Table (4)), with one or two exceptions. Further the sex ratio by age groups, shown in Table (5), does not exhibit any pattern to support migration as a possible reason for the high sex ratio in Libya.

The second reason, namely a higher mortality for females than males, can only be a guess. The world experience always is in favour of a lower female mortality. This is true even in some high fertility countries. However, in some countries where customs are preferential to male child, a general negligence of female child might result in

higher female mortality. It is likely that such a pattern is in existence in Libya, but it is difficult to establish it with the available data.

The first reason namely the underenumeration of females is considered as the most probable reason. The social system in Libya as in other moslem countries may contribute towards an overall undere-unmeration of females.

The sex ratio at birth in this study is taken to be around 104 for Libya. "The ratio of male births to female births is confined to the limits of 1.04 to 1 to 1.07 to 1 in almost all populations where birth registration is essentially complete, the consistent exceptions being in populationns of African origin, where the ratio varies from 1.02 to 1.04" (United Nations, 1967, Manual IV, p. 21).

ESTIMATION OF VITAL RATES AROUND THE YEAR 1964

Estimation of birth rates and death rates for Libya making use of census data is full of problems. Some of them have already been mentioned. The census data of 1954 and 1964 which are more recent are being used for the purpose of estimating vital rates from the two censuses.

The usual census survival ratio method, which is employed to derive estimates of birth rate and death rate, fails to yield any meaningful results when applied to the two censuses of 1954 and 1964. The population projected from 1954 census data to 1964 always falls short of the enumerated 1964 census figures, even when life tables with expectation of life at birth as high as 65 are used. The reasons could be (1) underenumeration of 1954 data and (2) excessive increase of population in 1964 due to return migration. Thus this method cannot be used to derive vital rates. But by correcting the census data for the above mentioned errors it is possible to make estimates of birth rate and death rate. In the absence of reliable data on census coverage and migration this cannot be done.

The other two important methods are : (1) Reverse survival method

and (2) Stable population techniques. Both these methods can be used for one census data. For this reason it will be useful to employ these methods to 1964 census data.

Reverse survival ratio methods :

The method consists of reverse surviving the 1964 population of the age groups 0-4 and 5-9. The 0-4 population when survived back gives the births in the preceding five years, i.e. 1960-64. The population aged 5-9, when survived back gives 0-4 population in 1960. Again by surviving back the 0-4 population in 1960 we obtain births during 1955-60. From these five year births, the average number of births per year during the period in question can be obtained. Now if we know the mid-year population for 1957 and 1962, we can relate the above annual births and mid-year population and obtain birth rates.

There are many ways of obtaining mid-year population but we shall describe here two methods:

I. Reverse survive the entire population by sex and age from 1964 backwards at five year intervals. This gives population at 1960 and 1956. By taking the averages of the respective populations the mid period population for 1956-60 and 1960-64 can be obtained.

II. Assume a certain intercensal growth rate r and multiply the total population in 1964 by $e^{-7.5r}$ and $e^{-2.5r}$ to obtain population at mid periods 1956-60 and 1960-64.

The crude birth rates obtained by the above two methods are shown in table (6). Along with birth rates we can obtain death rates also for the same period. The male deaths during five years 1960-64 are obtained as :

$$P^{m}_{1960} + B^{m}_{1960\text{-}64} - P^{m}_{1964}$$

The average annual deaths during 1960-64 are obtained by taking a fifth of the above value. Relating these annual deaths to midyear

population estimated earlier, the crude death rates are obtained. The crude death rates obtained by using midyear population obtained by method I, are shown in Table (6).

From Table (6) it is clear that the birth rate varied much, depending upon which age-group (0-4 or 5-9) is used for reverse surviving. The birth rates based on age group 0-4 are always higher than those based on the age group 5-9, irrespective of mortality level and the method employed. This could be due to age reporting errors. The age group 5-9 must have lost some population to the age group 0-4. There is considerable amount of ignorance regarding ages of children in Libya. If we assume that the reported population in the age groups 0-4 and 5-9 are relatively accurate then we can attribute higher birth rates of age group 0-4 population to a rise in the birth rate during the later part of the period 1954-64. Although we have no evidence on this, it is likely that such a rise takes place when the general economic level of the country is rising at a faster rate. The change in the level of mortality from level 11 to level 13 only decreased the birth rate by 2.5 points for the 0-4 age group and about 1 point for 5-9 age group under method I. Although it is not easy to pin down the level of mortality and fertility levels from Table (6), we can say that for 1964 a birth rate of 46 to 47, and a level of mortality of 12 appear reasonable approximations.

Stable Population Techniques :

It is not possible to firmly assert whether the age distribution of Libya has been stable or not on the basis of the two censuses of 1954 and 1964. The age distribution in 1954 is very much affected by errors in age reporting and hence cannot be compared with the 1964 census data. Therefore we should attempt to draw conclusions about the stability of the age distribution by indirect evidence and in a rough way.

A population can be said to result in a stable age distribution, if it experiences constant age specific fertility and mortality rates. In Libya the levels of fertility must have been steady and high because of the

absence of any family planning programme. In recent times there appears to be a significant increase in the rate of pregnancy wastage which is suspected to be due to some amount of induced abortions (Mukherji, 1972). But we can safely assume that fertility control if any, is only in small magnitude and the great part of the population could be assumed to be experiencing a constant and high fertility prior to 1964.

