

Chapter II

STUDIES OF FACTORS AFFECTING THE SIZE, COMPOSITION AND GROWTH OF THE LABOUR FORCE

A. Framework of demographic and other factors

The purpose of analysing census data on the labour force is not merely to measure its size, composition and growth but also to gain knowledge of the factors which enter into the determination of these characteristics. Such knowledge is useful in dealing with many questions of policy and formulation of action programmes in economic and social fields. In particular, it provides a basis for labour force projections, which occupy an important place in the statistical apparatus of planning for economic and social development.

The dimensions of the labour force can be considered as determined, on the one hand, by the size and sex-age composition of the population and, on the other by the age-specific activity rates for the two sexes. The changing size and composition of the population are determined, in turn, by the conditions of fertility, mortality and migration and modifications in these conditions in the course of time. Knowledge of the influences of these components of population change upon labour force dimensions is a matter of evident importance in connexion with questions of population policy. The age-specific male and female activity rates can be considered as representing the effects of economic, social, and cultural factors relevant to the desire of engaging in income-producing work and the opportunities for doing so. The latter also may sometimes have important bearing on the components of population change - migration especially is likely to be affected by conditions of employment opportunity - and the analyst attempting to get a comprehensive view of the determinants of labour force dimensions will not wish to omit this aspect. However, the study of factors affecting fertility, mortality and migration is outside the scope of the present manual.

B. Influences of the population age-structure

1. Age-standardized activity rates

Standardization is a useful method for estimating the effects of variations of population composition upon the dimensions of the labour force, and separating these from the effects of factors bearing on the specific activity rates. ^{1/} For these purposes, the analyst may calculate age-standardized activity rates; that is, weighted averages of age-specific activity rates with standard weights for the different dates, areas or population categories to be compared.

^{1/} On methods and applications of standardization, see Jaffe, Handbook of Statistical Methods for Demographers, *op. cit.*, chap. III.

These show how the relative size of the labour force would vary under the influence of the variations of age-specific activity rates alone, if the population age structure were the same. Differences between age-standardized and unstandardized (crude or refined) activity rates represent the effects of variations of population age-composition, subject to reservations as regards the interdependence and interaction of factors, which will be considered farther on.

An example is given in table 10, showing the use of standardization for analysing factors of difference between urban and rural male activity rates (six years of age and over) in Peru at the census of 1961. 2/ The standard weights used in this example are the proportionate shares of the different age groups in the male population of the country as a whole (six years of age and over). These weights (column 7 of the table) are applied to the age-specific urban and rural male activity rates (columns 5 and 6) and the products (columns 8 and 9) are summed over all the age groups six years and up. The totals (first line of columns 8 and 9) are the urban and rural age-standardized activity rates in the male population six years of age and over. In the same way, age-standardized rates could be calculated for the female population six years of age and over, and for the population of each sex in all age groups (including those under six years). 3/

In this example, the rural age-standardized male activity rate exceeds the urban rate by 5.2 per cent of the male population six years of age and over. The difference is a summary measure of the extent to which the rural age-specific rates exceed the corresponding urban rates; it is an estimate of the net effect of urban-rural differences in all factors affecting the relative size of the male labour force with the exception of the age composition of population. The difference between the rural and urban unstandardized rates (first line of columns 5 and 6) is smaller: only 2.3 per cent. This means that there is an urban-rural difference in population age composition exerting an influence on the relative sizes of the urban and rural labour force which is opposite to and partly offsets the net effect of other factors. As can be seen in columns 3 and 4, the rural population contains disproportionately many children under fifteen and men over sixty years of age, and their presence tends to depress the unstandardized rural activity rate. While in the urban population, the unstandardized rate is inflated by the presence of a disproportionately large number of men of prime working ages. Age-selective migration from rural areas to the cities is one cause of this imbalance in the age composition of the population, and a rural-urban fertility difference may be a supplementary cause. The unstandardized

2/ For additional examples of the use of age-standardized activity rates in analysing factors of variations of labour force dimensions, see Demographic Aspects of Manpower. Sex and Age Patterns of Participation in Economic Activities (United Nations publication, Sales No.: 61.XIII.4), pp. 13-14 and table A-4; Jaffe and Stewart, Manpower Resources and Utilization. Principles of Working Force Analysis, op. cit., pp. 287-290; Gertrude Bancroft, The American Labor Force: Its Growth and Changing Composition (New York, 1958), chap. 3.

3/ See the example in table 11 of calculation of age-standardized rates for the population of all ages. These may be no less useful than rates such as those calculated in table 10 for the population above the minimal age to which the labour force data refer.

Table 10

Computation of age-standardized activity-rates in the male population of Peru, urban and rural, 1961

| Age (years) | Population (thousands) | | | Activity rates | | Percent dis- tribution of total population | Computation of stand- ardized activity rates | |
|----------------|---------------------------|-------|-------|----------------|-------|---|---|-------|
| | Total | Urban | Rural | Urban | Rural | | Urban | Rural |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| Total 6 + | 3 928 | 1 900 | 2 028 | 61.1 | 63.4 | 100.0 | 59.6 | 64.8 |
| 6-9 | 582 | 256 | 326 | 0.5 | 0.6 | 14.8 | 0.1 | 0.1 |
| 10-14 | 595 | 281 | 313 | 5.2 | 7.4 | 15.1 | 0.8 | 1.1 |
| 15-19 | 494 | 252 | 242 | 46.3 | 63.8 | 12.6 | 5.8 | 8.0 |
| 20-24 | 421 | 222 | 199 | 86.6 | 97.2 | 10.7 | 9.3 | 10.4 |
| 25-29 | 360 | 182 | 178 | 96.0 | 99.0 | 9.2 | 8.8 | 9.1 |
| 30-34 | 312 | 160 | 152 | 98.2 | 99.2 | 7.9 | 7.8 | 7.9 |
| 35-39 | 261 | 127 | 133 | 98.4 | 99.2 | 6.6 | 6.5 | 6.6 |
| 40-44 | 209 | 102 | 107 | 98.3 | 99.1 | 5.3 | 5.2 | 5.3 |
| 45-49 | 177 | 84 | 94 | 98.0 | 99.1 | 4.5 | 4.4 | 4.5 |
| 50-54 | 143 | 70 | 73 | 96.6 | 98.7 | 3.6 | 3.5 | 3.6 |
| 55-59 | 110 | 53 | 57 | 93.7 | 98.5 | 2.8 | 2.6 | 2.8 |
| 60-64 | 99 | 44 | 55 | 87.5 | 95.4 | 2.5 | 2.2 | 2.4 |
| 65-69 | 60 | 27 | 32 | 78.6 | 90.9 | 1.5 | 1.2 | 1.4 |
| 70-74 | 42 | 18 | 25 | 60.6 | 77.9 | 1.1 | 0.7 | 0.8 |
| 75 and over | 63 | 22 | 41 | 40.4 | 57.7 | 1.6 | 0.6 | 0.9 |
| Not reported | 2 | 1 | 1 | 60.5 | 64.8 | 0.1 | 0.0 | 0.0 |

Note: Columns 7, 8 and 9 computed from unrounded data.

urban activity rate exceeds the standardized rate by 1.5 per cent; this is an estimate of the effect of the age-composition difference between the urban and the total population. For the rural activity rate, the corresponding measure is a difference of 1.4 per cent in the opposite direction.

