Chapter II

COMPONENTS OF URBAN AND RURAL POPULATION CHANGE

38. Even though it may be preferable to use only crude methods in forecasts of urban and rural population, some knowledge of the underlying dynamics will help in exercising good judgement. It is perhaps best to begin a discussion of components of population growth with a consideration of sex-age structures. The composition of populations by sex and age is a consequence of preceding population trends (births, deaths and migration). In its turn, this structure partly determines current and future demographic trends because each of the trend components, births, deaths or migration, have a varied incidence among population groups distinguished by sex and age. Reclassification is an additional factor which can affect the population composition.

Differences between urban and rural sex-age structures

39. The United Nations Secretariat has made a survey of sex-age patterns in urban populations throughout the world. It was found that each national population is urbanized to a varied extent when every sex-age group is considered separately. It was found, furthermore, that the sex-age patterns of urbanization vary among different parts of the world, no doubt owing to a diversity of social, economic and cultural conditions underlying urbanization trends, in factors causing differences between urban and rural fertility and mortality, and in the selection of rural migrants proceeding to urban areas by sex and age.[29]

40. Estimates have been made for 1960, largely based on census data, of the sex-age compositions of the urban and rural populations in eight major areas of the world, as summarized in table 1. It will be noted that in all eight areas the percentages of children, up to the age of 15, are smaller in urban as compared with rural places, certainly as a result of lower urban than rural birth rates. Likewise, in all areas the urban population has larger proportions at ages 15-44 than does the rural population because urban places attract especially those persons of principal working ages. In Europe, Northern America, Latin America and Oceania, but not in the other major areas, middle-aged and elderly adults are also relatively more numerous in urban than in rural places. It is probable that at least in these regions rural migrants, once settled in urban localities, prefer to remain there also at advanced ages.

41. The ratio of males to females, of all ages, is much greater in urban than in rural areas in South Asia and Africa, while the reverse is true in Northern America, Latin America and Oceania, and to a lesser extent also in Europe. Below age 15, except those aged 5 to 14 in Latin America, urban and rural sex ratios are nearly the same as might be expected since a majority of children of either sex will ordinarily reside with their parents. The high rural sex ratio in Northern America at ages 15 to 24 may in part be attributed to the stationing of military troops in rural localities. But probably for different reasons the excess of males over females aged 15 to 24 in rural areas is also considerable in Latin America and Oceania. In South Asia and Africa, by contrast, there is a considerable excess of males in urban areas at ages 15 to 24, and an even greater excess at ages 25 to 44. But despite such regional diversity, and for unknown reasons, at ages 65 and over all major areas show a lower urban than rural sex ratio, and the difference between the two is greatest in Northern America, Latin America and Oceania.

42. The economic, social and cultural reasons for such a diversity in regional modes of urbanization have not yet been systematically studied,[30] but it is evident that the age structures reflect urban-rural differences in demographic trends (fertility, mortality and migration). Since urban and rural structures differ so much, it is of considerable interest to detail urban and rural population projections according to sex and age. In the choice of a suitable method to obtain such results, it is of some importance to appreciate the relative roles of the several demographic trend components in producing such effects.

Urban residence ratios by sex and age

43. There is a more direct way to analyse the structural differences between the urban and rural population. If we can assume a sufficient degree of population mobility between the two types of residence (urban, rural) we can consider the percentage urbanized, in each sex-age group, as reflecting a specific preference for residence in urban, rather than rural, areas, varying according to sex and age. Those sex- and age-specific "urban residence ratios" can therefore be plotted in a curve much as one

[29] See "Sex and age patterns of the urban population" (ESA/P/WP.36); "Comparative regional typology of urbanization patterns by sex and age" (ESA/P/WP.42); and "Sex-age composition of the urban and rural population of the world, major areas, regions and individual countries in 1960" (ESA/P/WP.44).

[30] One further United Nations study suggests that there is an interrelation between patterns of urbanization and patterns of marital status, both of which may be partly determined by the role and status of women in a society. See "Urban-rural differences in the marital status composition of the population" (ESA/P/WP.51).

TABLE 1. PERCENTAGE AGE COMPOSITION OF MALE AND FEMALE POPULATIONS, AND AGE-SPECIFIC SEX RATIOS, IN URBAN AND RURAL AREAS IN EACH OF EIGHT MAJOR AREAS OF THE WORLD, AS ESTIMATED FOR 1960

Group	East Asia		South Asia		Europe		Soviet Union		Africa		Northern America		Latin America		Oceania	
	Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural
Males																
All ages	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*
0–4	12.8	15.2	14.7	17.1	8.8	10.3	11.5	14.4	15.6	18.1	11.8	17.4	15.6	18.1	10.8	14.9
5–14	21.0	25.2	23.8	25.4	16.6	19.5	19.7	23.6	22.6	26.5	19.8	21.8	23.8	27.5	19.7	23.3
15–24	22.1	18.1	21.3	18.2	15.6	15.1	19.2	16.9	21.6	18.6	13.2	15.6	18.1	18.3	14.3	16.6
25–44	28.8	24.7	26.9	24.6	27.8	25.4	31.0	24.8	28.3	23.0	27.2	23.6	25.8	22.1	27.8	25.8
45–64	12.7	13.1	11.1	11.6	23.3	21.4	15.1	14.4	10.0	10.9	20.1	18.6	13.0	11.0	20.0	14.8
65 and over	2.6	3.8	2.3	3.1	8.0	8.3	3.5	6.0	2.0	2.8	7.9	9.1	3.7	3.0	7.4	4.6
Females																
All ages	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*
0–4	12.9	14.7	15.9	17.3	7.6	9.5	9.1	11.2	16.8	17.5	10.8	11.8	14.4	18.6	10.1	15.9
5–14	21.1	24.3	25.5	25.6	14.5	18.2	15.9	18.6	25.4	25.6	18.2	22.3	23.0	27.8	18.7	24.6
15–24	21.2	17.8	20.2	17.7	14.1	13.9	16.5	13.2	20.9	18.5	13.4	13.6	18.6	17.9	14.1	16.0
25–44	28.3	24.8	24.7	24.6	27.2	25.2	31.1	25.6	23.9	23.7	27.2	24.2	26.1	22.2	26.4	25.1
45–64	13.0	13.8	10.8	11.7	25.0	22.5	20.4	21.6	10.3	11.4	20.6	18.4	13.5	10.5	20.3	13.8
65 and over	3.7	4.6	2.9	3.0	11.6	10.1	7.0	9.8	2.8	3.2	9.8	9.7	4.4	3.0	10.3	4.6
Males per 100 females																
All ages	*103*	*99*	*112*	*102*	*91*	*97*	*83*	*82*	*110*	*97*	*94*	*108*	*95*	*106*	*99*	*113*
0–4	103	102	104	104	105	105	105	105	102	100	104	104	103	104	105	106
5–14	103	103	105	104	104	105	103	98	98	100	103	105	98	105	104	108
15–24	108	100	118	97	100	106	97	105	114	98	93	123	92	109	100	117
25–44	105	99	122	102	93	98	83	79	130	93	95	105	94	106	104	116
45–64	101	94	115	105	85	93	62	55	107	93	92	108	91	112	97	121
65 and over	74	82	89	97	63	76	42	51	80	84	76	101	80	105	71	112