Regarding mortality we should say, that the level has been decreasing beginning with the sixties. The discovery of oil and the resultant economic development have contributed to this in a great measure. However it is not possible to quantify the magnitude of declines in mortality during the intercensal periods. While the general feeling is that the level of mortality has substantially decreased during the recent times in the Arab world as a whole (Zachariah, 1970), it is not possible to estimate the amount of decrease for Libya in particular. The efforts to extend medical services available to a majority of the population are likely to reduce mortality beyond 1964 by a sustantial amount. Even though mortality is not constant (age-specific mortality rates remaining constant) we can expect a population to attain quasi-stable age distribution if other conditions for stability are met. These will be discussed later.

One of the most important factors that can affect the stability of Libyan population is the return migration of Libyan population. Prior to 1954 some Libyans emigrated to the neighbouring Arab countries, though the magnitude of this is not known. This could have given a undercount of population in 1954. However, after the discovery of oil and the consequent economic prosperity many Libyan nationals living outside Libya started to return to their homes in Libya. The stream of return migration must have started about 1962. Thus 1964 census must have suffered from overcount of population. The magnitude of this, as stated earlier, is about 54,000 (Doxiadis,). This figure of 54,000 if assumed correct forms a little less than 3.6% of 1964 population. These return migrants are only a small portion of the 1964 total population, and hence

is not likely to affect stability of the age distribution. Even if the estimated figure of 54,000 is taken as an underestimate, the true magnitude of migration which could be higher, is not likely to disturb the stability of age distribution.

Another interesting point emerges from the study of the age distribution of 1964 census. Most of the return migrants are setteld in the metropolitan area of Tripoli (Charkiewicz, 1968). Thus a comparison of the age distributions with and without Tripoli metropolitan area can throw some light on the two questions : (1) Is the age distribution of return migrants the same as that of the citizen population in 1964; (2) If we assume that the age distribution of migrants to be different from the citizens, can the volume of return migrants be significant.

Table (7) shows the percentage age distribution of male population and female population both with Tripoli and without Tripoli in five year age groups. A study of this table illustrates that return emigration must not have affected the age distribution. This implies two things as mentioned earlier. The volume of return migrants could be small even though their age distribution is different from that of the citizen population, or the volume of return migrants could be large but, the age distribution of return migrants might be quite close to that of the citizen population. It is difficult to state that one of them is correct. But we can say, that close agreement between the age distributions in 1964 with and without Tripoli gives indirect evidence that migration might not affect the stability of the age distribution of Libyan population.

From the above discussion it should be concluded that the application of stable population techniques to Libya are not direct and without problems. The problems in applying the stable population are discussed a little later.

The stable age distribution of a population is described by the well known formula of Lotka :

$$c(x) = b\, e^{-rx}\, p(x)$$

where

c(x) : proportion of the population aged x
b : birth rate of the stable population
r : annual rate of increase
p(x) : proportion surviving from birth to age x.
e : base of natural logarithm.

Along with the knowledge that a particular population has a stable age distribution, if we know the annual rate of growth r and c(x); then we can derive death rates and birth rates. If on the other hand we know p(x) and c(x) we can estimate the vital rates.

The problems in the use of these methods is that values of p(x) or r cannot be estimated from the two censuses of Libya for the various reasons discussed earlier. Further the values of c(x) are grossly affected by age reporting. As a result of these difficulties the application of the stable population techniques and drawing conclusions from their results should be made with caution.

In U. N. Manual (IV) it has been suggested that age reporting errors, mostly those due to digit preference can be minimized or eliminated if the cumulative age distribution C(x) is used along with annual growth rate r or with a level of mortality. However, this procedure may not eliminate errors of a systematic overreporting or underreporting of ages at most of the ages. In Libya, it is particularly of importance because of " the absence of markedly differentiated seasons, or camparative lack of incidents in the desert " (United Kingdom of Libya, 1954, p.xiii).

The birth rates computed making use of C(x) of 1954 for males and females, and annual rate of growth r are shown in Table (8).

It is clear from Table (8) that the crude birth rates estimated from younger ages, say, less than age 15 are higher than those estimated from ages above 15. This could be due to transfer of some persons around age 15 downwards and transfer of some young adults to higher ages (Zachariah, 1970).

The crude birth rate based on the four ages 15 to 30 give an average value of 39 for males and 54 for females. This is an interesting finding. An analysis of the sex ratio and age ratio scores illustrate that male age distribution is better reported than female age distribution. But the derived crude birth rates based on male age distribution seems to be on the lower side than that of the females.

The calcualtions of Table (8) are based on the assumed annual growth rate of .027 per cent per year. As has been mentioned earlier, this is only a rough estimate. If we assume a higher level of growth rate, the birth rate decreases at all ages, and when a lower growth rate is used the birth rate increases at all ages. However a value of r=.030 does not give plausible estimates of birth rates for males.

As has been mentioned earlier, the decrease in the level of mortality affects the stability of the age distribution. In other words the observed values of c(x) in 1964 for younger ages will be lower than c(x) values of the stable population defined by the mortality and fertility levels as of 1964. The opposite will be the case for older ages. Consequently, the derived estimates of crude birth rates, on the assumption of stability of 1964 age distribution, yield higher estimates of birth rates at higher ages. To take care of this problem an adjustment is made to the estimated crude birth rates based on 1964 age distribution. The adjusted birth rates are shown in Table (8). The adjustment is seen clearly as not completely successful.

The method of the adjustment is based on the principle that, the crude birth rate based on some middle age can give a birth rate free from this bias due to declines in mortality (Zachariah, 1970, p. 327-334). Another method of adjusting crude birth rate is described in U. N. Manual (IV), p. 27. The adjusted crude birth rates also show a pattern exhibited by unadjusted birth rates, though the U-pattern is less pronounced. The adjusted crude birth rate based on the ages 15-30, give a value of 34 for males and 48 for females. Thus we can expect the true crude birth rate to lie in the range 43-48. The persistence in

the U-pattern of birth rates by age could be due to errors in reported age distribution, assuming that the other assumptions for stability hold for Libya.