In this example, it seems obvious that the age distribution of the male population in the whole country is an appropriate standard for computing the weights to be applied to the rural and urban age-specific male activity rates. Likewise, in standardizing the activity rates for different regions or provinces of a country, different ethnic groups in the population and so on, it would appear appropriate to use the age distribution of population in the country as a whole for the standard. In other cases, though, the choice of an appropriate standard is not so obvious - for example, in comparing activity rates of two or more countries. It is important to recognize that the selection of the standard may have a considerable effect on the results of the analysis. ^{4/}

2. Interdependence and interaction of factors

In estimating the effects of various factors upon labour force dimensions, by standardization or by other methods to be discussed later, the analyst must be on guard against errors and biases which may result from a failure to take due account of the interdependence and interactions between the factors.

In the present context, interdependence means influences of population age structure (or of its component factors - fertility, mortality and migration) upon age-specific activity rates, and of the latter upon the former. For example, a high proportion of school-age children in the population may make for a high activity rate in this age group, since the more children there are, the more difficult it is from an economic point of view for the community and the family to keep them all in school. A high proportion of younger children, due to a high birth rate, may tend to depress activity rates of women by adding to their responsibilities as mothers; conversely, high activity rates of women in child-bearing age groups may depress fertility; migration may affect specific activity rates; and so forth. It is essential that such influences be absent for the estimates of the effects of various factors obtained by methods such as are described here to be strictly valid - a condition which is probably seldom fully satisfied in reality. While a little interdependence may do no harm, the estimates obtained in a situation of great interdependence between factors may be misleading.

^{4/} Instead of age-standardized activity rates, gross years of active life (see table 5) may be used as a summary measure of the levels of age-specific activity rates. For example, see Demographic Aspects of Manpower. Sex and Age Patterns of Participation in Economic Activities (United Nations publication, Sales No.: 61.XIII.4), p. 18 and table A-7. This has the advantage of avoiding the need for arbitrary selection of a standard, but the standard represented by gross years of active life is not an ideal measure because it gives equal weight to the specific activity rates for all age groups (according to the number of years in each group). Thus the measure is affected to an undue extent by the rates for the highest age brackets, which have little influence on the size of the labour force in any population.

Interaction, in the present context, means intensification or dampening of the influence of demographic factors by variations of specific activity rates and vice versa. When the activity rate in a certain age group varies, the effect on the dimensions of the labour force depends on the proportionate share of that age group in the population; conversely, the effect of varying the proportionate share of the age group depends on the specific activity rate. Thus, when specific activity rates and population age structure vary simultaneously, their influences interact; and the interaction may be responsible for a sizeable share of the effect on labour force dimensions.

Suppose, for example, that both the age composition of a certain population and its age-specific activity rates have changed between the dates of two censuses and it is desired to estimate the effect of the change in each factor upon the change of the crude activity rate during the interval. The values of the two factors at the two dates make four combinations which can be represented by the following scheme:

| <u>Population age composition</u> | <u>Age-specific activity rates</u> | |
|---------------------------------------|------------------------------------|---------------------|
| | <u>Earlier census</u> | <u>Later census</u> |
| Earlier census | A | C |
| Later census | D | B |

Combinations A and B give the unstandardized crude activity rates of the earlier and the later census, respectively. Combination C gives an age-standardized activity rate as of the later census date with the population age-group weights of the earlier census. Combination D gives an age-standardized rate as of the earlier census date with the age-group weights of the later census. The effect of the change in specific activity rates can be estimated either as the difference (C - A) or (B - D); the two estimates will differ as a result of interaction between the changes of the two factors, and there is no logical basis for a preference between these two estimates. Likewise, the effect of the shift in population age composition can be estimated either as the difference (D - A) or (B - C). So the net change of the crude activity rate between the two dates (B - A) can be factored into components in either of two ways:

$$\begin{aligned} (B - A) &= (C - A) + (B - C); \text{ or} \\ &= (D - A) + (B - D). \end{aligned}$$

A numerical illustration is provided by the calculations shown in table 11 with reference to the age composition and age-specific activity rates of the male population of Japan at the censuses of 1940 and 1960. ^{5/} In terms of the

^{5/} Actually, the 1940 and 1960 rates are not exactly comparable since the labour force enumeration in the 1940 census referred to a concept of usual activity whereas definitions referring to activity during a specified week were applied in the 1960 census. The difference in definitions is ignored in the present example.

Table 11

Calculation of age-standardized activity rates, male population
of Japan, 1940 and 1960

| Age (years) | Population distribution as a percentage | | Activity rates | | Calculation of age-standardized activity rates | |
|----------------|--|-------|----------------|------|---|-------------------------------|
| | 1940 | 1960 | 1940 | 1960 | 1960 rates 1940 population | 1940 rates 1960 population |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| All ages | 100.0 | 100.0 | 56.0 | 58.5 | 53.9 ^{a/} | 61.7 ^{a/} |
| Under 15 | 36.4 | 31.2 | - | - | - | - |
| 15-19 | 10.2 | 10.2 | 77.6 | 51.6 | 5.3 | 7.9 |
| 20-24 | 8.3 | 9.0 | 91.4 | 87.9 | 7.3 | 8.2 |
| 25-29 | 7.7 | 8.9 | 96.5 | 96.9 | 7.5 | 8.6 |
| 30-34 | 6.8 | 8.2 | 97.8 | 97.8 | 6.7 | 8.0 |
| 35-39 | 6.2 | 6.0 | 98.0 | 97.7 | 6.1 | 5.9 |
| 40-44 | 5.4 | 5.0 | 98.0 | 97.7 | 5.3 | 4.9 |
| 45-49 | 4.5 | 4.9 | 97.4 | 97.1 | 4.4 | 4.8 |
| 50-54 | 4.0 | 4.4 | 95.5 | 96.0 | 3.8 | 4.2 |
| 55-59 | 3.4 | 3.9 | 90.8 | 90.5 | 3.1 | 3.5 |
| 60-64 | 2.9 | 3.1 | 83.6 | 82.5 | 2.4 | 2.6 |
| 65 and over | 4.1 | 5.0 | 61.9 | 54.4 | 2.2 | 3.1 |

Source: Columns 2-5 from Bureau of Statistics, Office of the Prime Minister, 1960 Population Census of Japan, Abridged Report, Part I, All Japan, pp. 138-41, for data on age structure and pp. 226-227 for data on economic activity.

^{a/} Sum of unrounded products.

above scheme, the value of C is obtained as shown in column 6 of the table and D as shown in column 7. We have:

| <u>Population age composition</u> | <u>Age-specific activity rates</u> | |
|---------------------------------------|------------------------------------|--------------------|
| | <u>1940 census</u> | <u>1960 census</u> |
| 1940 census | A = 56.0 | C = 53.9 |
| 1960 census | D = 61.7 | B = 58.5 |

and according to the two alternative ways of factoring the components of change in the crude activity rate:

| <u>Net change</u> | <u>Effect of changes in specific activity rates</u> | <u>Effect of changes in population age composition</u> |
|--------------------|---|--|
| 58.5 - 56.0 = +2.5 | 53.9 - 56.0 = -2.1 | 58.5 - 53.9 = +4.6 |
| | or | |
| | 58.5 - 61.7 = -3.2 | 61.7 - 56.0 = +5.7 |

One can conclude that the effect of changes in specific activity rates was to lower the crude activity rate in the Japanese male population by an amount within the range of 2.1 to 3.2 and the effect of the change in age composition was to raise the crude rate by an amount within the range of 4.6 to 5.7. Within these interaction ranges, the specific measures of the effects of the two factors are indeterminate.

