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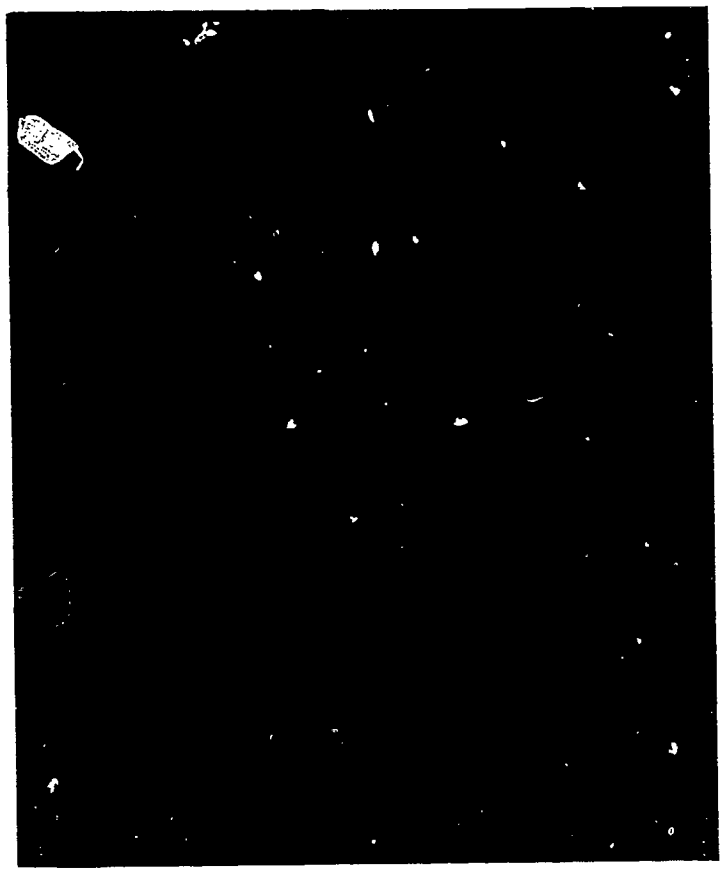
ABSTRACT

This report presents demographic data for four racial populations in South Africa (Blacks, Whites, Coloureds, and Asians) and examines trends in the aging of each of these populations. The age structure of a population is determined most directly by fertility and mortality. The findings of this report support a general theory to the effect that the average age of a population eventually rises in the transition from high to low levels of fertility and mortality. The report shows that the four South African populations are at different stages of this demographic transition. Whites are at the most advanced stage in this process, and are characterized as demographically old; the median age of this group was 29.5 years in 1985. Blacks, on the other hand, are demographically the youngest population group with a median age of 17.9 years in 1985. Asians and Coloureds occupy intermediate positions; in 1985 their median ages were 23.3 and 21.3 years respectively. While the demographic age of Blacks will eventually undergo the same transition, it is likely to be much less rapid than the transition of the other three groups, whose aging is projected to advance at steady rates. Numerous figures and tables of demographic data appear throughout this report, and a 22-item list of references is included. (DB)



Demographic ageing of the South African population

Past (1945-1985)and expected trends (1985-2035)

B. E. Hofmeyr
W. P. Mostert

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CONTENTS

LIST OF FIGURES

LIST OF TABLES

EKSERP/ABSTRACT

Historiese en geprojekteerde bevolkingsgetalle is gebruik om die proses van demografiese veroudering in die vier Suid-Afrikaanse bevolkingsgroepe te ondersoek en dit met die algemene demografiese transisiemodel te vergelyk.

Historical and projected future population data were used to investigate the process of demographic ageing in the four South African population groups and to compare it with the general theory of demographic transition.

1. INTRODUCTION

This report examines the changes in the age structure associated with the process of demographic ageing among the population groups in South Africa. The quantitative population data used in this study were reconstructed for the period 1945-1985 (Mostert, Van Tonder & Hofmeyr 1987a, 1987b) and projected for 1985-2035 (Mostert & Van Tonder 1987). The assumptions underlying these projections, classed as low, medium and high variants, are discussed by Mostert and Van Tonder. In the case of blacks, the results of the medium variant of the population projection are used as a basis for the discussion; in the case of the other three population groups, the results of the low variants are used, unless otherwise indicated.

Demographic ageing of a population is defined as an increase in the proportion of persons aged 65 and over with a resultant increase in the median age; the age structure is no longer stable. During the process of demographic transition the age structure of a population generally becomes older and the median age rises. The findings show that the four population groups in South Africa find themselves at different stages of demographic transition. This transition is a continuous process usually spanning a longer period of time than the 90 years covered in this report. Historically, during the early phase of such a transition, the age structure may temporarily become younger before ageing sets in, especially when a significant mortality reduction, which usually precedes fertility decline, is achieved at the younger ages. Whites, who are the most advanced in the process of demographic transition, went through the earlier stages of transition before the period under review. This group may be typified as demographically old, its median age being 29,5 years in 1985. On the other hand, in the case of blacks, the demographically youngest population group with a median age of 17,9 years in 1985, this period covers only the earlier stages of the transition process. In the case of Asians and coloureds, who occupy an intermediate position, probably the most significant changes in their age structures are covered, provided the projected decline in fertility and mortality will be realized. In 1985 their median ages were 23,3 and 21,3 years respectively .

The rate of transition of the various groups is different and conforms to different identified groups of countries (United Nations 1988b). Whites show a Western pattern and blacks thus far correspond to the developing nations. The coloured and Asian groups show an East Asian pattern.

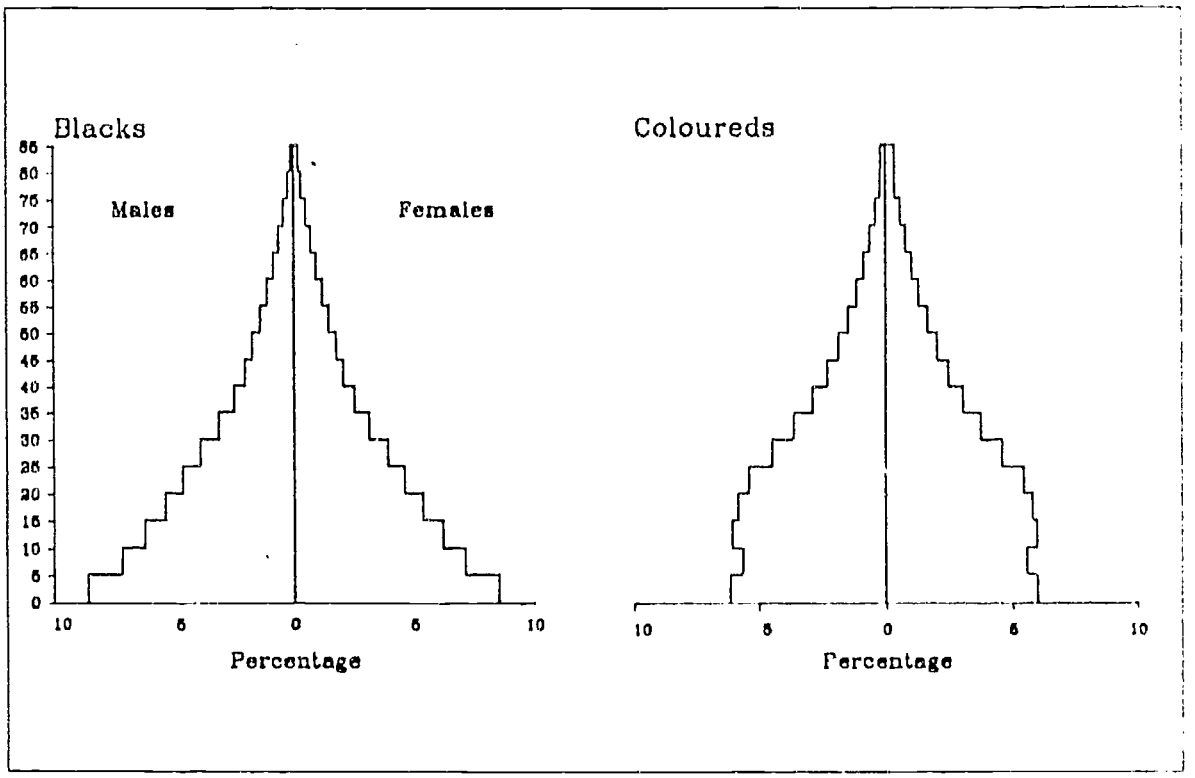
Although the individual non-black populations are all expected to be classified as old according to the United Nations criterion (1956) in the course of the projection period, the total South African population, due to the preponderance of the black component, will only reach demographic maturity.

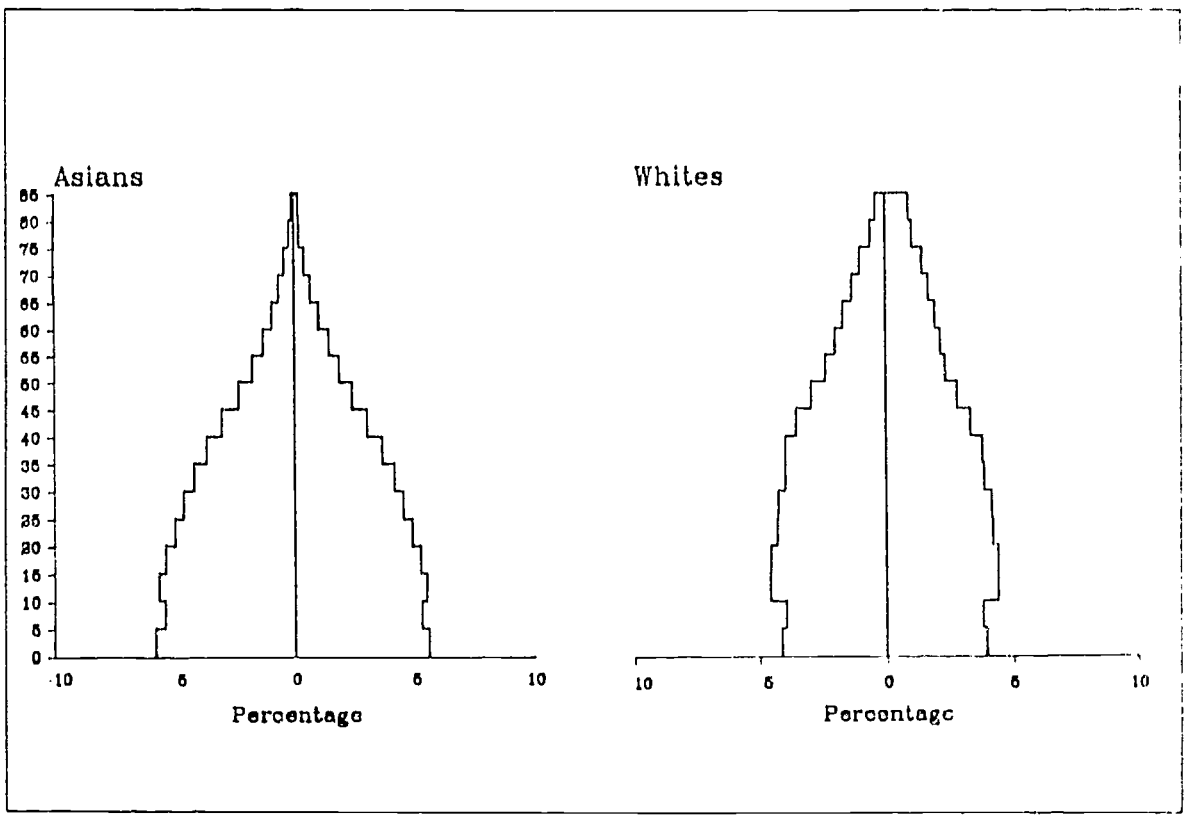
2. POPULATION STRUCTURE BY AGE

The age structure of a population is directly determined by demographic factors, i.e. fertility, mortality and migration. Economic and social factors affect the shape of the age distribution only to the extent that they cause changes in births, deaths or migration. Since the demographic factors may vary over time and between different populations at a given time, age pyramids showing the relative frequencies of each sex at the different ages can take very different forms. In many countries the present age distribution differs markedly from that of the past. The age pyramids of the different population groups in South Africa (including the TBVC states) in 1985 (see Fig. 1) provide a good example of the most frequent forms of age pyramids and can reflect the dynamics of an age structure during demographic transition.

The age pyramid of blacks is that of a population characterized by high and rather constant fertility: a wide base and steeply sloping sides. This form of pyramid is characteristic of a demographically young population, that is, of a population that contains a large proportion of children, a small proportion of elderly people and a relatively low proportion of persons in the productive ages and thus it has a low median age (17,9 years). This type of age structure is typical of the populations of most developing countries. The pyramids of coloureds and Asians represent transitional populations where fertility has declined fairly recently: They have a narrower base than the one for blacks and the general form is more bulging, especially up to age 30 in the case of coloureds and among all adults in the case of Asians, reflecting the large cohorts born when fertility

FIGURE 1: AGE PYRAMIDS, 1985





was much higher, which have moved progressively into older age groups. The shape of this type, especially of Asians, has been variously described as "beehive" or "barrel" (United Nations 1973). The bulge appearing at the middle ages is characteristic of a population in which the process of ageing has already set in. It is reflected in the increased proportion of adults, which leads eventually to an increase in the proportion of the elderly. The populations thus are more aged in the sense that there is a larger proportion of adults, while there are proportionally fewer children than among blacks. The demographic ageing of the white population is accentuated in the more rectangular pyramid.

The percentage distribution of broad age groups in 1985 were:

Age	Blacks	Coloureds	Asians	Whites
0-14	43,8	35,4	33,0	24,9
15-39	38,8	44,9	45,1	41,5
40-64	14,4	16,2	19,1	25,2
65+	3,0	3,5	2,8	8,4
Total	100,0	100,0	100,0	100,0
Median	17,9	21,3	23,3	29,5

3. CAUSES OF THE AGEING OF A POPULATION

It has been estimated that until perhaps two hundred years ago, most countries were demographically young, with fairly similar age structures not very different from that of the South African blacks of today. Since then, and especially over the past fifty to one hundred years, substantial changes in the age structures have occurred in the presently developed countries as the proportion of children declined markedly, while the proportions in the middle and older age groups increased (United Nations 1973). It is tempting to explain demographic ageing, i.e. the increased relative number of aged persons, by the decline in mortality: as life expectancy increases, the number of old persons in a population increases. Yet, reduced mortality, as it has occurred historically, increases the number of young persons as well. Indeed, the greatest increases in survival occur among the young rather than the old (Coale 1964).

Improvements in the standard of living, development of modern medicine and public health measures (the primary reasons for increasing life expectancy in the past), bring about a diminution of especially exogenous mortality. The decline of mortality then affects all ages and therefore also the growth rate of the total population, but will not be a factor in ageing, since the overall age structure will not be modified significantly.

If one considers the relative magnitude of the infant mortality rate and of the mortality rates of young children when the general level of mortality is high, one can understand why in most of the world's countries the greatest improvements in mortality have occurred at the young ages (United Nations 1973). Reduced mortality then, indeed, leads to a juvenation[1] at the base, i.e. an increase in the proportion of young persons and to a lower median age, and leaves the apex of the pyramid practically unchanged.

However, Pressat (1972) concludes that in the most advanced industrialized countries (e.g. Sweden), which have already attained a high expectation of life, exogenous infantile deaths will soon virtually disappear.

Progress in the struggle against endogenous deaths, essentially against the deaths due to ageing, results in mortality reductions chiefly at older ages and then becomes a factor in the ageing of the population. One could describe it as **ageing at the apex of the pyramid**: the relative importance of old people is augmented by the relative increase in the number of old persons (Pressat 1972). Thus, mortality decline at first contributes to the juvenation and at a much later stage to the ageing of a population. The former effect is significantly larger in populations with high mortality, the latter effect in populations with low mortality. In United Nations (1988b) and in this study it is confirmed that among the more developed populations ageing at the apex of the pyramid exerts an increasingly stronger influence on the ageing process of populations.

Findings have generally shown that among populations whose levels of fertility and mortality have declined markedly, a process generally referred to as demographic transition, the effect

[1] In United Nations (1988b) it was suggested that the term rejuvenation be replaced by another term, such as juvenation.

of declining fertility on the age structure has been more pronounced than that of declining mortality. Prolonged high fertility produces a large proportion of children and a small proportion of elderly people, and thus results in a young population. On the other hand, prolonged low fertility produces a small proportion of children and a large proportion of the aged and thus results in the demographic ageing of the population. One may say that there is an ageing from the base of the pyramid: the relative weight of elderly persons is augmented by the relative decline in the number of young persons (Pressat 1972).

The degree of ageing of a population is not only affected by fertility and mortality but also by migratory movements. With regard to international migration, it may be theorized that migration may be an immediate factor in the ageing of the population of the country of origin and in the juvenation of the population of the country of destination, since migrants are usually young people. However, the ratio of net migration to a country's population is mostly not sufficient to affect its age structure noticeably. Since it is difficult to predict the future number of migrants, this phenomenon is not taken into account in the analysis of future trends in South Africa. Internal migration trends account for differences in the age structure of local populations; for example, university towns have young populations because young people go there to study; conversely, a popular seaside resort for the retired has an older population.

Table 1 seems to corroborate the general findings that changes in fertility have in the past had much more effect on the age structure of the populations than changes in mortality. In particular, the decline in mortality has apparently as yet been a virtually negligible factor in the phenomenon of the ageing of the populations in South Africa. The mean annual total fertility rates (TFR) of blacks were in 1945-1950 still at an extremely high level (6,8), and declined only very steadily by 18% to reach 5,6 in 1980-1985. In the same period the life expectancy at birth (E(0)) rose by about 50% from 40 to 61 years. Yet the age structure remained practically unchanged. The considerable decline in mortality, namely the increase in E(0) by 35% from 40 to 54 years between 1945 and 1960, occurred in association with rather constant fertility and a constant percentage of elderly persons. There is evidence of a slight increase in the percentage of children up to 1970, possibly due to the rapid decline in infant and child mortality rates which caused a juvenation effect. In the case of coloureds and Asians, there were movements in both factors, the TFR and E(0); thus it is not without further investigation clearly visible from the table which factor played the decisive part in the changes in their age structures. However, while the E(0) of whites rose by only 8% in the period under review, the TFR declined by about 40% (from 3,5 to 2,1) and the percentage of elderly persons rose by about 35% (from 6,2% to 8,4%). An exact interpretation of the table is, of course, not possible owing to the accumulation of various effects in the course of time. These effects are discussed separately and in more detail in Section 7.

4. TRENDS AND DIFFERENTIALS IN THE AGEING OF THE POPULATION GROUPS IN SOUTH AFRICA

4.1 Observed trends: 1945-1985

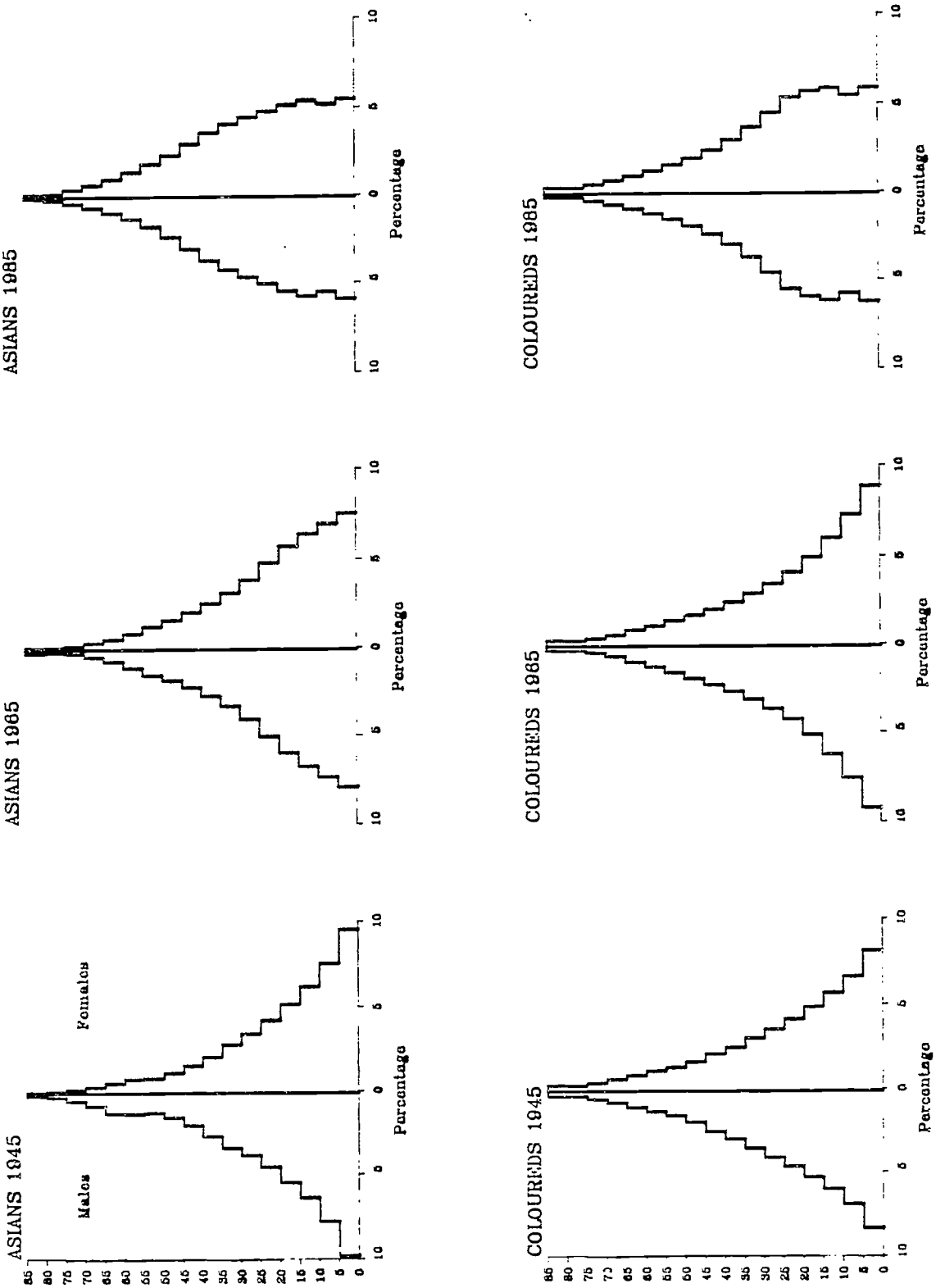
The age structure of a population depends on past as well as present demographic conditions as long as a stable state has not been arrived at, i.e. a state characteristic of a population that would result from a prolonged regime of unchanging fertility and mortality schedules. If fertility and mortality schedules have been constant for many years (about eight decades), the population ultimately attains a fixed age composition and a constant rate of increase, i.e. it becomes stable and the effect of the past becomes negligible (Coale 1972). A stable population is stationary if the growth is zero. Since the four population groups in South Africa are distinguished by differing fertility and mortality levels and are affected differently by international migration, they also have different age compositions.

Figures 2A-2B show the evolution of the age structure of the four population groups between 1945 and 1985. The pyramids representing the black population remained virtually unchanged during this period. They are characterized by a broad base and steeply sloping sides, reflecting the large number of children under 15 years (over 40%) and the small percentage of people aged 65 years and over (2,6 - 3,0%) in the population.

TABLE 1 : CHANGES IN AGE STRUCTURE BY BROAD AGE GROUPS OF THE POPULATION, IN FERTILITY AND MORTALITY, BY RACE: 1945-1985

AGE\YEAR	1945	1950	1955	1960	1965	1970	1975	1980	1985
Asians									
0 - 14	47,3	47,9	47,3	45,5	43,0	40,5	38,2	35,5	33,0
15 - 64	50,2	49,6	50,3	52,5	55,1	57,5	59,7	62,1	64,2
65 +	2,5	2,6	2,4	2,0	1,9	1,9	2,1	2,4	2,8
Total	100,0	100,0	100,0	100,0	100,0	100,0	100,0	100,0	100,0
TFR		6,46	6,11	5,45	4,71	4,11	3,61	2,92	2,67
E(O)		53,2	58,8	59,8	61,3	61,6	62,1	63,9	65,9
Blacks									
0 - 14	42,6	43,1	43,6	44,8	45,5	45,6	44,9	44,2	43,8
15 - 64	54,7	54,3	53,7	52,4	51,6	51,5	52,2	52,8	53,2
65 +	2,6	2,6	2,7	2,8	2,8	2,9	2,9	2,9	3,0
Total	100,0	100,0	100,0	100,0	100,0	100,0	100,0	100,0	100,0
TFR		6,81	6,83	6,73	6,73	6,50	6,25	5,80	5,60
E(O)		40,1	44,3	53,3	55,3	57,2	57,6	59,0	60,6
Coloureds									
0 - 14	41,8	42,5	43,4	44,5	45,2	44,5	42,5	38,6	35,4
15 - 64	54,5	53,8	53,0	51,2	51,7	52,3	54,3	58,1	61,1
65 +	3,7	3,7	3,6	3,4	3,1	3,2	3,2	3,3	3,5
Total	100,0	100,0	100,0	100,0	100,0	100,0	100,0	100,0	100,0
TFR		6,22	6,38	6,54	6,59	6,00	5,15	3,72	3,13
E(O)		45,4	50,7	53,3	54,2	53,8	54,6	57,3	59,7
Whites									
0 - 14	31,0	31,8	32,2	32,3	31,5	30,7	29,4	27,1	24,9
15 - 64	62,8	61,7	61,1	60,9	61,9	62,6	63,4	64,9	66,7
65 +	6,2	6,4	6,7	6,8	6,6	6,7	7,2	8,0	8,4
Total	100,0	100,0	100,0	100,0	100,0	100,0	100,0	100,0	100,0
TFR		3,45	3,37	3,46	3,29	3,02	2,83	2,15	2,07
E(O)		65,8	67,0	67,8	67,8	68,0	68,6	69,6	70,8
Total Population									
0 - 14	40,4	40,9	41,5	42,5	43,0	42,8	42,0	40,9	40,1
15 - 64	56,2	55,6	54,9	54,0	53,5	53,6	54,4	55,4	56,1
65 +	3,4	3,5	3,5	3,5	3,5	3,5	3,6	3,7	3,8
Total	100,0	100,0	100,0	100,0	100,0	100,0	100,0	100,0	100,0