Child-Woman Ratio :

The child-woman ratio provides a rough estimate of the level of fertility. The child-woman ratio based on the 1964 census is obtained as

$$\text{Estimate of child-woman ratio} = \frac{\text{persons aged 0-4}}{\text{females aged 15-49}} = .879$$

From the stable population models also the estimates of child-woman ratio can be obtained. the child-woman ratios can be derived either to, correspond to a given rate of growth or a given level of mortality. Assuming the observed value of .879 for child?woman ratio for Libya, it is possible to interpolate between the stable population values. For the present calculations we use Model West Tables as they were readily available in Mnual IV. These estimates of birth rate, growth rate and expectation of life at birth will be those that could be obtained by the use of South Model Tables.

Child-woman ratios and related vital rates :

Level of Mortality				
11			13	
Annual Rate of Growth (r)				
.025	.030	.025	.030	.035
Child-Woman Ratio				
.771	.879	.735	.838	.955
Crude Birth Rate				
.0435	.0505	.0416	.0465	.0516

The stable population tables provide proportions of male, and

female population under specific ages. The child-woman ratio can be obtained as

$$= \frac{C_5^f + C_5^m \left(\frac{M}{F}\right)}{C_{50}^f - C_{15}^f}$$

where C_x^f and C_x^m are cumulative proportion of female and male populations under age x respectively; and M and F total male and female populations reported in 1964. The computed child-woman ratios for two levels of mortality under different growth rates are shown in the above table. The growth rate corresponding to the observed child-woman ratio is .030 under level 11 and .032 under level 13. Thus assuming that the level of mortality is between levels 11 and 13, the annual rate of growth based on child-woman ratio appears to be in the neighbourhood of .030. If we use the South Model Tables then rate of growth will be a little greater than .030. In any case this figure appears to be on the high side compared to the value of .027 used in the earlier discussion. The birth rate corresponding to the observed child-woman ratio is 50.5 under level 11 and 48.3 under level 13. Thus the crude birth rate based on child-woman ratio is expected to lie between 48 to 50.

The child-woman ratio is only a rough measure of fertility. In the particular situation of Libya, it seems that the child-woman ratio is much affected by reporting errors in age. It has been mentioned earlier that in 1964 census it appears that children under age 5 are overestimated and women in the middle age groups under reported. This pattern results in an exaggerated values of child-woman ratio. If we take into cosideration these factors, then we can take the estimates based on child-woman ratio to be on the high side.

Gross Reproduction rate (G.R.R) :

The gross reproduction rate yields the number of female births per

woman in her reproductive life. This measure illustrates the rate at which the population is replacing itself.

The stable population tables provide estimates of G.R.R. However to select G.R.R. for Libya we need, the mean age of the age specific fertility schedule and annual rate of growth of the population or mortality level. The mean age of the fertility schedule can be obtained on the lines explained in Manual IV. The outline of the procedure is shown in Table (9). The computed $\bar{m}$ making use of standard fertility rates given in the U. N. Manual IV (which is based on the average experience of a number of non-contracepting countries) is found to be 29.3 years. It is also possible to obtain m using the age specific marital fertility rates of Benghazi (Mukherji, 1970). Table (10) shows age specific marital fertility rates of the UN model and those for Benghazi.

A study of Table (10) indicates that age specific marital fertility rates based on Benghazi survey appears to deviate from the U.N model rates. It is difficult to state whether the pattern of age specific fertility rates are different from that of the U. N. model on the basis of Table (10). The results of Benghazi survey are based on a small number of individuals and the age reporting errors might also be present. The fertility rate for the age group 20-24 seems to be high and that for 25-29 low. This could be due to a shift of women in the age group 25-29 to 20-24. However, the m calculated for Libya using Benghazi age specific fertility rates gives a value of 28.5 years. This is about one year less than the value obtained by the use of U. N. model rates. For our purpose we take a figure of 29 years for m.

The values of G.R.R for various rates of growth and $\bar{m} = 29$ are shown below. Again these values are taken from the model west.

Level of mortality	11		13		
Annual rate of growth	.025	.030	.025	.030	.035
G.R.R	3.03	3.47	2.78	3.19	3.66

The value of G.R.R. for f = .0275 is approximately equal to 3.25 for level 11 and 2.99 for level 13. If we assume a sex ratio of 104 the total fertility (i.e the total unmber of births per woman in her entire reproductive life) is $3.25 \times 2.04 = 6.63$ for level 11 and $2.99 \times 2.04 = 6.10$ for level 13. Both these values seem to be on the low side. Had we used South model stable population tables we would obtain higher values for G.R.R. than those given above.

The total fertility can also be obtained by adding the age specific fertility rates by five year age groups and multiplying them by 5. Making use of the age specific fertility rates obtained in the socio-economic survey of Benghazi, we obtain the total fertility as $5 (.096 + .338 + .278 + .250 + .184 + .077 + .019) = 6.2$ (Mukherji, 1970, p.81).

In the previous sections we have presented some rough estimates of various measures of fertility and mortality on the basis of 1964 age distribution and other related material. These analyses are by no means perfect estimation procedures as the data of Libya are far from being accurate. As our main purpose is to provide a set of rough estimates of fertility and mortality for 1964, the previous results are sufficient. However, there are many alternative procedures to estimate birth and death rates which are not either inapplicable or likely to yield similar results. Thus for the purpose of obtaining population projections, the earlier estimates of birth rates and death rates for 1964 are good enough.

