

ANALYSIS OF DATA ON FERTILITY, MORTALITY AND ECONOMIC ACTIVITY OF URBAN POPULATION IN LIBYA BASED ON A HOUSEHOLD(') SAMPLE SURVEY

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The Household Sample Survey was conducted in 1969 by the Census and Statistical Department of Libya. The writer of this article, in his capacity as a United Nations Statistical Advisor in Libya, was responsible for designing and conducting the survey.

0.1 The need for a continuous flow of comprehensive information on the demographic and economic characteristics of the population for formulating socio-economic plans needs no special emphasis. The importance of such information is far more essential in a developing country, as Libya, in which a remarkable economic and social development is being witnessed for the last ten years. The phenomenal high rate of increase in per-capita income (about 25.5% per annum) should have a tremendous influence on the various demographic characteristics of the population, i. e. the rate of growth, economic activities, the composition of labour force, etc.

(1) The results were tabulated and published by the Census and Statistical Department in the following reports :

- (a) Report on the First Phase of the Household Sample Survey (Tripoli Town).
- (b) Report on the First Phase of the Household Sample Survey (Benghazi Town).
- (c) Report on the First Phase of the Household Sample Survey in Tripoli and Benghazi (Economically Active Population).
- (d) Report on the First Phase of the Household Sample Survey in Tripoli and Benghazi (Economically Inactive Population).

0.2 In Libya, as in most countries, vital registration records are the main source for estimating fertility and mortality rates while data on the labour force are usually obtained from the population census or other periodic inquiries. Evaluation of the vital registration records in Libya showed clear evidence of deficiency and inadequacy. The information on the economic activities of the population, on the other hand, were obtained in the 1964 population census. However, in view of the wide coverage of the census operation and with the limited technical resources at that time, no adequate control could be laid on the collection of the data on economic activities. In addition, no distinction was made in the population census between urban and rural areas despite the fact that such distinction is most bearing on demographic analysis. It was, therefore, conceived that with the use of sampling methods, more refined techniques can be applied to seek information which might be less biased than those obtained from the population census.

0.3 Therefore, one of the main purposes of the Household Sample Survey conducted in 1969 was to seek more accurate and up-to-date information on some demographic and economic characteristics of the population in urban areas namely Tripoli and Benghazi, the two main capitals in Libya. The purpose of this study is to examine the reliability of the sample results and their applicability for estimating some of the demographic and economic parameters in the urban population and to gain some knowledge of the factors which enter into the determination of these parameters. The study will cover the following :

- I. A brief outline of the methodology used in designing and conducting the Household Sample Survey.
- II. Estimation of fertility and mortality rates.
- III. Analysis of the economically active population. An assessment of the potential increase in the economically active population in the urban areas.

1.1 Coverage and Scope :

A plan was prepared to conduct a household survey on a sample basis covering only Libya households in various sectors of the country

i. e. urban, semi-urban and rural areas. However, in view of the shortage in staff, it was found necessary that the geographical coverage should be carried out gradually, starting, as a first phase, with the urban areas, i. e. the two main cities in Libya : Tripoli and Benghazi, then the other large cities and finally the rural areas. Although no objective distinction had been made in the population census between urban and rural areas, this was arbitrarily defined by the Census and Statistical Department as the total population of Tripoli and Benghazi cities, plus the urban agglomeration in the provinces of Baida and Derna. According to the definition, the population in Tripoli and Benghazi represented about 90% of the total urban population in Libya⁽¹⁾ and 20% of the total Libyan population.

1.2 The Unit of Enumeration and the Sampling Frame :

The definition of the household adopted in this survey was that used in the population census i.e. «a group of persone who are normally residents of the dwelling under study and having a common budget». The sample was drawn in clusteres of 5 households by means of systematic selection with a random start. The 1964 Population Census records were used as a frame but in order to up-date the above frame another supplementary sample was selected representing dwellings built after the census. The supplementary sample was selected from the lists containing building permits issued by the Municipality until December 1967.

1.3 The sample selected from the Census records consisted of the names and addresses of : 930 householders in Tripoli and 575 in Benghazi, distributed proportionally among various districts (Mahallas). Non Libyan households were excluded and these represented 201 households. As to the supplementary sample, it consisted of 228 households representing 2% of the newly constructed buildings. However, 140 Units from the supplementary sample could not be interviewed either because the buildings were not residential or because of the difficulty to find these buildings. The following table gives the distribution of the selected of the selected sample by type of frame and the number of households interviewed in each type :

(1) The Statistical Abstract 1968. Table (4).

The Census and Statistical Department, Libya.

Faame		Number of Households Interviewed	Number of Household Not interviewed			Total Number of Households Selected
			Non— Libyan	Non— Located	Non-Residen- tial Units	
The Census	Tripoli	713	167	50	—	930
Record	Benghazi	511	34	30	—	575
New	Tripoli	46	15	14	30	105
Building	Benghazi	42	12	46	23	123
Total	Tripoli	759	182	64	30	1,035
	Benghazi	553	46	76	23	698

According to the field instructions, all the dwellings selected in the sample had to be interviewed even if these dwellings were occupied by some other householders different from those reported in the sample lists.

1.4 Some Limitations of the Survey :

It is important to point out some of the shortcomings and defects of the survey, the knowledge of which is most relevant in evaluating the accuracy of the results obtained and in assessing their limitations. Perhaps, the most serious limitation arise from the selection of the sample. Although the sample had been selected according to laws of probability, it seemed doubtful that the sample was completely representative of the household population in the two Towns. The defection of the sample can be attributed to the following :

- (a) The 1964 Population Census records not adequate enough as a sample frame due to the noticeable population changes that took place from 1964 to 1968.
- (b) The frame used for selecting the supplementary sample was defective and consequently it seemed doubtful that the supplementary sample represented accurately the households occupying dwellings built after 1964. Furthermore, owing to the difficulty of estimating the number of this type of households, it would be difficult to assess the working sampling fraction of the supplementary sample.