FIG. 2A: EVOLUTION OF AGE STRUCTURES, 1946-1986, BY RACE



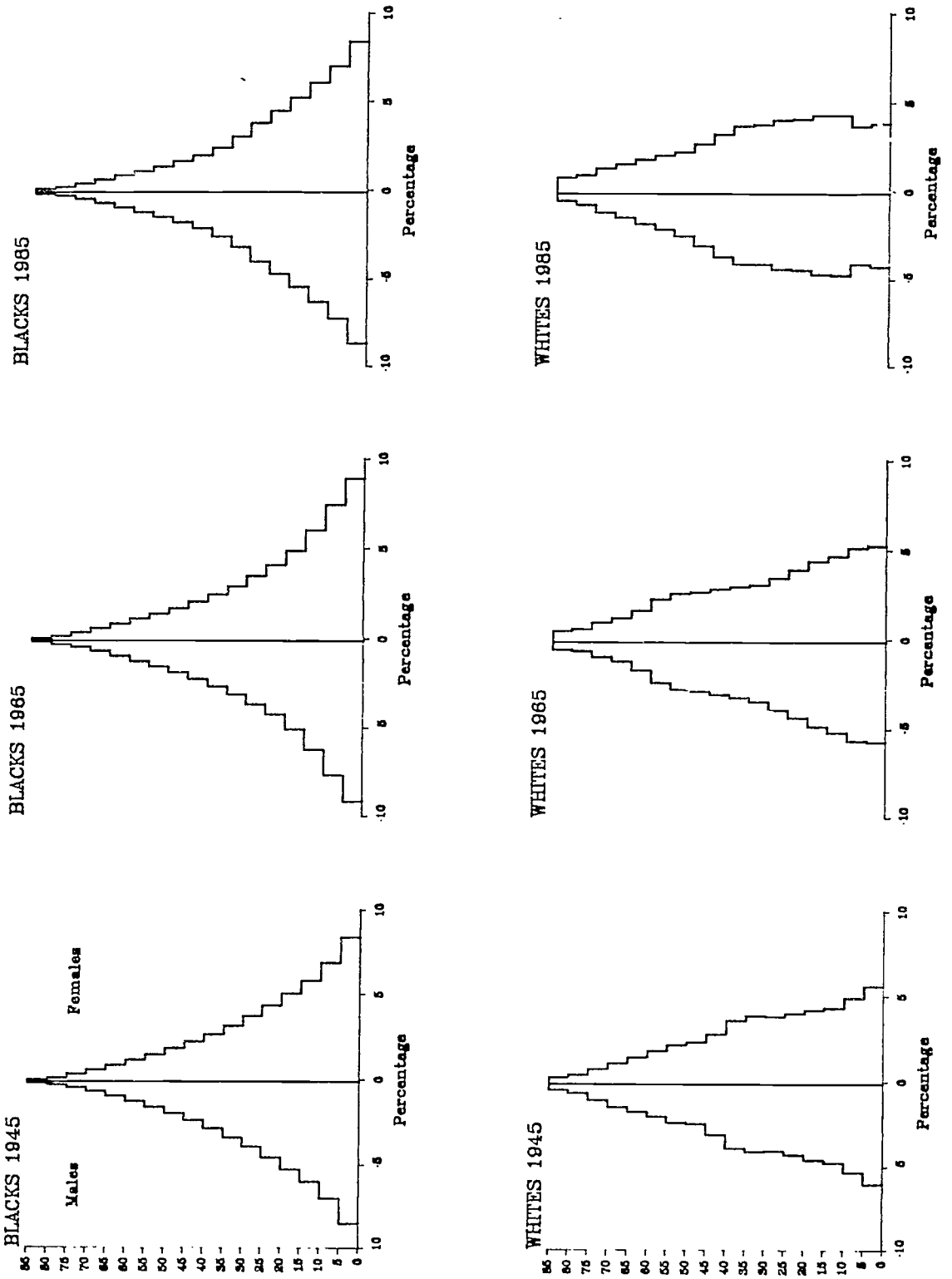
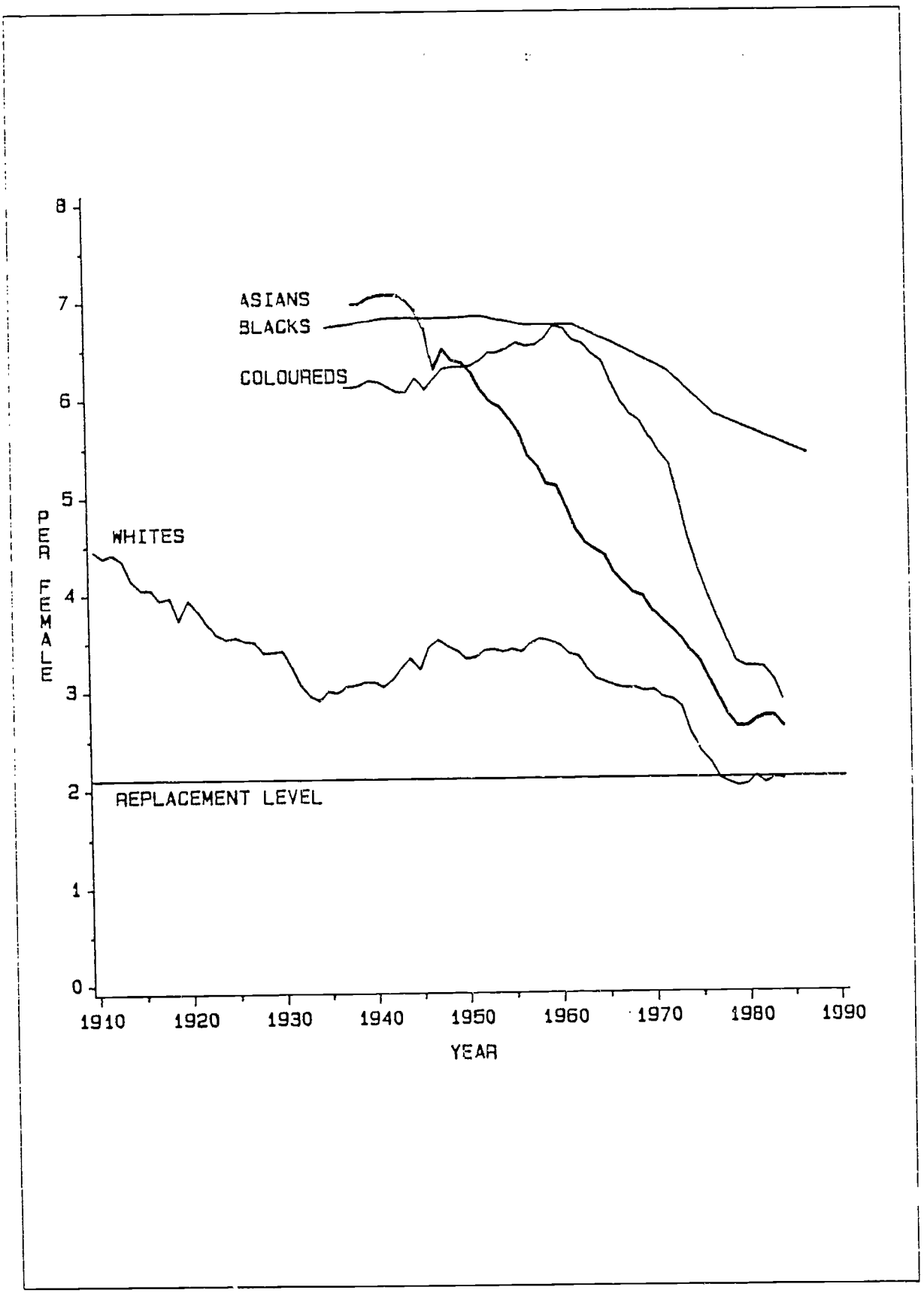


FIG. 2B: EVOLUTION OF AGE STRUCTURES, 1945-1985, BY RACE
BLACKS 1945
BLACKS 1965
BLACKS 1985
WHITES 1945
WHITES 1965
WHITES 1985
Males
Females
Percentage

FIGURE 3: TOTAL FERTILITY RATES



However, the slight, but steady decline in fertility since the sixties (see Fig. 3) is visible in the somewhat smaller base of the pyramid in 1985. It is evident that population ageing is a very recent phenomenon among blacks. According to the UN scale (1956) for the degree of population ageing, which distinguishes between

(a) young populations having less than 4 % of persons 65 years and over;

(b) mature populations, where this percentage is between 4 and 7%, and

(c) aged populations, when it exceeds 7%,

the black group is, demographically speaking, a young population. At the other extreme is the age structure of the white group, which is the most advanced in the ageing process. The decline in fertility, which occurred before 1945 (see Fig. 3) and which had been at low levels for some time, is evident in the 1945 pyramid representing this group. The 1985 pyramid has a rather rectangular shape with a slight sloping after the middle ages and a widened apex. In 1985 this group had the smallest percentage of children (25%) and the highest percentage of adults (67%) and old people (8%) among the four groups. In the early seventies this group moved into the most advanced phase of the process of population ageing by achieving an index of 7% for the number of elderly persons (65 and over). In the case of coloureds, the pyramids of 1945 and 1965 were still rather pyramid shaped. The increasing fertility between 1945 and 1965 (see Fig. 3) is reflected in the broader base of the 1965 pyramid, while the rapid fertility decline since the sixties is clearly visible in the 1985 pyramid.

The extremely high fertility rate of Asians at the beginning of the forties is illustrated in the even broader base of the 1945 pyramid than that of blacks. Continuously declining fertility thereafter is reflected in the increasingly bulging form of the 1965 and 1985 pyramids. The base of the 1965 pyramid of Asians was already narrower than that of coloureds, indicating that in this population group the ageing process had set in earlier than in the coloured population. The coloureds and Asians occupy an intermediate position in that, as a result of the relatively recent rapid decline in fertility, the population structures combine a relatively low percentage of children 0-14 years (35% and 33% respectively) with a low percentage of old people 65 and over (3,5% and 2,8% respectively) and a high percentage in the working ages aged 15-64 (61,1% and 64,2%).

The increase in the proportion of adults aged 15-64 (see Table 1), who comprise the so-called potential labour force, is termed "maturation" (United Nations 1988b) and usually precedes the increase in the proportion of the elderly. Rosset (1964) quotes the French demographer Daric (1948) who denotes the increase in the proportion of active population (15-64) as typical for the early phase of ageing. By contrast, already in 1945 the most aged population group, the whites, comprised a larger percentage of persons in the age group 15-64 than any of the other population groups prior to 1985, although Asians and coloureds show larger percentage increases over the past four decades (28% and 12% respectively) than whites (6%). The recent sharp increase in this age group among coloureds is visible in the bulging form of their age pyramid in 1985. The somewhat earlier increase in the case of Asians is slightly visible in their pyramids in 1965 and more so in 1985. By contrast, the percentages of blacks show little variation.

It is remarkable that despite the very sharp decline in the proportion of children among Asians and coloureds up to 1985, the proportions of elderly people remained below 4%, which typifies these two population groups as demographically young. Especially in the case of Asians the percentage of elderly people is still at the very low level of 2,8%. However, it is evident that although these two groups are demographically still young as characterized by the apex, the total structure shows that they are under the influence of the ageing process.

Another manifestation of the process of ageing is the ageing of the labour force (United Nations 1956), i.e. the increase in the number of older adults (40-64 years) relative to that of younger adults (15-39 years) (see Table 2). The ratio of persons aged 40-64 to the total productive population (15-64) is defined as the coefficient of the ageing of the productive population (Rosset 1964). Between 1945-1985, whites show, as expected, the highest age coefficient of the productive population, with fluctuations between 35-40%, which reflect the fluctuations in the birth rate years ago as well as international migration trends. The figures for blacks have been more or less stationary on a low level of about 27-29% The gradual ageing of the Asian population of productive age is evident during the past two decades, but seems to have gained momentum during 1980 and 1985. Although the level (29,8%) is still low, the symptoms of the ageing process manifest themselves in the

TABLE 2: PROPORTIONS OF POPULATION IN THE AGE GROUPS 15-39 AND 40-64: 1945-2035, BY RACE

Year	Asians		Blacks		Coloureds		Whites	
	15-39	40-64	15-39	40-64	15-39	40-64	15-39	40-64
1945	75,4	24,6	71,2	28,8	71,3	28,7	64,5	35,5
1950	75,9	24,1	71,2	28,8	71,1	28,9	62,1	37,9
1955	75,4	24,6	71,1	28,9	70,8	29,2	60,1	39,9
1960	75,1	24,9	70,9	29,1	70,5	29,5	59,7	40,3
1965	74,8	25,2	70,9	29,1	70,7	29,3	60,4	39,6
1970	74,4	25,6	71,2	28,8	71,6	28,4	61,8	38,2
1975	73,8	26,2	71,9	28,1	72,5	27,5	63,5	36,5
1980	72,5	27,5	72,5	27,5	73,4	26,6	63,4	36,6
1985	70,2	29,8	72,9	27,1	73,6	26,4	62,3	37,7
Projections								
1990	67,5	32,5	73,1	26,9	72,7	27,3	60,0	40,0
1995	64,4	35,6	72,6	27,4	70,3	29,7	57,4	42,6
2005	59,4	40,6	71,1	28,9	63,9	36,1	52,8	47,2
2015	55,1	44,9	69,9	30,1	58,4	41,6	49,0	51,0
2025	51,9	48,1	68,7	31,3	55,6	44,4	48,5	51,5
2035	50,1	49,9	66,5	33,5	51,6	48,4	49,6	50,4

distinctly rising trend. In the case of coloureds no similar trend is discernible. The figures for coloureds, which have been slightly declining since the sixties to an even lower level (26,4%) in 1985, still reveal no trace of the influence of the ageing process. This is understandable since the sharp decline in fertility since the middle sixties will show its effect on these age groups only about two to three decades later.

The following paragraph gives details regarding differentials in the ageing process as a function of time as manifested in the percentage of elderly people 65 and over. From Table 1 trends in the percentage of persons aged 65 and over in relation to the respective total population can also be seen. At each date the white population was considerably more aged than the three other groups. Among whites, the growth of the elderly was considerably faster during the period under review, especially in the 1970s and 1980s. By contrast, the percentage of elderly persons among the three non-white groups has not changed markedly (see also Fig. 4). This is in line with the worldwide pattern: The most aged populations are those of the economically advanced countries (e.g. Western Europe and the United States), due to earlier declines in fertility and mortality.

4.2 Projected trends: 1985-2035

The present age structure is one of the determining factors of the age structure at some future point in time, since the future population of each group at the defined point will, apart from new acquisitions (births, immigrants) consist of the survivors of the present generation. As time progresses, the absolute numbers of the survivors diminish, but whether this decline in numbers will be accompanied by changes in the proportion of the elderly depends on the fertility and mortality rates in the intervening period. It should be noted that changes in the proportion of the elderly (unlike changes in absolute numbers) are affected by variations in the numbers of people in other age groups; the projected age structures are largely determined by the underlying assumptions regarding fertility and mortality. The projected relative age distributions of the population groups and the total population (low and high variants) by three broad age groups are shown in Table 3 for the period 1995-2035. The numbers (N)

TABLE 3: PROJECTED TOTALS AND PERCENTAGE DISTRIBUTION, BY THREE AGE GROUPS: 1995-2035, BY RACE

AGE\YEAR	1995	2005	2015	2025	2035
Asians					
Low variant					
0 - 14	29,1	24,6	21,7	21,3	20,2
15 - 64	67,1	69,8	69,6	66,8	65,1
65 +	3,8	5,6	8,7	11,9	14,7
Total	100,0	100,0	100,0	100,0	100,0
N * 1000	1031,0	1150,1	1259,0	1352,7	1410,4
High variant					
0 - 14	29,5	25,8	23,1	22,0	20,8
15 - 64	66,7	68,7	68,4	66,5	65,3
65 +	3,8	5,5	8,5	11,5	14,0
Total	100,0	100,0	100,0	100,0	100,0
N * 1000	1037,1	1171,9	1297,3	1405,0	1478,9
Blacks					
Low variant					
0 - 14	43,2	41,7	36,1	30,4	26,6
15 - 64	53,7	55,1	60,2	64,7	67,2
65 +	3,1	3,2	3,7	4,8	6,2
Total	100,0	100,0	100,0	100,0	100,0
N * 1000	35285,4	47408,1	59288,0	71289,8	81942,5
High variant					
0 - 14	43,2	42,0	40,3	38,2	35,8
15 - 64	53,7	54,8	56,2	57,6	59,3
65 +	3,1	3,2	3,5	4,1	4,8
Total	100,0	100,0	100,0	100,0	100,0
N * 1000	35285,4	47655,0	63587,9	83144,2	105565,6
Coloureds					
Low variant					
0 - 14	32,7	28,9	23,8	21,8	21,4
15 - 64	63,6	66,6	70,1	69,2	65,9
65 +	3,7	4,5	6,1	9,0	12,7
Total	100,0	100,0	100,0	100,0	100,0
N * 1000	3528,4	4051,9	4472,8	4904,5	5273,3

(Table continued)

TABLE 3 (continued)

AGE\YEAR	1995	2005	2015	2025	2035
High variant					
0 - 14	33,2	30,3	26,1	23,7	22,2
15 - 64	63,2	65,3	68,0	67,8	66,0
65 +	3,6	4,4	5,8	8,5	11,8
Total	100,0	100,0	100,0	100,0	100,0
N * 1000	3553,6	4141,9	4686,3	5212,6	5665,4
Whites					
Low variant					
0 - 14	21,9	19,9	19,1	19,2	19,0
15 - 64	69,0	69,5	67,1	64,5	62,7
65 +	9,1	10,6	13,8	16,3	18,3
Total	100,0	100,0	100,0	100,0	100,0
N * 1000	5168,9	5421,7	5627,2	5740,2	5754,0
High variant					
0 - 14	22,7	22,0	20,6	20,1	20,0
15 - 64	68,2	67,7	66,2	64,5	63,0
65 +	9,0	10,3	13,2	15,4	17,0
Total	100,0	100,0	100,0	100,0	100,0
N * 1000	5222,3	5587,7	5865,6	6061,9	6170,7
Total population					
Low variant					
0 - 14	39,6	38,4	33,7	29,0	25,7
15 - 64	56,6	57,6	61,5	65,0	66,8
65 +	3,8	4,0	4,8	6,0	7,5
Total	100,0	100,0	100,0	100,0	100,0
N * 1000	45013,7	58031,8	70647,0	83287,2	94380,2
High variant					
0 - 14	39,7	38,9	37,6	36,1	34,2
15 - 64	56,5	57,1	57,9	58,7	59,9
65 +	3,8	4,0	4,5	5,2	5,9
Total	100,0	100,0	100,0	100,0	100,0
N * 1000	45098,4	58556,5	75437,1	95823,7	118880,6

FIGURE 4: POPULATION AGED 65+ AS PERCENT OF POPULATION, BY RACE AND TOTAL POPULATION: 1945-2035

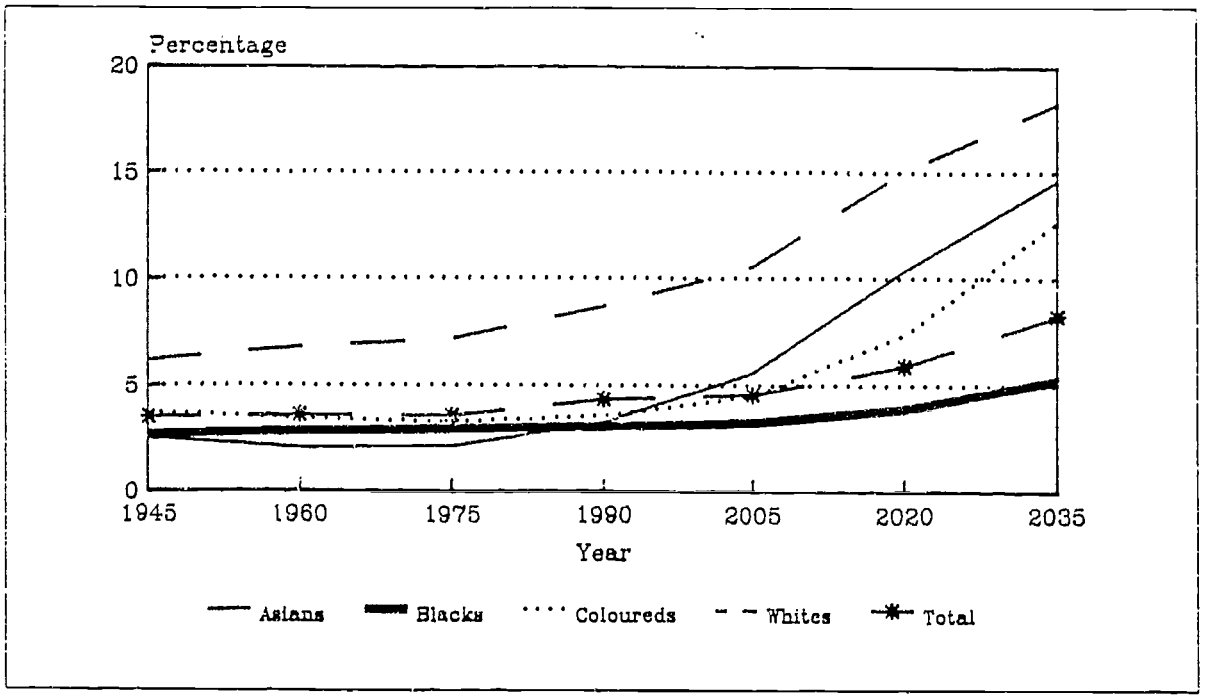
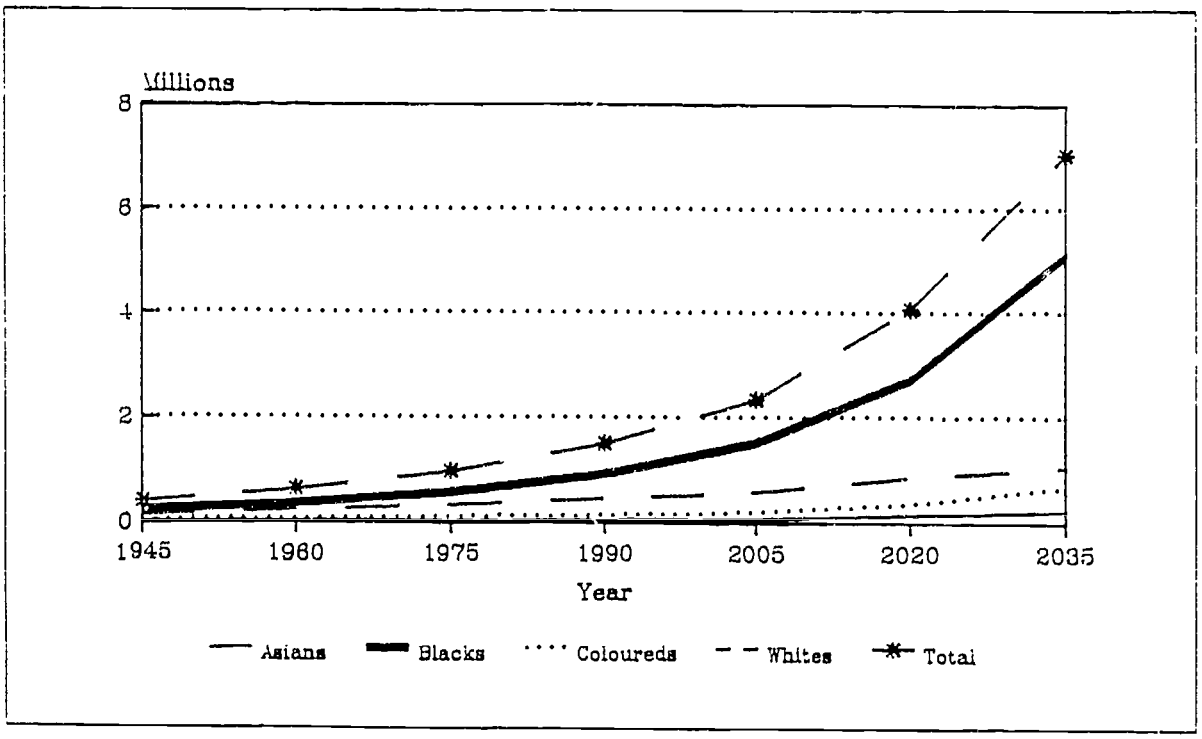


FIGURE 5: GROWTH OF THE POPULATION AGED 65+, BY RACE AND TOTAL POPULATION: 1945-2035



represent the totals in thousands.

It is evident that under any of the assumptions both the proportion and the numbers of the elderly groups are expected to increase continuously during the next 50 years for all four population groups and thus also for the total population as depicted in Figures 4 and 5. Although the expected increases in the proportion of the aged will be somewhat larger under the low fertility variants than under the high fertility variants, the percentage point differences will be rather small (about 1%). Based on the present age structures, whites are expected to experience an increase from 8,4% in 1985 to 17-18% in 2035 in their elderly population and will be the "oldest" population group, followed by the most rapidly ageing group, the Asians, with an expected increase in the elderly from 2,8% to 14-15% for the same period, and the coloureds whose corresponding figures will be 3,5% and 12-13%.

Among blacks, the expected percentage point increase in the proportion of elderly will be only 2-3% during the next 50 years. Therefore, this group will retain a reasonably youthful structure with only 5-6% of its population being 65 or over in 2035. The total population is envisaged to experience an increase from about 4% to 6-8% in its elderly group between 1985 and 2035.

From Table 3 it can be seen that generally there is an inverse relationship between changes in the population aged under 15 and over 65. The proportion of children is expected to decrease over the next 50 years to about 19-22% among the three non-black groups and to about 27-36% among blacks.

A symptom of the onset of ageing of the population, the initial proportional increase of the productive population (15-64), can be clearly observed during the projected period among blacks and the total population. The inequality between the older and the younger age groups of the productive population is expected to decrease during the projection period (see Table 2). In the respective cases of whites, Asians and coloureds the numbers of these two age groups will rapidly approach parity, which will be symptomatic of their demographically aged stage. In respect of blacks, the ratio of these two age groups will decrease steadily. In 2035 persons aged 40-64 are expected to contribute about one third of the total number of persons aged 15-64, indicating a general ageing of this population group and therefore an ageing of the productive population as a whole.

The projected ageing of the population groups is reflected in Figure 6, which shows their projected age pyramids in 2035. The shape of the pyramids of all population groups is expected to change appreciably during the projection period. Those of the three non-black groups, which show little differences under the low and high projection variants, may be described as bullet-shaped. The wide apices clearly show the advanced stage of ageing. The projected pyramids for blacks show larger differences under the low and the high fertility assumptions, especially among young and adult age groups.

5. TRENDS AND DIFFERENTIALS IN THE ELDERLY POPULATION GROUPS IN SOUTH AFRICA

5.1 Growth differentials

5.1.1 Past trends: 1945-1985

The increasing proportions of the elderly population in South Africa necessitates a closer look at the absolute numbers involved. In 1945 there were just over 0,4 million persons aged 65 and over in the total population of about 12 million. At an observed average annual growth rate of 3,0% (as against the 2,6% rate of growth of the total population), the elderly group had more than tripled to 1,3 million by 1985.

Within the total population, the various population groups differed considerably with regard to the growth rate of their elderly. Whereas the average growth rate of elderly coloureds, namely 2,4%, was somewhat lower than the 2,6% rate of growth of the total coloured group, the elderly age groups of blacks and Asians showed slightly larger growth rates than the respective total group, i.e., 3,3% against 3,0% in the case of blacks, and 2,9% against 2,6% in the case of Asians. The largest differential was observed among whites whose elderly persons increased at an average rate of 2,6% against the 1,8% growth rate of the total group. Translated into absolute numbers, this means an increase from 7 700 in 1945 to 24 900 in 1985 in the case of Asians, from 39 000 to over 103 000 in the case of coloureds, from 145 000 to 409 000 in the case of whites and from 211 000 to 779 000 in the

case of blacks. It is evident that, although blacks have a small percentage of elderly persons, they have the most numerous elderly population in terms of absolute numbers, which steadily increased its share in the total elderly population from 52% in 1945 to 59% in 1985.

5.1.2 Projected trends: 1985-2035

Since the future elderly (by the year 2035) were already alive in 1985, the projected numbers are only dependent on the assumptions regarding future mortality trends. Within the limits of the relatively small fluctuation in mortality, this allows a fairly dependable estimation of the growth and absolute size of this age group. Between 1985 and 2015, the growth of the total elderly population is projected to accelerate to an average of 3,1% as compared to 2,4% for the total population and even to 3,7% between 2015 and 2035, compared to the total growth rate of 1,4-2,3% according to the low and/or high projections. This translates into an expected addition of an average 68 000 older persons annually from 1985-2015 and 183 000 between 2015 and 2035, i.e. a total of 3,4 million in 2015 and 7,0 million in 2035.

The ethnic composition of the total elderly population is expected to change significantly over the next 50 years. While the share of the Asian elderly with regard to the total elderly population is expected to increase only slightly from about 2% in 1985 to 3% in 2035, and that of the coloureds from about 8% to 9%, the share of the white elderly will decrease drastically from 31% to 15%, whereas that of blacks will increase appreciably from 59% to 73%.

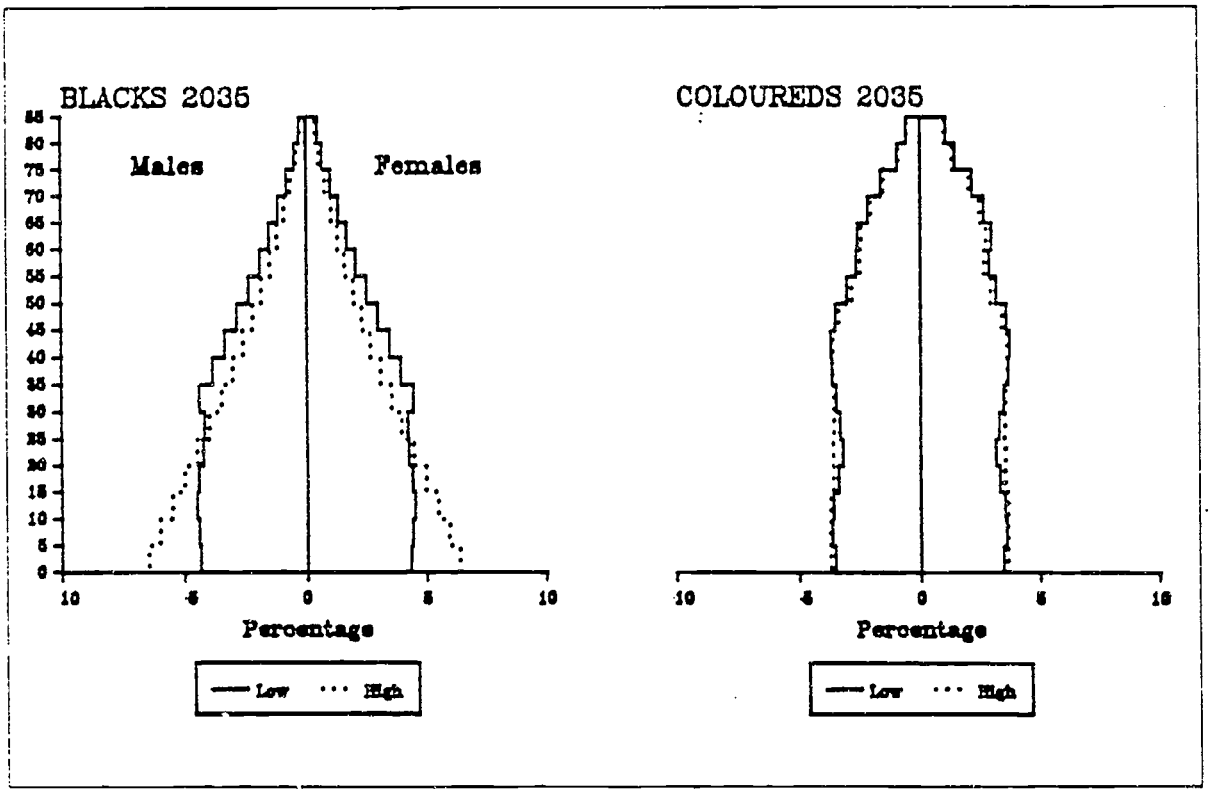
Although increasing proportions of elderly in a population tend to increase the burden of needs provided for by the labour force, increasing numbers of older persons increase the demand for the goods and services that the elderly require. South Africa's expected population may be described as relatively young at the end of the projection period, but the rapid increase in the absolute numbers of the elderly should be kept in mind (see Fig. 5). The very old age group (persons aged 80 and over) is expected to steadily increase its proportion in the elderly population from 12,1% in 1985 to 13,6% in 2035. The absolute numbers involved for each population group can readily be derived from Table 5. In 1985 blacks aged 80 and over accounted for about half of the total population aged 80 and over. By 2035, about two thirds of the "very old" group will be black. It is this group of very old persons that needs services like health care institutions most.