For some purposes, the analyst may need to fix the estimated effect of each factor at a specific figure within the interaction range. Although it must be recognized that any method of doing this is arbitrary, one way is to put the estimates at the mid-points of their ranges. Thus, in the Japanese example, the effect of the specific activity rate changes would be estimated at -2.65 and the effect of the change in age composition at +5.15.

C. Influences of fertility, mortality and migration

1. Analytical projections

Standardization provides no means of estimating the effects of the component factors of population structure and growth, that is to say, fertility, mortality and migration, upon the dimensions of the labour force. For studying the influences of these factors, the analyst may use the method of analytical projections, so called because they are not necessarily intended to represent expected future developments but rather to study the effects of hypothetical variations in particular factors. Beginning with the population, labour force and specific activity rates for sex-age groups at the latest census and contemporary age-specific rates of mortality and fertility, the analyst makes a number of variant projections of the labour force over a future period of time.

In one projection, he holds fertility, mortality and specific activity rates constant at the initial levels, while in other projections he allows these factors to vary singly or in combinations, so as to observe the effect of changes in each factor. 6/ The effects of migration may be brought into the picture, where it is considered important, by means of supplementary calculations which will be described below.

An example of the foregoing is given in table 12, showing twenty-five year projections of the male labour force of Brazil from the date of the 1950 census and the estimated effects of decreasing mortality alone, decreasing fertility combined with decreasing mortality, and shifts of age-specific activity rates in the directions of later entrance into the labour force and earlier retirement. The effects of decreasing mortality with constant fertility (columns 10 and 11) are mainly in speeding up labour force growth; the amount of growth projected over the twenty-five year period is augmented considerably, the rate of entries into the labour force is raised and the rate of losses by death is lowered, so that the labour force replacement rate and ratio are increased. When fertility and mortality decrease simultaneously, the growth of the labour force is moderated chiefly by a reduction of the rate of entries as shown in columns 12 and 13. The changes in mortality and fertility also influence the trend of the crude activity rate, mainly through their effects on the age structure of the population. Decreasing fertility tends to raise the crude activity rate by diminishing the percentage of children in the population and increasing the percentage of adults of working age, whereas decreasing mortality with unchanged fertility has an opposite effect, slightly lowering the crude activity rate. The age distribution of the labour force is also affected. Decreasing fertility tends to reduce the proportionate share of young workers and increase the share of middle age groups in the labour force while decreasing mortality exerts a slight influence in the opposite direction. The projections also show the effects of assumed changes of male age-specific activity rates upon the growth and dimensions of the labour force (column 9).

For incorporating effects of immigration and emigration in analytical projections, a model of the sex-age distribution of immigrants and emigrants and their specific activity rates is needed. Specific activity rates of immigrants may be estimated from census data if tabulations of population and labour force by sex and age groups are given separately for the native and foreign-born. In the case of emigrants, it may not be possible to do better than to assume their activity rates to be the same as those of the non-migrant population in corresponding sex-age groups. The effects on the labour force can be calculated in terms of increments and decrements in the projected labour force measures

6/ Mahmoud Seklani, "Variations de la structure par âge et charges de la population active dans les pays sous-développés", International Population Conference (International Union for the Scientific Study of Population, New York, 1961), vol. II, has used this method to study the possible effects of varying mortality and fertility levels upon future trends of crude activity rates and dependency ratios in seven developing countries.

Table 12

Analytical projections of male labour force of Brazil, 1950-1980

| Dimensions | 1950 census | 1980 projections | | | | | |
|--|----------------|-------------------------------------|-------------------------------|--|-------------------------------|---------------------------------------|-------------------------------|
| | | Constant fertility and mortality | | Decreasing mortality constant fertility | | Decreasing mortality and fertility | |
| | | Constant activity rates | Changing activity rates | Constant activity rates | Changing activity rates | Constant activity rates | Changing activity rates |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| Increase of male labour force during projection period: | | | | | | | |
| Number (thousands) | - | 13 972 | 11 392 | 16 686 | 13 721 | 14 941 | 12 431 |
| Percentage of 1950 labour force | - | 95.6 | 78.0 | 114.2 | 93.9 | 102.3 | 85.1 |
| Crude activity rate (percentage of total male population) | 56.4 | 56.5 | 51.4 | 54.9 | 49.7 | 59.9 | 54.8 |
| Components of labour force change (annual rates per 1,000 male labour force): a/ | | | | | | | |
| Entry rate | 38.8 | 38.3 | 39.4 | 40.8 | 40.0 | 35.3 | 36.0 |
| Retirement rate | 1.0 | 1.3 | 5.1 | 2.2 | 5.2 | 1.9 | 5.4 |
| Rate of losses by death | 14.4 | 14.8 | 14.7 | 10.4 | 10.2 | 10.7 | 10.3 |
| Replacement rate | 23.4 | 22.2 | 19.6 | 28.2 | 24.6 | 22.7 | 20.3 |
| Replacement ratio (entries per 100 retirements and deaths) | 252 | 238 | 199 | 324 | 260 | 280 | 229 |
| Age composition of male labour force (percentage): | | | | | | | |
| All ages, 10 and over | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |
| 10-19 | 21.4 | 21.4 | 15.4 | 22.1 | 15.9 | 19.8 | 14.2 |
| 20-54 | 69.6 | 68.6 | 75.4 | 67.8 | 74.8 | 69.5 | 75.9 |
| 55 and over | 9.0 | 9.9 | 9.2 | 10.1 | 9.4 | 10.7 | 9.8 |

Table 12 (continued)

| Dimensions | Effects of change of activity rates alone | | Effects of decrease of mortality with constant fertility | | Effects of simultaneous decrease of mortality and fertility | | Effects of simultaneous decrease of mortality and fertility and change of activity rates |
|--|---|--------------------|--|-------------------------|---|-------------------------|--|
| | (4-3) | (5-3) | Constant activity (5-3) | Changing activity (6-4) | Constant activity (7-3) | Changing activity (8-4) | (8-3) |
| | 9 | 10 | 11 | 12 | 13 | 14 | |
| Increase of male labour force during projection period: | | | | | | | |
| Number (thousands) | -2 580 | +2 71 ^h | +2 329 | +969 | +1 039 | -1 541 | |
| Percentage of 1950 labour force | - 17.6 | + 18.6 | + 15.9 | +6.7 | + 7.1 | - 10.5 | |
| Crude activity rate (percentage of total male population) | - 5.1 | - 1.6 | - 1.7 | +3.4 | + 3.4 | - 1.7 | |
| Components of labour force change (annual rates per 1,000 male labour force): ^{a/} | | | | | | | |
| Entry rate | + 1.1 | + 2.5 | + 0.6 | -3.0 | - 3.4 | - 2.3 | |
| Retirement rate | + 3.8 | + 0.9 | + 0.1 | +0.6 | + 0.3 | + 4.1 | |
| Rate of losses by death | - 0.1 | - 4.4 | - 4.5 | -4.1 | - 4.4 | - 4.5 | |
| Replacement rate | - 2.6 | + 6.0 | + 5.0 | +0.5 | + 0.7 | - 1.9 | |
| Replacement ratio (entries per 100 retirements and deaths) | - 39 | + 86 | + 61 | + 42 | + 30 | - 9 | |
| Age composition of male labour force (percentage): | | | | | | | |
| All ages, 10 and over | - | - | - | - | - | - | |
| 10-19 | - 6.0 | + 0.7 | + 0.5 | -1.6 | - 1.2 | - 7.2 | |
| 20-54 | + 6.8 | - 0.8 | - 0.6 | -0.9 | + 0.5 | + 7.3 | |
| 55 and over | - 0.7 | + 0.2 | + 0.2 | +0.8 | + 0.6 | - 0.1 | |

^{a/} Average annual rates estimated for 1950-1955 and projected for 1975-1980.