- (c) A considerable difficulty was witnessed in locating a large number of dwellings selected in the sample and consequently these had to be replaced by other units. Although some rigid rules had been laid for the selection of replacements, the possibility of some bias in the selection could not be excluded. This may be due to the tendency on the part of interviewers to select the most accessible elements.
- (d) The sample was originally selected with 2% sampling fraction but because of the failure to reach all the units selected, the working sample fraction (W. S. F.) was less than 2%. Using the civil registration records of the Municipalities, the Libyan households could be estimated at 51,000 households in Tripoli and 30,000 in Benghazi. This means that the (W. S. F.) was about 1.5% and 1.8% respectively and not 2% as had been originally planned.

However, it is worth noting that the above limitations should not seriously hamper the use of the results obtained for analytical purposes particularly for the estimation of Population averages and ratios. On the other hand, it would be doubtful to use the sample values to estimate any population aggregates due to the lack of reliable estimate of the working sample fraction.

1.6 In addition to the above limitation connected with the efficiency of the sample, there is another limitation which is common to most household surveys. It is that the results obtained from such surveys are usually liable to some bias due to the failure of some households to give accurate information either consciously or unconsciously as in the case of income data. Such sources of bias will be referred to when commenting on the results obtained.

II.—The Estimation of Fertility and Mortality Rates

2.1 Before deriving any estimates of the fertility and mortality rates from the information obtained from the sample, it was conceived necessary to examine first the rate of population growth in the urban areas based on the Population Census data. There are shown in the table below :

TABLE 1

The Estimation of Population Growth Rate in Urban Areas

City	Population (Libyan)		Estimated Rates of Population growth	
	1954	1964	Average Annual	Constant
	Census	Census	Rate	Rate
Tripoli	99,925	182,672	8.3%	6.2%
Benghazi	67,188	130,618	9.4%	7.1%
Total	167,113	146,177	8.8%	6.6%

2.2 The figures shown in Table (1) indicate that the annual rate off population growth in the urban areas amount to 8.8% on the assumption of constant annual increase in population and 6.6% on the assumption of constant rate of increase in population. The rates are noticeably high if compared with the constant rate of all Libay (3.6%) or with the corresponding rates in other neighbouring countries⁽¹⁾. This high rate was only exceeded by Kuwait in which the annual rate was 10.5%. Obviously the estimated rate of growth in urban population in Liba is not indicative of the natural rate of increase because of the considerable effect of internal migration to urban areas. If this latter factor can be allowed for, some tentative estimate of the natural rate of increase can be obtained.

2.3 This was attempted by utilizing some of the information collected in the Household Survey on the previous place of residence, if any, of all householders in the sample. The results showed that about 27% of the householders in the sample immigrated to Tripoli from 1954 to 1969 against 23% in Benghazi⁽²⁾. The above ratios were then applied to estimate population values of the volume of immigration during the said period. The effect of immigration was then eliminated to arrive at a tentative estimates of the rate of natural increase. The figures are shown in the following :

(1) The annual rates of growth in some neighbouring countries for the period (1958/66), were as follows : Algeria = 2.0 — U. A. R. = 2.5 — Tunisia — 1.5 — Kuwait = 10.5.

Source : United Nations Demographic Year Book, 1966. Table (2).

(2) The Census and Statistical Department, Libya «The Household Survey» Reports 1 and 2, Table 27.

TABLE 2

The Estimation of the Rate of Natural Increase in Urban Areas in Libya

City	Census of Population 1954 (1000)	Rate of Population growth (r)	Estimated Population in 1969 (1000)	Estimated Population Immigrants in 1965/69 (1000)	Estimated Rate of increase due to immig. (m)	Estimated ⁽¹⁾ Rate of natural increase (n)
Tripoli	100	6.2%	246	66	3.5%	2.7%
Benghazi	67	7.1	183	42	3.3%	3.7%

From the above computation, it can be seen that the rate of natural increase can be tentatively estimated at 2.7% in Tripoli and 3.7% in Benghazi and the weighted average of the total urban area is about 3.1 which is a reasonable estimate for the area.

Evaluation of fertility and mortality rates :

2.4 Information on the frequency of birth and death incidents were sought for the estimation of current crude birth and death and assessing the deficiency in the conventional civil registration records. These informations on birth and deaths in the sample were obtained by asking female members of the household about the number of children born to each woman during the last twelve months, and during her entire lifetime and also by asking the householders about the number of deaths among members of the household during the last twelve months.

The Deficiency in birth registration :

2.5 The following figures give the computed birth rates obtained from the sample as compared with those based on the civil registration records in 1968 (i. e. the year which almostly correspond to the survey reference year).

1. Crude Birth Rate from the Sample	49.6%	57.9%
2. Crude Birth Rate from Registration Records (1968)	39.4%	31.6%
3. Deficiency Ratio	$\frac{1 - 2 \times 100}{2}$	20.6% 45.5%

(3) The natural rate of increase was derived on the assumption that $(1+r) = (1+n)(1+m)$, when r is the rates of population growth, m the rate of increase due to immigration and n the natural rate of increase.

So, assuming that the rates obtained from the sample are of the correct order of magnitude for Libya, the above figures indicate the degree of deficiency in the civil registration system. Obviously the deficiency is expected to be much higher in rural areas.

2.6 The normal test of significance was applied to test the regional differences in fertility as estimated from the sample. The differences between the crude birth rates in Tripoli (49.6) and Benghazi (57.9) was not significant (the standard error of the difference $\sigma d = 4.8$). It can then be assumed that the Tripoli and Benghazi samples were drawn from the same population as to fertility level. The pooled data in the two cities gives an overall estimate of the crude birth rate at 53.2 (with standard $\sigma p = 2.5$).

2.7 Examining the applicability of the above estimates, it appears that it is exceptionally high if compared with the birth rates observed in other countries. A part from the effect of sampling errors, the high crude rate may be due to some exaggeration in reporting the number of births during the reference year. However, the high fertility can be accepted if it is considered in the light of the exceptional economic developments witnessed in Libya in the last ten years. The most important of these is the phenomenal and continuous increase in per capita income which brought about a state of affluence. Meanwhile, the community is still retaining its conservative traditions and its negative attitude towards birth control. Such factors should induce more marriages and subsequently an increase in birth rates. This can be indicated by the fact that the crude birth rates for all Libya (based on civil registration records) has increased from 25. in 1964 to 38. in 1968. Although this increase is partly due to improvement in registration, a considerable part of it could be to actual rise in fertility rates.