5.2 Sex differentials: Past and future trends

Two factors may cause differences in the age structure of the male and the female populations: The first factor, namely the general preponderance of men over women among migrants, played an important role in the case of Asians (and to a lesser extent among whites). The former group experienced a considerable influx of male migrants during the first half of this century and consequently shows a considerably more aged male population up to 1965. Secondly, in most populations the expectation of life at birth of women has for a considerable period of time been higher than for men (see Fig. 7). This generalization applies to whites, coloureds and blacks. Among Asians this pattern emerged only during the forties (see Fig. 7). It is probable that life expectancy of coloured and black women was also lower than that of their male counterparts during the earlier part of this century.

Table 4 shows that, except in the case of Asians (during 1945-1965), the female populations were relatively older than the male populations during the period 1945-1985. In the case of whites and coloureds, the elderly male and female populations accounted for roughly the same percentages in 1945, but the sex differential increased considerably to nearly 50% and over 30% respectively by 1985, probably mainly as a result of the widening gap in life expectancy between males and females. Whereas the percentage of the elderly among white males increased from 6,2% to only 6,8% over the period 1945-1985, the corresponding increase for white females was from 6,2% to 10,1%. Among coloureds, the percentage elderly among males even decreased from 3,6% in 1945 to 3,0% in 1985, whereas the elderly females showed a slight increase from 3,8% to 4,0% over the same period. Between 1985 and 2005, these sex differentials are expected to increase to about 38% in the case of Asians (when males 65 years of age and over will account for 4,7% of the total Asian male population, compared to 6,5% in the case of females) and to 45% in the case of coloureds

FIGURE 6: PROJECTED AGE STRUCTURES BY 2035, BY RACE



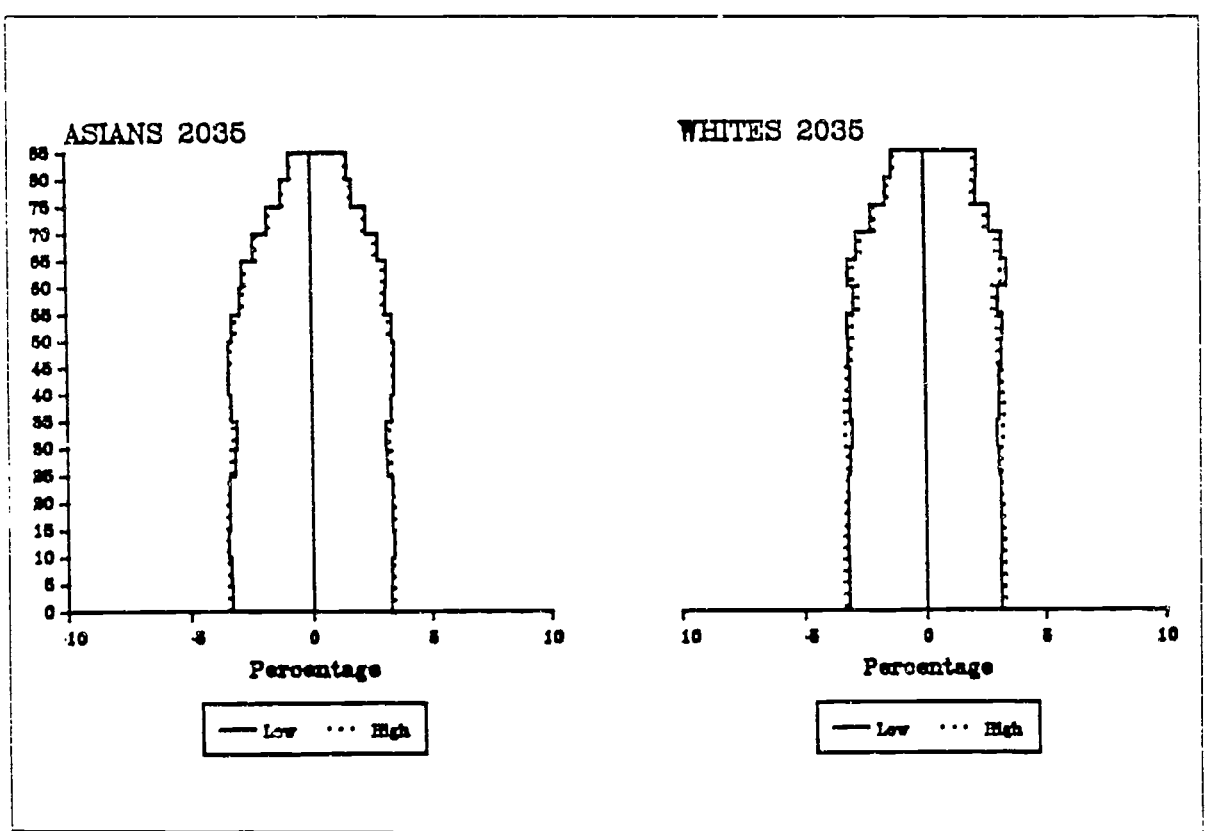


FIGURE 7: LIFE EXPECTANCY AT BIRTH: 1926-1985

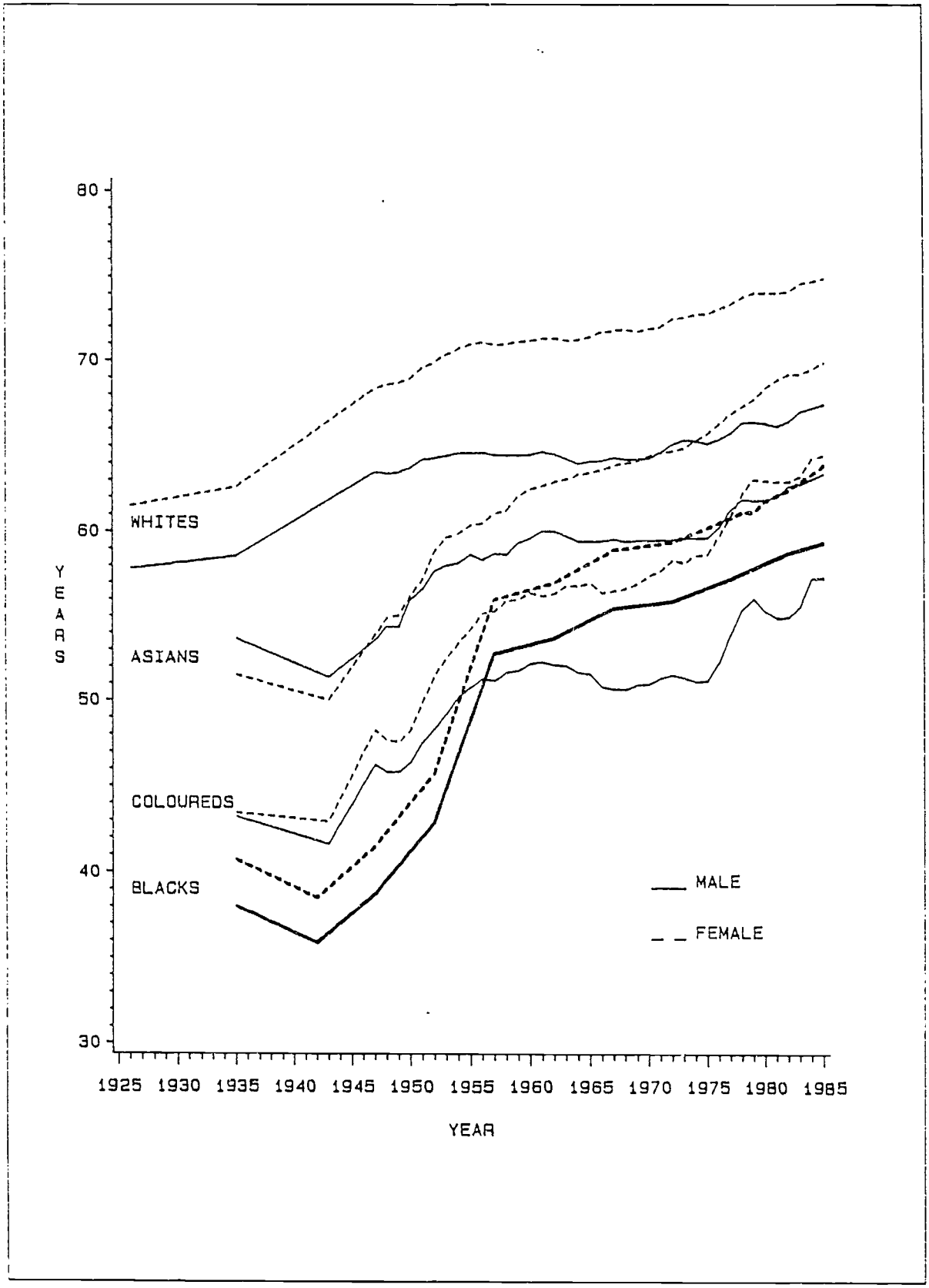


TABLE 4: PERCENTAGE OF PERSONS AGED 65 YEARS AND OVER OF ALL PERSONS OF THE SAME GENDER, BY RACE: 1945-2035

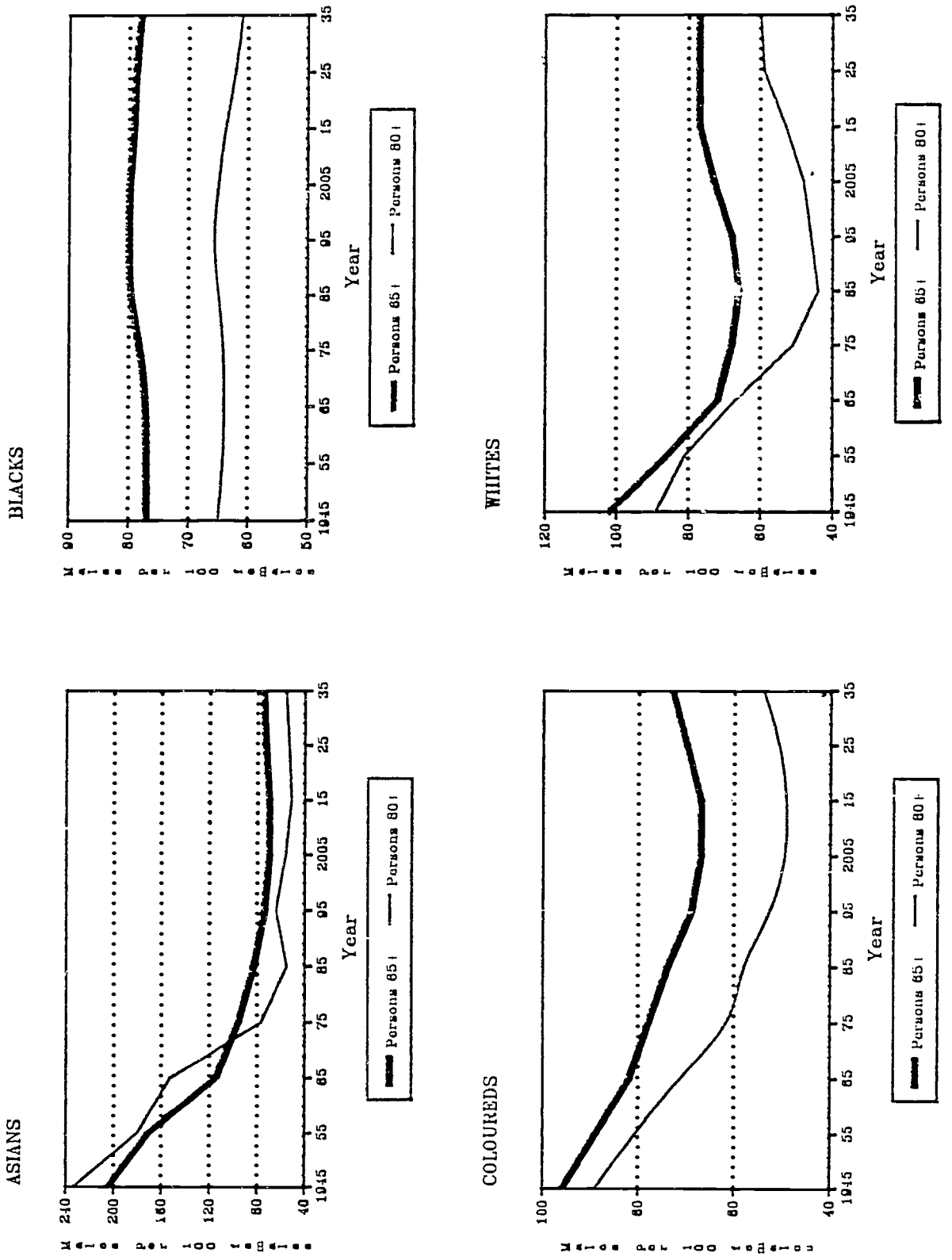
	Asians		Blacks		Coloureds		Whites	
Year	M	F	M	F	M	F	M	F
1945	3,2	1,7	2,3	3,0	3,6	3,8	6,2	6,2
1950	3,3	1,8	2,3	3,0	3,5	3,8	6,2	6,7
1955	2,9	1,8	2,4	3,0	3,3	3,8	6,2	7,2
1960	3,3	1,7	2,4	3,1	3,1	3,6	6,0	7,6
1965	2,0	1,8	2,5	3,2	2,8	3,5	5,5	7,7
1970	1,9	1,9	2,6	3,2	2,8	3,5	5,5	7,9
1975	2,1	2,2	2,6	3,3	2,8	3,5	5,9	8,6
1980	2,4	2,6	2,7	3,2	2,9	3,8	6,4	9,5
1985	2,6	3,1	2,7	3,3	3,0	4,0	6,7	10,1
Projections								
1995	3,2	4,3	2,7	3,4	3,1	4,3	7,4	10,7
2005	4,7	6,5	2,9	3,5	3,6	5,3	9,1	12,1
2015	7,3	10,0	3,1	3,9	5,0	7,2	12,2	15,3
2025	10,2	13,6	3,8	4,8	7,6	10,4	14,4	18 1
2035	12,8	16,4	4,7	5,9	10,9	14,3	16,2	20,.

(where the corresponding percentages are 3,6% for males and 5,3% for females), and thereafter to decline steadily to 28% and 31% respectively. Among whites, a narrowing of the sex differential to about 26% is projected between 1985 and 2015, when elderly males will comprise 12,2% of the white male population compared to 15,3% in the case of females. Thereafter, the percentage is expected to remain fairly unchanged up to the end of the projection period. In the case of blacks the observed differences fluctuated between 20-26% and little variation is envisaged for the projection period. In 1985 the elderly males accounted for 2,7% of the male population, whereas the corresponding figure for females was 3,3%.

Since the number of women in a population usually exceeds that of men, the differential is even more salient when the sex ratio, i.e. the number of males per hundred females in the relevant age interval, is considered. From Figure 8 it is evident that the elderly population, and especially the population aged 80 and over, is predominantly female. The observed sex ratios for the three non-black groups indicate clearly that elderly females have continuously increased their longevity advantage over elderly males. The extremely high sex ratios for Asians before 1975 are the result of predominantly male immigration as mentioned earlier. Among blacks, average life expectancy for females has exceeded that for males by a moderate, nearly constant number of years between 1945 and 1985 and the gap is expected to widen only moderately during the projection period. This is in line with Stolnitz' conclusion in 1956, that mortality differentials tend to be less favourable to females in developing regions of the world than in the industrially advanced countries. Although the projections indicate that the widening of the sex differential is envisaged to come to a halt and even to become narrower during the projection period in the case of the three non-black groups, Soldo and Agree (1988) draw attention to the debate regarding the future course of the difference in male-female life expectancy. The sex differential for the oldest age group, i.e. persons aged 80 and over, is even more pronounced, but shows similar trends as the differential for the age group 65 and over as can be seen from Figure 8.

It appears that in South Africa the problems of old age are also largely the problems of women, as Butler, former director of the National Institute on Aging (Soldo & Agree 1988), concluded with regard to America. In each population group the elderly female population is more numerous than

FIG. 8: SEX RATIOS OF THE AGED: 1945-2035, BY RACE



the corresponding male population (see Table 5). For example, in 1985 females accounted for 55-60% of the respective total elderly population among all four population groups. The sex imbalance at the oldest ages, i.e. persons aged 80 and over, means that among whites 70 out of every 100 persons in this age group in 1985 were females. The corresponding figures for Asians, coloureds and blacks are 64, 63 and 61 females respectively.

5.3 Urban/Rural differentials

Although fertility and mortality trends usually differ in urban and rural communities and thus may cause an urban/rural ageing differential, the most important cause of differences is internal migration. Migratory movements from the country to the city - which are the corollary of the process of urbanisation - involve mainly young adults. Consequently they have the immediate effect of increasing the proportion of the old people in rural areas. On the other hand, retired city-dwellers may tend to move to the country.

With respect to the urban/rural distinction within the RSA in 1985 (excluding the TBVC states), no significant urban/rural ageing differential seemed to exist in the case of the three non-black groups. The percentages of elderly persons in the urban and rural areas were 2,8 and 3,0, 3,5 and 3,5, and 8,4 and 8,3 for the Asians, coloureds and whites respectively. In the case of blacks, however, the respective figures were 2,2% and 3,1%.

5.4 Regional differences

The TBVC countries are excluded from the analyses in Sections 5.4.1 and 5.4.2 since district data were not available for them.

5.4.1 The situation in 1985

Figures 9A-9D, which depict the distribution of people aged 65 and over as a percentage of the population in each district of the RSA (in which the number of individuals of the respective total population group exceeded 100) in 1985, separately for each population group, show a noticeable ageing differential between different districts. Whereas some districts have a relatively old population, others have relatively young populations.

Different trends of population redistribution according to age result in regional differences in age structures. In Mostert, Hofmeyr and Kok (1989) it is shown that in 1985 there were significant differences in the age structures of the various magisterial districts with regard to all four population groups, mainly as a result of permanent internal migration and temporary occupational migration.

In the case of Asians, a percentage of elderly people of more than 5% is found in districts of which the number of Asians of all ages is small (less than 500) and thus the elderly make a small absolute contribution. In the other districts inhabited by Asians, the percentage of elderly people varies between 0,7% and 5%. In the case of coloureds and blacks, the highest percentages, namely over 7,5% and 6% respectively, are also found in a few districts with small numbers of coloured and/or black people (less than 520). The picture looks different with regard to whites. The percentage of elderly people in different districts varies between 1% and 30%. Among the most 'aged' districts are Hermanus with about 28% of its population of about 7 000 being over 64 years of age, Umzinto and Port Shepstone with over 20% of their inhabitants of over 10 000 and 25 000 respectively being in the elderly age group. This correlates with the fact that these are popular seaside migration destinations for the retired.

Although percentages of the elderly relative to the population of a specific district are useful for classifying the nature of a district, i.e. demographically young or old, the actual numbers are also important for determining needs. Pretoria for example, is a relatively young city, with only 6,8% of its white inhabitants being over 64 years of age. However, 6,6% of the total white population over the age of 64 live in this city. This amounts to a number of about 27 000, which is about three times more than all the elderly combined in the 'old' districts of Hermanus, Umzinto and Port Shepstone which together amount to only about 9 400. Districts with more than one percent of the total elderly age group in each population group in 1985, and thus a large number of elderly, are given in Table 6. From Table 6 it is evident that in the case of Asians about 87% of the elderly live in 12 districts, and 60% of the coloured elderly live in 19 districts. Regarding whites, 57% live in 20 districts. The elderly blacks are more widely distributed: about 41% live in 26 districts, mainly in the national states. With respect to all districts, about 50% of the black elderly live in the national states.

TABLE 5: NUMBER OF ELDERLY 65 AND OVER, 80 AND OVER, BY GENDER AND RACE: 1945-1985, PROJECTIONS 1995-2035 (thousands)

	Persons 65+		Persons 80+	
Year	Males	Females	Males	Females
Asians				
1945	5,2	2,5	0,5	0,2
1955	6,4	3,8	0,8	0,5
1965	5,8	5,1	1,1	0,7
1975	7,6	7,9	0,8	1,0
1985	11,3	13,6	0,9	1,6
1995	16,6	22,5	1,4	2,2
2005	26,7	38,0	2,2	4,0
2015	45,4	64,4	3,9	7,6
2025	68,0	93,4	7,3	13,9
2035	88,9	117,9	12,2	21,8
Blacks				
1945	91,4	119,4	6,1	9,4
1955	119,2	155,6	8,0	12,5
1965	173,9	225,4	13,1	20,5
1975	246,7	314,6	20,2	31,7
1985	345,9	433,5	30,3	47,0
1995	482,3	603,9	46,0	69,7
2005	676,5	849,5	67,3	103,7
2015	976,6	1231,2	101,7	158,0
2025	1518,1	1920,3	154,4	248,1
2035	2247,3	2863,9	240,5	393,9
Coloureds				
1945	19,2	19,9	3,2	3,6
1955	23,3	26,2	4,0	4,9
1965	26,9	32,6	4,5	6,3
1975	33,8	43,4	4,4	7,5
1985	44,0	59,5	6,1	10,4
1995	53,0	76,9	5,6	10,8
2005	72,5	108,7	7,2	14,6
2015	110,0	163,6	10,6	21,6
2025	182,3	259,8	17,3	34,4
2035	283,0	385,5	30,5	56,8
Whites				
1945	73,2	71,7	8,2	9,3
1955	88,1	102,8	12,6	15,5
1965	95,7	132,5	14,8	22,0
1975	124,4	183,9	15,7	30,9
1985	162,7	246,2	19,4	44,3
1995	190,4	279,6	25,8	55,6
2005	243,2	331,7	31,4	64,9
2015	337,4	437,3	40,3	75,5
2025	407,0	528,2	59,3	100,4
2035	457,9	591,7	76,6	127,4

FIGURE 9A
PERSONS AGED 65+ AS A PERCENTAGE OF POPULATION IN EACH DISTRICT: ASIANS, 1985
(TBVC STATES EXCLUDED)

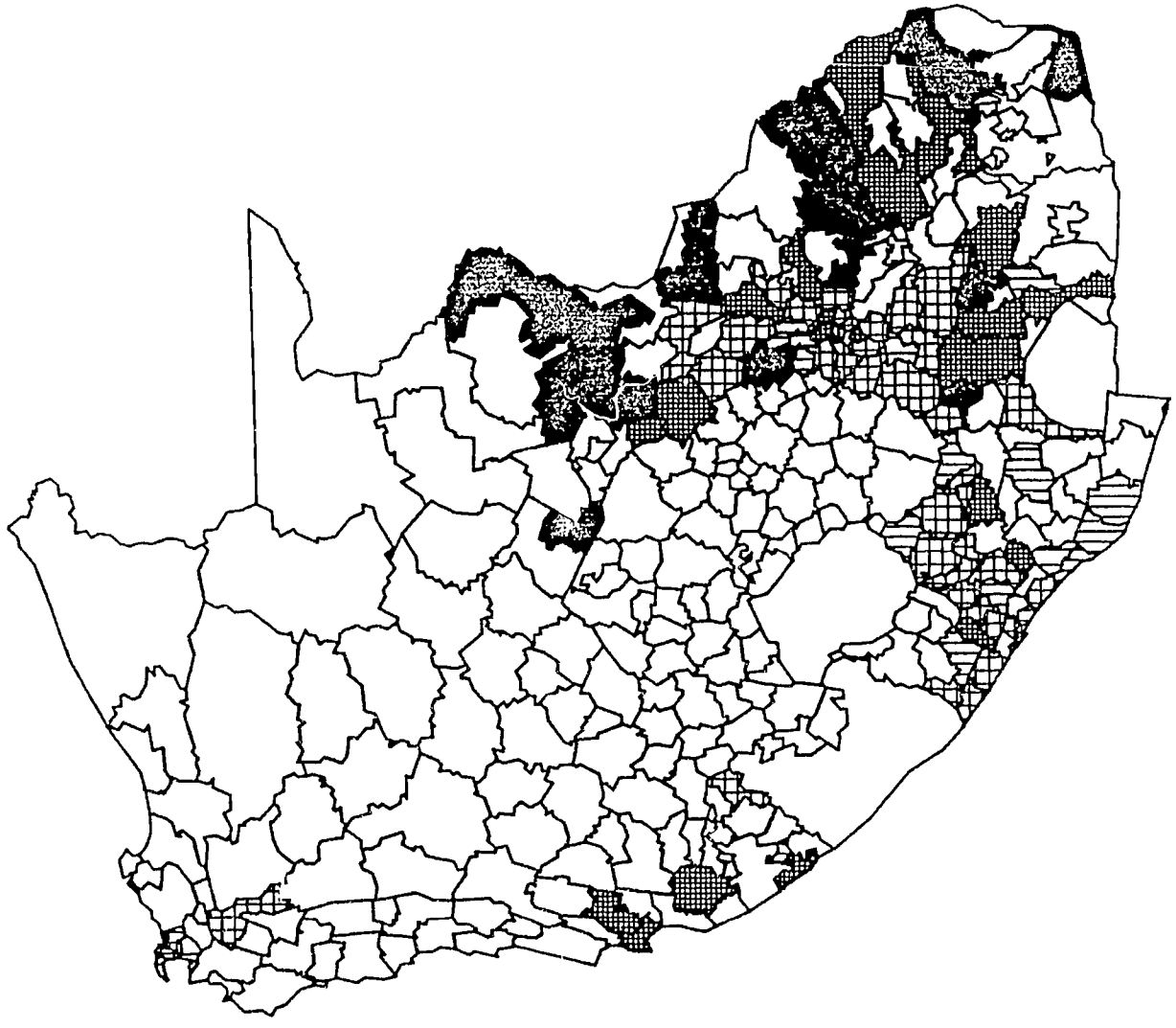


FIGURE 9B
PERSONS AGED 65+ AS A PERCENTAGE OF POPULATION IN EACH DISTRICT: BLACKS, 1985
(TBVC STATES EXCLUDED)

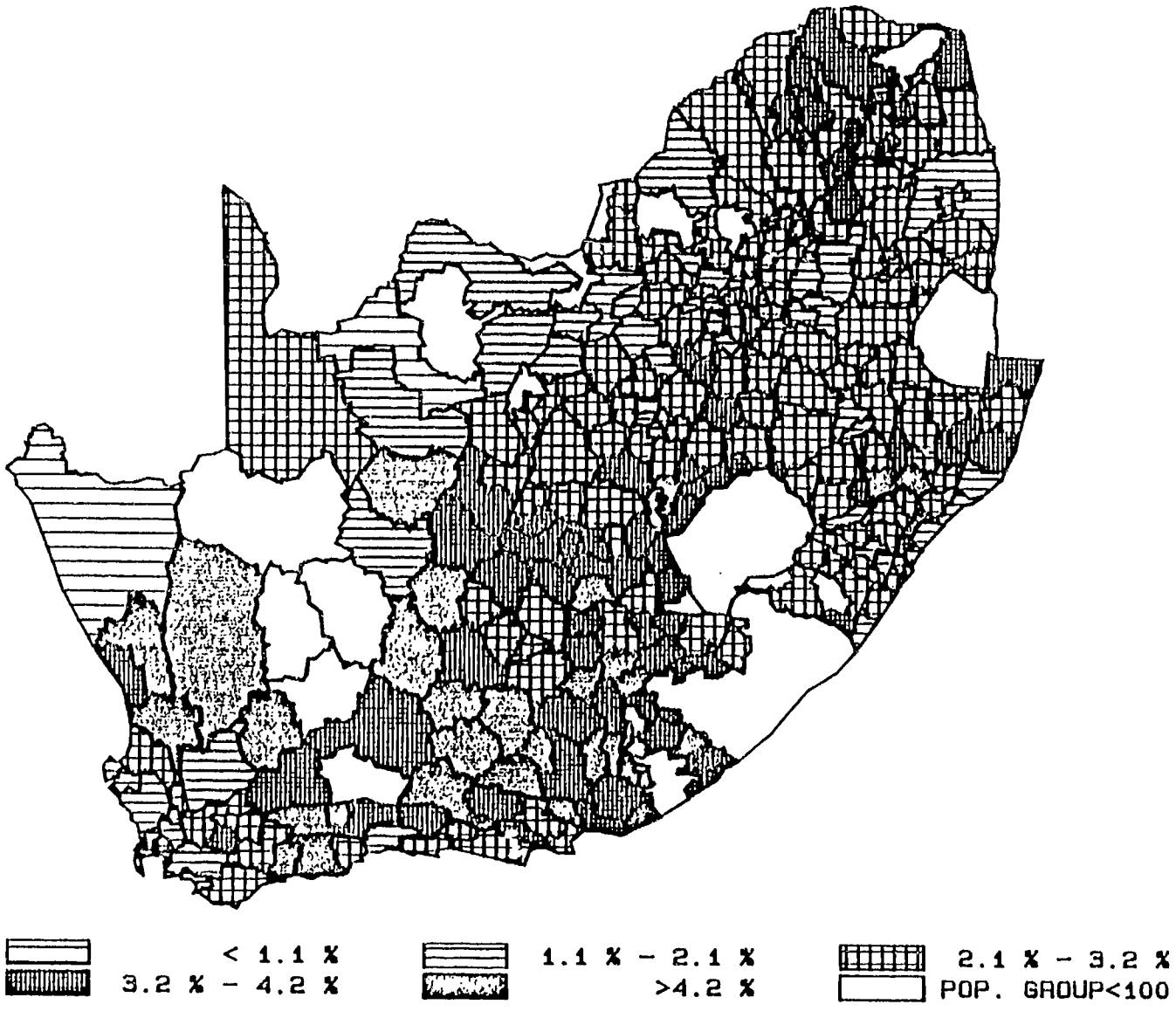


FIGURE 9C
PERSONS AGED 65+ AS A PERCENTAGE OF POPULATION IN EACH DISTRICT: COLOUREDS, 1985
(TBVC STATES EXCLUDED)