Definition of Factors

The assumptions with regard to changes in mortality and fertility correspond to those adopted for the population projections in Future Population Estimates by Sex and Age, Report II: The Population of South America, 1950-1980 (United Nations publication, Sales No.: 55.XIII.4). The decrease of mortality is such as to raise expectation of life at birth from an estimated level of 44.1 years in 1950-1955 to 56.6 years in 1975-1980. The decrease of fertility is such as to reduce the sex-age adjusted birth rate from an estimated level of 43.0 in 1950-1955 to 31.6 in 1975-1980. For the projections under changing activity rates, the age-specific male activity rates indicated by the 1950 census of Brazil are assumed to change so as to reach by 1980 the values indicated by the 1950 census of Sweden.

resulting from a given annual volume of immigration or emigration (for example, the increments and decrements per 10,000 or 100,000 annual immigrants or emigrants). 7/

The method of analytical projections can also be used for estimating the effects of factors of change in labour force dimensions over a past period, if suitable data are available. The data required are sufficiently comparable measures of the population and labour force by sex and age groups at the two census dates, together with measures of fertility 8/ and life tables representing the conditions of mortality at the two dates. 9/ Estimates of population gains or losses by immigration and emigration during the interval are also required where migration has been an important factor. 10/ Variant projections of the population and labour force from the earlier to the later census date are made, holding each factor (or combinations of factors) in turn constant at the earlier levels while other factors are allowed to change as the data show them actually to have done during the interval. Comparisons with the labour force dimensions shown by the later census then furnish estimates of the effects of each factor. To take account of interactions, the procedure should also be followed through in reverse, by retrojecting the population and labour force from the later to the earlier census date with each factor in turn held constant at the levels of the later date, and comparing results with the measures of labour force dimensions at the earlier census.

2. Estimates of the effects of internal migration

An important application of the method of analytical projections is in estimating the effects of internal migration upon labour force dimensions in regions, urban-rural areas or other parts of a country during the interval between two censuses. First, estimates of net migratory gains and losses of population according to sex and age groups are made for the various areas to be

7/ For examples of such models of the effects of immigration and emigration upon population projections by age and sex (without distinction between the economically active and inactive), see The Population of South America, 1950-1980 (Future Population Estimates by Sex and Age, Report II) (United Nations publication, Sales No.: 55.XIII.4), Annex C.

8/ Fertility measures are not indispensable if the interval between the censuses is no longer than ten or fifteen years and the calculations are restricted to the population in working ages at the later census date. However, if estimates of the effect of each factor upon the crude activity rate are to be obtained, a measure of the change in fertility is required.

9/ Instead of life tables, the measures of mortality may be obtained, in appropriate circumstances, by the "census survival ratio" method commonly used in estimating net internal migration. See Barclay, op. cit., p. 253.

10/ For examples of analysis of the contributions of immigration to the growth of the labour force, see Hovne, op. cit.; H.V. Muhsam, "Labour force characteristics and economic absorption in Israel", Integration, International Bulletin (Vaduz), vol. 8, 1961.

considered, by methods which are described elsewhere. ^{11/} (Essentially, the population that would have been expected in each area at the later census date if no migration had occurred since the earlier census is estimated by projecting the earlier census figures with due allowances for mortality and births during the interval; the difference between this expected population and the population enumerated at the later census is taken as the estimate of net gain or loss by migration for each sex-age category.) To estimate the corresponding net increments and decrements of the labour force by migration, ideally one should have measures of activity rates of migrants according to age and sex, but such measures are ordinarily lacking. ^{12/} Instead, approximate estimates may be made by applying the sex-age specific activity rates of the population as a whole in each area to the estimated net gains and losses by migration. While the results for certain sex-age categories may be affected by large errors, the sums of estimated net migratory gains or losses of labour force in all age groups for each sex may be close enough approximations for practical purposes. In order to take account of interactions, the estimates should be made with the specific activity rates of both the earlier and the later census, and differences between the results obtained with the two sets of rates should be studied.

D. Influences of the marital and maternal status of women

1. Marital status and activity rates

The study of factors which influence age-specific activity rates for each sex begins with the data furnished by the census on other population characteristics relevant to employability and the propensity to be employed, as well as on non-economic activities and responsibilities which may inhibit income-producing employment. Among the most pertinent data are classifications of the population and labour force by marital status, of economically active and inactive women by maternal status, population in the school-going age-groups by school attendance, and adult population by level of education.

In many societies, the probability of women being engaged in economic activities varies greatly according to marital status, and consequently the age-specific activity rates of females may be influenced by the distribution of women's ages at marriage, the frequencies of non-marriage, widowhood and divorce, and the conditions of re-marriage of widows and divorcees. Men's marital status also may have some bearing on their participation in economic activities, but the variations of male activity rates according to marital status are likely to be comparatively slight.

^{11/} For example, see Spiegleman, *op. cit.*, chap. 10; K.C. Zachariah, A Historical Study of Internal Migration in the Indian Subcontinent 1901-1931 (Bombay, Demographic Training and Research Centre, 1964).

^{12/} On the differences between specific activity rates of migrants and non-migrants in the United States of America, see Ann R. Miller, "Migration differentials in labor force participation: United States, 1960", Demography (Chicago), vol. 3, No. 1, 1966.

Cross-classifications of the male or female population and labour force by marital status in combination with age groups permit the calculation of activity rates specific for marital status and age, such as those shown in table 13 derived from the data of the census of Colombia, 1951. ^{13/} As this example shows, the cross-classification with age groups is indispensable if such data are to be really useful for studying relationships between marital status and economic activity. Cruder activity rates, calculated from totals for the marital status categories without regard to age, are greatly influenced by differences in the age composition of these categories.

In Colombia, it appears that few women who have husbands are reported in the census as economically active; the activity rates of legally married women are especially low, and those of women in common-law unions somewhat higher. Single, widowed, and divorced women all have much higher activity rates, those of single women being highest on the whole. When the rates are charted as in figure II, one can see that they describe an age-curve of one form for the three categories of women without husbands and a different form for the two categories of women with husbands. The activity rates of the former are more definitely peaked, with maximum rates in the age ranges of twenty or twenty-five to forty-four years, while the legally and consensually married categories exhibit more nearly constant, low levels of activity rates over the broad range of twenty to sixty-four years.