Another estimate of the crude birth rate in urban areas :

2.8 In order to examine the applicability of the above estimate, another attempt was made by utilizing the information collected in the Household Survey on the number of birth to each female in the sample (15 and over) during her life-time. Assuming a hypothetical cohort of females passing through the age 15—50, the number of birth for a specific age group were estimated by simply subtracting the total number of births during life-time in the preceding age group. The figures and calculations are shown in the following table for the pooled data in Tripoli and Benghazi :

TABLE 3

The Estimation of Crude Birth Rate from Sample Data on Life-time
Fertility in Urban Areas in Libya

(1) Age group	(2) Number of Females in the Sample	(3) Number of births during life-time Y_t	(4) Number of births by age group of females Y_t	(5) Av. Number of births in specific age group per year
15 —	331	99	99	20
20 —	287	600	501	100
25 —	224	996	396	79
30 —	222	1,261	265	53
35 —	201	1,414	153	31
40 & 50	275	1,777	363	36
Total	1,540		1,777	319

(3) Y_t = Life-time births of females in age group t .

(4) $Y_t = Y_t - Y_{t-1}$

The crude birth rate in Tripoli and Benghazi can be then obtained by dividing total number of birth in one year (Column 5) by the total number of persons in the sample.

$$\text{The crude birth rate in urban areas} = \frac{319}{7,850} \times 1,000 = 40.8.$$

2.9 Two estimates of the crude birth are now obtained from the sample : the first based on current fertility during the reference year (53.2) and the second based on life-time fertility (40.8). The difference between the two estimates is considerably large.

According to previous experience, it seems that the first method tends to overestimate the crude birth due to overreporting of births as householders may tend inadvertently to report some birth events which happened before the reference year. The second method, on the other

hand, seems to underestimate the crude birth rate due to the underreporting of births as a result of normal lapses of memory⁽¹⁾. Therefore, a mid value of the above two estimates seems to be a reasonable estimate of the crude birth rate in urban population of Libya, i. e. 47.0. It is striking to note that this estimate⁽²⁾ agrees closely with another estimate obtained for the year 1965 based on the Reverse Survival Method.

The Computing of Gross and Net Reproduction Rates from Sample Data on Life-time Fertility :

2.10 The figures contained in Table (3) Column (4) were utilized to estimate the gross reproduction rate (G. R. R.) and the net reproduction rate (N. R. R.).

TABLE 4
The Computation of the Gross and Net Reproduction Rates
for Urban Population, Libya

(1)	(2)	(3)	(4)	(5)
	Specific Fertility Rates	Specific Fertility Rates (Females) ⁽¹⁾	Survival Function L_x	Net Specific Fertility Rates (3) × (4)
15 —	299.09	146.55	7.672	112.4
20 —	1.745.64	855.36	7.539	644.8
25 —	1.622.95	795.25	7.370	586.1
30 —	1.193.69	584.91	7.188	420.4
35 —	761.19	372.98	6.999	261.0
40 & 50	1.320.00	646.80	6.797	439.6
Total		3.401.85		2.464.3

(1) The experience gained in the Indian National Sample Survey showed that the number of births reported failed off systematically as the events recede in time :

Das Gupta Ajit «Determination of Fertility Levels at trends in Defective Registration Areas» Bulletin de L'Institut International de Statistique 1957.

(2) In a previous attempt the crude birth rate for all Libya was estimated at 46.9 in 1965 by applying the Reverse Survival Method.

S. Zaghloul «Demographic Parameters in Libya» — The Demographic Centre

(1) The specific fertility rates of females was estimated on the assumption the sex ratio of births was 105.

As can be seen from the above table, Column (3), the Gross Reproduction Rate = 3.4.

It is interesting to note that in a previous attempt⁽²⁾ the G. R. R. in Libya in 1965 was estimated at 3.32, a result which agrees closely with that obtained in the present study.

In deriving the N. R. R. the survival function L_x of (the Southern Region level 13.5) was applied and the N. R. R. is estimated at 2.46 which seems to be a reasonable estimate for the area.

From the above analysis, it can be seen that the sampling surveys, if adequately designed and controlled, can provide reasonably accurate information for estimating fertility measures in defective registration areas.

Variations in Fertility by Income Groups :

2.11 The crude birth rates were calculated for broad income groups in Tripoli and Benghazi samples as shown in the table (4).

TABLE 4

The Crude Birth Rates for Different Income Groups in Urban Population, Libya

Monthly Income of Household L. L. Area	Less than 50	50—	100 and over	total sample
Triboli	62.8	42.8	29.6	49.6
Benghazi	60.8	66.4	51.0	57.9
Total	62.1	60.9	42.2	53.2

As expected, the fertility tends to be lower for higher income groups and the relationship seems to be more clearly indicated in Benghazi. Accordingly, one should expect a higher rate of fertility for all Libya than that for urban areas on account that the per capita income in the rural areas is lower than in urban areas.

(2) S. Zaghloul «Demographic Parameters in Libya» — The Demographic Centre, Cairo, 1971.

The Deficiency in Death Registration :

2.12 The crude death rates were computed from the information collected from the sample on death incidents in the households during the reference year. The computed rates are shown below along with those based on civil registration records :

	Tripoli	Benghazi
1. Crude Death Rate from the sample	12.2%	14.0%
2 Crude Death Rate from Reg. Records (1968)	4.6	7.3
3. Deficiency ratio $\frac{1-2}{2} \times 100$	62	48

The above comparison shown that the deficiency in death registration records is considerably far more serious than the deficiency in birth registration.

A pooled estimate of Crude Death Rate for urban areas :

2.13 The difference between the mortality rates in Tripoli and Benghazi did not show to be significantly different (the standard error of the difference $d = 0.8$). This could permit the estimation of an overall crude death rate from the data obtained in Tripoli and Benghazi pooled together. This gave an estimate of crude death rate at 13.1 (the standard error $\sigma_p = 1.27$).