can plot age-specific labour force participation rates, or age-specific percentages of married population, entries and departures from the category being possible at each age so as to result in a curve. There is, however, an important exception in the factors causing the varied urban residence ratios: the children of either urban or rural parents have no free choice of residence and ordinarily stay with their parents, or at least with their mothers. Only as age progresses into adolescence and beyond can one note the effects of the varying balance between entries into and departures from urban residence.

44. Almost invariably the urban residence ratios attain a peak near those ages at which migration is most frequent.[31] The age of greatest peak comes a few years of age sooner for females than for males. The height of the peak, on the whole, is greater for men than for women in Africa and Asia, but it is greater for women than for men in Latin America and in most of the more developed countries. Countries differ in the shape of the curve at ages past the peak. In some countries, for instance, a second peak appears at some more advanced ages, after an intervening depression. Probably the shape of the curve reflects to a considerable extent the past trends of net rural-to-urban migration which, of course, could have fluctuated. To an undetermined extent, however, the curve is also influenced by comparative levels and trends in urban and rural fertility, and mortality, respectively. As is known, age structure can be greatly affected by varying fertility trends of the more or less distant past, but only to a minor extent by varying mortality trends.

TABLE 2. PERCENTAGE OF NATIONAL SEX-AGE GROUPS RESIDING IN URBAN AREAS, COLOMBIA 1964 AND IRAN 1966

Age (years)	Colombia 1964		Iran 1966	
	Males	Females	Males	Females
0–4	49.1	49.5	35.0	35.6
5–9	48.5	49.8	35.9	36.3
10–14	49.3	53.7	42.0	42.6
15–19	50.7	60.3	46.9	42.9
20–24	51.4	58.5	51.2	42.2
25–29	51.8	57.0	41.5	38.2
30–34	52.4	57.0	38.7	37.5
35–39	49.3	55.1	38.7	40.6
40–44	49.1	55.1	36.8	36.6
45–49	47.8	55.6	39.8	42.2
50–54	47.3	56.2	39.8	41.8
55–59	49.0	58.3	37.1	41.3
60–64	45.3	56.7	37.7	38.7
65–69	49.0	59.1	35.4	36.5
70 and over	46.2	57.2		

Almost invariably, the urban residence ratios for small children fall below the level for women of ages at which they might be their mothers; this is a reflection of a usually lower fertility in urban areas as compared with rural ones. To illustrate this rather summary statement, the relevant ratios for Colombia (1964) and Iran (1966) are shown in table 2 and figure I.

[31] As further examined from intercensal balances in "The dynamics of rural-to-urban population transfers by sex and age" (ESA/P/WP.48).

45. An exact interpretation of the graphs is not possible owing to the accumulation of various effects in the course of time. Nor are the data very accurate: zig-zags at advanced ages can be the result of a different incidence of age misstatements in urban as compared with rural areas. A few facts are evident nevertheless: the young migrants to urban areas are predominantly female in Colombia and predominantly male in Iran: in both countries, female migrants are somewhat younger, on an average, than male migrants; in both countries, as witnessed by child-woman ratios, urban fertility is lower than rural fertility; and whereas probably most female migrants in Colombia establish permanent residence in urban areas, in Iran the residence of many young male migrants in urban areas is probably more temporary, leaving smaller balances past the age of 25. The impressions may be partly falsified by inaccuracy in the age data, and by possible and unknown fluctuations in net migration during decades of the past.

DIFFERENCES BETWEEN URBAN AND RURAL CRUDE DEATH RATES[32]

46. Conditions affecting mortality are apt to differ between urban and rural areas. For instance, in urban places medical facilities are more readily accessible. On the other hand, risks of contagion or motor vehicle accidents are probably less in the rural areas. Because of a differing incidence of various forms of pathology, it is possible that one of the two environments has relative advantages for persons of one or the other sex, or for individuals of different age. Whether, on balance, mortality is heavier in cities or in the countryside is a little-researched subject. It is believed that, because of the relative lack of health services, rural mortality appreciably exceeds the urban in the less developed countries, but it is not known how large the difference may be in the typical instances. In the more developed countries medical and sanitary services are very widely available, and mortality is generally so low that the differences between urban and rural areas cannot be very wide.

47. The United Nations has carried out some calculations of what the urban and rural crude death rates could have been around 1960 if mortality conditions in each region had been the same in urban and rural areas. Then assuming some differences at least in the less developed regions, the United Nations also calculated what the crude death rates might actually have been under those assumptions,[33] with further adjustments in these rates to make them compatible with a basic set of United Nations estimates pertaining to regional rates of population growth. The two sets of results are shown in table 3.

[32] In this and the following two sections, estimates are discussed as calculated in "The components of urban and rural population change: tentative estimates for the world and twenty-four regions for 1960" (ESA/P/WP.46).

[33] It was assumed that urban expectation of life at birth exceeded the rural by 5 years in East Asia (except Japan), South Asia, Africa, Melanesia, Polynesia and Micronesia, and by 2.5 years in Latin America. In Japan, Europe, the Soviet Union, Northern America and Australia and New Zealand urban and rural mortality were assumed to be the same.