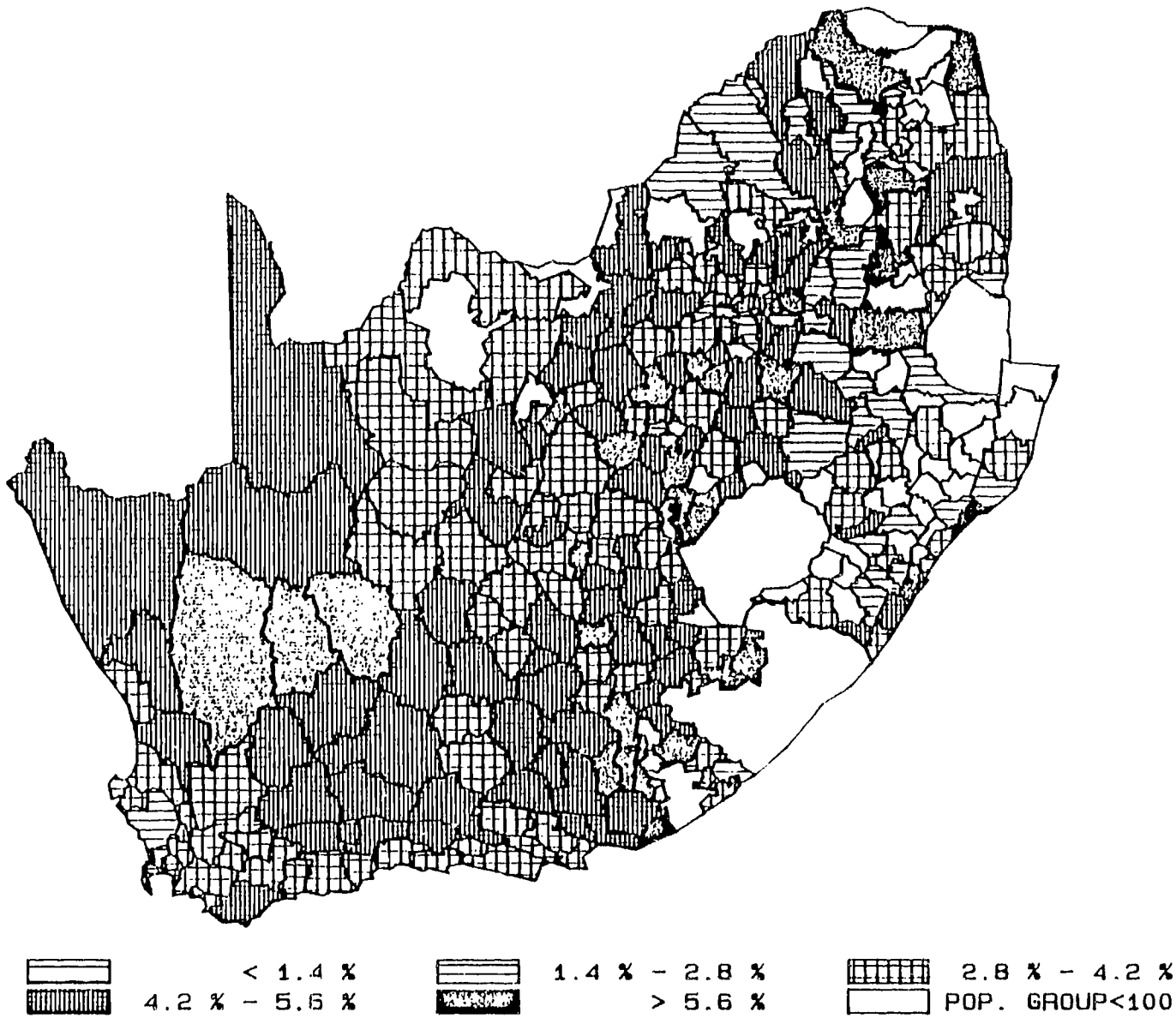


FIGURE 9D
PERSONS AGED 65+ AS A PERCENTAGE OF POPULATION IN EACH DISTRICT: WHITES, 1985
(TBVC STATES EXCLUDED)

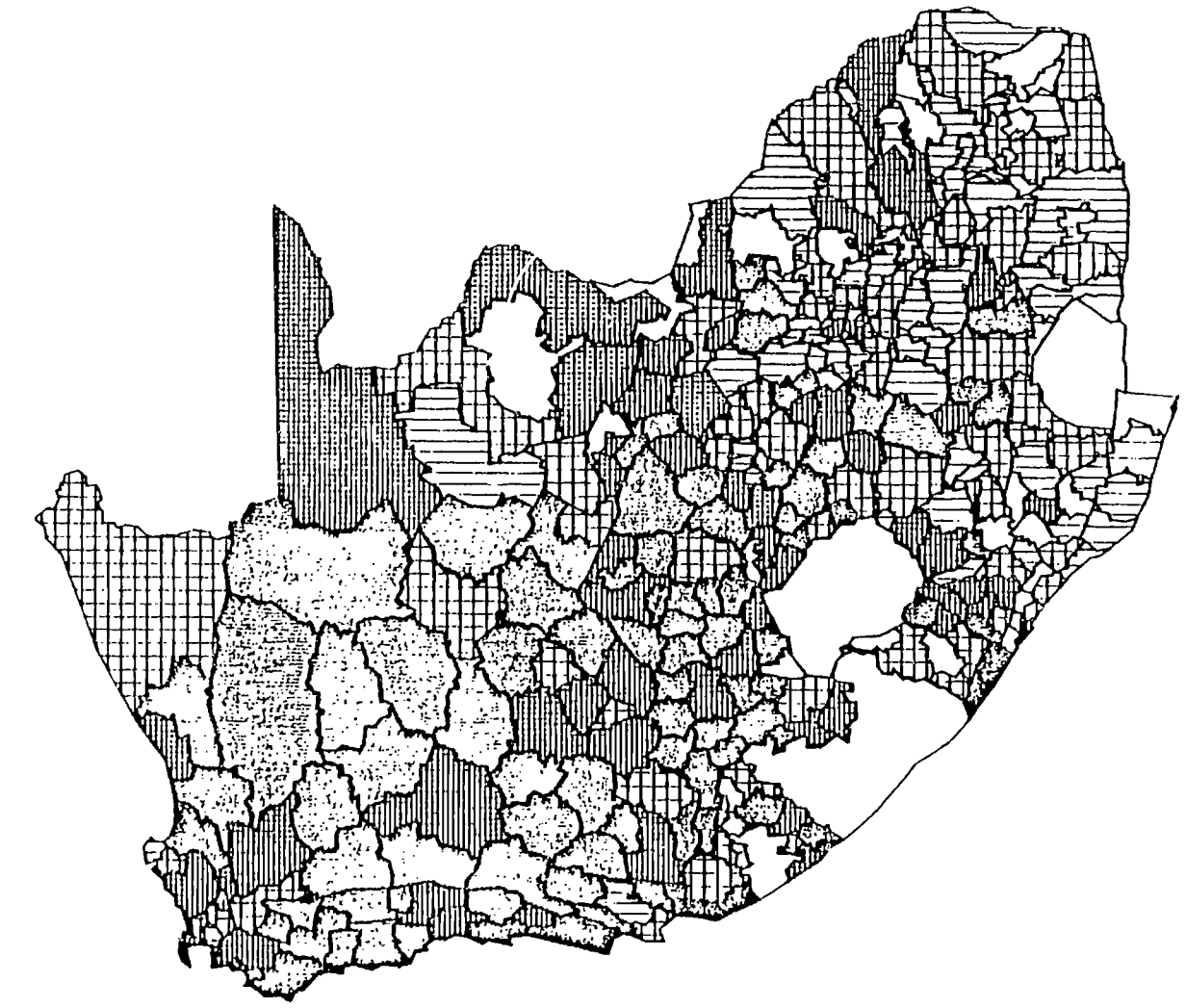


TABLE 6: DISTRICTS WITH 1% OR MORE OF THE TOTAL ELDERLY AGE GROUP, BY RACE: 1985

ASIANS		BLACKS		COLOUREDS		WHITES	
District	%	District	%	District	%	District	%
Pinetown	24,0	Johannesburg	5,7	Wynberg	16,1	Johannesburg	10,2
Durban	17,8	Sekhukhuneland	2,3	Goodwood	5,1	Durban	7,3
Inanda	15,1	Mokerong	2,2	Port Elizabeth	4,3	Pretoria	6,6
Johannesburg	8,5	Nebo	1,9	Johannesburg	3,6	Cape	4,0
Pietermaritzburg	6,3	Seshego	1,8	Gordonia	3,5	Wynberg	3,9
Lower Tugela	4,6	Thabamoopo	1,7	Cape	3,1	Port Elizabeth	3,2
Umzinto	2,7	Port Elizabeth	1,6	Bellville	2,9	Bellville	2,1
Pretoria	2,5	Emzumbe	1,5	Namakwaland	2,6	East London	2,1
Wynberg	1,7	Ezingolweni	1,5	Paarl	2,4	Germiston	2,0
Benoni	1,5	KwaMapumulu	1,5	Worcester	2,1	Randburg	1,8
Port Shepstone	1,4	Witsieshoek	1,5	Kimberley	2,0	Pietermaritzburg	1,8
Port Elizabeth	1,3	Enseleni	1,3	Malmesbury	2,0	Bloemfontein	1,8
		Ntuzuma	1,3	Oudtshoorn	1,8	Roodepoort	1,5
		Madadeni	1,3	George	1,7	Goodwood	1,4
		Nqutu	1,3	Durban	1,5	Pinetown	1,4
		Vanderbijlpark	1,3	Caledon	1,4	Port Shepstone	1,3
		Embumbulu	1,2	Stellenbosch	1,2	Benoni	1,2
		Vulindlela	1,2	Uitenhage	1,2	Vereeniging	1,2
		Bolobedu	1,1	Ceres	1,0	Krugersdorp	1,1
		Empumalanga	1,1			Simonstown	1,1
		Giyani	1,1				
		Nkandla	1,1				
		Inkanyezi	1,1				
		Emnambithi	1,0				
		Wonderboom	1,0				
		Wynberg	1,0				
TOTAL %	87,4		40,6		59,5		57,0
TOTAL N*	24 500		513 700		102 600		405 700

* Total elderly population (census date).

5.4.2 Recent changes in the regional distribution of the elderly: 1980-1985

In order to measure differential regional growth in the elderly population between 1980 and 1985 use has been made of the Perloff-shift method (Perloff 1963), which, in this study, relates the growth of a district (or larger geographic entity) to the national growth with regard to the elderly. The 1980 population numbers for magisterial districts have been adapted to the 1985 boundaries to make population numbers comparable over this period. If the elderly population of each district had grown at the national average rate of the elderly, which might be termed its "expected" rate of growth, the regional proportional distribution of the elderly among the districts would have remained the

same over the given period. Of course, some districts grew at higher rates and others at lower rates than the expected rate.

The deviations from the expected growth in absolute terms added together for all districts are defined as the total net shift for the elderly population. The differences between actual and expected growth for each district in absolute numbers expressed as a percentage of the total net shift indicate a district's growth in its elderly population in relation to the growth of the elderly population as a whole. The same concept can be extended to larger geographical units like national planning regions and provinces.

(a) Migration between districts

Between 1980 and 1985 the district of Johannesburg, for example, experienced an actual increase of 282 in its white elderly population compared with an expected growth of 4 915, if its elderly population would have grown at the 5-yearly national rate of 12% (general area of the RSA) over the period. Thus, Johannesburg can be said to have had a net downward shift in its white elderly population between 1980 and 1985 of 4 633 - the difference between the two numbers which constitutes 28,4% of the total national downward shift experienced among the total white elderly population. Randburg, on the other hand, is an illustration of a district showing a net upward shift in its white elderly population, since the rate of increase was higher than the national growth rate.

Figures 10a - 10d depict the net elderly population shifts among the districts (in which the number of the respective total population exceeded 100 in 1985) by race. Tables 7a - 7d present the districts which account for more than 2% of the total net shifts (downward or upward) in the elderly and/or total population of the four population groups. The indices were computed with regard to the elderly as well as the respective total population in order to determine whether patterns of redistribution differ among the elderly and the total population. When the deviations from expected growth of all districts are added together, they amount to 16 300 in the case of whites, which constitute 4% of all elderly whites. The corresponding numbers for Asians, blacks and coloureds are 1 600 (6,5%), 34 800 (6,8%) and 4 700 (4,6%) respectively.

In the case of elderly whites, the four metropolitan districts of Johannesburg, Durban, Cape Town and Pretoria account for 52% of the total net downward shift, although they rank highest when the elderly population is measured in absolute terms. Randburg with 11,9% of the total net upward shift leads in relative growth in elderly whites, followed by Bellville (6,2%), Pinetown (5,2%) and Pietermaritzburg (4,6%).

With regard to Asians, Inanda is the outstanding district in relative growth of the Asian elderly: its share of all net upward shifts being 67,8%, followed by Johannesburg with 9,6% and Pinetown with 6,1%. On the other hand, Durban which accounts for 40,2% of the total downward shift, shows the greatest relative decrease in its Asian elderly population, despite the relatively large number of its Asian elderly. Lower Tugela accounts for 14,8% of the total downward shift.

As in the case of whites, Cape Town shows a relative loss in its elderly coloured population: it accounts for 21,6% of the total downward shift. Wynberg, which has the largest number of coloured elderly, also shows the greatest relative increase, its share being 27,1% of the total upward shift. It is followed by Johannesburg, Goodwood and Port Elizabeth which respectively account for 8,2%, 7,4% and 7,3% of the total upward shift.

Most of the more significant downward shifts in the elderly black population are distributed among districts in Lebowa and KwaZulu: Seshego and Thabamoopo both show a downward shift of 3,7%, followed by Msinga (3,2%), Vulamehlo (2,9%), Emzumbe (2,8%) and Ezingolweni (2,5%). As in the case of Asians and coloureds, Johannesburg was well above the national growth rate of the elderly blacks: it accounts for 10,1% of the total upward shift concomitant with the fact that it also is the district with the largest elderly black population. Mkobola follows with 7,3% of the total upward shift, Botshabelo with 6,4%, Ntuzuma with 4,9% and Wynberg with 4,4%.

As indicated in Mostert, Hofmeyr and Kok (1989) significant migration within the black states occurred to the borders of metropolises. Among black elderly persons this trend has also been observed in, for example, the case of KwaZulu where in-migration occurred to the districts of Embumbulu and Ntuzuma, which are adjacent to the Durban metropolis. It can be assumed that this trend also occurs in the districts of Bophuthatswana with regard to the PWV. The in-migration of black elderly into KwaNdebele and Botshabelo is also an indication of this trend among blacks to migrate to metropolitan borders. The results of the analyses give a clear indication

FIG. 10A: PERCENTAGE DISTRIBUTION OF NET SHIFTS: ELDERLY ASIANS, 1980–1985
(TBVC STATES EXCLUDED)

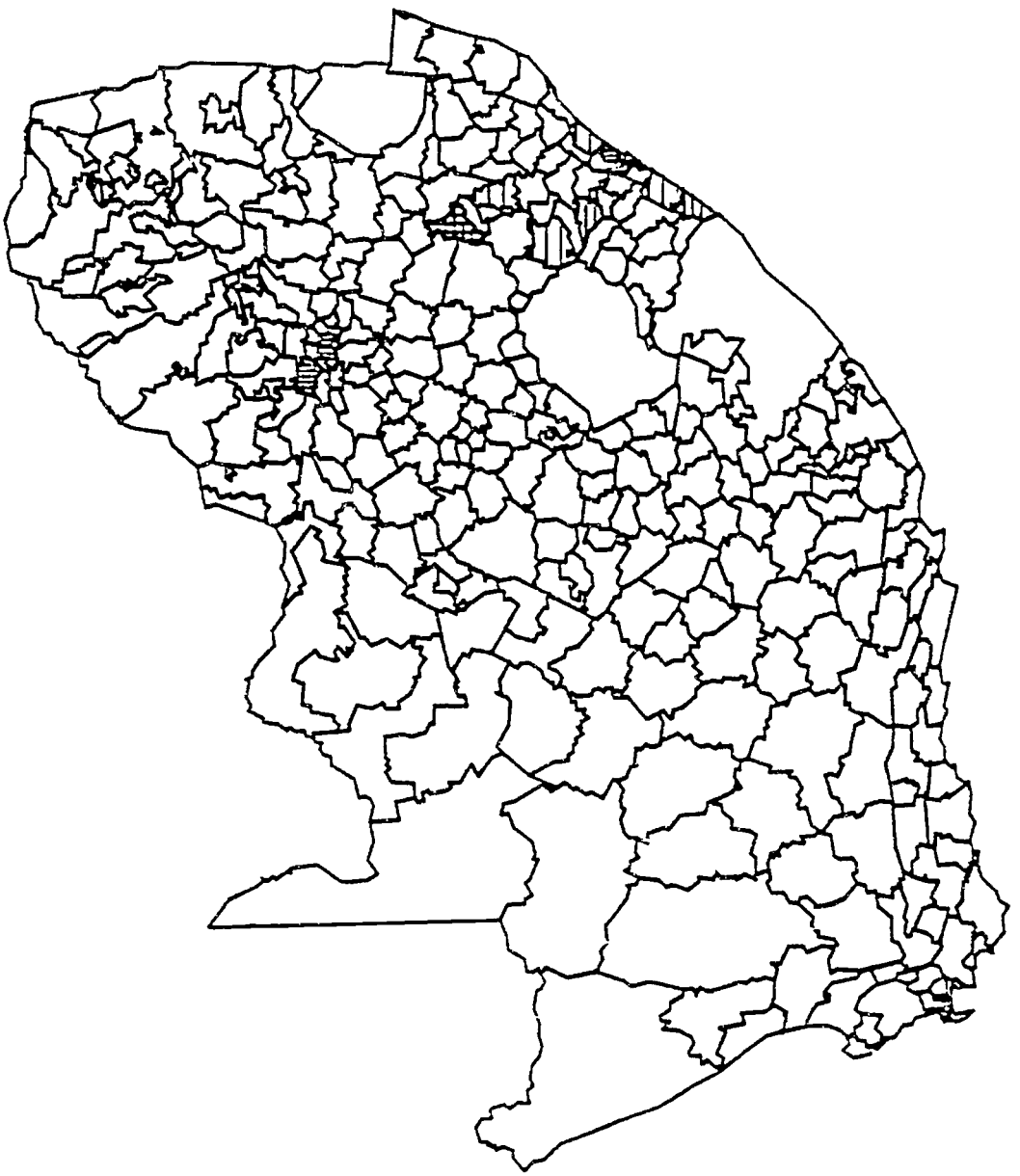
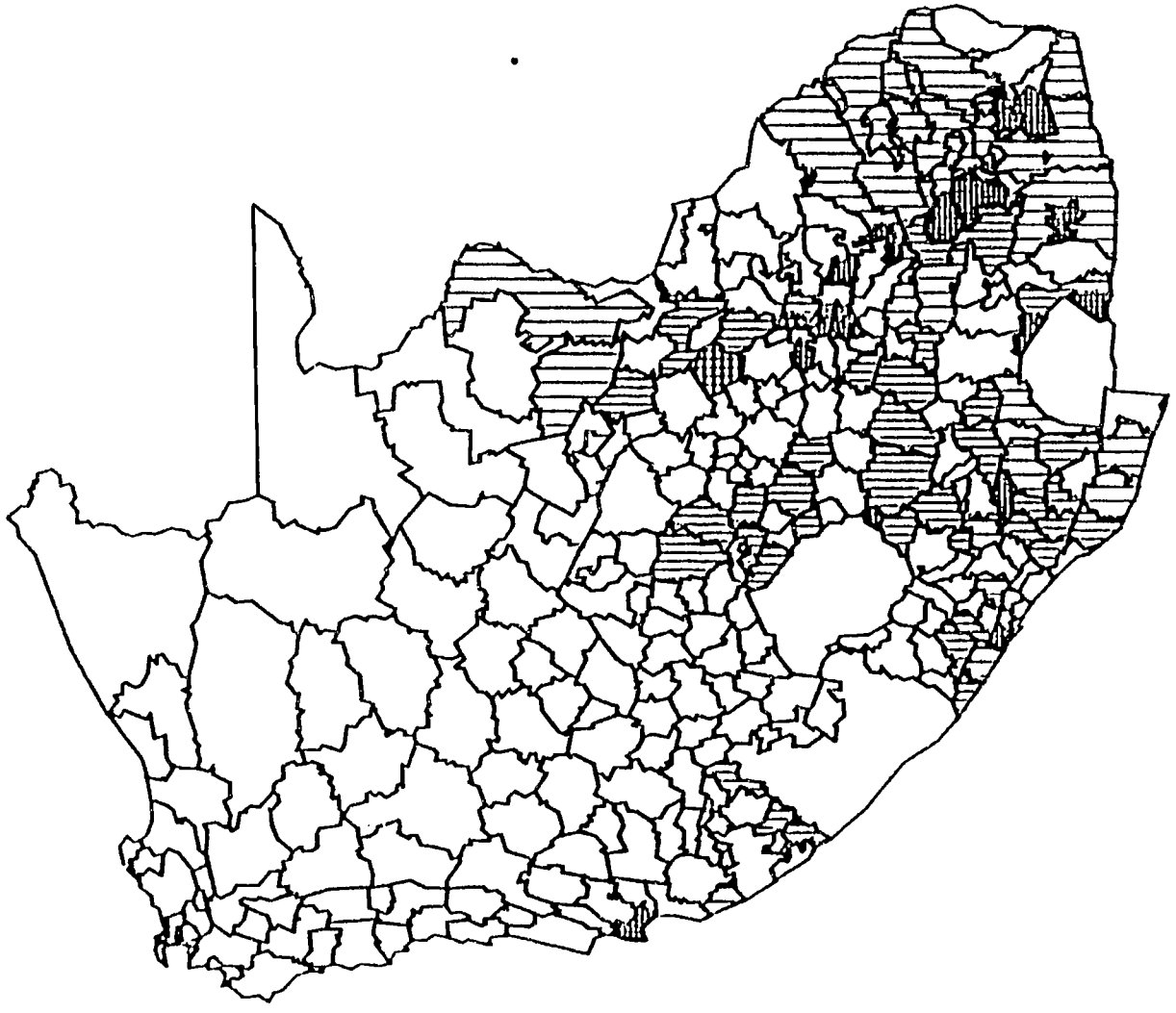


FIG. 10B: PERCENTAGE DISTRIBUTION OF NET SHIFTS: ELDERLY BLACKS, 1980–1985
(TBVC STATES EXCLUDED)



NET SHIFTS
< -1.0%
-1.0 - -0.5%
-0.5 - +0.5%
0.5 - 1.0%
> 1.0%

FIG. 10C: PERCENTAGE DISTRIBUTION OF NET SHIFTS: ELDERLY COLOUREDS, 1980–1985
(TBVC STATES EXCLUDED)

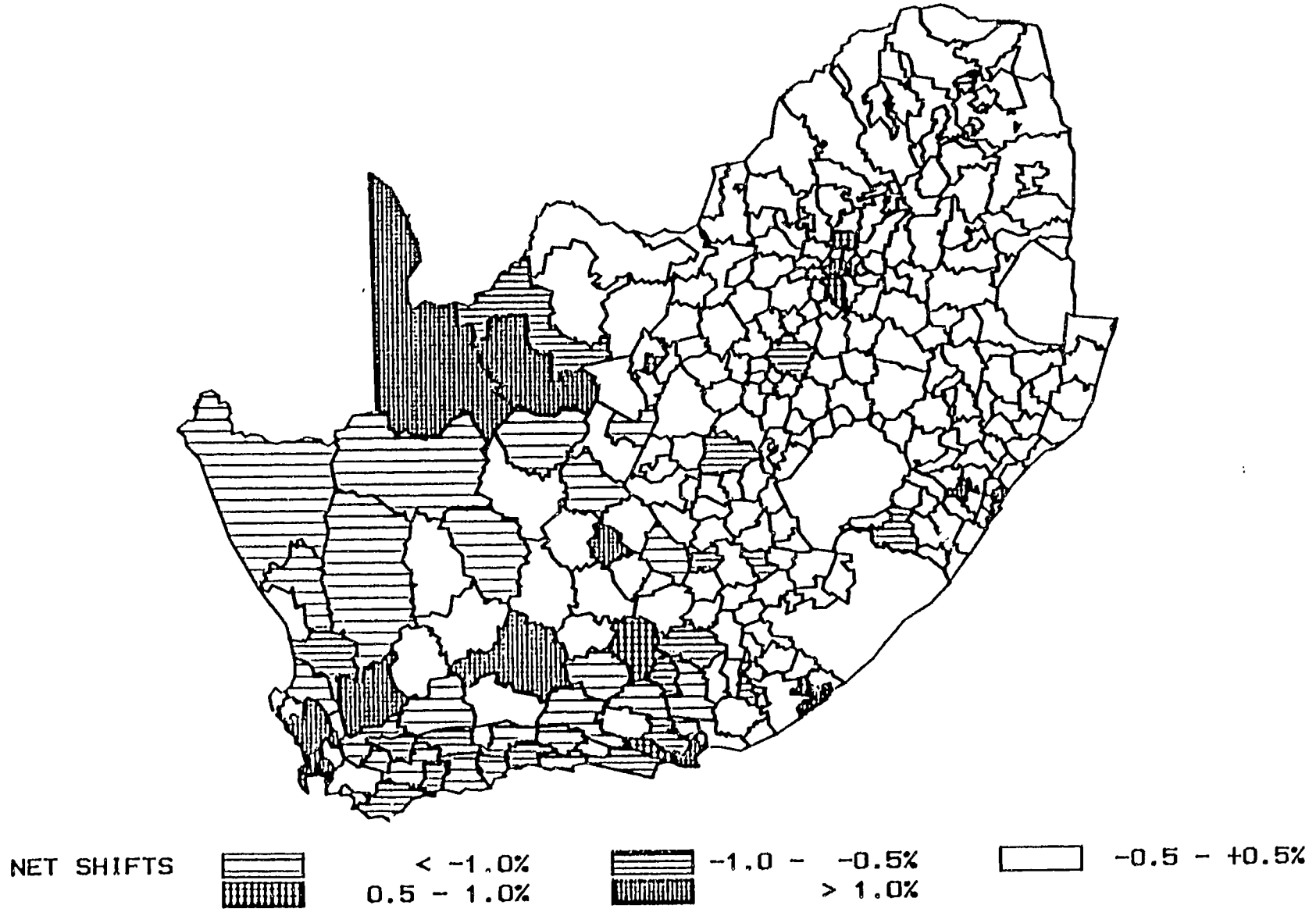


FIG. 10D: PERCENTAGE DISTRIBUTION OF NET SHIFTS: ELDERLY WHITES, 1980–1985
(TBVC STATES EXCLUDED)

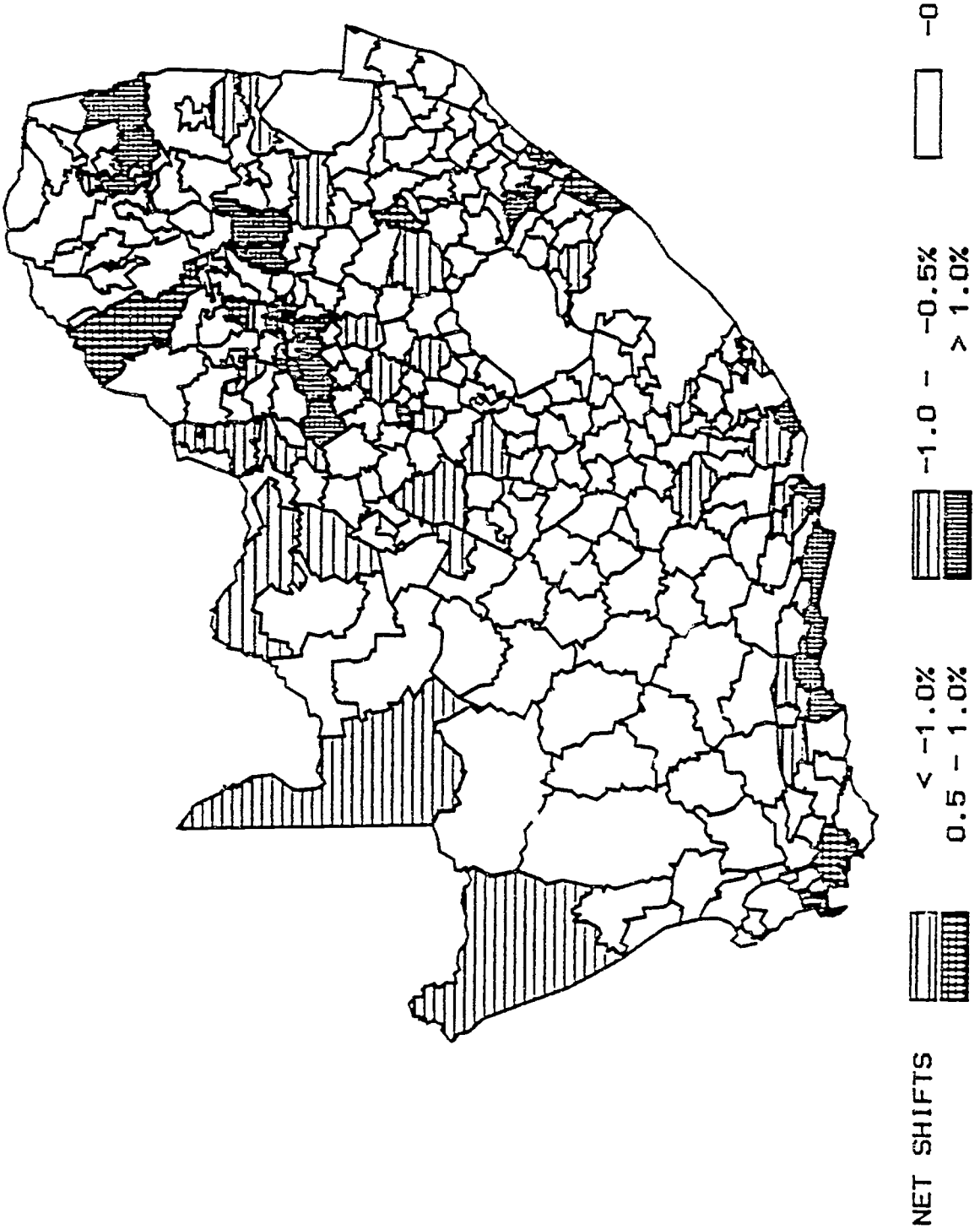


TABLE 7a: PERLOFF SHIFTS AND GROWTH RATES WITH REGARD TO DISTRICTS: 1980-1985, ASIANS

District	No. of NPR	1985 Population 65+ years	Perloff shifts %		Growth rates Annual %	
			65+	Total population	65+	Total population
DURBAN	41	4360	-40,2	-40,7	1,6	-2,9
LOWER TUGELA	41	1120	-14,8	-12,4	0,5	-3,4
UMZINTO	36	650	-3,9	-2,9	2,6	-0,8
PIETERMARITZBURG	41	1540	-3,2	0,5	3,8	1,7
CAPE	39	90	-2,9	-1,1	-3,7	-6,1
ESTCOURT	37	140	-2,3	-0,3	-0,4	0,5
WYNBERG	39	420	3,0	1,5	7,1	3,4
PINETOWN	41	5890	6,1	-28,8	4,9	-0,6
JOHANNESBURG	42	2090	9,6	5,5	6,1	3,1
INANDA	41	3700	67,8	82,0	12,2	11,8

Note: Districts with fewer than 50 aged persons in 1985 excluded.

of the trend among black elderly to metropolitanize and redistribute within black states.