Data like those in table 13 provide a basis for some inferences on the likely effects of changing conditions of marriage upon trends of age-specific female activity rates. The ratio of consensually married to legally married women as reported in the 1951 Colombian census was about 1 to 4; if this ratio were reduced, while the activity rates specific for marital status and age remained unchanged, the effect would be a tendency to lower the total female activity rates in each age group. If the proportion of women with husbands were increased (by decreasing average age at marriage, decreasing frequencies of spinsterhood, widowhood and divorce, or increasing remarriage rates of widows and divorcees), the curve of age-specific total female activity rates would be depressed still more and would tend to flatten out, as the rates would be reduced more in the age groups between fifteen and thirty-five years than between thirty-five and sixty-five. On the other hand, if the proportion of married women engaging in economic activities should increase, the effect might be to transform the age-curve of female activity rates in Colombia into a shape like that of the Indonesian curve (see table 2), with two peaks separated by a trough at ages in the twenties and early thirties.

2. Maternal status and activity rates

Studies in industrialized countries have shown that the probability of women's being economically active varies to a great extent with their maternal responsibilities as well as marital status, and that the presence of a child of pre-school age is an especially powerful deterrent to paid employment of the

^{13/} A broad, international compilation and analysis of such measures for females is contained in Demographic Aspects of Manpower. Sex and Age Patterns of Participation in Economic Activities (United Nations publication, Sales No.: 61.XIII.4), chap. VI and tables A-11, A-12, A-13.

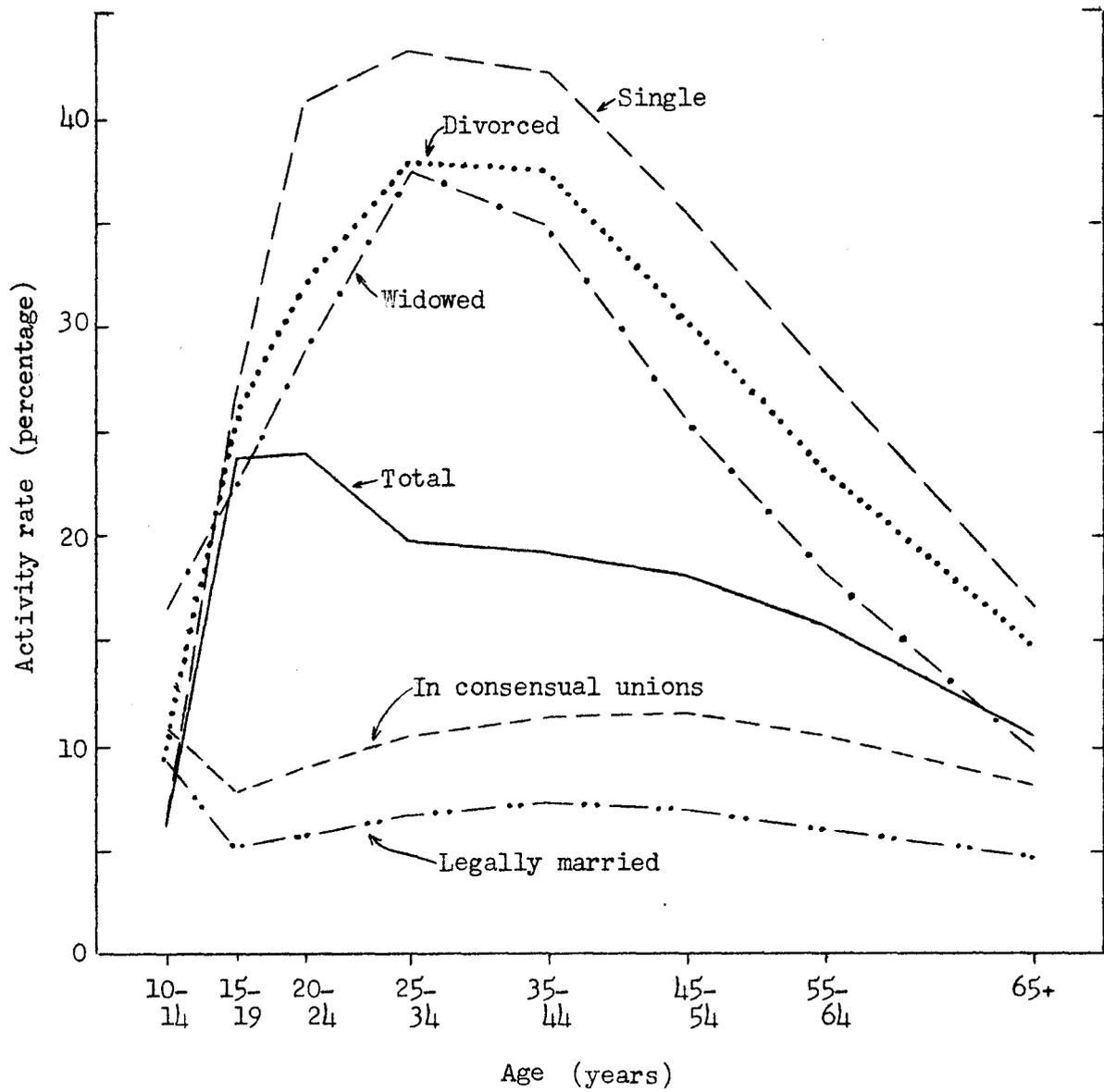
Table 13

Activity rates of males and females specific for marital status and age, Colombia, 1951

| Age (years) | Total | Single | Legally married | In consensual unions | Widowed | Divorced |
|--------------------|-------|--------|--------------------|-------------------------|---------|----------|
| <u>Males</u> | | | | | | |
| Total, 10 and over | 79.7 | 67.3 | 96.4 | 98.1 | 80.3 | 92.0 |
| 10-14 | 16.9 | 16.9 | - | - | - | - |
| 15-19 | 84.8 | 84.6 | 92.9 | 94.1 | 90.9 | 90.0 |
| 20-24 | 95.4 | 94.5 | 98.9 | 98.3 | 94.6 | 95.2 |
| 25-34 | 97.6 | 95.8 | 98.8 | 99.1 | 96.9 | 96.8 |
| 35-44 | 97.9 | 95.0 | 98.7 | 99.1 | 96.6 | 96.7 |
| 45-54 | 96.8 | 92.9 | 97.7 | 98.6 | 94.5 | 95.6 |
| 55-64 | 92.7 | 86.4 | 94.2 | 96.5 | 88.0 | 90.7 |
| 65 and over | 71.8 | 63.2 | 77.6 | 84.6 | 57.1 | 68.7 |
| <u>Females</u> | | | | | | |
| Total, 10 and over | 17.7 | 25.1 | 6.6 | 10.2 | 21.0 | 32.4 |
| 10-14 | 6.2 | 6.2 | - | - | - | - |
| 15-19 | 23.6 | 26.9 | 5.2 | 7.9 | - | - |
| 20-24 | 23.9 | 40.8 | 5.7 | 9.0 | 28.8 | 31.9 |
| 25-34 | 19.7 | 43.2 | 6.8 | 10.4 | 37.3 | 37.8 |
| 35-44 | 19.1 | 42.1 | 7.3 | 11.4 | 34.8 | 37.5 |
| 45-54 | 18.0 | 35.4 | 7.0 | 11.6 | 25.4 | 30.1 |
| 55-64 | 15.7 | 27.7 | 6.0 | 10.3 | 18.2 | 23.1 |
| 65 and over | 10.3 | 16.4 | 4.6 | 8.0 | 9.7 | 14.5 |

Figure II

Female activity rates specific for marital status and age,
Colombia, 1951



Source: Table 13.

mother. For this reason, activity rates of married women in some industrialized countries are relatively high in the early years of married life, drop in the years when they are building their families, and rise again in later years when the children have grown older and no longer require such constant attention from the mother. More or less similar relationships between maternal status and activity rates of women in the urban areas of less developed countries have also been indicated by the findings of a few studies, while it appears that the relationships may be different in little developed agricultural areas. 14/ The effects of maternal status upon women's activity rates are an important question for study, relevant to an assessment of the economic effects of changes in fertility and the possibility of promoting paid employment of women as a means of reducing fertility, as well as to the investigation of factors affecting the dimensions of the female labour force.