FIGURE I

Percentage of national sex-age groups residing in urban areas, Colombia 1964 and Iran 1966

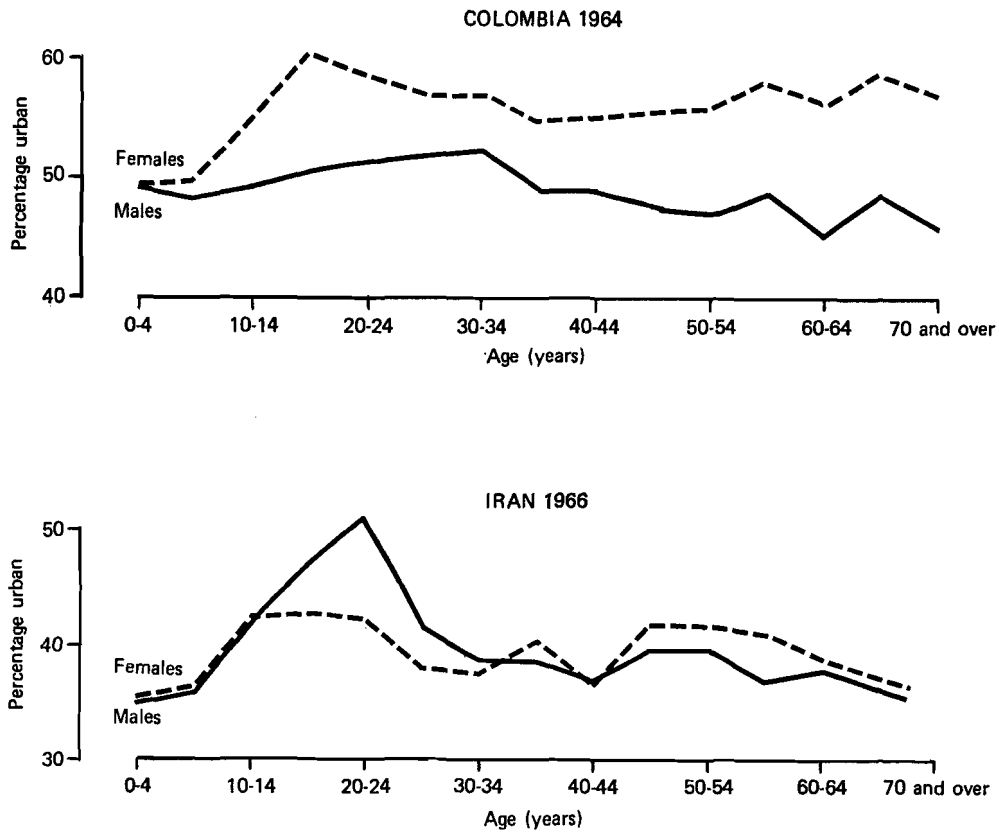

TABLE 3. URBAN AND RURAL CRUDE DEATH RATES WHICH WOULD RESULT IF URBAN AND RURAL MORTALITY WERE THE SAME, AND AS ACTUALLY ESTIMATED, AROUND 1960

Major area	*Assuming equal urban and rural mortality in each major area*			*As actually estimated (with adjustment)*		
	Urban death rate	*Rural death rate*	*Urban minus rural*	*Urban death rate*	*Rural death rate*	*Urban minus rural*
East Asia	14.9	18.6	−3.7	12.8	19.2	−6.4
South Asia	20.5	22.3	−1.8	17.1	22.8	−5.7
Europe	10.4	10.4	0.0	10.1	10.0	0.1
Soviet Union	6.5	8.3	−1.8	6.5	8.4	−1.9
Africa	20.9	24.3	−3.4	17.9	25.0	−7.9
Northern America	9.2	9.6	−0.4	9.0	9.3	−0.3
Latin America	11.6	12.0	−0.4	10.8	12.5	−1.7
Oceania	9.7	12.3	−2.6	8.7	13.1	−4.4

48. In the first three columns of table 3, differences between urban and rural crude death rates are due only to differences between urban and rural sex-age compositions. Since young adults predominate more in urban than in rural localities, and death risks for young adults are always comparatively low, these hypothetical death rates are generally lower in the urban areas, the differences being most considerable in East Asia, Africa and Oceania; in Europe, Northern America and Latin America, however, the differences are slight or negligible because in these major areas the urban localities contain also comparatively large shares of the aged population. In the last three columns of the table, however, it becomes evident that probably in many regions the difference between urban and rural crude death rates is actually larger than it would be for reasons of age structure only. As estimated, the urban death rate may have been almost 8 points less than the rural in

TABLE 4. URBAN AND RURAL CRUDE BIRTH RATES WHICH WOULD RESULT IF URBAN AND RURAL FERTILITY WERE THE SAME, AND AS ACTUALLY ESTIMATED, AROUND 1960

Major area	*Assuming equal urban and rural fertility in each major area*			*As actually estimated (with adjustment)*		
	Urban birth rate	*Rural birth rate*	*Urban minus rural*	*Urban birth rate*	*Rural birth rate*	*Urban minus rural*
East Asia	40.0	35.2	4.8	29.9	36.8	−6.9
South Asia	44.6	44.5	0.1	40.1	47.4	−7.3
Europe	19.5	17.9	1.6	17.8	21.8	−4.0
Soviet Union	27.2	22.4	4.8	20.9	26.6	−5.7
Africa	47.3	47.4	−0.1	41.8	48.0	−6.2
Northern America	25.4	22.1	3.3	24.3	24.9	−0.6
Latin America	43.7	37.0	6.7	35.3	44.5	−9.2
Oceania	28.1	26.5	1.6	22.4	36.6	−14.2

Africa, about 6 points less in East Asia and South Asia, and considerably less also in Oceania; in Europe and Northern America, on the other hand, the difference, if any, could have been only slight.