LEVELS OF MORTALITY AND FERTILITY FOR 1964

Mortality :

The previous section gives estimates of crude death rate for 1964. Some further evidence also is provided by the study of mortality in Benghazi from hospital records (Mukherji, 1972). As the population in Benghazi is of urban character the crude death rate of Benghazi, estimated around 20 per thousand population, is likely to be less than the crude death rate for whole of Libya.

An indirect evidence on the crude death rate can be obtained by studying the mortality of neighbouring Arab countries. The crude death rates of these countries is estimated to be around 17-21 per thousand (Cairo Demographic Center, 1970). Therefore, the death rate of Libya should be in the range of this value.

A study based on the mortality patterns of a number of countries of the Northern African countries has indicated that their mortality pattern by age is closer to "South Model" (Zachariah, 1970). It is well known that the age patterns of mortality of various countries of the World are found to belong to four distinct types : "East", "West", "North" and "South" (Manual IV). For the purpose of our projections we use South Model Life Tables.

Three assumptions are made both to the present level and future trend of mortality. The medium population projection assumes a level of 12 of the South model for 1964. However, for the high projection level 13 is assumed. For low projection the level 12 is assumed which is the same as that of the medium projections. Table (11) shows the expectation of life at birth assumed in 1964 under the three population projections.

Fertility:

Estimates of crude birth rates have been obtained earlier making use of the census data. The study based on the hospital records of

Benghazi (Mukherji, 1972) gives a value of about 45 per thousand for the crude birth rate around the period 1969-70. This is close to the estimate of the crude birth rate obtained earlier which lies in the range 46-48.

The level of crude birth rate for 1964 is taken as 46 per thousand for our purpose. However, for the purpose of obtaining future births, we use age specific fertility rates obtained for Benghazi (Mukherji, 1970). These rates are shown in Table (11). When these rates are applied to smoothed 1964 age distribution a birth rate of 42.2 per thousand is obtained. Therefore the age specific fertility rates are inflated by a factor 46/42.2 . These rates are also shown in Table (11). For the projection these adjusted rates are used.

ASSUMPTIONS REGARDING FUTURE TREND OF MORTALITY, FERTILITY AND MIGRATION

Mortality :

The Government of Libya has been taking a number of steps in making available the medical facilities to a majority of the population. A number hospitals were opened throughout the country and free medical care is being provided. There are plans to expand these facilities to other parts of the country. As a result these efforts substantial reductions in mortality are expected after 1974.

The infant mortaity is likely to decrease faster, if it has not already decreased. However, since mortality also depends on a number of other factors such as sanitaion, public hygiene, general education of the female etc. further declines in mortality are to be expected only after 1985 or later than this date. It is reasonable to expect that the future declines in mortality result in a rise in the female ${}^0e_0$ of 2.5 for every five years, under the High and Medium projections. Under the Low projections it is assumed that the female ${}^0e_0$ will increase at the rate of 2.5 years for every five years during 1964-74. From and after 1975 the female

${}^0e_0$ is expected to increase at the rate of 3.75 for every five years. The rise in the ${}^0e_0$ for males is 2.26 years and 3.39 years respectively. These assumptions are summarized in Table (11).

Fertility :

The levels of fertility in Libya is high and is likely to remain at that high level for some time to come. There is no evidence of any family planning practise in the country, though in the study of mortality patterns for Benghazi (Mukherji, 1972) it is stated that some induced abortions might be present in the reported abortions. As there are no signs of governmental efforts to propagate family planning practice no significant decrease in fertility is expected to take place in the near future. It is also important to note that Libya lacks sufficient manpower and hence no population control programmes seem necessary. Further it is known that any national family planning programme requires a long gestation time before any decrease in crude birth rate can occur. Thus it is reasonable to expect no change in fertility during 1964-84, which is assumed under Low and Medium projections.

About 40% of the population of Libya is situated in the metropolitan areas of Tripoli and Benghazi, according to 1964 census. As it is evident from the study in Benghazi (Mukherji, 1972) and other world experience, the population in the urban areas will get firstly exposed to the idea of small family norm and higher standard of living; and this segment may practise family planning. If the government in future decides to implement family planning programme even as a maternal welfare programme, the metropolitan fertility will decrease significantly and hence the fertility of Libya as a whole. Thus under High projections it is assumed that fertility will decrease by about 1 point in five years begining with 1975. This assumption allows for a slower rate of growth of population.

One other possibility should also be mentioned. As the medical facilities increase and the general economic level rises with the increased

oil resources for the state, one can expect the fertility to rise. However, we have not taken this possibility.

Migration :

A large number of Libyans returned to Libya after the discovery of oil and subsequent prosperity of the country. However this return migration is expected to decrease with time. In the present study we ignore the immigration into Libya.

As we are projecting total population the future influx of alien population becomes important. It is realized in the futrure years with increased developmental activity in the country a large amount of labour is expected to flow into the country from the neighbouring Arab states, primarily Egypt. Thus if we take into consideration this aspect the expected future population will be more than the projected values.

METHODOLOGY

The method of projecting population into future by component method is well known and many works are avilable which illustrate this method (United Nations, 1955). Here only a brief outline of the method is given.