Comparing the estimated crude birth rate with those prevailing in the neighbouring countries, which are socially more developed⁽¹⁾, it seems that the above estimate is lower than should be expected. This may be partly due to errors resulting from underreporting of death incidents in the reference year of the survey and partly due to sampling errors⁽²⁾.

The Crude death rate as the difference between the crude birth rate and the natural rate of increase :

2.14 On the assumption that the estimate of crude birth rate is reasonably acceptable, another estimate of the crude death rate can be arrived at by utilizing the estimate of natural rate of increase which was obtained in item (2.3) of this study, i. e.

(1) Crude death rates prevailing at present in some Arab countries are of the following order : Algeria = 19.0, U. A. R. = 18.1, Tunisia = 17.8, Sudan = 21.0. U.N. and U. A. R. Cairo Demographic Centre «Demographic Measures for Arab countries of North Africa and South West Asia», April 1969.

(2) When p is small, a larger sample is needed for precise estimate of the number possessing any attribute.

The crude death rate = (The crude birth rate) — (The rate of natural increase) = 47.0 — 31.0 = 16.0.

Evaluating the above estimate, it can be noted that in a previous attempt⁽³⁾ the crude death rate in all Libya was estimated at 18.1 in 1965. Taking into account the better living conditions in urban areas and the improvement in medical services since 1965, the above estimate of 16.0 can be conceived as a reasonable estimate of the crude death rate in urban areas in Libya.

III.—Analysis of Data on the Economically Active Persons in the Sample :

3.1 The economically active population, or, the total number of persons in the labour force, is defined as those persons who are engaged in productive or remunerative work for pay or profit, whether employed or unemployed during the survey's reference period.

The past experience in the field of labour force surveys, has always shown that there are some difficulties in estimating, with precision, the size of the labour force because of the ambiguity involved in identifying some classes of the population. On one hand, some persons particularly those reporting as own account workers or unpaid family workers, might be classified as economically active while they are not actually engaged in any work connected with the production of goods and services. On the other hand, it is also likely that some persons reporting that they are not seeking work may be classified accordingly as economically inactive while they are actually wanting work though not seeking it for temporary reasons. Therefore, such persons should be considered as unemployed i. e. economically active, persons not at work.

Assessment of errors in measuring labour force :

3.2 To eliminate such misclassifications, the questionnaire had to be carefully drafted so as to make possible a precise measurement of the labour force. Therefore, the household questionnaire included some questions on individual characteristics such as occupation, income from and hours of work to ensure that no person who was out of the labour force was misclassified as economically active. In addition, another individual form was utilized to collect detailed information

(3) S. Zaghloul «Demographic Parameters of Libya»—The Demographic Centre, Cairo, 1971.

on the those persons who reported in the household that they were either unemployed or economically inactive. The informations were sought, not only to examine the causes, of unemployment, but more importantly, to correct any misclassification of those persons reported as economically inactive.

By applying this technique, it was possible to reclassify some members of the households as unemployed while they had been originally reported as inactive. These cases represented mainly persons who were wanting work but not seeking it for temporary reasons. The reclassified cases represented about 26% of the total unemployed. This can indicate the amount of bias which may occur in measuring the volume of unemployment or the size of labour force.

The change in the relative size of labour force :

3.3 The following figures show the crude activity rates by sex based on the 1954 and 1964 population census in Libya as compared with the rates obtained from the sample in 1969.

TABLE 5

The Crude Activity Rates in Libya and the Average Rate in Africa

	1954 (Population Census)	1964 (Population Census)	1969 (Sample Survey)	Average in ⁽¹⁾ Africa
Males	51.0%	47.0%	38.1%	56.8%
Females	7.0%	3.1%	2.6%	14.5%
Total	29.2%	25.7%	20.9%	35.8%

It can be seen that the activity rates in Libya based on data from successive censuses and surveys were far below the average activity rate for African countries.

The above figures also indicate a continuous decline in the rate of participation in the economic activities in the population. However, the figures have to be interpreted with caution. Although there were no basic differences in the definitions applied in measuring the labour force, there may be variations in the degree of accuracy. As the for

(1) Demographic Aspects of Manpower ; Sex and Age Patterns of Participation in Economic Activities Population Commission, United Nations.

in the activity rate of males. This comparison still indicates a continuous decline in the activity rate particularly in 1969 even after allowing for the fact that the 1968 rates represent only the urban areas (Tripoli and Benghazi)⁽¹⁾.

3.4 The change in age composition might had some influence on the change in crude activity rate. Examining the change in age structure, it was found that the percentage population in the age group 0—14 had increased from 38% in 1954 to 44% in 1964. On the assumption that 15 years is a reasonable minimal age for entering into labour force in Libya, the population less than 15 years old can be excluded to compute the refined activity rates as follows :

TABLE 6
The Refined Activity Rates in Libya (Libyan only)

	1954 (Population Census)	1964 (Population Census)	1969 (Sample Survey)
Males	81.3%	80.1%	70.6%
Females	9.7%	4.3%	3.2%
Total	46.2%	43.2%	37.0%

As indicated by the refined activity rates, the differences between the male rates in 1954 and 1964 is much reduced while the female rate in 1964 showed a pronounced decline. As to the activity rate in 1968 derived from the sample data, the decline in both the male and female rates is substantial⁽²⁾. A part from the effect of sampling error, the decline is partly due to the increase in accuracy resulting from the use of more refined techniques in collecting the information on labour force in the sample. The use of such techniques may not be possible in the census. The decline can be also attributed to the remarkable

(1) According to the 1964 population census, there were no marked difference in activity rates between urban population, as defined in this survey, and the rural population.

(2) The R. A. R. for the male population, nationals and expatriates in Libya and other neighbouring countries were as follows : Libya (1964) = 86.7, Tunisia (1966) = 83.5, Algeria (1966) = 83.7, Morocco (1960) = 90.7.