Classifications of women by the number of children born during their life-time are obtained in the censuses of many countries, and if these are tabulated in relation of economic activity of the women, the data can be used for studying relationships between maternal status and economic activity. 15/ It is more pertinent, though, to have a classification relating to the number of children remaining in the home, under the mother's care, at the time of the census, and including some information as to the age of the children. Such a classification can be derived from the listing of members of the household on the census forms according to age and relationships. Cross-classifications by activity status, marital status and age of the women provide a good basis for studying the effects of maternal status on women's activity rates. The work of deriving such a classification from the census records is rather expensive, though, and population sample surveys may be a more practical means of obtaining data for the study of this question. 16/

3. Analysis by multiple standardization

Given classifications of the population and labour force by age in combination with marital status, maternal status, and/or other characteristics at two census dates, or at one date in different areas of the country, different ethnic groups and so on, the analyst can use multiple standardization to estimate the effects upon the labour force dimensions of variations in population composition with regard to each of the characteristics involved in the cross-

14/ "The influence of family-building on women's rate of economic activity", Proceedings of the World Population Conference, 1965 (United Nations publication, Sales No.: 66.XIII.0), vol. IV, pp. 283-287, summarizes data from studies in various countries.

15/ For example, see A.J. Jaffe People, Jobs and Economic Development. A case History of Puerto Rico Supplemented by Recent Mexican Experiences (Glencoe, Illinois, 1959). pp. 186-194.

16/ In the United States of America, data of the kind described here have been obtained both in the population censuses and national population sample surveys. For an example of their use in analysing relationships between the maternal status and the activity status of women, see Bancroft, op. cit., pp. 57-64.

classifications. The methods are analogous to those illustrated for age-standardization by the examples in tables 10 and 11. 17/

Suppose, for example, that data are now available from the 1964 census of Colombia corresponding to the 1951 data on which the activity rates in table 13 are based, specific for sex, age, and marital status in combination. The problem is to estimate how much of the change in the crude activity rate for each sex between 1951 and 1964 is attributable to the variations in each of three factors: (a) age composition of the population, (b) marital-status composition of the population within each age group, and (c) specific activity rates for the various categories of marital status in combination with age. For his first estimate of the effect of (a), the analyst calculates the per cent distribution by age in combination with the marital status of a hypothetical population (of each sex) having the age composition of the 1951 population but the marital-status composition of the 1964 population within each age group. He applies these population weights to the specific activity rates of 1964 according to age and marital status, and sums up the products. The difference between the age-standardized activity rate so obtained and the unstandardized 1964 crude activity rate for each sex is the first estimate of the effect of the change in the age composition of the population. The second estimate of the effect of this factor is made by calculating an analogous standardized activity rate with the 1964 population age composition, 1951 marital-status composition within each age group, and 1951 specific activity rates, and taking the difference between this and the unstandardized 1951 crude activity rate. These two estimates define the range for the effect of factor (a). By analogous procedures, the analyst determines the ranges of effects of factors (b) and (c). He may then find it convenient to use an arbitrary method to fix the estimates of the effects of the three factors at specific points within their ranges, as suggested in section B.2 of the present chapter. If a further cross-classification by maternal status were included in the tabulations of the female population and labour force for both census dates, the analyst could add this fourth factor to his analysis of the components of change in the female crude activity rate, using strictly analogous procedures. The same method is applicable for estimating components of differences between crude activity rates for urban and rural areas, regions etc., at the date of either census. The techniques of matrix analysis can also be used for this purpose.

E. Influences of school attendance and educational level

Relationships between education and economic activity are of special interest for developing countries as an aspect of the many-sided question of the economic and social effects of expanding provisions for popular education. These relationships are twofold: first, prolongation of schooling has the obvious effect of decreasing activity rates of young people of school age; and second, it may affect the propensity and the opportunity to engage in economic activity in later life.

17/ For examples of such multiple-standardization analysis, see Jaffe and Stewart, op. cit., pp. 292-302; Durand, op. cit., chap. 3; Bancroft, op. cit., p. 43; S. Kono, "Demographic influence on participation rates: introduction and illustration of component analysis" (Tokyo, Institute of Population Problems, 1959) Annual Report, No. 4 (In Japanese).

1. School attendance and activity rates

Although the existence of an inverse relationship between school attendance and economic activity rates of young people hardly needs to be demonstrated, it is useful to quantify this relationship as definitely as possible with available data and to see to what extent non-participation of young people in economic activities is accounted for by their attendance at school. Ideally for this purpose, the census statistics on economic activity should be cross-classified by attendance at or enrolment in school so as to provide the following classification of males and females in each age group within the school-going age range:

| | <u>Economically active</u> | <u>Not economically active</u> |
|---------------|--------------------------------|------------------------------------|
| In school | | |
| Not in school | | |

Such classifications have seldom been provided in census tabulations; they are made more easily with population sample survey data. In some censuses, however, data on young people's attendance at or enrolment in schools have been collected and separate classifications have been made of these data and the data on economic activities. Given such classifications, it is useful to calculate sex-age specific school attendance rates as well as economic activity rates for corresponding age groups and to compare the variations of the two rates among areas of the country, ethnic groups of the population and other categories, and their changes over a period of time. Thus an understanding of the associations between the two variables can be achieved. It may be helpful in such an analysis to calculate sums of the school attendance rates and economic activity rates for corresponding sex-age categories. Any shortfall of this sum below 100 per cent is a minimal estimate of the proportion of the population in the given category that is neither in school nor economically active, and any excess over 100 per cent is a minimal estimate of the proportion of persons combining school attendance with economic activity. Of course, the validity of these interpretations depends on the correspondence of time-reference of the census questions on school attendance and economic activity; but even if the time-references do not correspond exactly, such an analysis is useful. An example using the data of the 1961 census of Indonesia is given in table 14.

In the case of females, the category of those who are neither in school nor economically active is not necessarily a problematic one; young females in this category are likely to be occupied with domestic duties, at least helping their mothers if they do not yet have their own homes and families to care for. On the other hand, the presence of any great number of males in this category may signify a waste of potential labour resources and a disquieting social problem. 18/

18/ For an example of an analysis of the relationship of school attendance rates to activity rates, on an international scale, see Population Growth and Manpower in the Philippines (United Nations publication, Sales No.: 61.XIII.2), Appendix D.