Among white persons (all ages) a trend of out-migration from the metropolitan centres to their peripheral areas has been observed, especially so in the case of the elderly. In addition, the trend to migrate to the villages of the Southern Cape Coast has been observed among white elderly persons. Before 1980, a significant redistribution of white elderly persons occurred to towns of the Natal South Coast, Bathurst in the Eastern Cape and Parys in the OFS - a trend which decreased during the late 1970s. Some of the elderly persons enumerated in coastal villages on the date of census may have been present in their capacity as holiday-makers, but the increasing numbers between the 1980 and 1985 censuses suggest permanent rather than temporary residence.

Whereas the metropolitanization of coloured elderly occurred mainly towards the periphery of Cape Town (Wynberg), the corresponding Asian movement was towards the periphery of Durban (Inanda and Pinetown); both these groups also showed considerable influx into the Johannesburg area.

Our analysis indicates that considerable independent migrations occurred among the white elderly, whereas family migration was predominant among the other population groups.

(b) Migration between larger geographical units

In Tables 8a - 8d analyses of population redistribution trends among the four population groups are presented with regard to national planning regions (NPRs).

From Tables 8a - 8d it is evident that, in contrast to whites, the percentages of elderly Asian, coloured and black persons differ only slightly between NPRs.

The smallest percentage of white elderly (3,1%) is found in Northern Natal compared to 20,4% on the Natal South Coast. The percentage of white elderly was less than 6% in only six NPRs, compared to 24 NPRs where the respective percentages were above 10%.

It can be assumed that during the past decades there were no significant regional differences in fertility and mortality. Therefore, regional similarities and differences in the percentage of elderly persons with regard to all four population groups should largely be attributed to internal migration trends. Thus, a large percentage of

TABLE 7b: PERLOFF SHIFTS AND GROWTH RATES WITH REGARD TO DISTRICTS: 1980-1985, BLACKS (TBVC excluded)

District	No. of NPR*	1985 Population 65+ years	Perloff shifts %		Growth rates Annual %	
			65+	Total population	65+	Total population
SESHEGO	95	9420	-3,7	-1,5	0,2	1,1
THABAMOOPO	95	8880	-3,7	-0,5	0,1	1,9
MSINGA	93	4980	-3,2	-1,9	-1,3	-1,9
VULAMEHLO	93	4040	-2,9	-0,9	-1,8	0,6
EMZUMBE	93	7770	-2,8	-1,0	0,4	1,2
EZINGOLWENI	93	7780	-2,5	-0,9	0,6	1,2
POTGIETERSRUS	44	1730	-2,5	-2,7	-5,4	-4,5
INKANYEZI	93	5570	-2,0	-0,1	0,4	2,2
LETABA	25	1140	-1,2	-2,5	-3,6	-5,7
HIGHVELD RIDGE	28	1080	-0,4	-2,2	0,2	-2,1
DURBAN	41	1790	-0,3	-2,3	1,8	-2,3
PRETORIA	42	4230	0,4	-2,2	3,6	0,0
SOSHANGUVE	42	1060	0,6	2,3	8,2	8,4
RANDBURG	42	2000	1,1	2,9	7,5	7,4
GIYANI	94	5910	1,2	2,4	4,5	4,8
SIMDLANGENTSHA	93	3050	1,6	2,0	7,4	7,4
WITSIESHOEK	96	7500	1,8	2,4	4,8	4,9
EMPUMALANGA	93	5910	1,8	2,4	5,4	4,8
KEMPTON PARK	42	3710	2,1	2,1	7,6	4,4
BOLOBEDU	95	5460	2,2	1,0	6,1	3,7
ENSELENI	93	6460	2,3	1,3	5,7	3,8
MDUTJANA	98	4450	2,4	2,1	7,5	5,8
HLABISA	93	4770	2,4	0,9	7,2	3,9
NQUTU	93	6460	2,5	2,8	6,0	6,2
NSIKAZI	97	4730	2,5	4,3	7,4	7,5
WONDERBOOM	4	5230	3,1	0,3	8,0	2,6
PORT ELIZABETH	40	8110	3,1	2,1	6,0	3,7
SEKHUKHUNELAND	95	11810	3,3	2,9	5,1	4,9
EMBUMBULU	93	6340	3,3	4,2	7,3	6,1
EERSTEHOEK	97	3210	3,6	3,4	14,0	10,8
WYNBERG	39	5140	4,4	12,7	10,7	12,8
NTUZUMA	93	6920	4,9	8,4	9,2	7,8
BOTSHABELO	31	3820	6,4	7,7	23,2	23,8
MKOBOLA	98	3940	7,3	8,9	27,3	25,2
JOHANNESBURG	42	29080	10,1	-4,4	5,7	1,5

* 93 = KwaZuiu; 94 = Gazankulu; 95 = Lebowa; 96 = QwaQwa; 97 = KaNgwane; 98 = KwaNdebele

TABLE 7c: PERLOFF SHIFTS AND GROWTH RATES WITH REGARD TO DISTRICTS: 1980-1985, COLOUREDS

District	No. of NPR	1985 Population 65+ years	Perloff shifts %		Growth rates Annual %	
			65+	Total population	65+	Total population
CAPE	39	3210	-21,6	-19,9	-3,0	-6,5
NAMAKWALAND	1	2620	-3,7	-5,4	1,3	-1,4
KIMBERLEY	19	2100	-3,3	-0,6	1,2	1,3
OUDTSHOORN	7	1890	-2,8	-1,8	1,3	0,5
KNYSNA	6	830	-2,5	-2,2	-0,1	-1,0
CALVINIA	14	880	-2,4	-1,7	0,1	-1,5
ABERDEEN	9	210	-2,3	-0,6	-5,8	-1,5
SIMONSTOWN	39	400	-2,3	-3,6	-2,3	-5,0
SWELLENDAM	5	740	-2,3	-1,1	-0,2	0,1
SOMERSET EAST	12	380	-2,2	-0,9	-2,3	-1,7
KENHARDT	17	440	-1,6	-2,1	-0,6	-4,7
CLANWILLIAM	2	870	-0,5	-2,3	2,1	-1,6
DURBAN	41	1530	-0,5	-5,6	2,4	-2,0
PRETORIA	42	600	0,5	2,1	3,6	5,1
VEREENIGING	42	320	0,9	3,1	5,9	10,0
CERES	4	1030	2,0	-0,8	4,8	1,0
POSTMASBURG	18	520	2,4	1,4	8,0	4,6
SOMERSET WEST	39	870	2,4	-0,6	5,7	1,0
KUILS RIVER	39	970	2,6	9,0	5,6	9,1
INANDA	41	260	2,6	5,5	17,9	17,3
GORDONIA	17	3560	2,8	0,2	3,5	1,8
MALMESBURY	3	2050	4,1	8,2	4,8	5,2
BELLVILLE	39	3020	5,2	3,3	4,5	2,6
PORT ELIZABETH	40	4400	7,3	4,3	4,4	2,6
GOODWOOD	39	5270	7,4	-3,5	4,1	1,1
JOHANNESBURG	42	3710	8,2	10,3	5,1	4,5
WYNBERG	39	16560	27,1	35,4	4,4	3,9

elderly persons in a specific region is the result of either out-migration of young persons or in-migration of elderly persons, or a combination of these two factors.

From Table 8a it can be seen that redistribution of black elderly persons was to a large extent commensurate with that of the total black population. In two thirds of the NPRs out-migration predominated with regard to the total black population as well as the elderly. In most of these regions negative overall growth rates occurred. In-migration of elderly black persons and of the respective total population occurred mainly in the black states and in the metropolitan areas. Although the data used for these analyses have been adapted for underenumeration during the censuses in 1980 and 1985, adaptations are not necessarily correct (see Mostert, Hofmeyr & Kok 1989). Two salient anomalies are the Perloff indices computed for the PWV metropolitan area and for Lebowa, which differ significantly with regard to the elderly and the total population. It is possible that underenumeration of elderly black persons in Lebowa and of the younger age groups in the PWV metropolis (especially Soweto) during the census of 1985 occurred to a larger extent than in other areas.

TABLE 7d: PERLOFF SHIFTS AND GROWTH RATES WITH REGARD TO DISTRICTS: 1980-1985, WHITES

District	No. of NPR	1985 Population 65+ years	Perloff shifts %		Growth rates Annual %	
			65+	Total population	65+	Total population
JOHANNESBURG	42	41290	-28,4	-20,8	0,1	-0,5
DURBAN	41	29680	-13,6	-5,5	0,8	0,4
CAPE	39	16090	-7,6	-6,5	0,8	-0,8
PRETORIA	42	26870	-2,4	-3,3	2,1	1,0
BLOEMFONTEIN	31	7190	-0,7	-2,5	2,0	0,4
POSTMASBURG	18	520	-0,4	-2,4	-0,1	-4,4
LOWER UMFOLOZI	34	500	0,0	2,6	2,5	5,6
BRITS	42	1920	0,0	2,3	2,4	4,5
HIGHVELD RIDGE	28	680	0,4	4,5	4,4	5,9
KUILS RIVER	39	1040	0,7	2,0	4,9	5,0
NEWCASTLE	32	830	0,8	-2,2	6,1	-1,4
WONDERBOOM	42	3260	1,0	2,7	3,4	2,8
MIDDELBURG	27	2060	1,3	2,3	4,8	3,7
PORT SHEPSTONE	36	5280	1,3	3,5	3,3	6,9
ALBERTON	42	2070	1,6	5,4	5,2	4,7
WYNBERG	39	15830	2,0	-2,8	2,8	0,6
GEORGE	6	2540	2,1	1,9	5,5	4,7
KLERKSDORP	23	3820	2,1	0,1	4,4	1,3
GOODWOOD	39	5790	2,3	0,5	3,8	1,5
PORT ELIZABETH	40	12950	2,4	-1,2	3,0	1,0
SIMONSTOWN	39	4320	2,4	0,7	4,4	2,2
HERMANUS	5	1980	2,4	0,8	7,3	5,6
GERMISTON	42	8130	2,6	-5,2	3,5	-0,1
STRAND	39	3.20	2,6	0,9	5,0	3,1
KNYSNA	6	2140	2,7	1,3	7,3	5,3
KEMPTON PARK	42	3090	3,3	3,3	6,5	2,6
SOMERSET WEST	39	2940	3,3	1,8	6,8	4,6
ROODEPOORT	42	5910	3,7	4,9	4,6	3,0
BENONI	42	4930	3,8	0,9	5,3	1,8
PIETERMARITZBURG	41	7430	4,6	0,9	4,7	1,8
PINETOWN	41	5590	5,1	3,7	5,9	3,0
BELLVILLE	39	8670	6,2	2,4	5,0	2,0
RANDBURG	42	7430	11,9	19,0	9,0	6,7

Out-migration of elderly white persons predominated in 60% of the NPRs compared to only 13 regions in which in-migration of more than 2% predominated (see Table 8b). Receiving areas of white elderly persons were the metropolitan areas of the Cape, PWV and Port Elizabeth, the rural coastal areas of the Southern Cape, Overberg, Natal South Coast and Langkloof, the industrializing areas of the Eastern Transvaal, Central Natal, Western Transvaal, and the inland rural areas of the Tugela Basin, Northern Transvaal and the Transvaal Bushveld.

From Table 8b it can be seen that in the case of some NPRs the trends of redistribution among white elderly persons differed significantly from those of the respective total population. In the

TABLE 8a: PERLOFF SHIFTS AND GROWTH RATES WITH REGARD TO NATIONAL PLANNING REGIONS: 1980-1985, BLACKS

No. of NPR*	1985		Perloff shifts %		Growth rates Annual %	
	Population 65+ years	% 65+ of total population	65+	Total population	65+	Total population
28	12780	2,2	-9,5	-11,3	-0,1	-0,3
29	12020	3,1	-8,7	-8,2	0,0	-0,5
25	5060	3,0	-8,0	-7,4	-3,0	-3,0
44	4490	2,2	-7,0	-5,9	-2,9	-1,5
34	1410	1,7	-6,7	-3,4	-10,7	-2,7
21	9420	3,9	-6,3	-6,3	0,2	-1,1
27	9950	2,4	-6,0	-5,1	0,4	0,6
95	73220	3,3	-5,1	3,9	2,6	2,6
33	3140	2,5	-5,0	-3,8	-2,9	-1,6
35	3780	2,5	-5,0	-5,1	-2,1	-1,9
26	4760	2,5	-4,1	-5,0	-0,5	-1,1
37	3490	3,1	-3,9	-3,3	-1,4	-1,4
10	7310	4,3	-3,7	-2,9	0,8	-0,0
36	1140	2,1	-3,0	-1,8	-5,9	-1,9
38	2170	2,9	-3,0	-1,9	-2,3	-1,0
22	1080	1,5	-2,7	-2,4	-5,7	-1,8
23	12130	2,0	-2,4	-2,8	2,1	1,7
32	2300	2,3	-2,4	-3,8	-1,1	-2,5
20	2230	3,2	-1,9	-1,9	-0,6	-1,3
30	15880	2,1	-1,1	-0,6	2,6	2,2
09	890	4,9	-0,9	-0,8	-1,1	-3,1
11	3100	3,5	-0,9	-1,2	1,7	0,5
19	4230	2,7	-0,7	-1,2	2,1	1,3
18	510	1,4	-0,6	-2,1	-1,8	-4,3
12	3240	3,9	-0,4	-0,9	2,4	0,8
08	690	3,1	-0,2	-0,1	1,5	1,8
03	100	1,9	-0,1	-1,2	-1,0	-15,2
07	220	4,2	-0,1	0,1	1,8	4,8
15	1090	3,1	-0,1	-0,4	2,5	0,9
16	90	1,9	-0,1	-0,5	-2,5	-7,7
43	80	0,8	-0,1	-0,3	-3,2	-1,6
02	80	4,6	0,0	0,0	5,6	4,9
13	280	3,8	0,1	-0,1	4,7	0,2
05	230	1,6	0,3	0,4	9,9	7,1
24	2580	2,3	0,3	-2,5	3,5	-0,6
17	460	2,6	0,4	0,4	7,4	5,7
41	6660	1,8	0,4	-5,3	3,1	0,4
06	460	2,2	0,6	0,9	9,7	10,7
04	810	2,6	0,9	0,2	8,5	3,3
31	16750	3,1	1,3	2,7	3,2	3,1
96	7500	3,4	3,1	3,6	4,8	4,9
94	16230	2,7	4,1	7,3	4,0	4,2
40	10160	2,5	5,9	3,3	5,7	3,5
39	6110	1,6	7,7	19,1	9,5	11,2
93	139910	3,2	8,3	26,1	3,2	3,2
97	11300	2,6	12,2	14,2	8,4	7,7
98	8390	2,9	16,3	16,4	14,4	13,3
42	84300	2,1	38,1	1,1	5,0	2,4

Note: NPRs with fewer than 50 aged persons in 1985 excluded.

* 93 = KwaZulu; 94 = Gazankulu; 95 = Lebowa; 96 = QwaQwa; 97 = KaNgwane; 98 = KwaNdebele.

TABLE 8b: PERLOFF SHIFTS AND GROWTH RATES WITH REGARD TO NATIONAL PLANNING REGIONS: 1980-1985, WHITES

No. of NPR	1985		Perloff shifts %		Growth rates Annual %	
	Population 65+ years	% 65+ of total population	65+	Total population	65+	Total population
21	11770	11,5	-10,5	-0,8	1,3	1,2
31	11770	9,0	-9,6	-11,3	1,4	0,1
19	4280	8,3	-8,5	-7,8	0,0	-0,8
29	5410	11,4	-8,3	-4,7	0,5	-0,1
41	45170	11,1	-7,4	1,6	2,2	1,3
28	6200	5,3	-5,5	12,1	1,3	2,8
26	3460	6,4	-5,0	2,4	0,6	1,9
30	9170	6,8	-4,9	-1,7	1,7	1,1
07	2290	12,7	-4,4	-4,3	0,1	-1,9
09	1660	16,2	-3,6	-2,0	-0,2	-1,3
12	1790	11,9	-3,5	-1,7	0,1	-0,3
17	2060	11,0	-3,5	-3,6	0,3	-1,3
22	1130	10,1	-3,2	-2,9	-0,9	-2,1
24	3510	7,3	-3,0	-2,6	1,3	0,5
11	2170	16,7	-2,6	-1,1	0,9	0,1
13	1600	13,9	-2,5	-2,6	0,5	-1,8
18	1020	5,5	-2,3	-9,2	-0,2	-4,7
20	810	13,3	-2,1	-1,8	-0,7	-2,6
34	1170	3,1	-1,9	6,3	0,4	3,9
01	710	7,3	-1,8	-3,6	-0,6	-3,3
16	530	12,0	-1,6	-2,4	-1,1	-5,2
38	830	9,5	-1,6	-1,1	0,1	-0,4
02	1830	14,0	-0,9	-1,3	1,8	-0,1
14	980	17,2	-0,9	-1,4	1,2	-2,0
33	1140	6,4	-0,6	0,6	1,7	1,8
03	3530	10,2	-0,3	0,9	2,3	1,7
43	270	5,0	0,0	-3,8	2,2	-6,8
15	1520	11,4	0,5	-1,7	2,7	-0,5
04	4480	11,1	0,6	-2,6	2,5	0,4
10	3600	13,6	0,7	1,7	2,6	2,2
32	1940	4,8	0,8	-7,9	2,9	-1,3
44	4660	9,2	2,4	1,2	3,0	1,6
25	4280	6,2	2,5	2,3	3,1	1,8
08	1810	14,6	2,6	0,9	4,3	2,4
23	12530	7,5	2,6	-4,7	2,6	0,9
37	1750	7,7	2,6	-1,1	4,4	0,6
36	7530	20,4	4,7	10,2	3,2	5,8
35	2430	10,8	4,9	0,2	5,1	1,4
40	15550	8,5	4,9	-4,0	2,8	1,0
05	5820	17,6	7,4	2,6	4,1	2,5
27	5240	5,4	7,5	9,5	4,3	2,8
42	136010	6,7	8,3	37,5	2,4	1,5
06	7480	14,3	15,6	10,0	5,2	4,3
39	62600	10,9	31,6	-6,2	3,0	1,1

TABLE 8c: PERLOFF SHIFTS AND GROWTH RATES WITH REGARD TO NATIONAL PLANNING REGIONS: 1980-1985, COLOUREDS

No. of NPR	1985		Perloff shifts %		Growth rates Annual %	
	Population 65+ years	% 65+ of total population	65+	Total population	65+	Total population
06	4090	3,7	-10,9	-4,7	1,3	1,1
12	1580	4,8	-10,0	-4,6	-0,3	-0,3
09	2130	4,7	-9,9	-6,2	0,4	-0,3
07	3030	4,5	-9,3	-8,9	1,1	-0,2
19	3740	4,2	-7,6	-4,2	1,7	1,0
05	3450	3,4	-7,3	-2,9	1,6	1,3
01	2620	5,3	-7,1	-10,9	1,3	-1,4
14	1250	6,0	-5,7	-5,7	0,5	-2,0
02	2020	4,1	-3,6	-4,8	1,8	0,3
04	5060	3,2	-3,5	-12,5	2,3	0,5
11	580	5,0	-3,5	-1,8	-0,2	-0,5
10	1120	5,6	-3,3	-3,1	1,2	-0,5
16	1140	5,2	-3,1	-4,2	1,3	-1,0
30	530	3,3	-2,7	-0,7	0,2	1,0
15	1920	4,3	-2,3	-3,8	2,1	0,4
31	1620	3,8	-2,2	1,1	2,0	2,1
38	260	3,8	-1,3	-1,9	0,2	-2,1
20	100	5,0	-1,2	-1,1	-2,7	-5,0
28	140	2,7	-1,1	-3,8	-1,0	-6,7
27	180	2,9	-0,9	0,1	0,1	2,0
25	130	4,2	-0,8	-0,3	-0,2	0,1
35	60	3,6	-0,8	0,1	-3,2	2,2
22	260	3,2	-0,5	-0,6	1,7	0,6
26	130	3,6	-0,5	-0,4	0,6	0,2
43	60	1,2	-0,5	-1,1	-1,8	-1,6
36	170	4,3	-0,3	-0,7	1,7	-0,8
24	80	3,9	-0,1	0,0	2,2	1,8
32	90	2,7	-0,1	-0,1	2,3	1,3
29	130	4,2	0,3	-0,2	4,0	0,8
08	1430	3,6	0,5	0,9	2,9	2,0
37	90	3,5	0,5	0,2	5,9	2,7
13	2330	4,8	0,8	-6,7	2,9	-0,3
34	90	3,5	0,8	0,3	8,3	3,6
23	1030	3,9	2,0	2,5	3,7	3,2
17	4000	4,6	2,3	-3,7	3,0	1,1
21	1490	3,9	2,6	1,9	3,6	2,5
18	680	3,1	2,8	2,2	5,0	3,3
03	3560	2,7	4,8	10,4	3,4	2,9
41	2450	3,1	7,7	0,5	4,4	1,8
40	5600	3,1	12,7	6,5	3,9	2,2
42	6690	2,9	18,4	39,2	4,2	4,4
39	35260	3,2	43,5	33,6	3,3	2,1

Note: NPRs with fewer than 50 aged persons in 1985 excluded.

TABLE 8d: PERLOFF SHIFTS AND GROWTH RATES WITH REGARD TO NATIONAL PLANNING REGIONS: 1980-1985, ASIANS

No. of NPR	1985 Population 65+ years	1985 % 65+ of total population	Perloff shifts % 65+	Perloff shifts % Total population	Growth rates Annual % 65+	Growth rates Annual % Total population
36	990	3,2	-19,5	-29,5	3,0	-0,1
21	110	3,3	-11,5	-3,2	-2,1	-0,0
37	400	2,6	-9,4	-2,6	2,7	1,2
34	90	1,9	-7,2	-9,0	-0,9	-1,5
28	140	2,8	-7,0	-5,2	0,9	-0,2
25	90	4,3	-5,7	-2,0	0,2	-0,1
19	70	4,6	-5,0	-2,1	-0,6	-0,8
40	330	4,2	-4,9	-6,0	3,4	0,3
23	130	3,8	-4,7	-3,1	2,0	0,0
32	490	2,7	-4,4	3,9	3,8	1,9
35	320	2,9	-3,7	-16,0	3,6	-0,8
24	80	3,8	-2,6	1,1	2,1	2,4
27	60	2,8	-2,4	-7,9	1,5	-4,1
26	50	2,7	-1,7	-1,6	2,1	0,1
39	590	3,0	0,4	7,2	4,6	2,2
42	3680	3,1	24,8	86,4	5,0	2,9
41	16670	2,7	67,1	0,3	4,8	1,5

Note: NPRs with fewer than 50 aged persons in 1985 excluded.

Border area and the Durban metropolis appreciable out-migration of elderly persons occurred, while the total population maintained the status quo. South-eastern Transvaal experienced marked out-migration of elderly white persons, but in-migration with regard to the total white population. The metropolitan areas of the Cape and Port Elizabeth, and the Southern Cape and Overberg experienced a larger influx of elderly persons than of persons in the younger age groups (the Port Elizabeth metropolis experienced a negative shift with regard to the total population). The opposite trend occurred in the PWV metropolis and the area of the Natal South Coast. Similar trends, although to a lesser extent, occurred among whites in other areas. Population decline (negative growth rates) among whites occurred mainly in the rural areas of the Cape Province, but a salient feature is that negative growth among elderly whites (to a lesser extent than with regard to the total white population) was restricted to a small number of NPRs (six regions with regard to the elderly compared to 18 with regard to the total white population). The selective out-migration of younger (non-aged) persons in these NPRs resulted in advanced age structures among whites in a large part of the country.

Negative population shifts of elderly coloureds as well as the total coloured population occurred in about 60% of the NPRs (see Table 8c). Predominant in-migration of coloured elderly persons occurred mainly in the four metropolitan areas. As in the case of whites, negative population growth in the rural areas occurred to a larger extent with regard to the total coloured population than with regard to the elderly. If this trend persists, population ageing will become more salient among rural coloureds.

From Table 8d it can be seen that Asians (the elderly as well as the total population) are becoming increasingly metropolitanized. Asian elderly persons migrate mainly to the two

metropolitan areas of Durban and the PWV.

The extent of migration within the provinces and the black states is expounded in Table 9. In the districts of the Cape Province as well as the OFS out-migration of the elderly and of the total population predominated with only a few exceptions. The predominant trend among blacks is out-migration from the provinces to the black states - among the elderly as well as the total population.

Collectively, in a provincial context, positive shifts occurred to Transvaal with regard to elderly persons in the case of Asians, predominantly to the Cape Province and the Transvaal in the case of whites, to the Transvaal and Natal in the case of coloureds, and to the black states in the case of blacks. However, within these regions significant population redistribution also occurred.

6. CHARACTERIZATION OF THE FOUR GROUPS AND OF THE TOTAL POPULATION

6.1 Relationships between the elderly and the child populations

As mentioned earlier, the change in the proportion of elderly in the total population is to some extent related to changes in the proportion of children. Figure 11 illustrates this usually inverse relationship and gives an indication of its effect on the process of ageing and/or juvenation by means of the median ages at different stages (see also Table 10). While each point on the graphs represents the percentage of children and of the elderly at a given date for a specific group, four points in time separated by 25 years are indicated by symbols on each graph to show the variation in the age structure of the four population groups over time. The numbers in brackets represent the median ages. In line with previous findings, it is evident that blacks and whites are at entirely different stages of demographic transition. Only at the end of the projection period (2035) will the age structure of blacks show similar characteristics as the age structure of whites at the beginning of the period under review, i.e. 1945. In contrast, Asians and coloureds had rather similar age structures as the blacks in the forties, but the observed and the projected degree of ageing is such that they will resemble that of whites more closely at the end of the projection period. It is evident that Asians and coloureds will, due to rapid fertility transition, pass through the various stages of demographic transition at a much faster pace than either whites or blacks.

It is interesting to note that the changes in the age structure of the different groups over time, by and large, resemble those of their continent of origin as can be seen in United Nations (1988b). The Asian and coloured groups show an East Asian trend, which is characterized by an extremely fast transition pace.

As in Africa as a whole, blacks went through a phase of juvenation during 1945-1970 as a result of a significant increase in the percentage of children due to mortality decline. The median age declined from 18,6 years in 1945 to 17,2 years in 1970, but then recovered and is projected to rise continuously to reach 24,4 years in 2035. It is evident that this ageing process will primarily result from the decline in the percentage of children (from 45,6% in 1970 to 32,1% in 2035) with some contribution from the increase of the percentage of elderly (from 2,9% in 1970 to 5,3% in 2035).

By contrast, among whites the median age fluctuated around 26 years during 1945-1970. Thereafter it rose rapidly to 29,5 years in 1985 and is projected to reach 39,9 years in 2035. While this ageing process between 1945 and about 2000 can be attributed mainly to the decline in the child population (from 31,0% to 20,8%) and a less important increase in the elderly population from 6,2% to 9,6%, it is envisaged that thereafter the increase of the elderly population will be the dominant factor. While the percentage decline of children during 2000-2035 is expected to be less than two percentage points (from 20,8% to 19,0%), the proportion of the white elderly is projected to increase from 9,6% to 18,3%.