DIFFERENCES BETWEEN URBAN AND RURAL CRUDE BIRTH RATES

49. Virtually throughout the world the fertility of urban women is lower than that of rural women, and in many instances the difference is large. Fertility decline, where it has occurred, usually began first in urban areas and spread to rural areas later on. Thus, the urban-rural fertility difference can widen for a time, to narrow down again when the general decline in fertility comes to an end. The reasons for such differences between urban and rural fertility appear to be manifold. Various factors usually associated with lowered fertility, such as education, public health, non-agricultural activities, the economic activity of women, the prevalence of salaried employments and so forth, are associated with urbanization; hence it cannot be said to what extent the urban habitat itself, as an isolated factor, contributes to this fertility difference. One factor, which has not been sufficiently explored may be the different incidence of marriage among young urban or rural women: since urban women generally marry at a later age or more often remain single, the general fertility of urban women can be expected to be lower than that of the rural for this reason alone.[34]

50. Without going into the discussion of possible causes, we refer to United Nations estimates of urban and rural crude birth rates around 1960, analogous to the estimates of death rates already discussed. Comparison is made of the figures shown in table 4.

51. If fertility, calculated as the average number of births to women aged 15 to 44 years, were the same in urban and rural areas, differences between urban and rural crude birth rates would result as shown in the first three columns of table 4. These differences would have been due entirely to differences between urban and rural sex-age compositions. On this hypothetical basis, the urban birth rates would generally exceed the rural birth rates because of the prevalence of young adults in the urban areas. However, as already noted, in some regions the urban population has comparatively few women, and mainly for this reason equal urban and rural fertility would produce only a negligible difference between the hypothetical urban and rural birth rates of South Asia and Africa. In Latin America, where women predominate in the urban population, equal fertility would cause the urban birth rate to exceed the rural by nearly 7 points. Considerable excesses of the urban over the rural crude birth rate would have occurred also in East Asia, the Soviet Union and Northern America.

52. Actually, however, as calculated by reverse-survival of sex-age data, the urban crude birth rate was in general considerably below the rural crude birth rate. Only in Northern America was the difference rather slight. In Europe, the rural birth rate exceeded the urban by 4 points, in the Soviet Union and Africa by about 6 points, in East Asia and South Asia by about 7 points, in Latin America by 9 points, and in Oceania by 14 points.[35]

DIFFERENCES BETWEEN URBAN AND RURAL RATES OF NATURAL INCREASE

53. On the basis of age composition only, as has been argued, the urban areas would have higher crude birth rates and lower crude death rates than the rural areas. Therefore, on this hypothetical basis, the urban areas would have a greater potential for natural increase, assuming that urban and rural fertility and mortality could be equal. In actual fact, however, both the birth rates and the death rates are lower in urban than in rural places, and often the excess of the rural over the urban birth rate is greater than the excess of the rural over the urban death rate, with the consequence that the rate of natural increase is generally somewhat lower in urban, as compared with rural, populations. This reasoning is illustrated in table 5, showing the rates of natural increase which result from subtraction of the death rates

[34] In fact, women's age at marriage is almost everywhere higher in urban as compared with rural areas; and the proportions of married women are markedly lower in urban as compared with rural areas: "Urban-rural differences in the marital status composition of the population" (ESA/P/WP.51).

[35] In the case of Oceania it should be noted that most of the urban population is that of Australia and New Zealand, whereas much of the rural population is that of Melanesia, Polynesia and Micronesia.

TABLE 5. URBAN AND RURAL RATES OF NATURAL INCREASE WHICH WOULD RESULT IF URBAN AND RURAL FERTILITY AND MORTALITY WERE THE SAME, AND AS ACTUALLY ESTIMATED, AROUND 1960

Major area	*Assuming equal urban and rural fertility and mortality in each major area*			*As actually estimated (with adjustments)*		
	Urban natural increase	*Rural natural increase*	*Urban minus rural*	*Urban natural increase*	*Rural natural increase*	*Urban minus rural*
East Asia	25.1	16.6	8.5	17.1	17.6	−0.5
South Asia	24.1	22.2	1.9	23.0	24.5	−1.5
Europe	9.1	7.5	1.6	7.7	11.7	−4.0
Soviet Union	20.7	14.1	6.6	14.4	18.2	−3.8
Africa	26.4	23.1	3.3	24.0	23.0	1.0
Northern America	16.2	12.5	3.7	15.4	15.6	−0.2
Latin America	32.1	25.0	7.1	24.6	32.0	−7.4
Oceania	18.4	14.2	4.2	13.7	23.6	−9.9

in table 3 from the birth rates in table 4. Potentially, the urban natural increase could have exceeded the rural by more than 8 points in East Asia, by about 7 points in the Soviet Union and Latin America, by about 4 points in Northern America and Oceania, by 3 points in Africa and by smaller amounts in South Asia and Europe. However, as actually estimated, the reverse was the case, and the rural natural increase probably exceeded the urban by almost 10 points in Oceania, 7 points in Latin America, 4 points in Europe and the Soviet Union, and smaller amounts in East Asia and South Asia; in Northern America the estimated difference was slight, and in Africa the urban natural increase was estimated higher than the rural, though not by a large amount.

DIFFERENCES DUE TO THE EFFECTS OF INTERNATIONAL MIGRATION

54. At least in a few countries international migration can have a significant effect on the growth and composition of urban and rural populations. In earlier times there was much international migration originating from rural areas in one country, destined to settle in rural areas of another country. This may still be the case in some countries, such as in Africa. But elsewhere in recent times most international migration has had both an urban origin and an urban destination. The composition of the international migratory stream will have some effect on the sex-age structures of the populations affected. Countries where these considerations are of some importance are fewer than they used to be, nor are the effects as large as they were in earlier times. Unfortunately, in many countries the statistics on international migration are quite unsatisfactory, and even where they are fairly accurate the urban or rural origin of the migrants remains undetermined.

DIFFERENCES DUE TO INTERNAL RURAL-TO-URBAN MIGRATION

55. The most conspicuous cause of differences between urban and rural rates of population growth is the geographic shift of persons from rural to urban places of residence within the same countries. Throughout the world, urban populations grow with considerably greater speed than do the corresponding rural populations. Little of that difference can be attributed to differences in rates of natural increase or to international migration. It is therefore obvious that net migration between rural and urban areas plays a large role. The relative effect of internal migration will be greater on the urban population while this is still a minority in the national population, and greater on the rural population once the urban population makes up the majority. The sex-age selectivity of migration is important because of the resulting effects on urban and rural population structures. Unfortuntunately, difficulties are involved in the more detailed calculation of these migratory effects.