A. A. LLAYYAT «A bridged table of working life for male Population». Cairo Demographic Centre, 1971.

females are likely to be much affected than the by variations of definitions and biases, it would be preferable to consider only the changes expansion in educational facilities and school enrolments during the sixties⁽¹⁾. The continuous and noticable rise in per capita income must had induced many members of the households to continue higher education than to enter the labour market. The situation of labour supply had also been influenced by the demand factor. As the rise in income originated mainly from one main sector (the oil sector), the economic growth was not balanced and as a result employment opportunities in other sectors did not expand proportionally. But on the contrary, the agricultural sector has been subject to a considerable contraction. This may demonstrate that unless a balanced growth can be maintained in the future, further decline in the activity rates in Libya would be expected.

The Specific Activity Rates :

3.5 For comparison purposes, the males specific activity rates, derived from 1969 Sample Survey, are charted against the corresponding rates in U. A. R. derived from 1960 Census. It can be seen that the age-curve in Libya is almost parallel but lower than that in U.A.R. Furthermore, the specific activity rates for the ages 15—19 and 65 and over, in Libya, are far below the corresponding rates in U.A.R. This indicates a more delayed entry in labour force in Libya, as well as earlier retirement than in U.A.R., i. e. shorter period of active life in Libya than in U. A. R.⁽¹⁾. However the conclusion is qualified on the assumption that the specific rates derived from the sample of urban population in Libya are indicative of the rates in the whole country.

Average gross years of Active Life for Libyan males :

3.6 The age specific activity rates are utilized in computing the average gross years of active life from age 15 to 70. The calculations are shown in Table (7).

(1) School enrolments had increased from 100,000 in 1957 to 209,000 in 1967. Census and Statistical Department-«Statistical Abstract» 1968.

(2) The observed high negative correlation between school attendance rates and age specific activity rates is superficial and should not be considered as indicative of any causal relationship. School attendance has its influence less than 20.

A. ALAYYAT, Op cit.

TABLE 7

Calculation of Gross Years of Active Life of Males in Urban Areas in Libya 1969

Age Group (1)	Age Interval (2)	Specific Activit Rate (3)	Average Number of Acitve Years (2 × 3)
15 —	5	26.69	1.334
20 —	5	81.90	4.095
25 —	5	95.67	4.783
30 —	5	96.19	4.809
35 —	5	96.47	4.823
40 —	5	96.94	4.847
45 —	5	96.23	4.811
50 —	5	96.63	4.831
55 —	5	87.21	4.380
60 —	5	75.00	3.750
65 —	5	37.35	1.867
Total	55		44.330

The above computation shows that the average gross years of active life from age 15 to age 70 is 44.33 year, ignoring the effect of mortality. This average amounts to 48.4 years in industrialized countries, 49.6 in semi industrialized countries and 50.8 in agricultural countries and 50.8 in agricultural countries. This indicates that the average working life in Libya is below the world averages.

Labour Force Life Table :

3.7 To estimate the reduction in gross years of active life due to mortality, the expectations of economically active life were calculated by constructing a «Labour Force Life Table» in urban areas in Libya. In constructing this table, it was assumed that mortality conditions of males in the population under study can be represented by the life table survival functions applicable in the Southern⁽¹⁾. Region, level (13.5), taking in view the estimated crude death rate of (16.0) arrived at in the present study (para. 2.14).

(1) Regional Model Life Tables «Princeton Univ. Press» 1966.

TABLE 8

Economically Active Life Table of Males in Urban Population
in Libya based on Household Sample Survey 1969

Age Group	Specific Activity Rate	L_x	${}_5L_x$	Economically Active Population (2 X 4)	Cumulative Population in ages X—to ∞	Cumulative Active Population in ages X—to ∞	Life Exp. 6 — 3	Act Life Exp. 7 — 3
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
15 —	26.69	75.462	374.022	99.827	3.387.707	2.793.314	44.9	366
20 —	81.90	74.146	365.836	299.620	3.013.685	2.663.487	40.7	35.9
25 —	95.67	72.187	356.174	340.752	2.647.848	2.363.867	36.7	32.7
30 —	96.19	70.281	346.301	333.108	2.291.673	2.023.115	32.6	288
35 —	96.47	68.239	335.604	323.758	1.945.371	1.690.007	28.5	24.8
40 —	96.94	66.002	323.178	313.289	1.609.767	1.366.249	24.4	20.7
45 —	96.23	63.268	308.074	296.460	1.286.588	1.052.960	20.3	16.6
50 —	96.63	59.960	289.135	279.391	978.514	756.500	16.3	12.6
55 —	87.21	55.693	264.715	230.858	689.379	477.109	12.4	8.6
60 —	75.00	50.193	232.771	174.579	424.664	246.251	8.5	4.9
65 —	37.35	42.915	191.892	71.672	191.892	71.672	4.5	1.7

(2) Specific activity rates of males in the whole sample.

(3) L_x = Number of survivals at age X of 100,000 born alive.

(4) ${}_5L_x$ = Number of persons alive within each age interval in the hypothetical cohort.

(5) Economically active survivals i.e. ${}_5L_x \times X$ Column (2).

(6) T_x = The Cumulative sum of ${}_5L_x$.

(7) Cumulative active population represents the cumulative sum of column (5).

(8) Total expectation of life at age X.

(9) Expectation of active life i.e. the average number of active years to be lived per person in the hypothetical cohort.

3.8 The computation are shown in Table (8) which gives in Column (9) the expectation of net active years at each age. The average years are charted against the corresponding figures in U.A.R.⁽¹⁾ in 1960. It can be seen that the length of active life, at different ages, in Libya is shorter than that in U. A. R.

The effect of mortality on active life in Libya at age 15 is simply the difference between the gross years of active life obtained from Table (7) i. e. 44.33 and the net active life at age 15 from Table (8) i. e. 36.6.

The effect of mortality on active life of males at ages between 15 and 70 in Libya and U. A. R. can be summarized as follows :

	Libya (1969)	U.A.R. ⁽¹⁾ (1960)
1. Gross years of active life (15 — 10)	44.3	49.6
2. Expectation of active life at age 15	36.	42.5
3. The loss of active years due to mortality (1 — 2)	7.7	7.1

The comparison indicates that the loss of active years due to mortality in urban population in Libya is not much different from U.A.R.