Among coloureds, a phase of juvenation occurred during 1945-1965 as a result of the increase in the percentage of children and a very slight decrease in the percentage of elderly, with the median age declining from 19,0 years to 17,4 years. Thereafter, the proportion of children in the population declined rapidly by 10 percentage points, reaching 35,4% in 1985, while the population of the elderly showed a virtually negligible increase from 3,1% to 3,5%. This trend is expected to continue up to about 2000. Thereafter the increase of the elderly will make a

TABLE 9 : PERLOFF SHIFTS WITH REGARD TO DISTRICTS IN A PROVINCIAL CONTEXT, 1980-1985, BY RACE

Province or State	ASIANS		WHITES		COLOUREDS		BLACKS	
	65+ *	Total population **	65+	Total population	65+	Total Population	65+	Total population
Cape	4,6 (3) -6,4 (5) -1,8	2,6 (21) -2,5 (16) 0,1	35,5 (33) 30,9 (74) 4,6	17,5 (22) -37,2 (87) -19,7	76,5 (34) -86,4 (74) -10,0	68,4 (23) -86,0 (86) -17,7	10,2 (40) -11,8 (62) -1,6	17,2 (29) -15,7 (80) 1,5
Natal	80,7 (7) -84,0 (13) -3,2	85,0 (8) -92,5 (24) -7,5	16,9 (21) -16,4 (17) 0,5	14,9 (29) -11,4 (19) 3,6	6,1 (21) -2,7 (16) 3,5	6,5 (23) -7,5 (15) -0,1	0,7 (4) -17,7 (34) -17,0	0,1 (1) -19,1 (37) -19,0
OFS			2,9 (13) -11,3 (37) -8,4	3,8 (7) -10,0 (43) -6,2	2,1 (29) -4,5 (19) -2,4	1,8 (17) -1,8 (33) 0,0	7,9 (11) -13,1 (39) -5,2	9,9 (8) -13,9 (42) -4,0
Transvaal	14,7 (9) -9,6 (16) 5,1	12,3 (19) -5,0 (45) 7,4	44,7 (35) -41,5 (33) 3,2	63,8 (33) -41,4 (36) 22,3	15,3 (36) -6,4 (32) 8,9	23,2 (40) -4,7 (29) 18,6	26,8 (24) -26,0 (44) 0,7	13,4 (17) -39,7 (52) -26,3
KwaZulu							24,8 (13) -19,8 (13) 4,9	25,9 (12) -8,5 (14) 17,5
KwaNdebele							9,7 (2) - (-) 9,7	11,0 (2) - (-) 11,0
Gazankulu							2,5 (3) -0,1 (1) 2,4	4,9 (4) - (-) 4,9
Lebowa							8,5 (5) -11,5 (6) -3,0	5,8 (6) -3,1 (5) 2,6
QwaQwa							1,8 (1) - (-) 1,8	2,4 (1) - (-) 2,4
KaNgwane							7,2 (3) - (-) 7,2	9,5 (3) - ( ) 9,5

* Districts with less than 20 elderly persons excluded

** Districts with less than 20 total persons excluded

TABLE 10: MEDIAN AGES: 1945-1985, PROJECTIONS 1990-2035

Year	Total	Asians	Whites	Coloureds	Blacks
1945	20,07	16,25	26,19	19,02	18,56
1950	19,94	16,02	26,42	18,71	18,38
1955	19,65	16,24	26,31	18,29	18,11
1960	19,13	16,96	25,87	17,79	17,64
1965	18,76	17,99	25,76	17,39	17,25
1970	18,74	19,10	26,06	17,59	17,15
1975	19,11	20,30	26,85	19,03	17,35
1980	19,56	21,85	28,25	19,73	17,69
1985	19,98	23,31	29,54	21,35	17,93
Projections					
1990	20,33	24,76	31,05	22,70	18,12
1995	20,64	26,39	32,60	24,02	18,30
2000	20,86	28,15	34,14	25,46	18,54
2005	21,23	30,06	35,81	26,79	18,89
2010	22,25	31,71	37,34	28,29	19,41
2015	23,54	33,20	38,48	29,95	20,11
2020	24,92	34,67	39,09	31,79	20,98
2025	26,54	35,93	39,62	33,45	22,00
2030	28,30	37,03	39,90	34,95	23,13
2035	30,13	37,87	39,90	36,30	24,38

more significant contribution to the structural changes in the age distribution and eventually will be the dominant factor in the ageing process among coloureds, increasing from 4,0% to 12,7% during 2000-2035. The median age is expected to rise from 25,5 years to 36,3 years in the same period.

After a slight decrease in the median age from 16,2 years to 16,0 years during 1945-1950, Asians have been ageing continuously and are expected to reach a median age of 37,9 years in 2035. This ageing process was clearly induced by a drastic decline in the percentage of children, since the percentage of elderly also showed a slight decline during 1950-1970 from 2,6% to 1,9%

Despite a slight increase after that period, the increase of Asian elderly is expected to play a dominant role only after about 2000 by increasing from 4,6% to 14,7% in 2035, while the percentage of children will decrease relatively slowly from 27,0% to 20,2% in the same period.

It is evident from Figure 11 that among all four population groups the increase in the percentage of elderly will be the dominant factor in the ageing process once the percentage of children has reached relatively low levels.

With regard to the total population it is clear that the proportion of the black group outweighs the other three groups to such an extent that the changes in the age structure are determined by the demographic trends prevailing among this group. Thus, the dominant factor in the ageing process will be the decrease in the proportion of children to about 25,7% in 2035 and a relatively small increase in the proportion of the elderly to 7,5% The median age will rise to 30,1 years.

6.2 Trends in the dependency ratios

The changes in an age structure associated with the ageing of a population are reflected in the dependency ratios (see Fig. 12), i.e. the youth dependency and the old-age dependency ratios which are respectively defined as the number of persons under 15 years divided by the number of

FIGURE 11: PERCENTAGE OF POPULATION AGED UNDER 15 AND OVER 64 AND MEDIAN AGE: 1945-2035

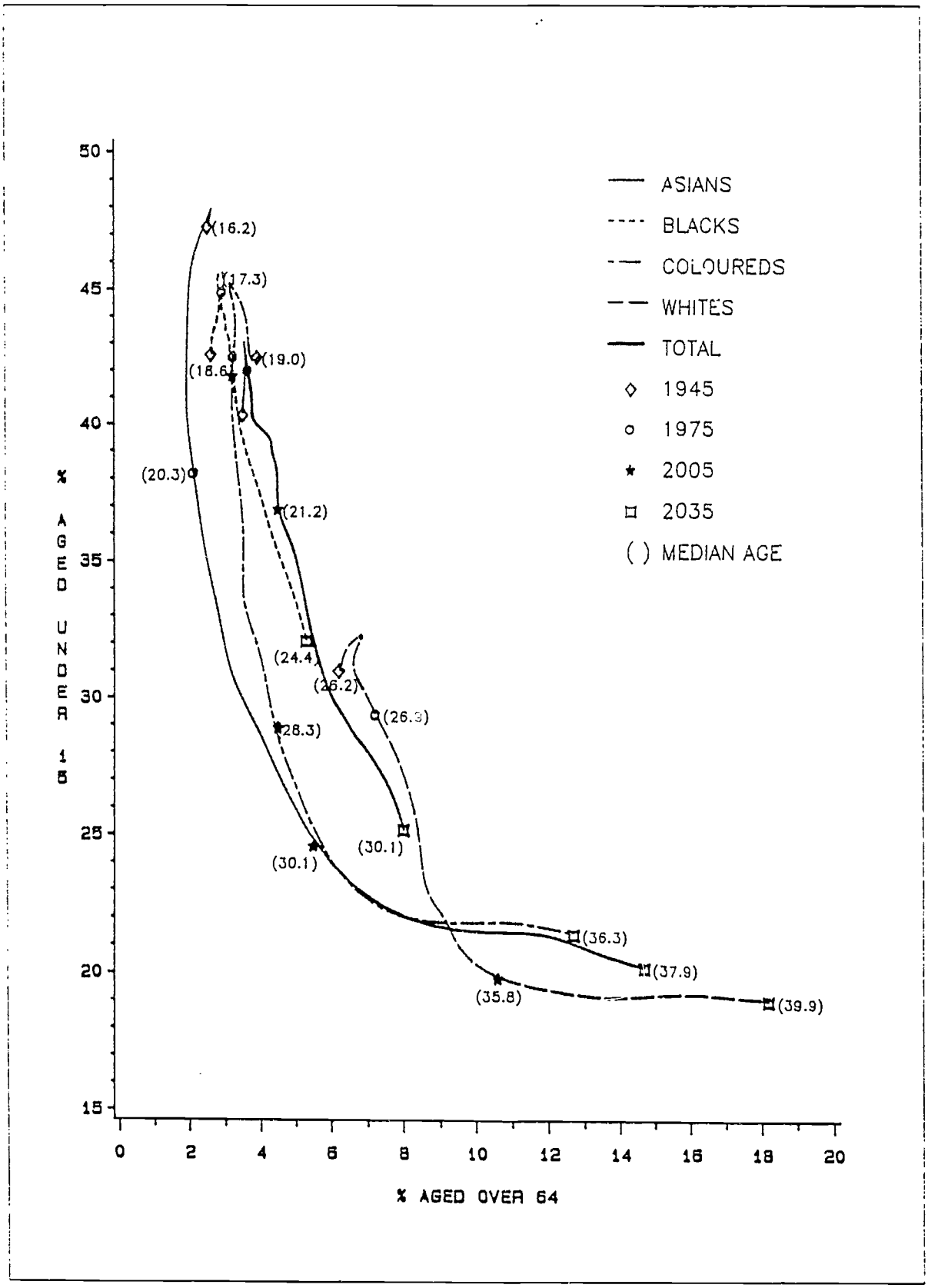
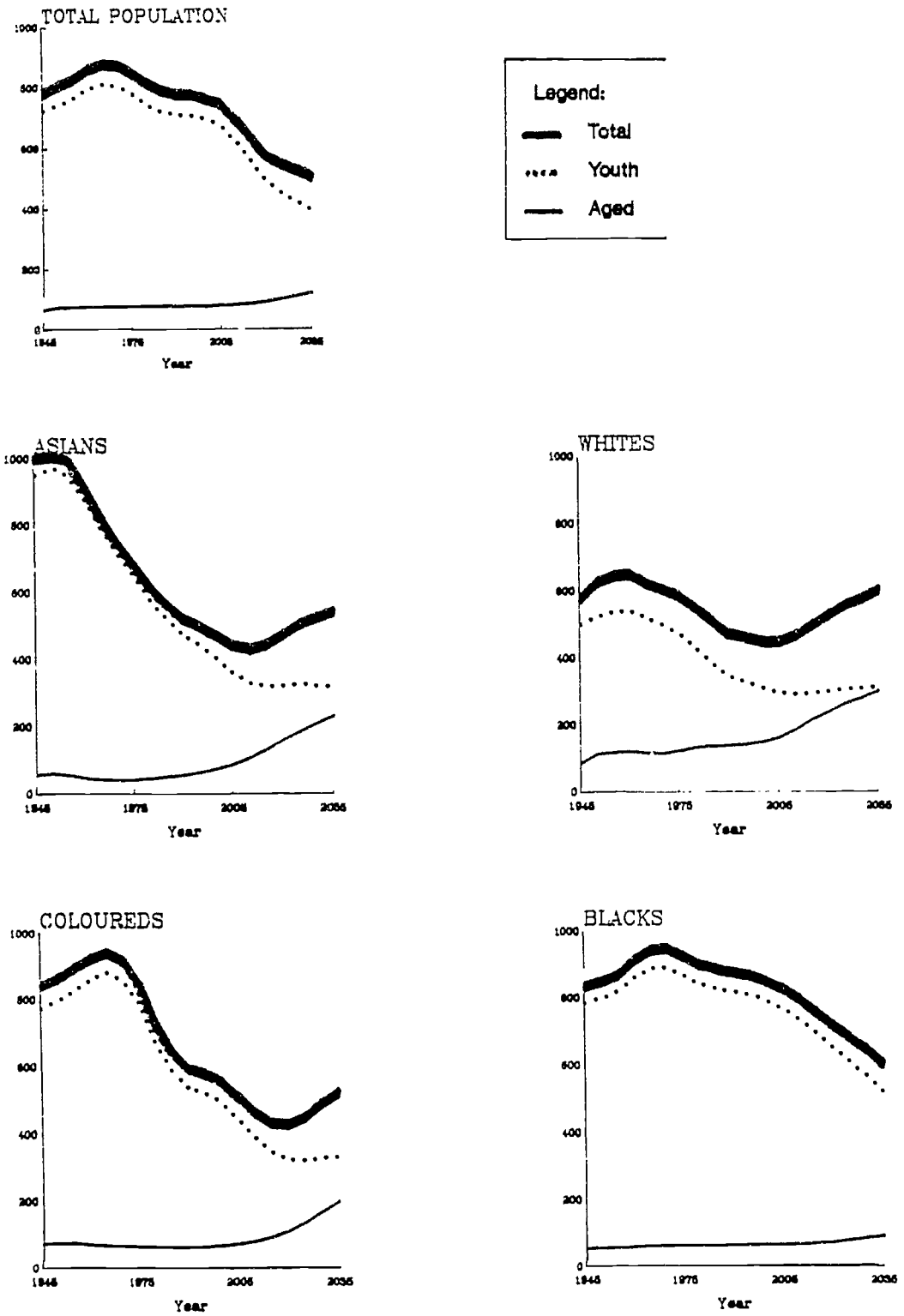


FIGURE 12: DEPENDENCY RATIOS: 1945-2035

(per 1000 persons 15-64 years)



persons aged 15-64, and the number of persons over 64 years divided by the same number. The total population dependency ratio is the sum of these two ratios, expressed per 1000.

It is evident that the sharp decline in fertility among Asians since the late forties caused a substantial decline in youth dependency and in the total dependency ratio, which was sustained up to 1985 despite a slight rise in old-age dependency from 34 in 1970 to 44 in 1985. Youth dependency is expected to level out just above 300 by 2015, and then the sharp increase in old-age dependency will cause the total dependency ratio to rise.

After a slight increase following World War II, the youth dependency ratio as well as the total dependency among whites has been decreasing since the sixties. Although the increase in the proportion of elderly people led to an almost monotonic rise in the old-age dependency ratio from 78 in 1945 to 126 in 1985, it has not yet outpaced the decline in youth dependency, resulting in an increase in the total dependency burden among whites. However, this is expected to occur by the beginning of the next century when the youth dependency ratio is projected to fluctuate around 300, and both old-age dependency and total dependency, will show a sharp upward trend.

Among coloureds the youth dependency ratio reached a peak of 875 in 1965 and since then fell sharply to 580 following the considerable decline in fertility. The only slight increase in the percentage of elderly people in the decade between 1975 and 1985 has not as yet caused an increase in old-age dependency because of the increase in the numbers of the middle-age group. An upward trend in total dependency is projected for coloureds only after 2020 when a rather significant increase in old-age dependency is projected concomitant with a minimum level in youth dependency.

In the case of blacks, the youth dependency ratio rose from 780 in 1945 to 883 in 1970 and since then showed a modest decline to 821 in 1985 following the slight decline in fertility. The downward trend is projected to continue during the projection period. The old-age dependency ratio among blacks showed a slight rise from 48 in 1945 to 56 in 1970 and has since then remained constant. Only a very slow rise to 84 in 2035 is projected, which will not affect the downward trend of the total dependency ratio significantly.

It is clear that among the four population groups in 1985 whites had the heaviest old-age dependency and the lowest youth dependency, which is in accordance with their advanced stage of ageing and level of development. In contrast, black adults must support a proportionally much larger dependent child population, in fact in 1985 more than twice as great a burden as whites, and a 60% and 42% higher burden than Asians and coloureds respectively.

This means, for example, that in 1985 for every five persons in the working age group there were approximately four young dependents among blacks compared with approximately three among coloureds, 2,6 among Asians and two among whites. Coale (1964) draws attention to the ironic fact that "industrialized countries that, better able to afford a high burden of child dependency, have only half the proportion of children found in underdeveloped areas, and that, having abandoned the institutions giving a meaningful role to the aged, have four times the proportion of the elderly found in pre-industrialized countries". This probably depicts the situation in this country with regard to blacks and whites, while Asians and coloureds find themselves in an intermediate position. It is evident from Figure 12 that the projected trend in the various ratios among blacks will be similar to the trend in countries defined as less developed by the UN (1988b), whereas the trend among the other three groups will follow that of the more developed regions.

Thus, it can be expected that the age structures of the Asians, coloureds and whites will become economically less favourable after the turn of the century, as a result of a reduction in the proportion of adults in the respective population groups. Although the size of the non-productive population relative to the size of the productive population among blacks is expected to decrease up to 2035, thus making the age structure economically more favourable, it is likely that the total dependency ratio among this group will also turn upwards in the more distant future and follow the course of the other three population groups.

In the case of the total population, the downward trend of youth dependency and total dependency since 1965 is expected to continue till the end of the projection period, despite a slight upward trend of old-age dependency. It is clear that the influence of the trend among blacks on the trend among the total population overrides the weight of the trends among the other three groups significantly.

7. EXPLANATIONS FOR THE OBSERVED AND PROJECTED STRUCTURAL CHANGES BETWEEN 1945-2025

In this section an attempt is made to explain the observed and expected changes in the age structures of the South African population by analysing the interaction of age structures and other demographic variables. As mentioned earlier, populations have a rather invariable age structure before they enter the process of demographic transition, i.e. the relationship of the totals of different age groups to the total population is fairly constant. However, in the process of demographic transition populations are characterized by a changing age composition, since the increase of an age group may be larger or smaller in proportion to the increase of the total population. Figures 13a-17a show the percentage increase in population size in a specific age group in 1985 above 1945 (=100%) in the same age group. The dotted horizontal line expresses the total population increase over the relevant period. The projected increases in the total population and the four population groups for the period 1985-2025 are shown in Figures 13b-17b. It should be emphasized that these increases do not relate to the absolute number in each age group, but are purely relative with respect to the prior date.

It is evident that, except in the case of coloureds, the percentage increase of older age groups was slightly larger than that of the relevant total population during 1945-1985. However, this trend is expected to be accentuated (during 1985-2025) among all four population groups and the total population when the proportions of the population in the older age groups will increase significantly and those in the younger age groups will decline.

To investigate these differences in the proportional increase of age groups, the effects of fertility, mortality and the initial age distribution were analysed. Changes in the distribution of population versus age that occurred in 1950-1985 are analysed with respect to observed trends in fertility and mortality in the past. Projected changes in the age distribution during 1985 and 2020 are related to expected fertility and mortality trends in this period.

The method used is "comparative population projections" as described in United Nations (1956) and modified in United Nations (1988b). Different population projections are calculated with the same real base population, but under different assumptions regarding fertility and mortality trends (see Table 11). Comparison of the age structure of the projected populations then allows the illustration of the effect of variations in these factors as well as that of the initial age distribution on age structure. A projection program (Shorter 1970) was used that covers 35 years, which is sufficient for this purpose.

For each population group as well as for the total population, a set of four comparative projections was made for two periods, 1950-1985 and 1985-2020. The abbreviations used in United Nations (1988b) are adopted: F = fertility, M = mortality, V = variable, C = constant.

(a) In the FVMV variant the observed fertility and mortality changes for each population group were used for the first period. For the second period the medium projection for the black and the low projections for the other population groups were used.

(b) In the FVMC variant fertility is assumed to change as in the FVMV variant and mortality is assumed to remain constant at the level of 1950 and/or 1985

(c) In the FCMV variant fertility is regarded as remaining constant at the level of 1950 and/or 1985 and mortality is assumed to change as in the FVMV variant.

(d) In the FCMC variant both fertility and mortality are kept constant.

The FVMV and FCMV variants on the one hand, and the FVMC and FCMC variants on the other, differ only in their assumptions regarding fertility during the projection period. A comparison of the age distribution at the end of the projection period of either the FVMV and FCMV variant, or the FVMC and FCMC variants, therefore illustrates the effect of fertility.

Conversely, a comparison of either the FVMV and FVMC variants or the FCMV and FCMC variants illustrates the effect of mortality. The very slight differences in the obtained values between the two alternative measures can be ascribed to interactions between fertility and mortality. The age structure of a population reflects past trends in the main components of population growth, and it is thus also one of the determinants of the subsequent pattern. As was