Define S_x^f and S_x^m as the survival ratios of females and males belonging to the age group x (such as 0-4, 5-9, etc.) to the next age group. These survival ratios can be obtained for a given ${}^0e_0$ from model (South) Life Tables (United Nations, 1967). Let us denote by M_x^{1964} and F_x^{1964} the male and female populations belonging to the age group x at the census date in 1964. Let f_x be the age specific fertility rate of women in the age group x. We shall now proceed to obtain M_x^{1969} and F_x^{1969}, the male and female populations after five years :

$$M_x^{1969} = M_{x-1}^{1969} \cdot S_{x-1}^{m} \qquad \ldots (5)$$

$$F_x^{1969} = F_{x-1}^{1969} \cdot S_{x-1}^{f}$$

where x can take vales 5—9, 10—14, 15—19, etc.

The population aged 0—4 in 1969 results from births occuring during the five year period 1964—69. Denoting by B as the births we have

$$B = \sum f_{x.} \cdot {}^{1}/_{2} \left(F_x^{1964} + F_x^{1969} \right) .5 \qquad \ldots (6)$$

$$x = 15—19,\ 20—24,\ 25—29, \ldots\ 45—49.$$

We can split the total births into male and female births as

$$B^m = B.\ (104/204)$$

$$B^f = B.\ (100/204) \qquad \ldots (7)$$

where 104/204 is the proportion of male births. Now we have

$$M_{0-4}^{1969} = B^m \cdot S_b^m \qquad \ldots (8)$$

$$F_{0-4}^{1969} = B^f \cdot S_b^f$$

where S_b^m and S_b^f are the survival ratios of male and female births to age group 0 — 4.

Equations (5) and (8) completely specify the population in 1969 starting from 1964 population. The survival ratios are to be taken from the appropriate life tables. The method remains the same for the three levels of projections.

It is also easy to compute the birth rate and death rate centering at the mid point of the period 1964 — 69 :

Crude birth rate (b')

$$= \frac{{}^1/_5 \cdot B}{{}^1/_2 \sum_x (M_x^{1964} + F_x^{1964} + M_x^{1969} + F_x^{1969})} \quad \ldots (9)$$

Crude death rate (d)

$$\frac{B + (\sum_x (M_x^{1964} + F_x^{1964}) - \sum_x (M_x^{1969} + F_x^{1969})}{{}^1/_2 (\sum_x (M_x^{1964} + F_x^{1964}) + \sum_x (M_x^{1969} + F_x^{1969})} \quad \ldots (10)$$

The above procedure can be repeated for years beyond 1969 with the use of appropriate survival rates and fertility rates.

The fertility rates are assumed to be constant under Low and Medium projections. Under High projections the birth rate is assumed to decrease by 1 point in five years. The projection for this case needs a little modification, for obtaining population in the age group 0 — 4. For other age groups the equation (5) is valid for this case as well.

The crude birth rate for the period 1969-74 will be known by the projections for the past five year period. Therefore by reducing this value by 1 point or by .001 we obtain crude birth rate (b') for the period 1974 - 79. The use of equation (5) on the population of 1974 gives the male and female population in 1979, 5 years and above. Let B' be the number of births in the period 1974 - 79. Then we have

$$b' = \frac{{}^1/_5 \cdot B'}{{}^1/_2 (B' \cdot S_b^m \cdot \frac{104}{204} + M_{5+}^{1979} + M^{1974} + B' \cdot S_b^f \frac{100}{204} + F_{5+}^{1979} + F^{1974})} \quad (11)$$

The numerator on the right hand side of equation (11) gives annual births 1974 - 79 and the denominator gives the mid-period population.

The only unknown quantity in the above equation is B' and hence it can be evaluated. Once B' is known we can derive male and female births using equation (7). From these values we can obtain male and female population in 1979 aged 0 — 4.

RESULTS

The female population of Libya is expected to increase from 751,000 in 1964 to 1,429,300 in 1984 under High level of projections. This means 90% increase during the 20 years of 1964-1984. The male population under High level of projections increases from 813,400 in 1964 to 1,474,000 in 1984, thereby implying a 81% increase during 20 years, 1964 to 1984. The total population has increased during the period 1964-84 by 86% under High level of projections.

The total population under Medium level increases from 1,564,400 in 1964 to 2,814,900 in 1984 implying a 80% increase in 1964-84. Under the Low level projection the population increases by 77% during 1964-84. It appears that the population of Libya is going to nearly double its value by 1984. It is appropriate to examine the implications of this. Before proceeding to these aspects a remark about the most likely projection in the future is useful.

The assumptions regarding mortality seem to be more reasonable than that of migration. With the future efforts, such as the expansion of medical services, Libya is likely to achieve good reduction in martality. Due to the likely expansion of maternal and child welfare programmes the birth rate might even increase. If we donot assume the decline in birth rate during 1974-84 the population will be more than that obtained under High level.

The other significant assumption is that of future trend in migration, which is assumed to be zero. It is not clear whether return migration of Libyans is negligible after 1964. If this is not so, then even the High level of projections will be on the low side.

The other contributing factor is the influx of aliens. It is suspected that this segment of the population may increase enormously in the

future. For example, Libya is short of labour at almost all levels. The gap is increasing with the launching of many developmental programmes in the fields of housing, schooling, road building etc. This is likely to increase the influx of labour from the neighbouring countries, as already mentioned. While the author is aware of these problems, paucity of data does not permit incorporating these aspects in the projections. Thus it appears from all these considerations that the High projections are the mostly likely ones.

It would be interesting to study the rate of increase of certain demographic measures such as school age population, dependency ratio, and child-woman ratio.