Some characteristics of the economically active Population :

3.9 After discussing some of the aspects related to the measurement and composition of the labour force in urban areas in Libya, it would be useful and instructive to examine the main characteristics of the economically active persons, i. e. their education level, occupational structure, and distribution by economic activities. Such information are, of course, essential in dealing with questions relating to manpower planning and to the formulation of economic and social policies.

(1) Methods of Analyzing Census Data on Economic Activities of the Population, Annex, published by Department of Economic and Social Affairs, Population Studies No. 43.

(2) Figures for U. A. R. were calculated from the Economically Active Life Table of U. A. R. in 1960.
Population Studies No. 43 Op cit.

(3) In a previous attempt to construct a table of working life for Libya for the years 1965, the gross year of active life was (15—80) 51.1 and the net active life 39.1 and the loss due to mortality is 12.0.

A. ALAYYAT, Op cit.

The distribution of the economically active by educational level :

3.10 Relationship between educational level and economic activity is of special significance for developing countries. The following figures illustrate the percentage distribution in the sample of the economically inactive⁽¹⁾ and active males (20 years and over) by educational level, along with the average earnings from work for different educational levels of the labour force.

Educational Status	Economically Active	Economically Inactive	Av. Earnings
			L. L.
Illiterate	35.4	37.8	44.5
Read and write	37.0	42.2	63.8
Primary certificate	12.2	9.3	67.3
Preparatory and secondary certificatees	13.5	10.7	108.2
University level	1.9	—	181.5
	100.0	100.0	63.7

From the above figures, it can be seen that the majority of the economically active are either illiterate or those who read and write. It is also interesting to note that the distribution by educational level of the economically active persons is not much different from that of the economically inactive. This may generally indicate that educational level has no influence on economic activity. This situation as will be shown below, is simply due to the predominance of the unskilled workers among the economically active persons. However, average earnings per active person seem to be closely related with the educational level. The attainment of an educational level equivalent to preparatory or secondary certificate would bring about a considerable rise in average earnings.

The distribution of the economically active by occupation and industrial activities :

3.11 Table (9) illustrates the cross classification⁽²⁾ of labour force in the sample by occupations (ISCO) and industrial activities (ISIC). The occupational structure indicates that the services unskilled labour

(1) Because of the limited number of the economically active females in the sample, no similar comparison could be established.

(2) The classification by occupation and industrial activities adopted in this study, was slightly different from the international classification, to suit local conditions.

TABLE 9
The Distribution of Economically Active Population in the Sample According
to Occupation and Economic Activity

Economic Activity and Occupation	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	Total
Prof., Tech. and Related Workers	—	2	8	2	1	1	81	5	—	100
Admin. Excc. and Managerial Workers	—	7	—	2	2	6	70	2	—	89
Clerical Workers	—	9	7	3	5	16	107	3	—	150
Sales Workers	1	1	—	1	1	226	2	3	—	235
Farmers and Related Workers	17	—	—	—	1	—	1	—	—	19
Workers in Transport and Comm.	—	12	2	1	96	2	37	3	—	153
Craftsmen and Prod. Workers & Miners	1	5	87	51	9	7	41	10	3	214
Service Skilled Workers	—	3	2	4	1	8	144	38	8	208
Unskilled Workers and Other	—	3	18	15	7	23	151	33	107	316
Total	19	42	124	79	123	289	634	97	128	1,535

represent the largest group (25%) followed by sales workers (16%)

3.13 As the non-agricultural activities in Libya are concentrated mainly in the urban areas namely Tripoli and Benghazi, the sample data on industrial activities can be indicative of the percentage distribution of the total labour force in the non-agricultural sectors in Libya.

Examining this distribution by industrial activities, it can be seen that the largest proportion of the economically active were engaged in the Government sector 41.2%. According to the (ISIC) classification, the service sector i. e. the Government and Personal Services, combined together, included almost 47.5% the labour force in the sample. Excluding the agricultural sector which is not normally represented in urban areas, the percentage of those engaged in the services amounts to 48.2% as compared with only 34.6% according to the 1964 population census. The change in the structure of industrial activities of the labour force in non-agricultural sectors in Libya can be tentatively summarized by dividing the industrial activation (5—9) and M Sector, the processing industries i. e. divisions (2—4).

TABLE 10

The Change in Percentage Distribution of Labour Force and Gross Domestic Product by Industrial Activity in Libya

Industrial Sectors in non-agricultural activities	Percentage Distribution of Labour Force		Percentage Contribution in ⁽¹⁾ Gross Domestic Product	
	1964 Popul. Census	1969 Sample	1964	1969
M Sector (division 2—4)	26.8	16.2	40.0	67.2
S Sector (division 5—9)	73.2	83.8	60.0	328.
Total (excluding Agriculture)	100.0	100.0	100.0	100.0

(1) Figures on the percentage contribution of various sectors to the G. D. P. for the period 1964-67 were based on preliminary estimates prepared by the National Accounts Section of the Statistical and Census Department. - The corresponding figures for 1969 were based on assumed rates of income growth in various sectors. The Statistical and Census Department «Preliminary National Accounts in Libya, 1962—67» 1968. Table 13.

3.13 So, on the assumption the sample figures reflect the composition of the total labour force in non-agricultural sector in Libya, the above table indicates the increasing share in labour force of the service sectors and the declining share of processing industries. On the hand, the situation is in reverse as regard to the change in the percentage contribution of these sectors to gross domestic product which shows an increase in the contribution to the G. D. P. of the processing sector (mainly the petroleum sector) and a profound decline in the contribution of the services sector. The above figures are indicative of a situation of an unbalanced economic development as regard to the utilization of labour force. The relative decline in labour productivity in the service sectors, which was mainly due to the continuous increase in employment of the Government sector, suggests that relatively a situation of underemployment or possibly disguised unemployment was seriously developing in this sector.