FIGURE 13a: TOTAL POPULATION INCREASE IN 1985 OVER AND ABOVE 1945, BY AGE

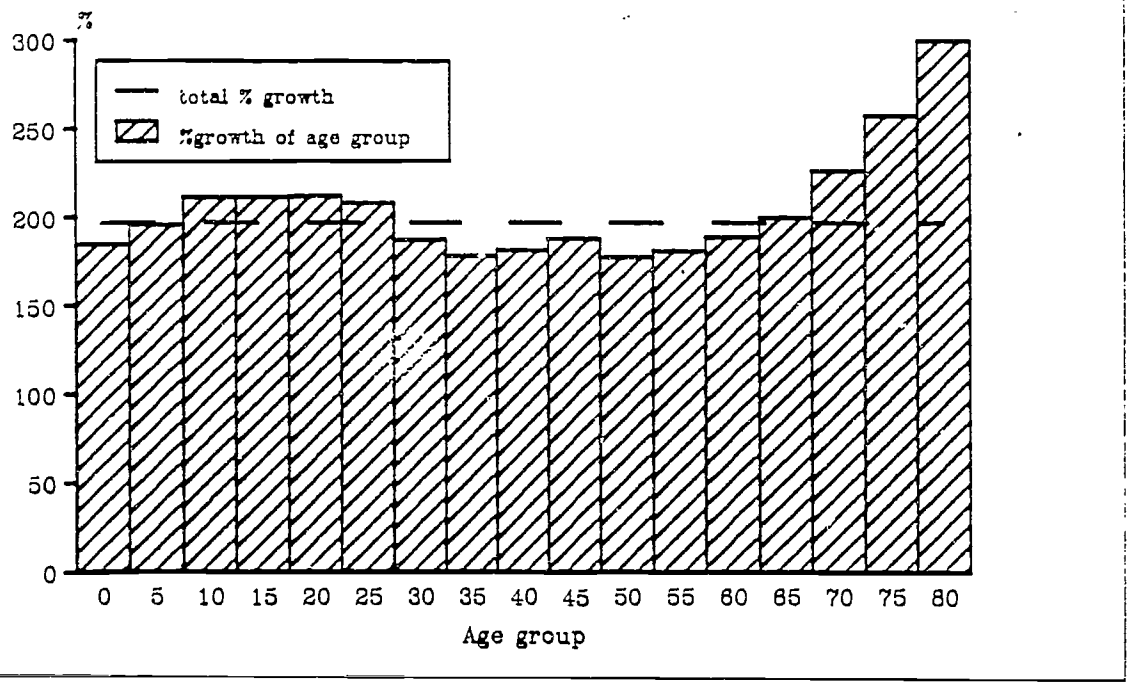


FIGURE 13b: TOTAL POPULATION INCREASE IN 2025 OVER AND ABOVE 1985, BY AGE

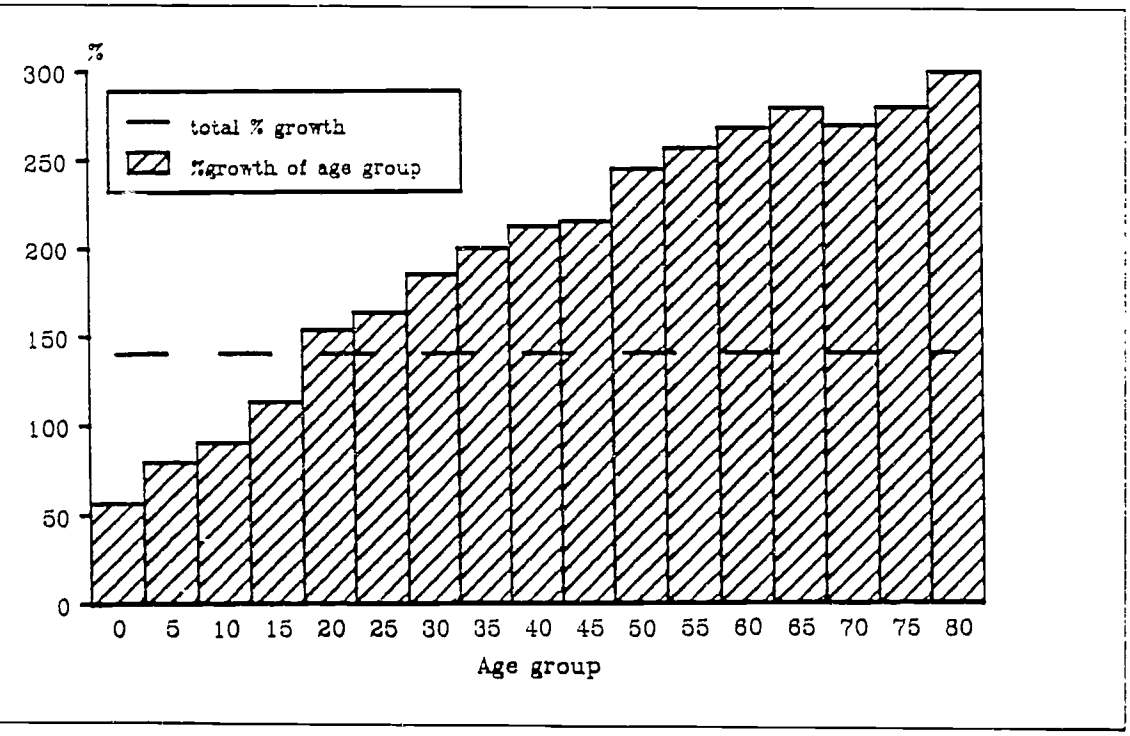


FIGURE 14a: ASIAN POPULATION INCREASE IN 1985 OVER AND ABOVE 1945, BY AGE

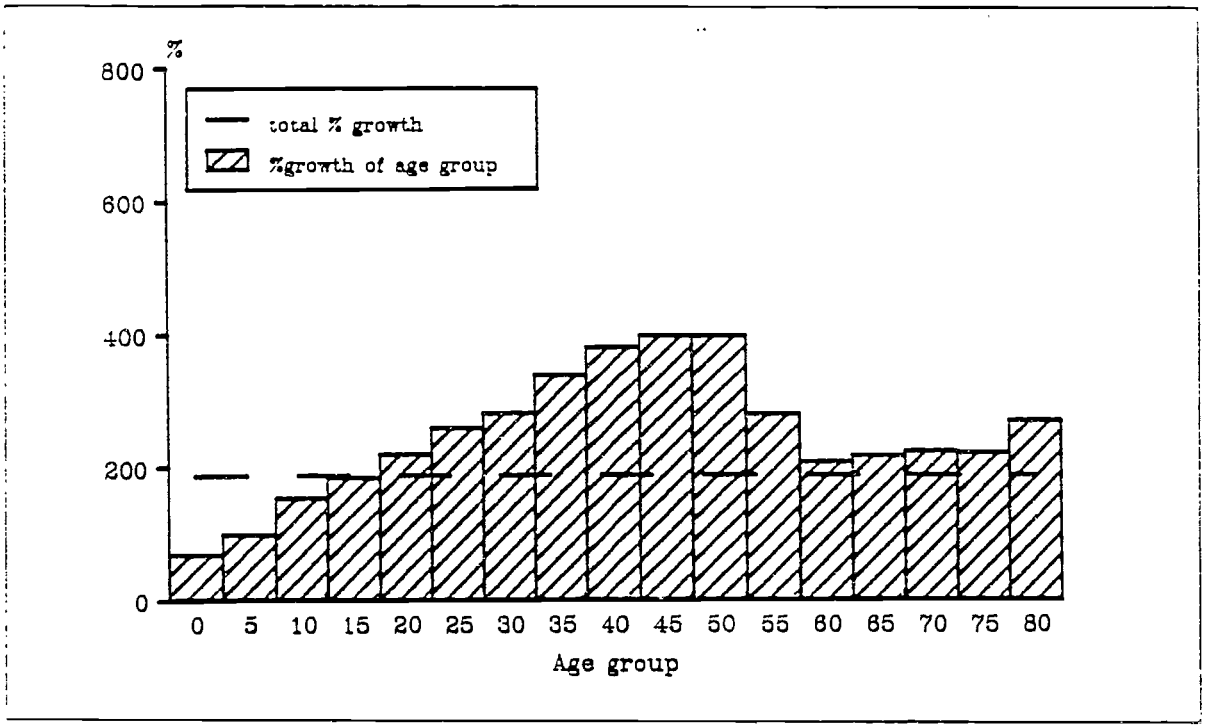


FIGURE 14b: ASIAN POPULATION INCREASE IN 2025 OVER AND ABOVE 1985, BY AGE

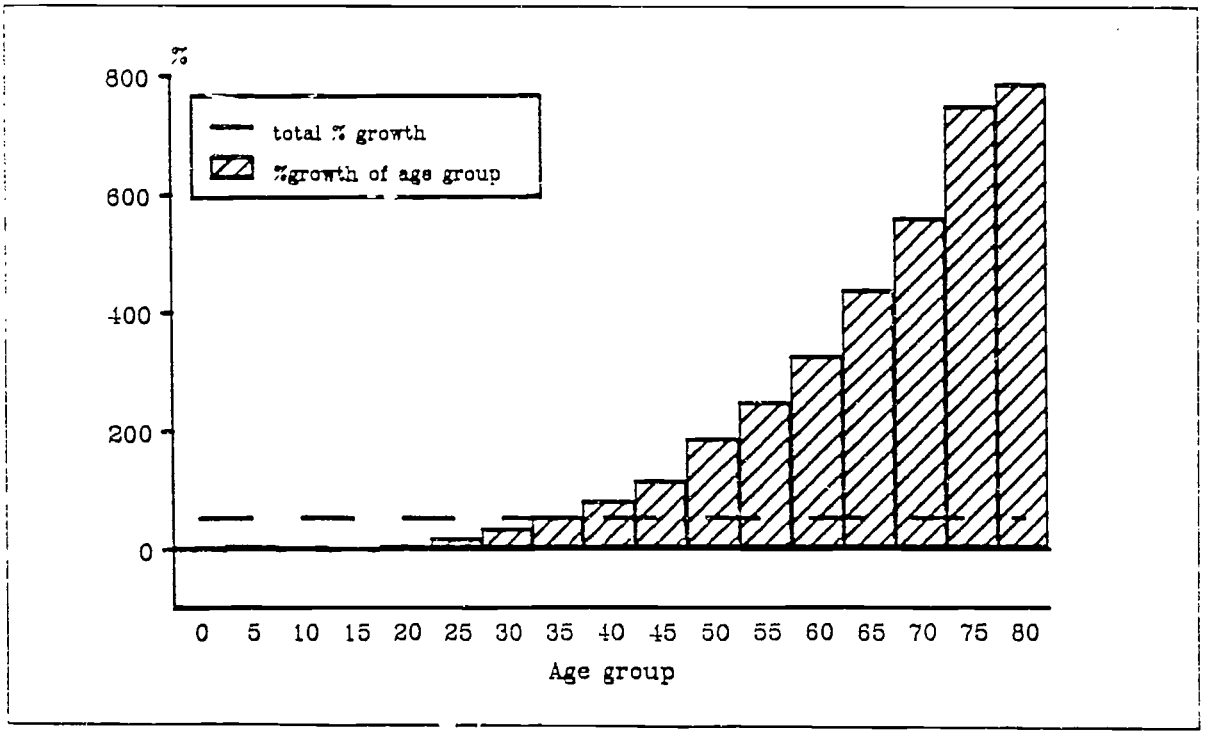


FIGURE 15a: BLACK POPULATION INCREASE IN 1985 OVER AND ABOVE 1945, BY AGE

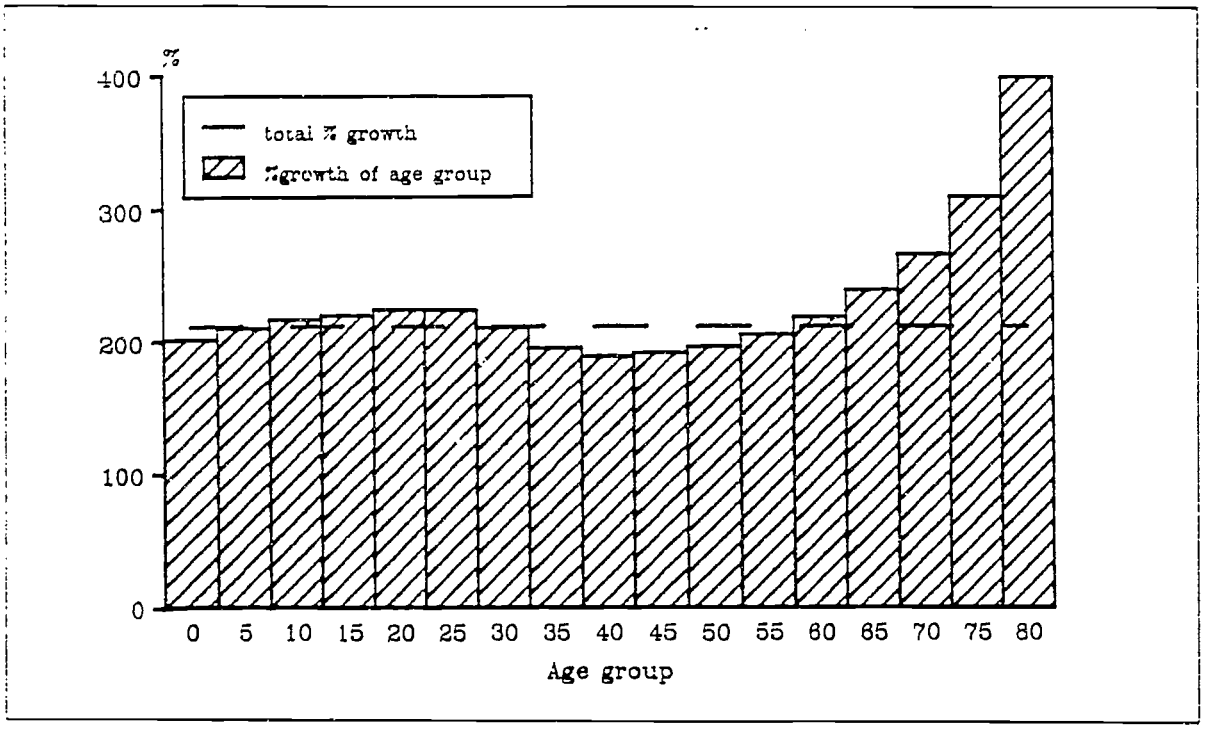


FIGURE 15b: BLACK POPULATION INCREASE IN 2025 OVER AND ABOVE 1985, BY AGE

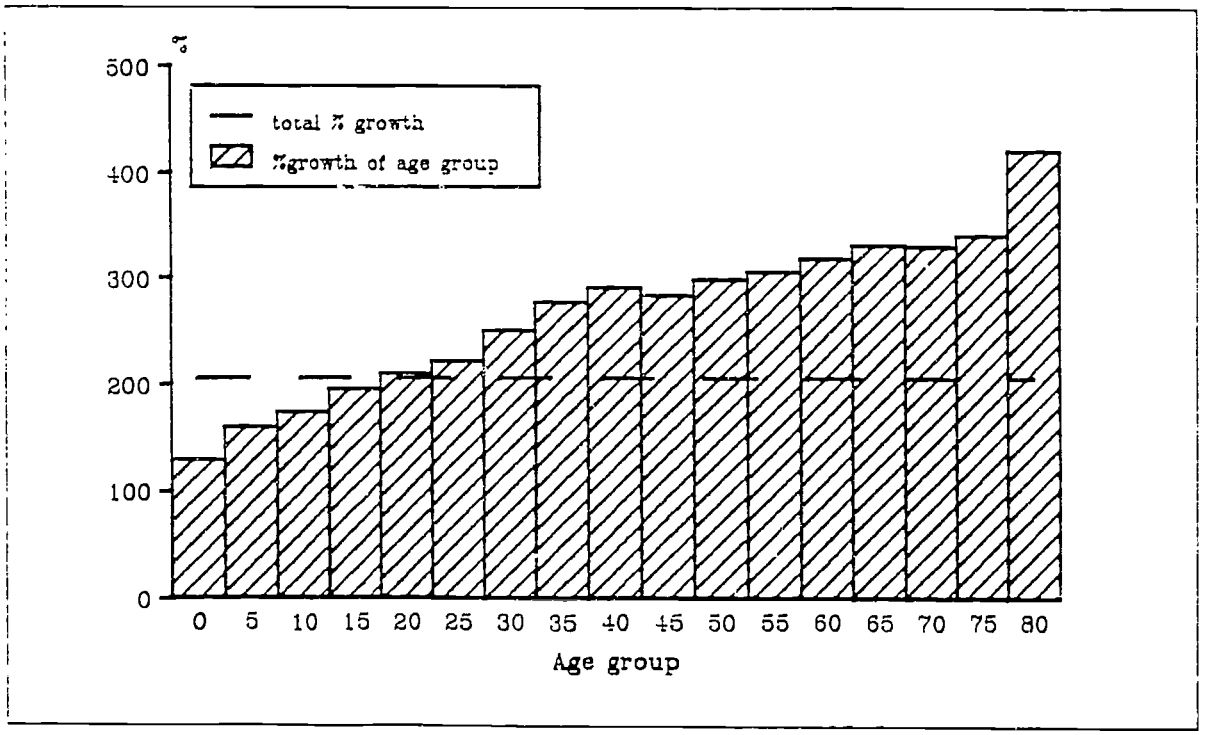


FIGURE 16a: COLOURED POPULATION INCREASE IN 1985 OVER AND ABOVE 1945, BY AGE

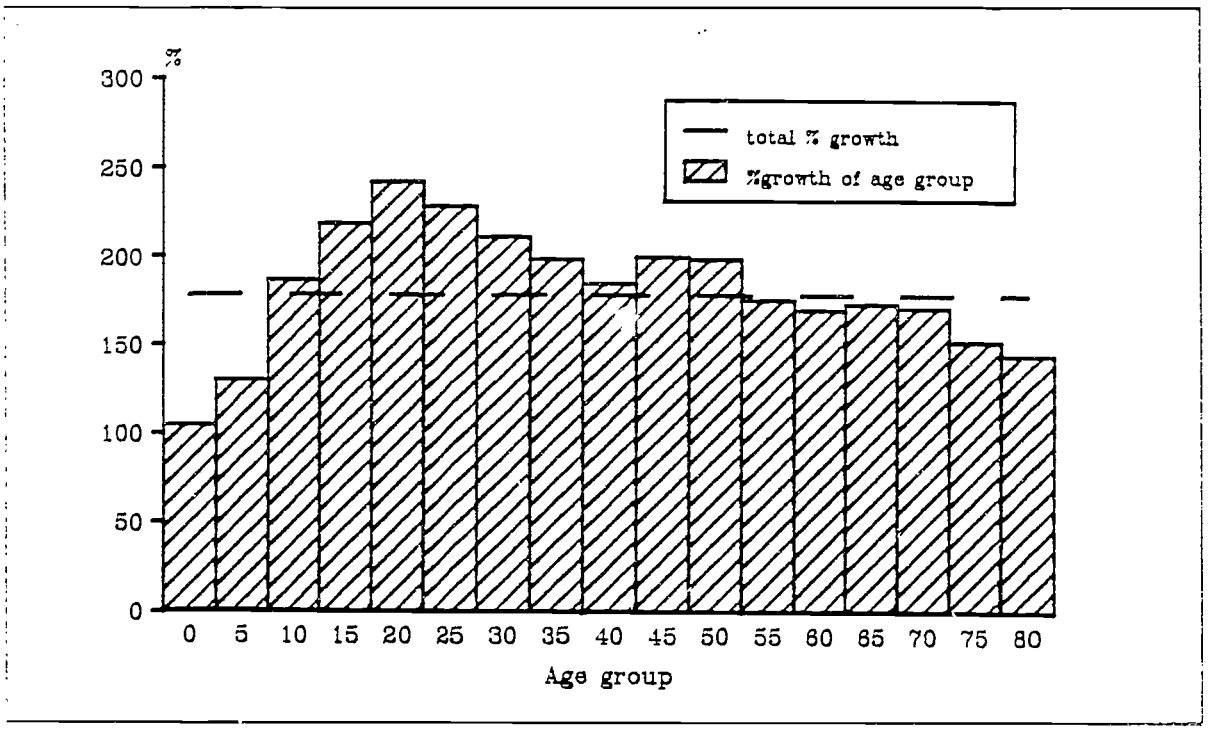


FIGURE 16b: COLOURED POPULATION INCREASE IN 2025 OVER AND ABOVE 1985, BY AGE

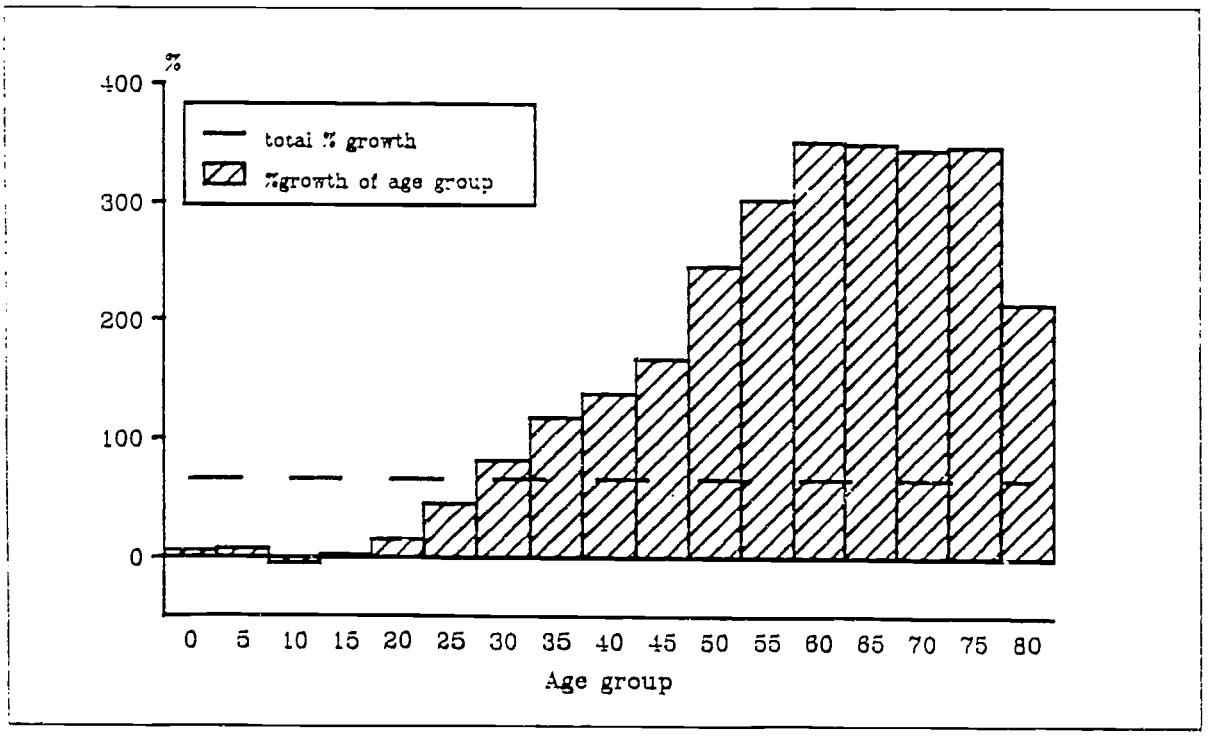


FIGURE 17a: WHITE POPULATION INCREASE IN 1985 OVER AND ABOVE 1945, BY AGE

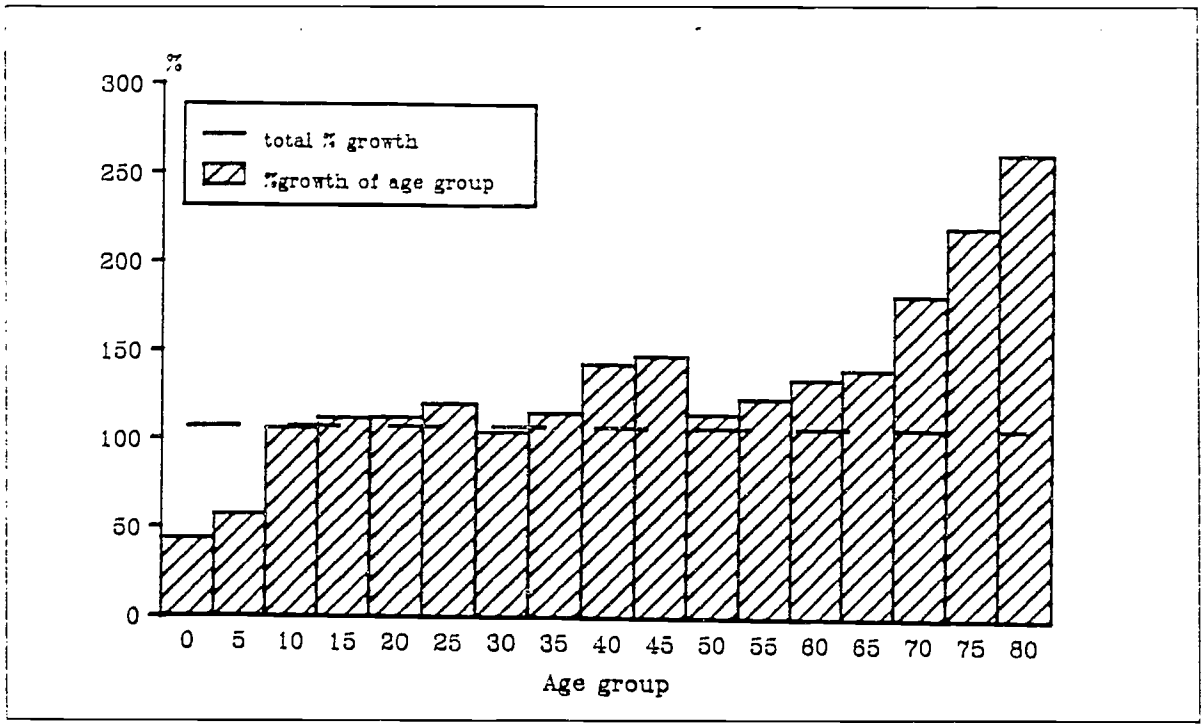


FIGURE 17b: WHITE POPULATION INCREASE IN 2025 OVER AND ABOVE 1985, BY AGE

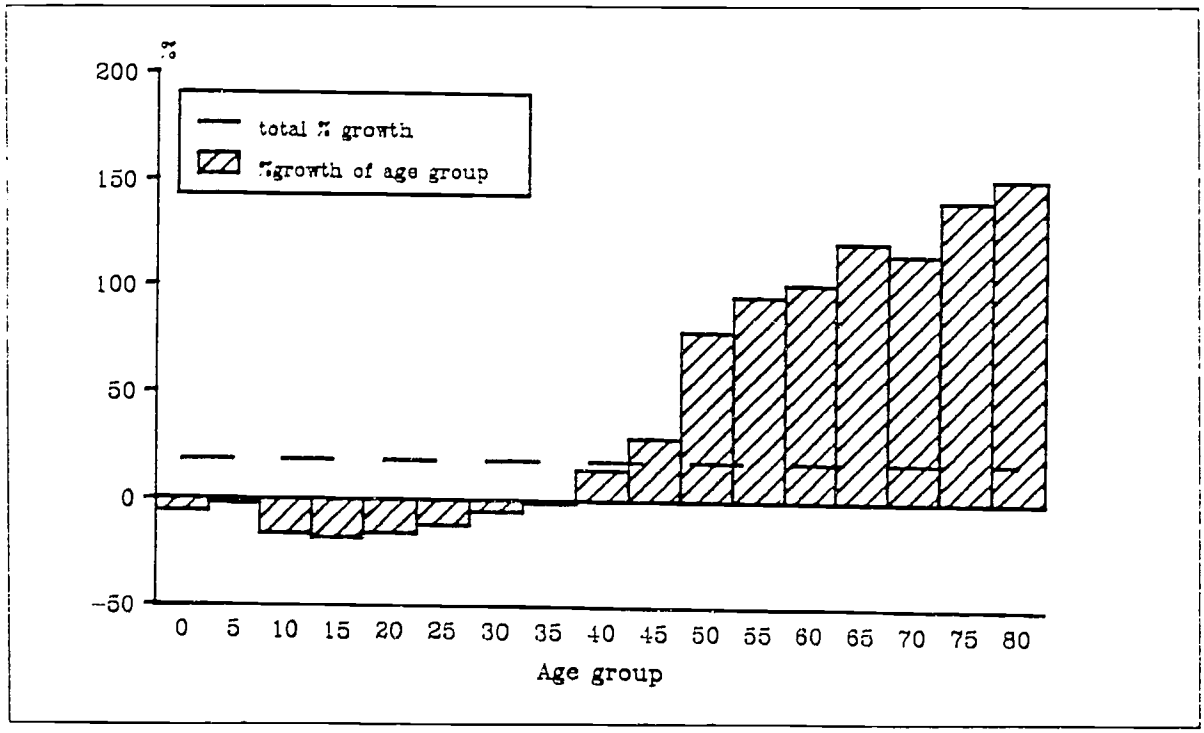


TABLE 11: ASSUMPTIONS OF TOTAL FERTILITY RATE (TFR) AND EXPECTATION OF LIFE AT BIRTH (E(0)), BY RACE, 1950-2020

YEAR	BLACKS			COLOUREDS		
	TFR	E(0) Male	E(0) Female	TFR	E(0) Male	E(0) Female
1950	6,82	41,2	44,0	6,30	46,3	48,2
1950-1955	6,83	43,6	46,5	6,38	49,1	52,5
1955-1960	6,73	51,7	54,9	6,54	51,6	55,9
1960-1965	6,73	53,8	57,1	6,59	52,0	56,8
1965-1970	6,50	55,3	58,8	6,00	50,6	56,6
1970-1975	6,25	56,0	59,5	5,15	51,3	58,1
1975-1980	5,80	57,3	60,8	3,72	55,4	62,2
1980-1985	5,60	58,8	62,7	3,13	55,5	63,2
1985	5,49	59,3	63,6	3,03	56,7	64,0
1985-1990	5,38	59,7	64,7	2,95	57,2	64,8
1990-1995	5,16	61,4	66,3	2,74	59,0	66,4
1995-2000	4,96	63,1	68,0	2,53	60,8	68,1
2000-2005	4,73	64,9	69,7	2,31	62,8	69,9
2005-2010	4,41	67,0	71,5	2,10	64,9	71,7
2010-2015	4,05	68,5	73,4	1,90	67,1	73,6
2015-2020	3,78	69,5	75,0	1,90	69,5	75,7

YEAR	ASIANS			WHITES		
	TFR	E(0) Male	E(0) Female	TFR	E(0) Male	E(0) Female
1950	6,29	55,6	56,2	3,41	63,7	68,9
1950-1955	6,11	58,0	59,6	3,37	64,4	70,3
1955-1960	5,44	58,6	61,2	3,46	64,4	71,0
1960-1965	4,71	59,7	63,0	3,29	64,2	71,1
1965-1970	4,12	59,4	64,0	3,02	64,2	71,8
1970-1975	3,61	59,6	64,9	2,83	65,3	72,6
1975-1980	2,92	61,9	67,3	2,15	66,3	73,7
1980-1985	2,67	62,7	69,2	2,07	67,0	74,5
1985	2,57	63,3	69,6	1,98	67,6	75,0
1985-1990	2,48	63,9	70,5	1,90	67,8	75,2
1990-1995	2,29	65,2	71,9	1,79	68,7	76,1
1995-2000	2,10	66,6	73,4	1,79	69,5	77,1
2000-2005	1,90	68,0	75,0	1,79	70,3	77,8
2005-2010	1,90	69,2	76,3	1,90	71,1	78,0
2010-2015	2,00	70,5	77,8	2,00	72,0	78,1
2015-2020	2,00	72,0	78,0	2,05	72,3	78,3

pointed out in United Nations (1988b), changes in the age distribution during the relatively short projection period occur (unless the base population is a stable population) even if fertility and mortality remain constant. These changes cannot be ascribed to changes in fertility or mortality, but can be interpreted as the effect of the initial age distribution which is determined by the fertility and mortality patterns before the projection period. This effect is measured as the difference between the initial and the projected percentage of the age group considered in the FCMC variant.

The most important results are presented in Table 12. The absolute change [(3)=(2)-(1)] is also equal to the sum of factors (4), (5) and (6). It is evident that the findings correspond closely with those of United Nations (1988b):

(a) During both periods changes in fertility have a significantly larger effect on the percentage of population under age 15 than changes in mortality, except among whites in 1985-2020 and among blacks in 1950-1985. This is understandable, since fertility among whites is expected to fluctuate around replacement level in 1985-2020. Among blacks fertility has declined only slightly in 1950-1985, although expectation of life at birth has risen considerably during this period which is visible in the relatively strong mortality effect that, however, does not exceed the fertility effect. A strong fertility effect among blacks is noticeable in the second projection period when fertility is expected to decline considerably. The reduction of fertility has also caused a slightly larger increase in the proportion of elderly persons among the three non-black groups than mortality in 1950-1985 and the same trend is projected for blacks over the period 1985-2020. Among coloureds the somewhat surprising negative mortality effect in the first period is the result of increasing mortality among coloured male adults in the late 1960s.

(b) An increase in expectation of life at birth has not only a positive effect on the percentage of elderly people over both periods under review among all population groups (except among coloureds in 1950-1985 as mentioned above), but also on the percentage of the age group under 15 years over the period 1950-1985, thus contributing to population juvenation. Especially in the case of blacks and coloureds this effect is relatively strong. In the second period the effect of declining mortality on the population under 15 years becomes negative among the three non-black groups, whereas its positive effect on the elderly age group becomes increasingly strong, thus accelerating population ageing. In the case of blacks, declining mortality is expected to exert a positive influence on the proportion of the young and the elderly age groups over the second period.

(c) Although the effects of the initial age distribution upon subsequent changes in the age structure are relatively small over the first period under review, they become increasingly stronger during the second period among the three non-black population groups with regard to the population under age 15 (where it exerts a negative influence) as well as the elderly (where its influence is positive). In the case of the three non-black groups, the projected increase in the age group 65 years and over is mostly due to the initial age distribution. Even in the absence of future changes in fertility and mortality significant increases in the percentage of the population over 64 are inevitable as a result of the age distribution in 1985.

(d) The underlying reasons for these findings can be seen in Figures 18-21, which depict the real and the modelled proportional population increases (prior date = 100%) as obtained from the comparative population projections. The solid line depicts the real population increase (FVMV variant) for the total population and the different subgroups. The dotted line that runs systematically lower, was obtained by assuming constant mortality at the initial level (FVMC variant). The dotted line above the solid line was obtained by assuming constant fertility at the initial level (FCMV variant). Thus, the shaded areas between the solid and the dotted lines represent the effect of changing mortality (differences between the FVMV and FVMC variant) and fertility

TABLE 12: ANALYSIS OF CHANGES IN THE PERCENTAGE OF POPULATION AGED UNDER 15 AND OVER 64, 1950-1985 AND 1985-2020, BY RACE

	< 15 years							
	Asians		Blacks		Coloureds		Whites	
	1950-1985	1985-2020	1950-1985	1985-2020	1950-1985	1985-2020	1950-1985	1985-2020
(1) Initial %	47,9	33,0	43,1	43,7	42,5	35,4	31,8	24,9
(2) % at the end	33,3	21,4	43,7	37,7	36,2	22,3	25,5	19,2
(3) Absolute change[a]	-14,6	-11,6	0,6	-6,0	-6,3	-13,1	-6,3	-5,7
(4) Fertility effect[b]	-15,0	-4,7	-2,5	-6,1	-10,9	-8,1	-7,1	-0,2
(5) Mortility effect[c]	0,9	-1,1	2,3	0,8	2,7	-0,6	0,3	-0,5
(6) Effect of the initial age distribution	-0,5	-5,8	0,8	-0,7	1,9	-4,4	0,5	-5,0

	> 64 years							
	Asians		Blacks		Coloureds		Whites	
	1950-1985	1985-2020	1950-1985	1985-2020	1950-1985	1985-2020	1950-1985	1985-2020
(1) Initial %	2,6	2,8	2,6	3,0	3,7	3,5	6,4	8,4
(2) % at the end	2,7	10,4	3,0	3,9	3,2	7,4	8,9	15,1
(3) Absolute change[a]	0,1	7,6	0,4	0,9	-0,5	3,9	2,5	6,7
(4) Fertility effect[b]	0,9	1,1	0,2	0,5	0,5	1,1	1,0	0,4
(5) Mortility effect[c]	0,0	2,2	0,2	0,3	-0,4	1,2	0,4	1,1
(6) Effect of the initial age distribution	-0,8	4,3	0,0	0,1	-0,6	1,6	1,1	5,1

a (3) = (2) - (1) and (3) = (4) + (5) + (6)

b Average of FVMV - FCMV and FVMC - FCMC

c Average of FVMV - FVMC and FCMV - FCMC

(differences between the FVMV and FCMV variant) respectively. The width of the bars relates to the percentage of population in the age group at the beginning of the 35-year period. There are two reasons why the effects of fertility exceed those of mortality:

(i) The effects of changing fertility on population increase are more age selective than mortality effects. (Although fertility effects can only show up for ages under 35 years which is the projection period, the same trend will be evident for a longer projection period.)

While changing fertility has an immediate and direct effect on the proportional population increase at very young ages, changing mortality has an immediate direct effect on the proportional population increase of all ages, so that it tends not to change the overall population distribution drastically. Figures 18a - 21a show clearly that reduced mortality has benefited all ages, thus enlarging the age pyramid without drastically changing its shape. On the other hand, changes in births modify the number of entrants of new cohorts to the pyramid, thus changing both the present and the future structure of the population.

(ii) Pronounced mortality effects are mainly reflected in the elderly groups which comprise only a small proportion of the population, whereas fertility effects affect the young age groups which comprise a significantly larger proportion of the population. Thus, even if the fertility effect for a young age group and the mortality effect for an old age group may be comparable in proportional terms (height) (Figures 18 - 21), they are not comparable in absolute terms (area) because of the difference in size of the two age groups (width).