Table (13) shows the population in the age group 5-14 at five year intervals during 1964-84. This is the group which contributes mostly to the primary school. This population is likely to increase by more than 50% between 1974-84. This implies that the potential number of children requiring primary education is likely to increase by 50%. However the real pressure on primary education will be more than this. It is expected that the participation rates of primary education will increase in future. As a result of this the absolute number of children wanting to attend school will increase by more than 50%. This emphasises the need for enormous expansion of schools, teachers and related educational inputs.

Child-woman ratio is also presented in Table (13). The child woman ratio decreased for years 1969 and 1974 from 1964 level. In 1984 the level has increased. However the increase would have been more, had the assumption of a decrease in birth rate during 1974-84 been relaxed. The decrease in child woman ratio during 1969-1979 is due to changing age distribution.

The ratio of children and old persons (0-15 and 55+) to the population in the working ages — termed here as dependency ratio — is also shown in Table (13). The dependency ratio shows a steady increase which underlines the increase of dependents.

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TABLE 1

Enumerated population and growth rate for Libya for Various census years

Date of census	Enumerated population		Annual growth rate	
	Citizen	Total	Citizen	Total
21 Apr 1931 [a]	654,716	—	—	—
21 Apr 1936 [a]	732,973	—	2.26	—
31 Jul 1954 [b]	1041,599	1088,873	1.92	—
31 Jul 1964 [b]	1515,501	1564,369	3.75	3.63

Source : [a] Pan (1949), p. 106;

[b] General Population Census of Libya 1954 p.82; 1964 p.1.

TABLE 2

Crude birth rates and death rates based on Vital registration statistics 1964 - 67

Sub-region	Birth rates				Death rates			
	1964	1965	1966	1967	1964	1965	1966	1967
Tripoli	28.2	30.4	31.7	35.2	4.4	3.4	4.1	3.8
Benghazi	28.5	33.7	37.2	40.4	7.7	7.4	8.4	10.3
Sebha	—	—	—	—	—	—	—	—
Gebel Gharbi	22.0	35.5	42.4	40.2	2.3	4.4	5.5	6.5
Zawia	28.8	33.0	36.6	41.0	3.3	4.2	8.3	9.3
Homs	13.5	23.1	41.5	47.7	2.1	5.3	6.5	7.1
Misurata	19.5	21.8	30.0	34.1	2.3	4.1	4.0	3.7
Derna	31.8	38.3	41.2	49.6	7.0	6.7	5.7	7.1
Gebel Akhdar	24.0	33.3	39.9	39.5	3.0	3.5	3.9	4.4
Ubari	—	—	—	—	—	—	—	—
Libya	25.3	29.7	36.3	37.9	4.2	4.6	5.9	6.2

Source : Statistical Abstracts, Libya, 1966 and 67.

TABLE 3

Percentage age distribution of male and female citizen population in 1954 and 1964; and smoothed age distribution of total population in 1964

Age Group	Reported age distribution 1954		1964		Smoothed age distribution 1964	
	Males	Females	Males	Females	Males	Females
0 — 4	14.02	15.21	17.76	18.65	18.12	18.34
5 — 9	12.70	13.35	14.90	15.45	14.00	14.31
10 — 14	10.94	9.87	10.72	10.00	11.54	11.78
15 — 19	8.73	8.42	7.63	7.97	9.86	9.61
20 — 24	8.58	8.09	7.87	7.90	8.46	8.42
25 — 29	8.51	8.53	7.91	8.53	7.16	7.33
30 — 34	6.56	6.75	6.32	6.46	6.06	6.44
35 — 39	5.08	4.98	5.79	5.41	5.26	5.35
40 — 44	4.58	5.38	4.42	4.49	4.36	4.44
45 — 49	3.76	3.42	6.53	6.24	3.66	3.63
50 — 54	4.47	4.60			2.96	2.97
55 — 59	2.63	1.87	4.78	4.12	2.46	2.38
60 — 64	3.34	3.46			2.00	1.78
65 — 69	1.77	1.39	3.14	2.88	1.60	1.29
70 — 74	4.33	4.68			1.20	0.89
75 +			2.23	1.90	1.30	1.04
All Ages	100.0	100.0	100.0	100.0	100.0	100.0

Source : Census reports of Libya, 1954 and 1964.

TABLE 4

Sex ratio in Libya by region, 1964

Sub-region	Males	Females	Sex ratio
Tripoli	197,794	182,131	108.6
Benghazi	147,075	131,751	111.6
Sebha	24,490	22,946	106.7
Gebel Gharbi	93,921	86,962	108.0
Zawia	99,041	91,667	108.0
Homs	71,181	65,498	108.7
Misurata	75,778	70,116	108.1
Derna	43,462	40,650	106.9
Gebel Akhdar	44,976	43,040	104.5
Ubari	15,668	16,222	96.6
Libya	813,386	750,983	108.3

TABLE 5

Sex ratio in Libya by age groups in 1954 and 1964.

Age group	Sex ratio in	
	1954	1964
0 — 14	105.7	106.5
15 — 24	113.2	105.7
25 — 34	106.3	102.9
35 — 44	100.7	111.7
45 — 54	110.9	113.3
55 — 64	120.9	125.6
65 +	108.5	121.9
All ages	107.9	108.3

Source : General Population census, Libya 1954 and 1964.