3.14 The interrelation between occupation and industry can be examined from table (9) which serves as input-output matrix showing the interactions between the supply of occupational skills and the demand by various industries. From this table it is interesting to note that although only 12% of those employed in the Government administration sector were from the professional category, the Government sector employed 81.0% of all the professional skills. This is also indicative of the unbalanced allocation of the professional skills which represent the most scarce category (7.6%) of the labour force in non-agricultural sector. Any further expansion in the activities of the Government administration sector would have, under these conditions an important impact on the demand for professional skills. The same situation almostly applies to the category of executive, administrators and managerial workers.

The Change in the Occupational Structure :

3.15 Table (11) describes the relationship between the present occupation of the economically active persons and their previous occupations if any. Although the data suffer from some limitations due to errors in biases in reporting accurate information on the previous or present occupation, the figures shown in the table can tentatively reflect the changes that took place in the occupational structure of the labour force resulting from the recent economic and social developments and more particularly, resulting from the change in the demand for occupational skills by various industries.

TABLE 11

Distribution of Economically Active Population According to Present Occupation and Main Previous Occupation in the Sample

Present Occupation Main Previous Occupation	Prof. & Admin. Clerical Sales Farmers and Workers Craftsman Services Tech. & Exec. & Manage- rial Work rkers in and Prod. Skilled Workers Related Workers and Comm. & Miners Workers Total								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Prof. Tech. and Related Workers	90	5	3	5	—	2	7	1	3
Admin. Exec. and Managerial Workers	3	63	—	5	1	—	2	1	1
Clerical Workers	—	9	111	3	—	1	3	1	—
Sales Workers	—	2	3	73	1	3	3	1	5
Farmers and Related Workers	1	1	2	17	—	99	4	8	3
Workers in Transport and Comm.	1	—	1	6	—	10	13	14	50
Craftsmen and Prod. Workers and Miners	3	3	9	15	—	11	151	19	15
Services Skilled Workers							9	138	10
Unskilled Workers and Other	1	1	10	36	4	14	15	24	276
Total	100	89	150	235	19	143	214	208	376
									1535

These changes can be best summarized in Table (12) which gives for each occupation, the number of persons retaining their previous occupation (Column 3), the number of leaving i. e. the loss (Column 2) and the number entering the occupation i. e. the gain (Column 4).

It can be seen from the above tables, that those who have changed their occupations represent (45.8%) of those who retained their previous occupation. This high ratio indicates that the workers are not firmly attached to their occupations and there is a tendency, on the part of workers, to take up other occupation as a result of various incentives.

The figures also indicate that the rate of change differs from one occupation to another and while some occupation have lost a considerable proportion of their members, other occupations have gained new entries.

As expected the most considerable loss in the number of workers is witnessed in agriculture. Out of 122 workers in the sample whose previous occupation was farming only 13 were still retaining their previous occupation and only 6 new entries with a net loss of 790.0%. Despite the limitations due to the sample size, the above result might show the dimensions of the main handicap of agricultural development, namely the problem of labour drain.

The net loss in professional and technical workers group was 17.8% and in the production workers group it was 7.4%.

As to the occupations which attracted new entries, Sales workers' occupation has gained 39% and Transport workers in which the net gain is 31%. The results are in agreement with the general impression about the recent expansion in the above two activities.

Despite the limitations imposed by such factors as the size of the sample and the possible existence of errors in classifications, the results obtained are indicative of noticeable changes in the occupational structure of the economically active persons. This might suggest that more detailed and wider inquiries in the field are conceived necessary to provide more sound basis for labour force planning.

TABLE 12

The Changes in the Occupation Structure of the Economically
Active Population in the Sample

Occupation	The Number of Persons							
	In Main Previous Occupation	Leaving Occupation (Loss)	Retaining their Previous Occupation (1—2)	Entering the Occu- pation (Gain)	In Present Occupation	Percentage of Gain $\frac{1}{8} \times 100$	Percentage of Loss $\frac{7}{8} \times 100$	Net Gain (7—6)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Prof. Tech. and Related Workers	116	26	30	10	100	28.9	11.1	— 1.78
Admin. Exec. and Managerial Workers	76	13	63	26	89	20.6	41.2	20.6
Clerical Workers	128	17	111	39	150	15.4	31.6	16.2
Sales Workers	179	35	144	91	235	24.3	63.3	39.0
Farmers and Related Workers	122	109	13	6	19	838.0	48.0	—790.0
Workers in Transport and Comm.	122	23	99	54	153	23.6	55.2	31.6
Craftsmen and Prod. Workers and Miners	225	74	151	63	214	49.2	41.8	— 7.4
Service and Skilled Workers	185	47	138	70	208	32.7	50.7	18.0
Unskilled Workers and Others	382	106	276	91	367	38.3	31.2	— 7.1
Total	1,535	450	985	450	1,535	45.8	45.8	0

The Income Distribution of the Economically Active Persons and Variations in Income by occupation :

3.16 The percentage distribution of the economically active persons in the sample by average monthly earnings is graphed in Chart (3). As can be seen from the graph, the income curve is not a descending type as normally observed in the income distribution of most developing countries. The curve also is not symmetrical but with positive skewness. The largest proportion of the labour force falls in the income group (20—40) L. L. with an average monthly income of L. L. 65.0 per workers.

3.17 The variations of income by occupation are indicated in Table (13) which suggests that the highest average income is gained by the administrative executives and managerial workers (L.L. 127.3). The professional and technical workers come second in average earning (L. L. 92.2) followed by the clerical workers (L. L. 73.4)⁽¹⁾. It is interesting to note that income level in the above occupations is higher than that in many other productive occupations such as craftsmen and production workers. The reason lies in the fact that most of the worker in the above groups are employed by the Government in which salary scales are more generous.

Examining the variations in average income against the variations in average weekly hours of work in different occupations, no clear relationship can be indicated. This may suggest that the level of earnings in one occupation is not much influenced by normal hours of work but most likely by the supply of labour in this occupation which, in term, is dependent in the amount of training and experience needed to entre this occupation.