56. In a calculation of rates it is logical to attribute migration to the population in the areas of origin, namely the population at risk of sending migrants. Actually, however, the matter is more complicated since migration occurs in both directions, rural-to-urban and urban-to-rural. It is possible, for instance, that in certain age groups the balance of all movements is in favour of urban areas, while in some other age groups the balance is in the opposite direction. However, the separate calculation of the components of each migratory balance is a refinement depending on detailed statistics which are rare, and it may be unnecessary in projections made only for the purpose of forecasts. The more direct estimation of migratory balances by sex and age is discussed in chapter IX.

57. An important question, in assessing the net effects of rural-to-urban migration, is the extent to which migrants establish a permanent urban residence. Where they do, they contribute to urban population growth also in the long run, founding new urban families and producing offspring. In other instances, many young persons in urban areas constitute a floating population that is in a continuous state of turnover. The pool of short-term migrants is replenished by a continuous inflow of young persons, but considerably drained, at the same time, by a continuous return flow to rural areas.[36] The floating migratory population may increase at times when urban areas offer a particular attraction, but shrink again at other times when they do not. It may leave only a small residual of persons remaining in the urban area

[36] The large effect of return migration from an Asian city is documented by K. C. Zachariah, "Bombay Migration Study: A Pilot Analysis of Migration to an Asian Metropolis", *Demography* (Chicago), vol. 3, No. 2, 1966, pp. 378-392.

up to an advanced age. But where migration leads largely to continued urban residence, migrants of earlier date remain in the urban population at all ages following the age of peak migration. If a survey were to be made, it would be difficult to distinguish between the "floating" migrants and the more permanent migrants; persons who have migrated to town will often not know themselves whether they are likely to leave soon, or whether they are apt to stay a longer time or even indefinitely. In those few countries where the census draws a distinction between *de jure* and *de facto* population, the differences between the two categories in urban areas reflect to some extent the presence of temporary migrants.

58. The type of migration to urban places will also depend in part on the census definition of "urban" areas, already discussed. For instance, in many countries there is a considerable migration from city centres toward the suburbs. Often this is a migration of mature adults, perhaps aged in their thirties, who, having made a successful beginning in an economic career, wish to settle their young families in the more favourable suburban housing conditions. Where suburbs do not form part of the definition of "urban" localities, the so-called "urban" places may gain young adult migrants (aged, say, in their twenties), while losing those aged in their thirties together with their young children.

59. A desirable type of census data for population projections (usually carried out in five-year time intervals) would be those on places of residence five years previous to a census in relation to their places of current residence. Five-yearly migration rates, immigration as well as emigration, would then be directly calculable. The data would be even more fruitful if it could be determined whether the previous place of residence (such as, five years ago) was urban or rural,[37] but such figures are seldom secured as well as difficult to obtain because of possible definitional changes in urban and rural localities. A question remains also whether the places of previous residence have been stated accurately in the census.

Effects of rural-to-urban area reclassification

60. Depending on the kind of definition involved, rural-to-urban reclassifications can occur especially in two types of areas: (*a*) in villages or other settlements attaining the status of "towns"; and (*b*) in suburban areas being annexed by the administrative authorities of geographically expanding cities. The consequence in either event is a transfer of population from the rural to the urban category. Census data describing the sex-age composition of the transferred population are rarely available. The study of data in those countries where they are provided gives some indication of possible effects of these transfers upon the sex-age composition of the rural and the urban population.

61. If it is only a matter of rural localities attaining urban status, it can be conjectured, very roughly, that the sex-age composition of the marginal population involved is of a type intermediate between the typical compositions of urban and rural populations, respectively. This can be approximately the case because the localities concerned may usually have characteristics which place them near the border line between the two types of settlement. In a country whose population is about 50 per cent urbanized, it is possible that the sex-age composition of the reclassified areas resembles that of the combined national population. In less urbanized or more highly urbanized countries this should generally not be expected.

62. An example of sex-age compositions of populations in localities of differing size groups is provided in a special report of the 1965 population census of Japan. Table 6 shows percentage compositions of Japan's total population and of its population in different community size groups.[38] In examining these data it should be borne in mind that Japan is now a highly urbanized country. Two significant observations can be made. First, the percentage compositions vary in almost continuous fashion, as we proceed from settlements of the largest to those of the smallest size. For instance, males aged 20 to 24 years constituted 7.3 per cent in cities of 500,000 or more inhabitants, while in successively smaller localities they constituted 4.9, 4.2, 3.4, 3.0, 2.6 and 2.4 per cent. Secondly, the national sex-age composition of the population is most nearly approximated in towns having around 50,000 inhabitants. As a matter of fact, in 1965 nearly half the population of Japan inhabited towns of this size and larger.

63. If it is a case of annexation of suburban areas, the matter may be quite different. Aside from migratory balances between the urbanized areas and the rest of the country, important balances also usually exist between the central parts of each city and its suburbs. The latter migration is usually highly selective of groups of sex and age. In the United States, for instance, the suburban areas tend to be settled by men of career ages and their respective families, hence the suburbs have higher percentages of small children and persons in their thirties than do the city centres, whereas the latter have higher percentages of adolescents and young adults, as well as of adults in mature and advanced ages.

64. Census data for 1960 have been provided for major cities in the United States whose territory had been enlarged as a result of annexations between 1950 and 1960.[39] Percentages in each sex-age group of the combined city population residing in annexed areas can be calculated, and table 7 presents the results for the city of Dallas. The same data are also charted in figure II. As can be seen, the above statement regarding suburban population is well borne out. It is rather probable, however, that in a city like Dallas much of the migration to the annexed areas occurred subsequently

[37] Such data have been found in censuses of India and Greece. See *Manual VI: Methods of Measuring Internal Migration* (United Nations publication, Sales No. E.70.XIII.3), p. 37.

[38] Japan, Bureau of Statistics, *1965 Population Census of Japan: Results by Population Size of Shi, Machi and Mura and of DID's* (Office of the Prime Minister). The calculation was made for *shi*, *machi* and *mura*, those being the minor administrative divisions of the country.

[39] Miller and Varon, *Population in 1960 of Areas Annexed to Large Cities of the United States between 1950 and 1960 by Age, Sex and Color*, Analytical and Technical Reports No. 1 (Philadelphia, University of Pennsylvania, Population Studies Center, November 1961).