TABLE 6

Crude birth rates and death rates for the intercensal period 1954-64 by reverse survival ratio method

Level of Mortality	$^{o}e_{o}$		crude birth rates Method I Age Group 0—4	5—9	Method II Age Group 0—4	5—9
11	42.9	M	49.0	46.0	49.4	47.2
	45.0	F	49.1	47.5	49.2	47.4
		T	49.1	46.7	49.3	47.3
12	45.1	M	48.2	44.9	48.4	45.7
	47.5	F	48.2	45.7	48.2	45.9
		T	48.2	45.2	48.3	45.8
13	47.4	M	47.3	44.0	47.5	44.6
	50.0	F	47.5	46.2	47.3	44.7
		T	47.4	45.1	47.4	44.6

TABLE 6 *(contd)*

crude death rates (Method I)

	Mortality level 11		12		13	
	Age group 0—4	5—9	Age group 0—4	5—9	Age group 0—4	5—9
M	24.1	22.8	22.0	20.8	20.0	19.0
F	21.3	19.0	19.8	21.3	17.4	15.9
T	22.7	21.0	20.8	21.1	18.8	17.5

TABLE 7

Age distribution of Libya with and without Tripoli

(Citizen Population)

Age Group	MALES		FEMALES	
	With Tripoli	Without Tripoli	With Tripoli	Without Tripoli
0 — 4	17.90	17.42	18.86	18.28
5 — 9	15.00	14.93	15.59	15.47
10 — 14	10.78	10.97	10.05	10.15
15 — 19	7.67	7.82	8.00	8.18
20 — 24	7.92	7.97	7.85	7.76
25 — 29	7.90	7.76	8.46	8.34
30 — 34	6.24	5.98	6.37	6.34
35 — 39	5.70	5.54	5.32	5.37
40 — 44	4.32	4.29	4.42	4.56
45 — 54	6.41	6.61	6.19	6.41
55 — 64	4.74	4.96	4.10	4.20
65 — 74	3.16	3.35	2.88	2.96
75 +	2.26	2.40	1.91	1.98
Total	100.00	100.00	100.00	100.00

TABLE 8

Estimates of crude birth rate by stable population techniques (Adjusted and unadjusted for mortality declines in 1954-64) Using cumulative age distribution of Libya 1964 and annual rate of growth of .027 for both sexes.

Age	Unadjusted		Adjusted	
	Males	Females	Males	Females
5	48	52	45	49
10	51	57	48	54
15	46	49	47	48
20	38	42	39	43
25	36	40	39	43
30	37	43	41	48
35	37	43	42	48
40	37	44	42	50
Average of four middle values	39	45	43	48

Source : Zachariah, K.C., 1970, p. 302.

TABLE 9

Computation of mean age specific fertility rate

Age Group	Median age	Proportion married	Standard marital fertility rates	Hypothetical fertility rates	Products (2)×(5)
(1)	(2)	(3)	(4)	(5)	(6)
15 — 19	17.5	.6942	.721	.5005	8.76
20 — 24	22.5	.8700	1.000	.8700	19.58
25 — 29	27.5	.9399	0.935	.8788	24.17
30 — 34	32.5	.9566	0.853	.8160	26.52
35 — 39	37.5	.9634	0.685	.6599	24.74
40 — 44	42.5	.9593	0.349	.3348	14.23
45 — 49	47.5	.9418	0.051	.0480	12.28
Total				4.108	120.28

Notes :

Column 3 : These are obtained from the female marital status distribution of Citizen population, census of Libya 1964, p.27. The totals of all marial statuses are taken as the base for each age group. These totals were found to be different from those given in table 8 of the same census report. For the age group 45-49, the figures are obtained by interpolation formula (U. N. Manual III, p. 15.)

Column 4 : U. N. Manual IV, table 1, p. 24. The first value of .721 is obtained as 1.2— .7 (.6942) = .721 where .6942 is the proportion married for the age group 15 — 19.

Column 5 : (3) × (4)

$$m = \frac{120.28}{4.108} = 29.27 \text{ years}$$

TABLE 10

Age specific marital fertility rates based on socio economic survey of Benghazi and that of the U. N. Model

Age group	Age specific marital fertility rates	ASMFR expressed as a proportion of the rate for 20 — 24	Standard marital fertility rate
15 — 19	.231	.510	.721
20 — 24	.453	1.000	1.000
25 — 29	.304	0.671	0.935
30 — 34	.266	0.587	0.853
35 — 39	.197	0.435	0.685
40 — 44	.093	0.205	0.349
45 — 49	.023	0.051	0.051

Note : Column (2) : Obtained from table 30, p. 81, Mukherji (1970).

TABLE 11

Assumptions of the levels of projections and patterns of fertility and mortality

MORTALITY

Period	Low		Medium		High	
	Males	Females	Males	Females	Males	Females
1964 — 69	47.4	50.0	45.1	47.5	45.1	47.5
70 — 74	49.6	52.5	47.4	50.0	47.4	50.0
75 — 79	51.9	55.0	49.6	52.5	50.8	53.8
80 — 84	54.1	57.5	51.9	55.0	54.1	57.5

FERTILITY

AGE group	Observed age specific fertility rates	Inflated age specifc* fertility rate
15 — 19	.096	.112
20 — 24	.338	.393
25 — 29	.278	.323
30 — 34	.250	.291
35 — 39	.184	.214
40 — 44	.077	.089
45 — 49	.019	.022

* Mukherji. S., Socio?economic survey in Benghazi, *Dirassat* Vol. 6 (2) 1970, p. 81.