Table 14

Comparison of census data on economic activity and school attendance of persons ten to twenty-four years of age, by sex, Indonesia, 1961

| Sex and age (years) | Population | Labour force | Persons attending school | Economic activity rate | School attendance rate | Sum of rates |
|---------------------|------------|--------------|--------------------------|------------------------|------------------------|--------------|
| <u>Males</u> | | | | | | |
| 10-14 | 4 318 543 | 977 351 | 2 793 431 | 22.6 | 64.7 | 87.3 |
| 15-19 | 3 834 117 | 2 556 342 | 890 796 | 66.7 | 23.2 | 89.9 |
| 20-24 | 3 452 362 | 3 008 984 | 210 385 | 87.2 | 6.1 | 93.3 |
| <u>Females</u> | | | | | | |
| 10-14 | 3 860 869 | 602 171 | 2 100 005 | 15.6 | 54.4 | 70.0 |
| 15-19 | 3 874 058 | 1 185 071 | 447 149 | 30.6 | 11.5 | 42.1 |
| 20-24 | 4 338 603 | 1 188 852 | 68 810 | 27.4 | 1.6 | 29.0 |

Administrative statistics of school enrolments may be used as a substitute for census classifications relating to school attendance for the purposes of analysis along these lines. This method is limited, though, by the fact that school enrolment statistics are not commonly compiled by age groups. Without an age classification, the enrolments of each sex in categories such as elementary and secondary schools may be expressed as ratios to the population in appropriate age groups, and variations of these ratios may be studied in relation to the variations of activity rates.

As a part of the inquiry relating to economic activities in many censuses, there is a provision for reporting persons who are not economically active according to functional categories such as students and housewives. The classification of these categories may be used as another means of investigating the relationship between school attendance and economic activity of young people. For example, in the 1961 Indonesian census, the classification shown in table 15 was obtained.

It will be noticed that the numbers of "students" in table 15 differ only slightly from the numbers of persons classified in table 14 as "attending school" for the age groups ten to fourteen years and fifteen to nineteen years, but the numbers in table 15 are smaller for the age group twenty to twenty-four years. This is to be expected since some persons attending school would also be economically active especially in the older group. On the other hand, some persons not actually attending school at the time to which the census classifications refer may be reported as "students". It will also be noticed that sizeable numbers of young males were classified in the Indonesian census as

"home houseworkers". It is possible that some of these were really economically active, as unpaid family workers on farms or in other family enterprises.

Table 15

Categories of persons classified as not economically active in age groups ten to twenty-four years, by sex, Indonesia, 1961

| Sex and age (years) | Total not economically active | Students | Home houseworkers | Others and not reported |
|---------------------|-------------------------------|-----------|-------------------|-------------------------|
| <u>Males</u> | | | | |
| 10-14 | 3 341 192 | 2 717 829 | 164 682 | 458 681 |
| 15-19 | 1 277 775 | 894 602 | 219 483 | 163 690 |
| 20-24 | 443 378 | 175 984 | 165 172 | 102 222 |
| <u>Females</u> | | | | |
| 10-14 | 3 258 698 | 2 031 144 | 782 852 | 444 702 |
| 15-19 | 2 688 987 | 441 404 | 2 091 900 | 155 683 |
| 20-24 | 3 149 751 | 53 760 | 3 003 867 | 92 124 |

2. Educational level and activity rates of adults

To see how the level of education affects the likelihood of individuals being in the labour force at various ages in later life, one can calculate activity rates specific for educational level, sex and age (beyond the age at which education is normally completed), as illustrated in table 16 and figure III with data for females from the census of Colombia, 1951. ^{19/} Multiple standardization can then be used to estimate the effects of variations in educational-level composition of the population upon labour force dimensions. The cross-classifications of population of each sex by educational level, activity status, and age, necessary for such analysis, are provided also in the census tabulations of some other developing countries. Here, as in the analysis of activity rates in relation to marital and maternal status, an age classification is necessary because there are likely to be important differences of age composition in different educational categories of the population.

^{19/} For other examples, see Bancroft, op. cit., pp. 65-70; Jaffe, People, Jobs and Economic Development. A Case History of Puerto Rico Supplemented by Recent Mexican Experiences, op. cit., pp. 202-203, 210-211.

Table 16

Activity rates of females specific for level of educational attainment and age, Colombia, 1951

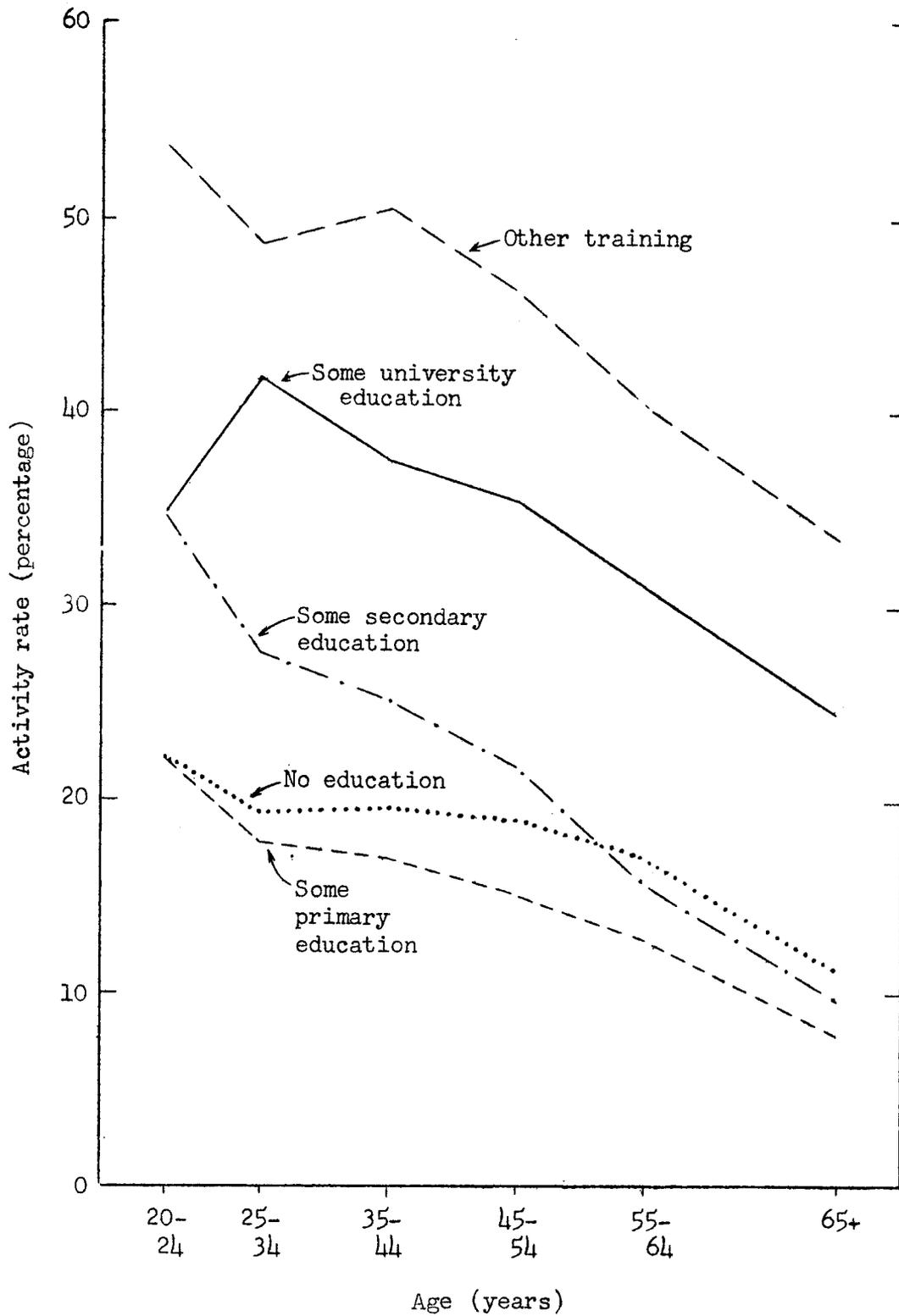
| Educational attainment | Total 20 and over | Age | | | | | |
|------------------------------|-------------------------|-------|-------|-------|-------|-------|----------------|
| | | 20-24 | 25-34 | 35-44 | 45-54 | 55-64 | 65 and over |
| Total | 19.2 | 23.9 | 19.7 | 19.1 | 18.0 | 15.7 | 10.3 |
| No education | 18.7 | 22.1 | 19.4 | 19.5 | 19.0 | 17.0 | 11.2 |
| Some primary education | 17.6 | 22.1 | 17.8 | 17.1 | 15.2 | 12.8 | 7.8 |
| Some secondary education | 26.7 | 34.6 | 27.6 | 25.2 | 21.7 | 15.8 | 9.7 |
| Some university education | 37.2 | 34.8 | 41.7 | 37.5 | 35.4 | 31.0 | 24.5 |
| Other training | 49.7 | 53.7 | 48.6 | 50.5 | 46.3 | 40.4 | 33.5 |