TABLE 6. PERCENTAGE COMPOSITION BY SEX AND AGE OF POPULATION IN JAPANESE ADMINISTRATIVE UNITS ACCORDING TO POPULATION SIZE, 1965

Sex and age	Japan total population	Size of administrative unit (number of inhabitants)						
		500,000 and over	100,000–499,999	50,000–99,999	30,000–49,999	10,000–29,999	5,000–9,999	Smaller than 5,000
Males	*49.1*	*50.8*	*49.1*	*48.6*	*48.2*	*48.3*	*48.4*	*49.0*
0–4	4.2	4.2	4.5	4.4	4.2	4.1	3.9	3.9
5–9	4.1	3.3	3.9	4.1	4.4	4.6	4.7	5.0
10–14	4.8	3.4	4.3	4.7	5.3	5.8	6.2	6.4
15–19	5.6	6.3	5.8	5.5	5.3	5.1	4.7	4.0
20–24	4.6	7.3	4.9	4.2	3.4	3.0	2.6	2.4
25–29	4.2	5.7	4.6	4.1	3.6	3.2	2.9	2.9
30–34	4.2	4.7	4.5	4.3	4.0	3.7	3.6	3.6
35–39	3.8	3.8	3.9	3.9	3.8	3.7	3.7	3.9
40–44	2.8	2.7	2.8	2.8	2.8	2.8	2.9	3.1
45–49	2.3	2.1	2.2	2.3	2.4	2.4	2.4	2.5
50–54	2.2	2.1	2.1	2.2	2.3	2.3	2.4	2.5
55–59	2.0	1.7	1.8	2.0	2.1	2.1	2.3	2.4
60–64	1.7	1.4	1.5	1.6	1.8	1.9	2.1	2.2
65–69	1.2	1.0	1.1	1.2	1.3	1.5	1.7	1.8
70–74	0.8	0.6	0.7	0.8	0.9	1.0	1.1	1.2
75+	0.8	0.4	0.6	0.7	0.8	1.0	1.1	1.3
Females	*50.9*	*49.2*	*50.9*	*51.4*	*51.8*	*51.7*	*51.6*	*51.0*
0–4	4.1	4.0	4.3	4.2	4.1	3.9	3.7	3.8
5–9	3.9	3.2	3.7	3.9	4.2	4.5	4.6	4.8
10–14	4.6	3.3	4.1	4.5	5.1	5.7	6.0	6.3
15–19	5.5	5.6	5.8	5.8	5.5	5.2	4.7	3.7
20–24	4.7	6.0	5.1	4.7	4.1	3.6	3.2	2.8
25–29	4.3	5.1	4.7	4.4	3.9	3.5	3.2	3.0
30–34	4.2	4.5	4.5	4.2	4.1	3.8	3.6	3.6
35–39	3.8	3.8	3.9	3.8	3.9	3.8	3.8	3.8
40–44	3.3	3.1	3.2	3.3	3.4	3.4	3.5	3.5
45–49	2.7	2.5	2.6	2.8	2.9	2.9	3.0	3.0
50–54	2.5	2.3	2.4	2.5	2.7	2.7	2.9	2.9
55–59	2.1	1.8	2.0	2.1	2.2	2.3	2.5	2.5
60–64	1.7	1.5	1.6	1.7	1.9	2.0	2.2	2.2
65–69	1.4	1.1	1.2	1.3	1.5	1.6	1.8	1.8
70–74	1.0	0.7	0.8	1.0	1.1	1.2	1.3	1.4
75+	1.2	0.7	1.0	1.2	1.3	1.5	1.7	1.9

TABLE 7. POPULATION OF DALLAS (UNITED STATES), 1960: PERCENTAGE OF EACH SEX-AGE GROUP CONTAINED IN AREAS ANNEXED BY THE CITY BETWEEN 1950 AND 1960, AND WITHIN THE 1950 BOUNDARIES (WHITE POPULATION ONLY)

Ages	Annexed areas		Within 1950 boundaries	
	Males	Females	Males	Females
0–4	38.4	38.9	61.6	61.1
5–9	40.0	39.9	60.0	60.1
10–14	33.8	33.9	66.2	66.1
15–19	26.1	23.7	73.9	76.3
20–24	17.8	20.5	82.2	79.5
25–29	27.5	33.6	72.5	66.4
30–34	36.8	37.2	63.2	62.8
35–39	35.9	31.8	64.1	69.2
40–44	29.3	24.4	70.7	75.6
45–49	23.6	18.7	76.4	81.3
50–54	18.8	15.6	81.2	84.4
55–59	16.7	13.2	83.3	86.8
60–64	13.4	11.7	86.6	88.3
65–69	13.1	11.3	86.9	88.7
70–74	12.2	10.5	87.8	89.5
75 and over	13.0	9.8	87.0	90.2

rather than prior to their annexation, with the implication that not so much adjustment is needed for this case of reclassification as the population data for the annexed areas would seem to suggest.

NET RURAL-TO-URBAN POPULATION TRANSFERS, I.E. COMBINED EFFECTS OF MIGRATION AND AREA RECLASSIFICATION

65. Whereas census data reflecting directly on rural-to-urban migration are rare, it is often possible to calculate the combined balance of net rural-to-urban population transfers resulting from the migratory balance as well as area reclassification. Given the rates of urban and rural population growth and the rates of urban and rural natural increase, simple subtraction can yield the rates of rural-to-urban transfers. It can usually be presumed that the greater part of the transfers is due to migration, and only a smaller portion to area reclassification, depending on whether the definition of urban areas is more or less flexible.[40]

[40] But this does not seem to hold true in Brazil, where the analysis of data suggests that reclassification contributed in a large measure to urban growth (see chap. IX).