A Tentative Attempt for Estimating the Potentialities of Increasing the Labour force in Urban Areas in Libya :

In a country like Libya, with a relatively small population and a high rate of economic expansion, the question of full utilization of its man-power resources should be given the first priority in the formulation of development plans. In fact, the achievement of a balanced growth will be greatly conditioned by the possibilities of increasing the labour force available for income-producing activities.

(1) In view of the limited number of workers in the farming and mining occupations in the sample, the estimates of average earnings in these two occupation groups would not be indicative of the population averages.

Under given conditions of productivity, one way of increasing the labour supply in Libya is to increase the customary working hours. The average weekly hours of work in Libya, as roughly indicated by the sample data, is 47.2 which is relatively high if compared with normal hours of work in other countries. In addition, with the trend towards a shorter working week, as observed in many countries, it seems that the increase of working hours in Libya is not a feasible approach for increasing the labour supply in Libya.

Therefore, it seems that the only possible way for increasing the labour force in Libya is to increase the activity rates by drawing upon the economically inactive persons. Obviously, the opportunities of such increase in labour force would depend on the composition of the economically inactive population as regard to their demographic, educational characteristics.

In the light of the data collected in the sample on the main characteristics of the economically inactive population, a tentative attempt was made to assess quantitatively the possibilities of augmenting the labour force in urban areas in Libya. In doing so, the economically inactive population were classified into some relevant groups reflecting the phases or priorities according which the additions to labour force were conceived feasible. The classification was made into 8 groups starting with the economically inactive persons less than 60 years old and having previous occupation, then the economically inactive over 60 and having previous occupation and the males attending schools and so on until the eight group which represent population less than 12 years. Table (14) shows the distribution of the sample members in Tripoli and Benghazi according to the above-mentioned groups (column 2). The percentage distribution of the sample members is shown in column (3) and is applied to derive the estimated distribution in the population on the assumption that the total population of Tripoli and Benghazi in June 1970 is 519,000. Column (5) gives, for each group, a hypothetical percentage indicating the possible contribution of each group to labour force. Applying these percentages, the possible additions to labour force supplied by various groups in the short run are estimated as shown in Column (6). These estimates indicate the relative importance of the various population groups as a potential resource for augmenting the labour force in the population.

It can be seen from this tentative analysis, based on some demographic factors, that there exist potentialities for increasing the labour in Tripoli and Benghazi by about 14,950 i. e. an increase of the present

size of labour force by about 14%. This would bring about an increase in the crude activity rate from 20.8 to 23.0%. Needless to say that the soundness of such conclusions is conditioned by the accuracy of the sample estimates and the validity of the hypothetical ratios of possible participation in labour force shown in Column (5). However, these ratios can be reviewed and adjusted in the light of further studies and inquiries in this field.

TABLE 13

Average Income per Worker, Average Hours of Work and Average
Income per Hour of Work for Various Occupation (Groups)

Present Occupation	Average Income per hour of work L. L.	Average Weekly hours of work	Average Monthly Income per Worker L. L.
	(1)	(2)	(3)
Prof., Tech. and Related Workers	0.51	39.2	92.2
Admin. Exec. and Managerial Workers	0.71	41.8	127.3
Clerical Workers	0.39	58.1	73.4
Sales Workers	0.30	53.8	70.1
Farmers and Related Workers	0.25	56.0	59.4
Miners and Related Workers	0.41	48.2	108.0
Workers in Transport and Comm.	0.30	47.5	61.9
Craftsmen and Prod. Workers	0.29	45.7	60.3
Services Skilled Workers	0.28	47.4	66.2
Unskilled Workers and Other	0.184	45.5	35.9
Total	0.31	47.2	65.0

TABLE 14

The Estimated Potential Additions to Labour Force Contributed by Various Population Groups in Order of Priority, in Tripoli and Benghazi

Population Groups	Number of Persons in the Sample	Percentage Distribution in the Sample	Estimated Population in Tripoli and Benghazi in 1970	Estimated Ratio of possible Contribution to Labour Force	Estimated Addition to total Labour Force in Tripoli and Benghazi (4) X (5)
(1)	(2)	(3)	(4)	(5)	(6)
1. The economically inactive, (males & females) less than 60 years old and having previous occupation		32	0.5	2.600	50% 1.300
2. The economically inactive, males & females over 60 years old and having previous occupation		78	1.0	5.200	20% 1.040
3. Those attending schools (males)		544	6.9	35.810	15% 5.370
4. Those attending schools (females)		294	3.8	19.720	10% 1.970
5. Other economically inactive males		78	1.0	5.200	5% 260
6. Other economically inactive females less than 60 years old	1.518	19.3	100.170	5%	5.010
7. Other economically inactive females over 60 years old		220	2.8	14.530	0 0
8. Persons less than 12 years males & females		3.450	43.9	227.820	0 0
9. Potential manpower resources		6.214	79.2	411.050	— —
10. The economically active persons		1.636	20.8	107.950	— 14.950
11. Total		7.850	100.0	519.000	

List of References

- AL AYYAT A. «A bridged Tables of working Life for Male Population of Morocco, Algeria Tunisia and Liba (1965 — 1966). Cairo Demographic Centre 1971.
- DAS GUPTA AJIT «Determination of Fertility levels and trends in Defecting Registration Areas Bulletin de L'Institut International de Statistique 1957.
- The Statistical and Census Department, Libya.
- The Statistical Abstract 1968.
- The reports on the first phase of the Household Sample Survey in Tripoli and Benghazi 1969 (Four reports).
- The Population Census 1964.
- The Population Census 1954.
- Preliminary National Accounts in Libya 1962 — 1968.
- U. N. United Nations Demographic New book 1966.
- U. N. Demographic Aspects of Manpower, Sex and Age pattern of Participation in Economic Activities «Report (1) », New York 1962.
- U. N. Methods of Analyzing Census Data on Economic Activities of the Population. ST/SOA/Series A/43 New York 1968.
- U. N. Handbook of Household Surveys Series F No. 10, New York 1964.
- S. ZAGHLOUL, «Demographic Parameters in Libya».
- The Cairo Demographic Centre — U. N. — 1971.