In the Colombian statistics, the highest activity rates are displayed by women with "other training", probably primarily in stenographic and other commercial skills. Next highest are women with some university education, though in the age group twenty to twenty-four years, the activity rate of women with some university education is depressed by the presence in this age group of some women still attending the university. Women with some secondary schooling rank third over-all, but at the oldest ages their rates are exceeded by those for women with no schooling. Women with some primary education have generally the lowest activity rates.

In any such analysis, one must consider the possibility that the variations of the activity rates according to the given characteristics may be affected significantly by other related variables. For example, educational attainment of women may be related to their marital and maternal status; in particular, women with university education may marry later, begin bearing children later and bear fewer children, on the average, than women with less education do; and more of the university women may remain unmarried throughout their lives. Thus it is possible that the relatively high activity rates of university women, especially in the younger age groups, may be partly or mainly due to marital and maternal status rather than to education. Another possibility is that the better educated women have relatively high activity rates because they live mostly in the cities, where (in the case of Colombia) the recorded activity rates of females are higher than

Figure III

Female activity rates specific for level of education and age,
Colombia, 1951



Source: Table 16.

in rural areas. The latter possibility can be investigated by computing the rates separately for urban and rural areas if the census tabulations provide this cross-classification. It is not practical, though, to make cross-classifications of all potentially related variables. The analyst attempting to unravel these relationships may use other methods such as those mentioned in the next section, to supplement the information provided by available cross-classifications.

F. Influences of economic factors

Knowledge of the effects of changing economic conditions upon the dimensions of the labour supply is, of course, highly pertinent to economic planning and especially to the definition of employment targets in economic development plans. The study of economic factors affecting activity rates deserves an important place in analyses of census data on the labour force. (As already noted, study of the effects of economic factors upon the components of population change, especially migration, is also important, but the methods of study in that field are outside the scope of the present manual). The principal economic factors to be considered include levels of earnings (from self-employment as well as wage-employment), family incomes, and the volume and composition of employment opportunities (including opportunities for self-employment and for productive work of unpaid helpers in family enterprises, as well as for paid employment).

Population censuses do not ordinarily provide suitable data for studying the effects of economic factors upon activity rates by the methods described in earlier sections of this chapter: classifying economically active and inactive individuals according to relevant characteristics, calculating specific activity rates for the categories so defined, and applying techniques of standardization, analytical projections and similar methods. ^{20/} In this field, the principal applications of census data are in studies of associations between variations of activity rates and economic measures in different areas and population categories and in historical time-series. The census itself may provide measures of some of the pertinent economic variables - measures of unemployment and part-time employment considered as indicators of relative volume of employment opportunities; the classifications of the labour force by occupation, industry, and status, considered as reflections of the composition of employment opportunities; and often some data which may serve as substitutes for income and wealth measures, such as characteristics of housing. Other economic measures may be obtained from various sources. The techniques of analysis - as, for example, comparisons of average activity rates for areas defined or grouped with reference to certain economic characteristics, simple and multiple correlation, analysis

^{20/} In some censuses and population sample surveys, income and employment data have been collected and tabulated in forms which do permit the application of such techniques. For example, in recent censuses and surveys in the United States of America, some classifications of economically active and inactive married women according to income and employment status of their husbands have been provided, and these data have been used together with other materials in research on the effects of income and employment conditions upon the dimensions of the labour force. For example see Long, op. cit., chap. 5; Glen C. Cain, Married Women in the Labor Force: An Economic Analysis (Chicago, 1966).

of variance and derivation of regression equations - are not specifically demographic techniques and do not require explanation and illustration here. In addition to referring to some examples of such analyses, 21/ it is sufficient to mention a few principles of relevant research designs.

So far as possible, it is useful to refine the measures of activity rates used in such analyses, so as to minimize extraneous influences. Clearer insight into the influences of the economic factors can be reached if the analyses are carried out with age-specific activity rates, or at least age-standardized rates, than with crude rates alone; and it is still better, if possible, to use activity rates specific for marital status, level of education (or rates standardized in these respects) as well as sex and age. In time-series analyses, the use of cohort measures of changing activity rates (as illustrated in table 8) may be helpful to clarify the picture of economic influences. In cross-sectional analyses of data for geographical units, it is advantageous where possible to separate urban and rural segments (or metropolitan and non-metropolitan segments etc.) because of the differences typically found between activity-rate patterns of urban and rural populations. In the circumstances existing in some countries, a distinction between ethnic components of the population is also important.

21/ For examples of relatively simple analyses, involving comparisons of certain measures of labour force dimensions for areas having different economic and other characteristics, derivation of simple correlation and regression co-efficients etc., see Human Resources of Central America, Panama and Mexico, 1950-1980 (United Nations publication, Sales No.: 60.XIII.1), pp. 46-50; J.N. Sinha, "Dynamics of female participation in economic activity in a developing economy", Proceedings of the World Population Conference (United Nations publication, Sales No.: 66.XIII.0), Vol. IV, p. 336 (Summary); The Mysore Population Study (United Nations publication, Sales No.: 61.XIII.3), chap. 15; Simon Kuznets, Ann R. Miller and Richard A. Easterlin, Population Redistribution and Economic Growth. United States, 1870-1950. II. Analyses of Economic Change (Philadelphia, American Philosophical Society, 1960), Vol. II, p. 22. Some examples of more complex analyses are to be found in the works of Cain, op. cit. and Long, op. cit., and William G. Bowen and T.A. Finegan, "Labor force participation and unemployment", Employment Policy and the Labor Market, ed. Arthur M. Ross (Berkeley, California, 1965); National Bureau of Economic Research, "Labor force participation of married women", Aspects of Labor Economics. A Conference of the Universities - National Bureau of Economic Research (Princeton, 1962); Richard N. Rosett, "Working wives: an econometric study", Thomas F. Dernberg, Richard N. Rosett and Harold W. Watts, Studies in Household Economic Behavior (New Haven, 1958); Kenneth Strand and Thomas Dernberg, "Cynical variations in civilian labor force participation", Review of Economics and Statistics (Cambridge, Mass.), November 1964.