FIGURE II

Population of Dallas (United States), 1960: percentage of each sex-age group contained in areas annexed by the city between 1950 and 1960

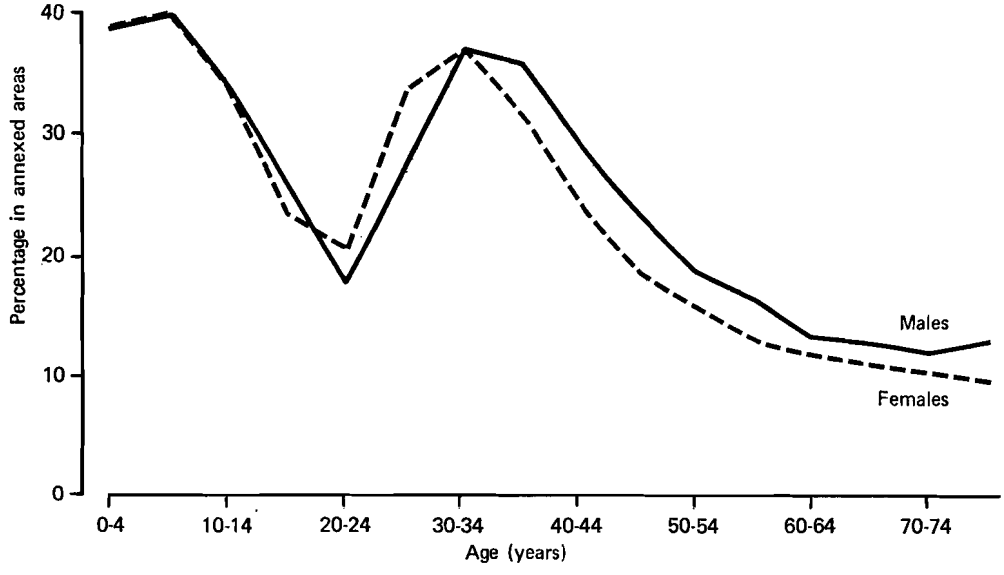

TABLE 8. RATES OF URBAN POPULATION GROWTH AND ITS COMPONENTS, AND RURAL RATES OF NATURAL INCREASE AND ITS COMPONENTS, AROUND 1960

Major area	*Urban population growth rate and its components (per 1,000 urban population)*			*Rural natural increase rate and its components (per 1,000 rural population)*		
	Growth rate	*Natural increase*	*Transfers from rural*	*Natural increase*	*Growth rate*	*Transfers to urban*
East Asia	47.0	17.1	29.8	17.6	8.8	8.7
South Asia	37.5	23.0	14.5	24.5	21.2	3.2
Europe	18.1	7.7	10.4	11.7	−4.3	16.0
Soviet Union	35.1	14.4	20.7	18.2	−2.1	20.3
Africa	45.8	24.0	21.9	23.0	18.2	4.8
Northern America	24.6	15.4	9.2	15.6	−1.8	17.4
Latin America	44.8	24.6	20.3	32.0	12.7	19.3
Oceania	26.5	13.7	12.9	23.6	13.2	10.3

66. The United Nations estimates of urban and rural rates of natural increase around 1960 in eight major areas of the world, already discussed (see table 5), have been ajusted to correspond with another set of estimates relating to urban and rural rates of population growth, [41] with results shown in table 8. The interdependence of these comparative figures is of course conditioned by the levels of urbanization. As estimated for 1960, the urban population constituted 70 per cent of the total in Northern America, 66 per cent in Oceania, 58 per cent in Europe, 49 per cent in the Soviet Union, 48 per cent in Latin America, 23 per cent in East Asia, and 18 per cent each in South Asia and Africa.

67. As estimated for 1960, urban rates of population growth were 45 to 47 per 1,000 in East Asia, Africa and Latin America, 35 to 37 per 1,000 in South Asia and the Soviet Union, 25 to 27 per 1,000 in Northern America and Oceania, and 18 per 1,000 in Europe. Urban rates of natural increase were 23 to 25 per 1,000 in South Asia, Africa and Latin America, 14 to 17 per 1,000 in East Asia, the Soviet Union, Northern America and Oceania, and 8 per 1,000 in Europe. It follows that the rates of net incoming population transfers, relative to the size of the urban population, were about 30 per 1,000 in East Asia, 20 to 22 per 1,000 in the Soviet Union, Africa and Latin America, and 9 to 14 per 1,000 in South Asia, Europe, Northern America and Oceania. *The proportion of urban population growth accounted for by transfers from rural areas* was thus 64 per cent in East Asia, 59 per cent in the Soviet Union, 58 per cent in Europe, 47 per cent each in Africa and Oceania, 46 per cent in Latin America, 38 per cent in South Asia, and 37 per cent in Northern America.

68. Rural rates of natural increase were 32 per 1,000 in Latin America, 23 to 24 per 1,000 in South Asia, Africa and Oceania, 16 to 18 per 1,000 in East Asia, the Soviet Union and Northern America, and 12 per 1,000 in Europe. The rates at which rural populations grew

[41] The growth rates were calculated as exponential rates (not compound rates) to maintain comparability with birth rates, death rates and rates of natural increase (ESA/P/WP.46).

were less, namely 21 per 1,000 in South Asia, 18 per 1,000 in Africa, 13 per 1,000 in Latin America and Oceania, and 9 per 1,000 in East Asia; in Europe, the Soviet Union and Northern America, the rural population underwent slow decreases. Relative to the size of the rural population, outgoing population transfers occurred at rates of 16 to 20 per 1,000 in Europe, the Soviet Union, Northern America and Latin America, at 10 per 1,000 in Oceania, at 9 per 1,000 in East Asia, and at comparatively low rates in South Asia and Africa whose rural populations, relative to the size of the urban, were still very large.[42] *The proportion of rural natural increase disposed of by transfers to urban areas* was thus 137 per cent in Europe, 112 per cent each in the Soviet Union and Northern America, 60 per cent in Latin America, 51 per cent in East Asia, 43 per cent in Oceania, 21 per cent in Africa, and 12 per cent in South Asia.

Implications for projection methodology

69. The foregoing review of components of urban and rural population change and of their influence upon urban and rural population structures demonstrates a complexity of factors difficult to isolate from each other unless the available statistics reflect all that detail with great accuracy.

70. To recapitulate, the urban and the rural populations can change by the incidence of urban and rural mortality, urban and rural fertility, internal migration from rural to urban and from urban to rural areas, international migration from abroad to urban and rural areas, and the population of previously rural localities being reclassified to an urban status. The incidence of all these events varies to an important degree by groups of sex and age, and it will be recalled that age itself changes as time progresses.