TABLE 12

Projected Population by age, sex, year and level
(in HUNDREDS)

HIGH LEVEL

Age group	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T
	1964			1969			1974			1979			1984		
0 — 4	1473	1377	2850	1616	1580	3196	1891	1847	3738	2268	2213	4481	2719	2651	5370
5 — 9	1139	1074	2213	1371	1283	2654	1519	1487	3006	1792	1754	3546	2167	2119	4286
10 — 14	938	885	1823	1119	1055	2174	1350	1264	2614	1499	1468	2967	1772	1736	3508
15 — 19	802	722	1524	924	871	1795	1104	1041	2145	1336	1252	2588	1483	1454	2937
20 — 24	688	632	1320	783	707	1490	905	855	1760	1087	1027	2114	1318	1238	2556
25 — 29	582	550	1132	669	616	1285	764	691	1455	888	841	1729	1069	1013	2082
30 — 34	493	484	977	565	535	1100	651	601	1252	748	679	1427	872	828	1700
35 — 39	428	402	830	477	470	947	548	521	1069	636	589	1225	732	668	1400
40 — 44	355	333	688	411	389	800	460	456	916	532	509	1041	620	577	1197
45 — 49	298	273	571	338	321	659	393	376	769	443	444	887	514	497	1011
50 — 54	241	223	464	279	261	540	318	308	626	373	363	736	422	430	852
55 — 59	200	179	379	220	209	429	256	246	502	295	293	588	348	347	695
60 — 64	163	134	297	175	162	337	194	191	385	229	228	457	266	273	539
65 — 69	130	97	227	133	114	247	145	140	285	164	168	332	195	203	398
70 — 74	98	67	165	96	74	170	99	89	188	111	113	224	127	137	264
75 +	106	78	184	100	74	174	99	80	179	104	96	200	116	122	238
All ages	8134	7510	15644	9276	8721	17997	10696	10193	20889	12505	12037	24542	14740	14293	29033

TABLE 12

(Contd)

MEDIUM LEVEL (HUNDREDS)

Age group	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T
	1964			1969			1974			1979			1984		
0 — 4	1473	1377	2850	1570	1536	3106	1847	1805	3652	2192	2141	4333	2626	2563	5189
5 — 9	1139	1074	2213	1357	1269	2626	1461	1431	2892	1736	1699	3435	2078	2033	4111
10 — 14	938	885	1823	1117	1052	2169	1334	1247	2581	1439	1409	2848	1713	1678	3391
15 — 19	802	722	1524	922	869	1791	1100	1035	2135	1316	1230	2546	1422	1393	2815
20 — 24	688	632	1320	781	704	1485	901	851	1752	1077	1016	2093	1292	1211	2503
25 — 29	582	550	1132	666	614	1280	759	686	1445	879	832	1711	1053	997	2050
30 — 34	493	484	977	563	533	1096	646	597	1243	739	670	1409	859	815	1674
35 — 39	428	402	830	475	468	943	545	517	1062	627	582	1209	720	655	1375
40 — 44	355	333	688	410	388	798	457	453	910	526	502	1028	607	567	1174
45 — 49	298	273	571	336	320	656	390	374	764	436	438	874	504	487	991
50 — 54	241	223	464	278	259	537	315	305	620	367	358	725	412	421	833
55 — 59	200	179	379	219	208	427	250	243	493	289	287	576	339	339	678
60 — 64	163	134	297	174	161	335	192	188	380	224	222	446	257	264	521
65 — 69	130	97	227	132	113	245	143	137	280	159	162	321	187	193	380
70 — 74	98	67	165	94	73	167	97	86	183	107	107	214	120	128	248
75 +	106	78	184	98	72	170	94	76	170	96	89	185	106	110	216
All ages	8134	7510	15644	9163	8611	17774	10535	10031	20566	12209	11744	23953	14295	13854	28149

TABLE 12

(Contd)

LOW LEVEL (HUNDREDS)

Age group	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T
	1964			1969			1974			1979			1984		
0 — 4	1473	1377	2850	1570	1536	3106	1847	1805	3652	2118	2069	4187	2445	2386	4831
5 — 9	1139	1074	2213	1357	1269	2626	1461	1431	2892	1736	1699	3435	2008	1965	3973
10 — 14	938	885	1823	1117	1052	2169	1334	1247	2581	1439	1409	2848	1713	1678	3391
15 — 19	802	772	1524	922	869	1791	1100	1035	2135	1316	1236	2546	1422	1393	2815
20 — 24	688	632	1320	981	704	1485	901	851	1752	1077	1016	2093	1292	1211	2503
25 — 29	582	550	1132	666	614	1280	759	686	1445	879	832	1711	1053	997	2050
30 — 34	493	484	977	563	533	1096	646	597	1243	739	670	1409	859	815	1674
35 — 39	428	402	830	475	468	943	545	517	1062	627	582	1209	720	655	1375
40 — 44	355	333	688	410	388	789	457	453	910	526	502	1028	607	567	1174
45 — 49	298	273	571	336	320	656	390	374	764	436	438	874	504	487	991
50 — 54	241	223	464	278	259	537	315	305	620	367	358	725	412	421	833
55 — 59	200	179	379	219	208	427	254	243	493	289	287	576	339	339	678
60 — 64	163	134	297	174	161	335	192	188	380	224	222	446	257	264	521
65 — 69	130	97	227	132	113	245	143	137	280	159	162	321	187	193	380
70 — 74	98	67	165	94	73	167	97	86	183	107	107	214	120	128	248
75 +	106	78	184	98	72	170	94	76	170	96	89	185	106	110	216
All ages	8134	7510	15644	9163	8611	17774	10535	10031	20566	12135	11672	23807	14044	13609	27653

TABLE 13

Population aged 5 - 14, child woman ratio and dependency ratio at five year intervals during 1964-84 under Low level projection.

	1964	1969	1974	1979	1984
Age group 5 — 14	403,600	482,800	562,000	651,300	779,400
Child-Woman Ratio	839	818	834	839	856
Dependency Ratio	1.066	1.089	1.090	1.115	1.114