71. If we consider the urban population only we can derive a scheme of its change as follows. Let U_o and U_t be the urban population at the beginning and at the end of a time interval t; B the number of births occurring during that interval; D the number of deaths; Ii internal migrants from rural to urban areas; Ie internal migrants from urban to rural areas; Ei migrants to urban areas from abroad; Ee urban emigrants to other countries; and R the population being reclassified; we arrive at the equation

$$U_t = U_o + B - D + Ii - Ie + Ei - Ee + R$$

72. If the time interval t is very short, only a few individuals will undergo more than one of the indicated events. Over a longer period of time, such as in the course of five years, many individuals may experience two or several of the events noted in the equation. Thus, one person may move from the rural to the urban area, then emigrate abroad and then return to a rural place which in turn undergoes urban reclassification still within the same time period. In the first event, he is added to the urban population; in the second event, he is subtracted; in the third event, he is not registered in the urban population at all; and in the fourth event, he is again added. The net result is the addition of one individual to the urban population, but the events have been several. The fictitious example illustrates that the several events depend not only on the initial urban population, but on an urban population which changes while these and other events, some of them partly interdependent, occur. A complete independence of different events from each other can be postulated only when the time interval is infinitesimally short.

73. Some degree of statistical stability—whether a constant level, a continuous trend or fluctuations—can be imputed to the flow of events when these are taken in proportion to the population *at risk* of experiencing these events. Annual events occurring per thousand of the population at risk constitute demographic rates.[43] However, some difficulties occur in determining which is the population "at risk".

74. Clearly it is the urban population itself that is at risk of experiencing urban births and urban deaths. On the other hand, it is the rural population (and also the population of other countries) which is at risk of sending migrants to the urban areas. Furthermore, the rural population, or at least some sections of it are at risk of being reclassified to an urban status.[44]

75. In this connexion, it must be pointed out that the population "at risk" of sending emigrants from the urban areas is not necessarily the urban population itself. Many of the persons leaving an urban area are previous immigrants, either from a rural area or from abroad, who after a period of urban residence return to their places of origin. In so far as this is the case, the migrant population is the one "at risk". And since the risk of generating this migrant population (at least the internal migrants) pertains to the rural population of origin, it might even be said that the rural population itself is at risk of receiving back some of its previous emigrants.[45]

76. Statistics detailed and accurate enough to trace the frequency of every type of demographic event exist in some of the countries which have systems of population registers. However, where registers are maintained on a local basis, the statistics are usually biased: whereas most migrants register their arrival at the place of destination, some always fail to register their departure at the place of origin. Only in a centralized registration system is it possible to ensure that the resulting errors will be detected and reduced to a minimum.

77. The existence of a vital statistics system and repeated censuses of sufficient accuracy can suffice for calculations by which the balance of rural-to-urban

[42] As it happens (see also the first section of this chapter), the highest rates of rural out-migration occurred mainly in those regions where women predominated among the migrants; where the migration consisted mostly of men, the rates of rural out-migration were lower.

[43] As explained in the second section of chapter III, correct demographic rates are those related to the mean population of each time period, ordinarily represented by the mid-year population. The mid-year population, of course, is already affected by about one-half the events occurring in each year.

[44] In special instances, it is also possible that part of the urban population is at risk of being reclassified as rural.

[45] This would not be the case, however, where suburbs receive many migrants directly from the central city and the suburbs continue to be governed by administrations of a rural type.

migration and reclassification can be estimated.[46] In a few countries the censuses also contain data concerning place of residence at some prior fixed date, such as one or five years prior to the census, and these data are directly relevant to the calculation of migration in both the rural-urban and urban-rural directions. However, such data are often believed to be rather deficient and, even in the few instances where the urban or rural character of the previous place of residence is recorded, a residual uncertainty remains because some of those places may meanwhile have become reclassified. The vital statistics, even if accurate and detailed, may record births and deaths by place of occurrence rather than by place of usual residence, with the result that births and deaths occurring to rural residents at an urban hospital are attributed to the urban area.

78. In the absence of vital statistics, it is still possible to estimate levels of fertility and mortality from the relationship between a population's age structure and the estimated rate of population growth.[47] In that situation, one can no longer detect what differences in mortality conditions might exist between urban and rural areas, but in actual fact it is possible that those differences are not quantitatively important in a population projection. On the other hand, by the method of reverse survival the level of urban and rural fertility can be estimated separately, often with a tolerable degree of accuracy, even if the level of child mortality is estimated only by a rough approximation. The accuracy of these estimating procedures, however, can be much affected if the census age statistics are inaccurate.

79. All things considered, there are a fair number of countries in which the statistical data situation permits, without the risk of great error, to estimate at least the net migratory balance between urban and rural areas. In view of what has been said, the rural population can be considered at risk, not only of sending migrants to urban areas, but also of receiving some of them back as they return to their places of origin. This consideration can make it legitimate to attribute the net balance resulting from migration and return migration to the rural population as the one "at risk". One can go further and ascribe the combined balance of migration and area reclassification to the rural population, i.e. to consider the rural population "at risk" of producing a net rural-to-urban population transfer with these combined effects.[48] Projection methods therefore are applicable in which use is made of some combinations of the components of urban and rural population change, instead of the use of detailed assumptions concerning every one of the numerous components.

80. Unfortunately, the countries lacking sufficient statistics for urban and rural population projections by components of population change are more numerous. A large part of the manual is concerned with situations where detailed statistics are rather scant. It is obvious that in such countries the projections can be made only by rather summary methods. However, it does not follow that responsible projections can be made by the mechanical or indiscriminate application of a simple formula. Judgment is needed in selecting the formula most appropriate to the particular conditions. Such judgment depends on some knowledge and experience of factors likely to affect urbanization and its demographic components, as well as of the calculable interaction of the demographic components in some other countries where the statistical documentation is more satisfactory.

[46] See United Nations, *Manual VI: Methods of Measuring Internal Migration* (United Nations, Sales No. E.70.XIII.3).

[47] See United Nations, *Manual IV: Methods of Estimating Basic Demographic Measures from Incomplete Data* (United Nations, Sales No. 67.XIII.2).

[48] In this context it is worth mentioning that those areas often tend to be reclassified as urban where as a result of much recent migration a population size or density has been attained which can be assimilated with urban conditions elsewhere in the same country. In the circumstances, reclassification is partly determined by migration.