(e) There are three reasons for the increasing relative importance of mortality effects on the age structure:

(i) After fertility has approximated the replacement level, absolute changes are expected to be rather small so that its effect on changes in the age distribution is insignificant as is evident from Figures 18b and 21b, which show the small fertility effect on the age structures of Asians and whites during 1985-2020. Although absolute changes in the expectation of life at birth may also be small at very low levels of mortality, even a small increase in the expectation of life at birth tends to be associated with a significant reduction of death rates at old ages (see Coale *et al.* 1983). This is reflected in the relatively large proportional increase in the age group 60 years and over among whites and Asians (Figures 18b and 21b).

(ii) The expected increase in the proportion of the elderly age groups where mortality effects are pronounced, tends to increase the significance of mortality changes.

(iii) Mortality effects are expected to become increasingly age selective as can be clearly seen from Figures 18b, 20b and 21b, which show significant mortality effects only at the older ages, the reason being that at low levels of mortality further increases in the expectation of life at birth results mainly in mortality reductions at older ages.

(f) The effect of the initial age distribution on population ageing is visible in Figures 18b, 20b and 21b. The FVMC (varying fertility and constant mortality) stepwise curves (lower dotted line) show a significant proportional increase in the older age groups even without further mortality reduction.

8. SUMMARY

The findings support the general theory of population ageing as propounded in e.g. United Nations (1956 and 1988b).

The demographic transition from high to low levels of fertility and mortality, as it occurred historically, causes significant changes in the age structure of a population. During the early phase of demographic transition mortality decline, which usually precedes fertility decline, may be a juvenation factor for the whole population, since

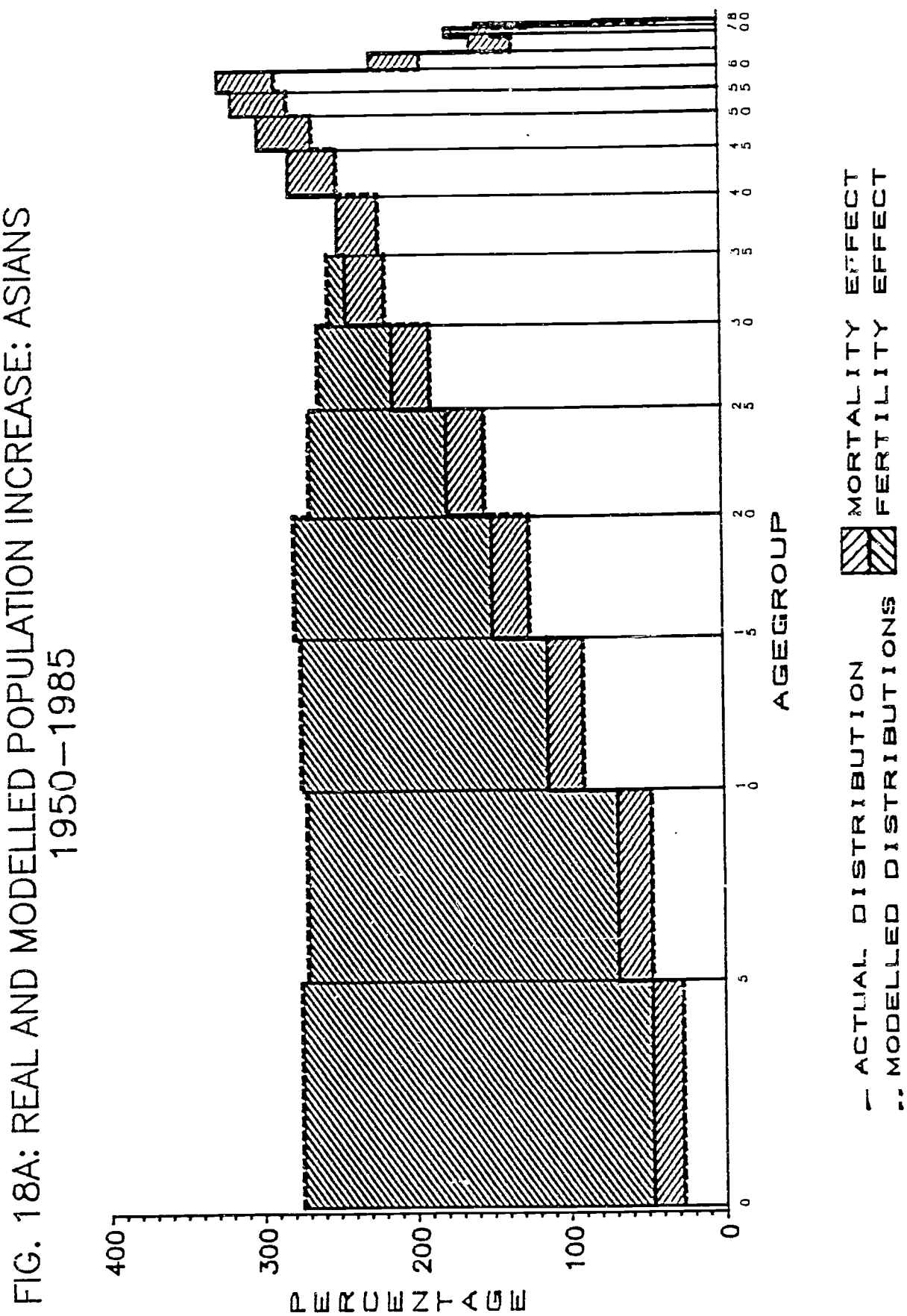
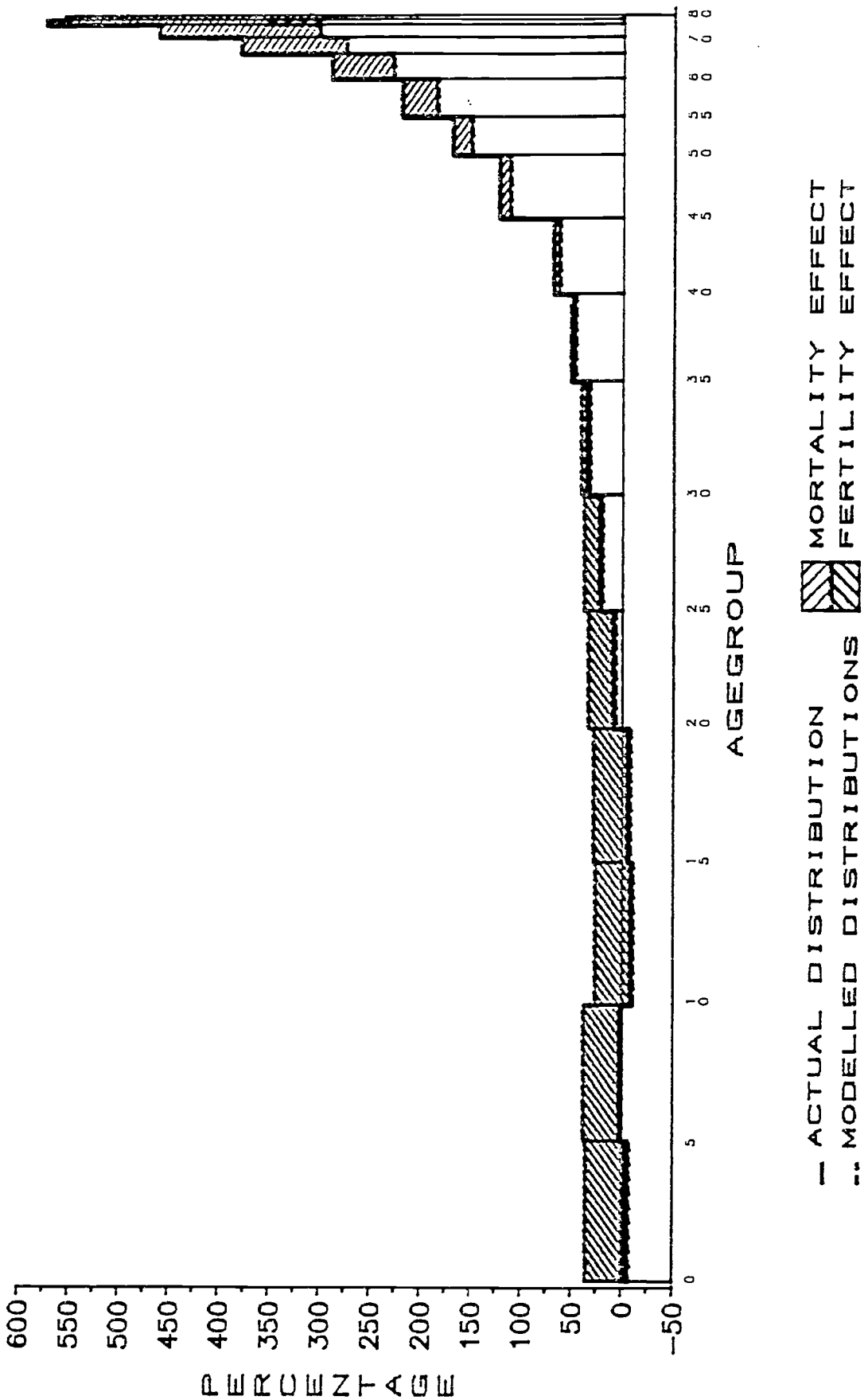


FIG. 18A: REAL AND MODELLED POPULATION INCREASE: ASIANS 1950–1985
PERCENTAGE
400
300
200
100
0
AGEGROUP
0
5
10
15
20
25
30
35
40
45
50
55
60
65
70
75
80
ACTUAL DISTRIBUTION
MODELLED DISTRIBUTIONS
MORTALITY EFFECT
FERTILITY EFFECT

FIG. 18B: REAL AND MODELLED POPULATION INCREASE: ASIANS 1985–2020



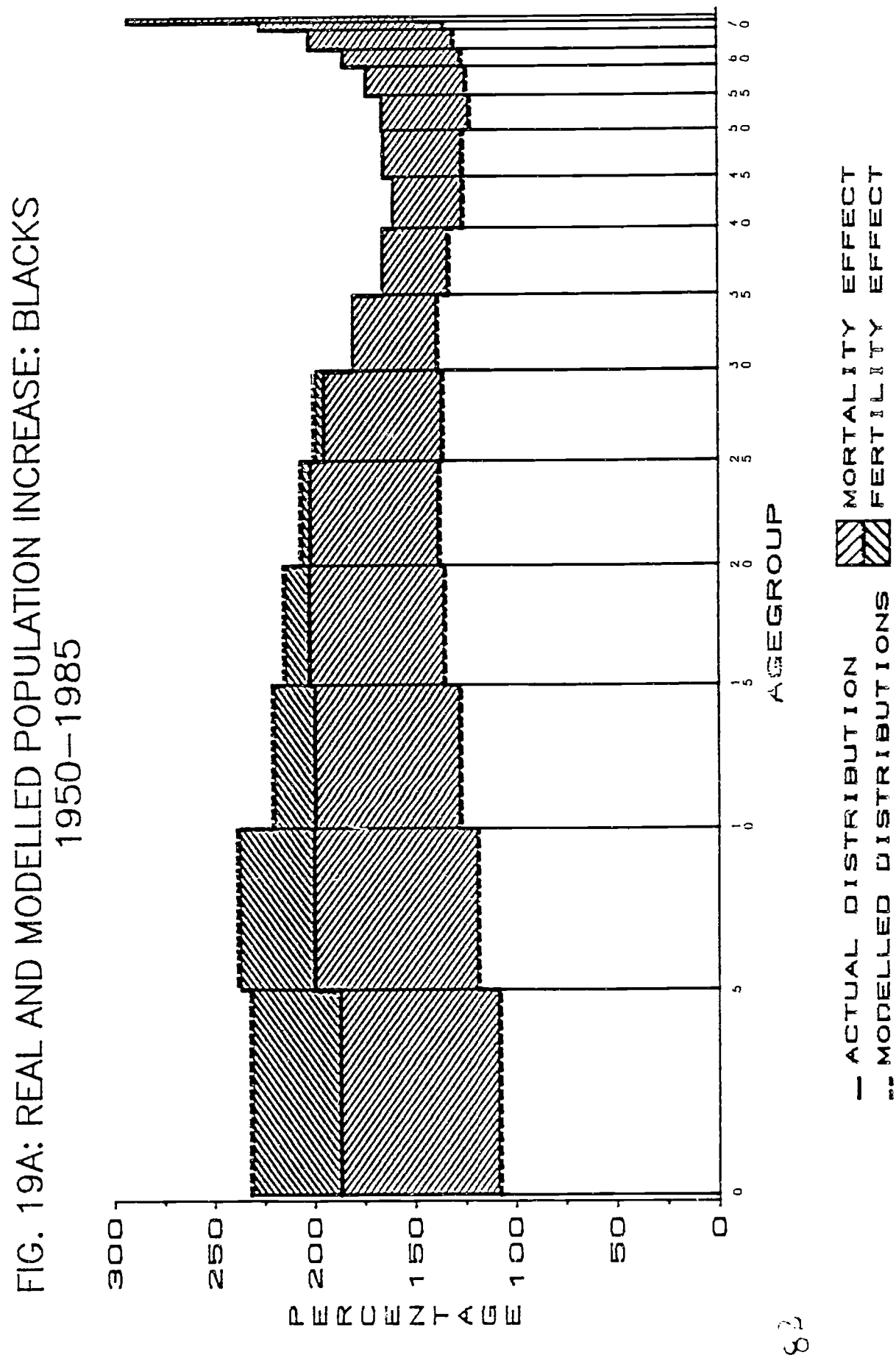
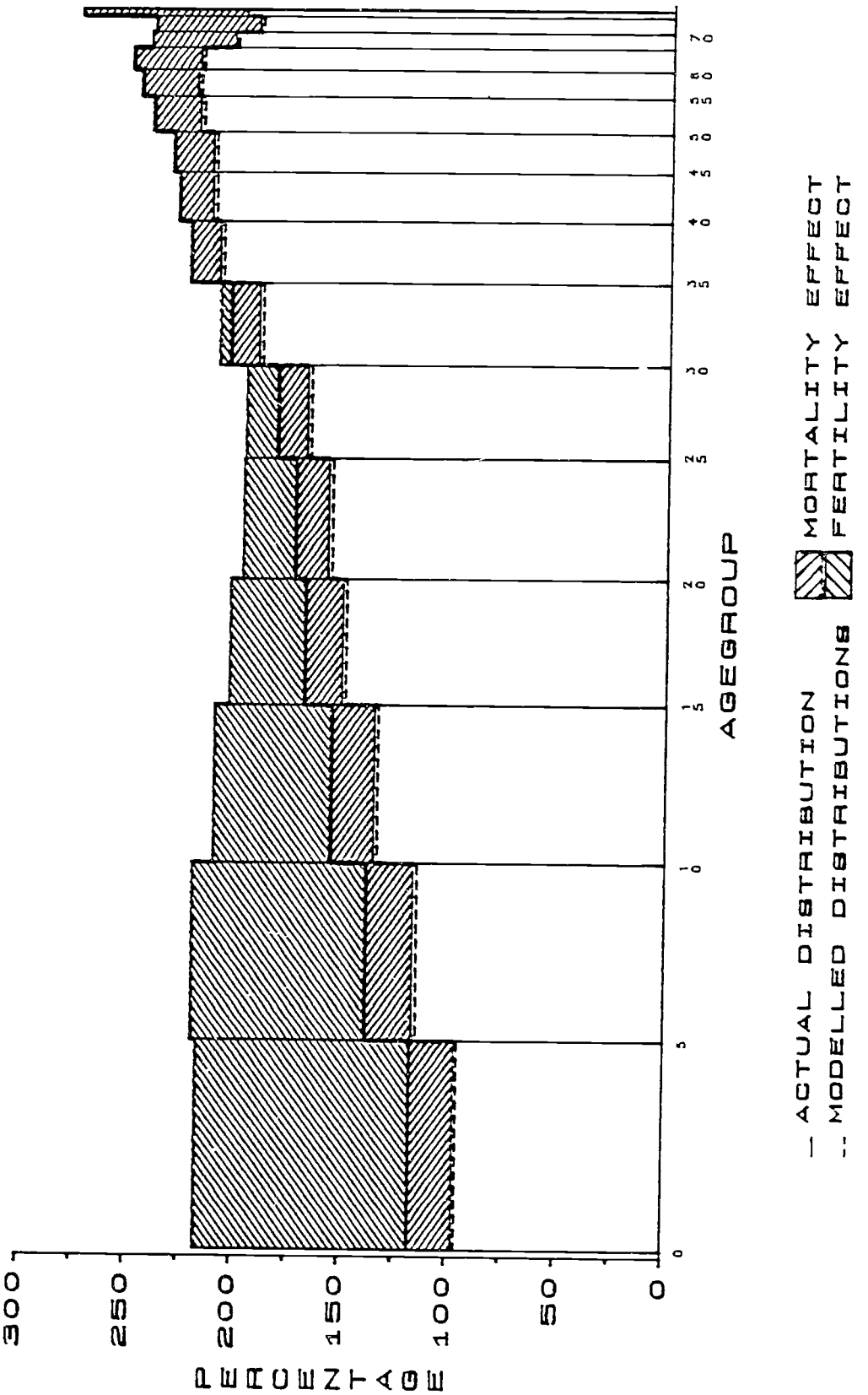


FIG. 19A: REAL AND MODELLED POPULATION INCREASE: BLACKS
1950–1985
PERCENTAGE
300
250
200
150
100
50
0
AGEGROUP
0
5
10
15
20
25
30
35
40
45
50
55
60
65
ACTUAL DISTRIBUTION
MODELLED DISTRIBUTIONS
MORTALITY EFFECT
FERTILITY EFFECT

FIG. 19B: REAL AND MODELLED POPULATION INCREASE: BLACKS
1985–2020



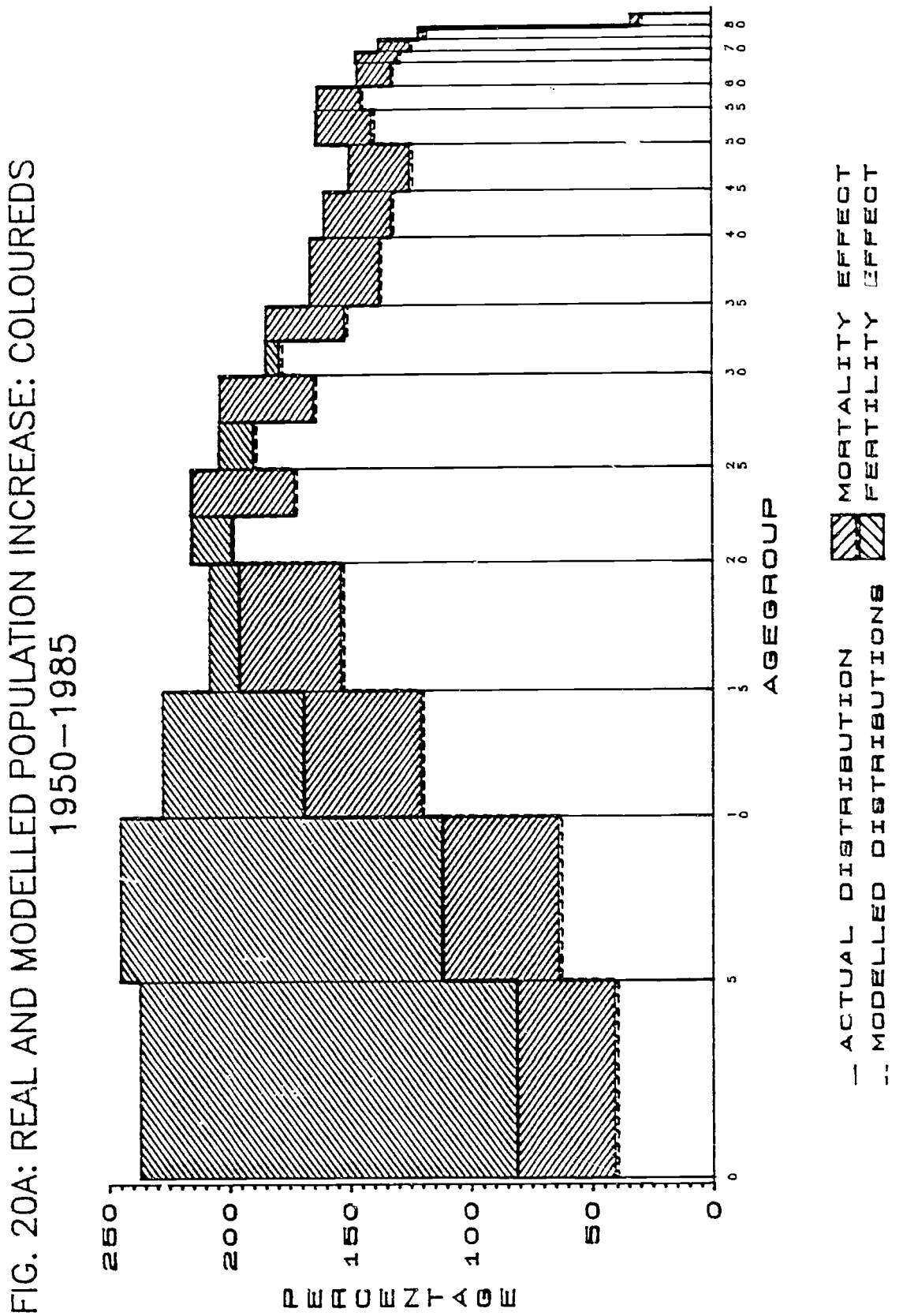


FIG. 20A: REAL AND MODELLED POPULATION INCREASE: COLOUREDS
1950–1985
FREQUENTAGE
250
200
150
100
50
0
AGEGROUP
0
5
10
15
20
25
30
35
40
45
50
55
60
65
70
75
80
ACTUAL DISTRIBUTION
MODELLED DISTRIBUTIONS
MORTALITY EFFECT
FERTILITY EFFECT

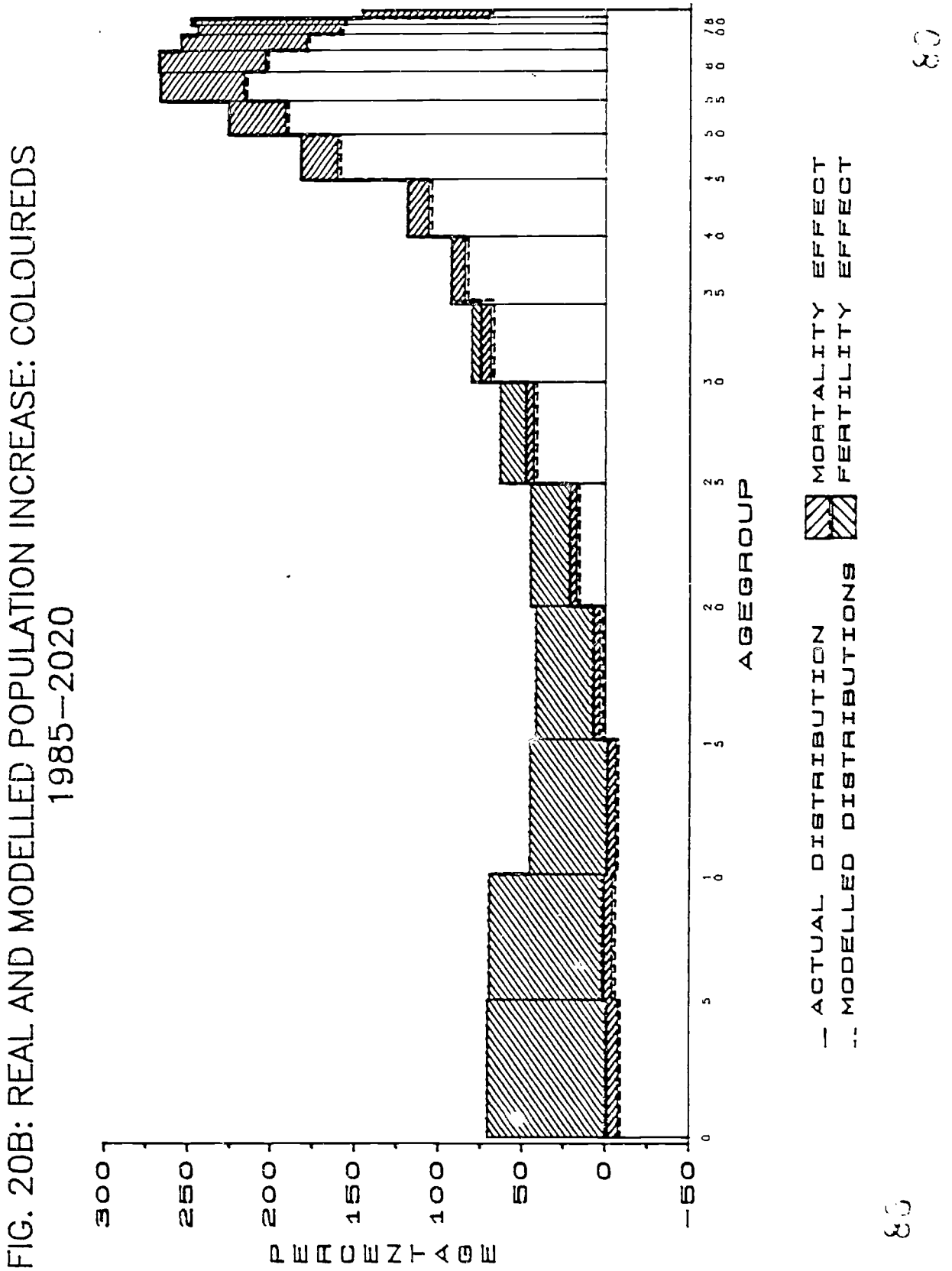


FIG. 20B: REAL AND MODELLED POPULATION INCREASE: COLOUREDS
1985–2020
PERCENTAGE
300
250
200
150
100
50
0
-50
AGEGROUP
0
5
10
15
20
25
30
35
40
45
50
55
60
65
70
75
80
— ACTUAL DISTRIBUTION
-- MODELLED DISTRIBUTIONS
MORTALITY EFFECT
FERTILITY EFFECT

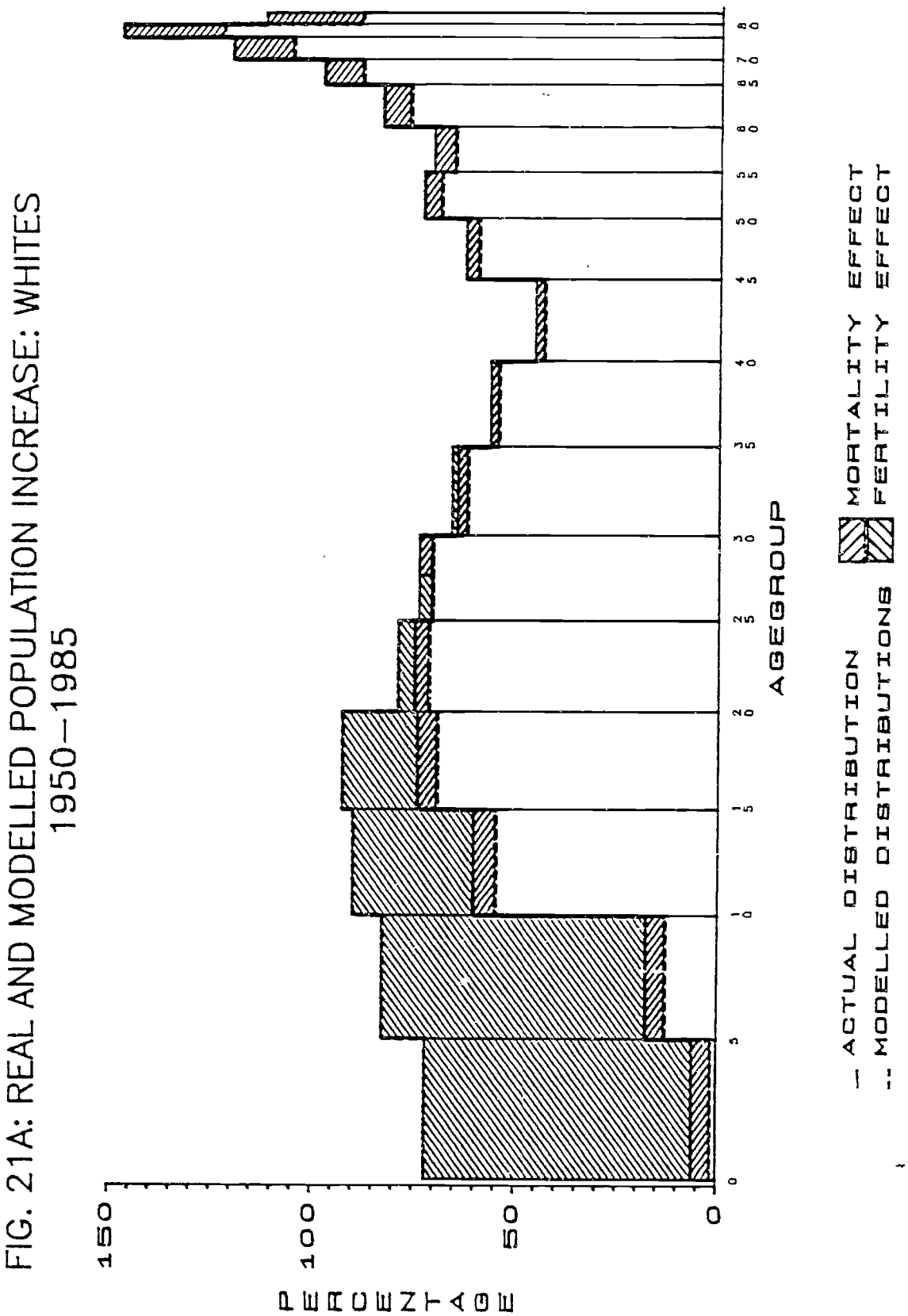
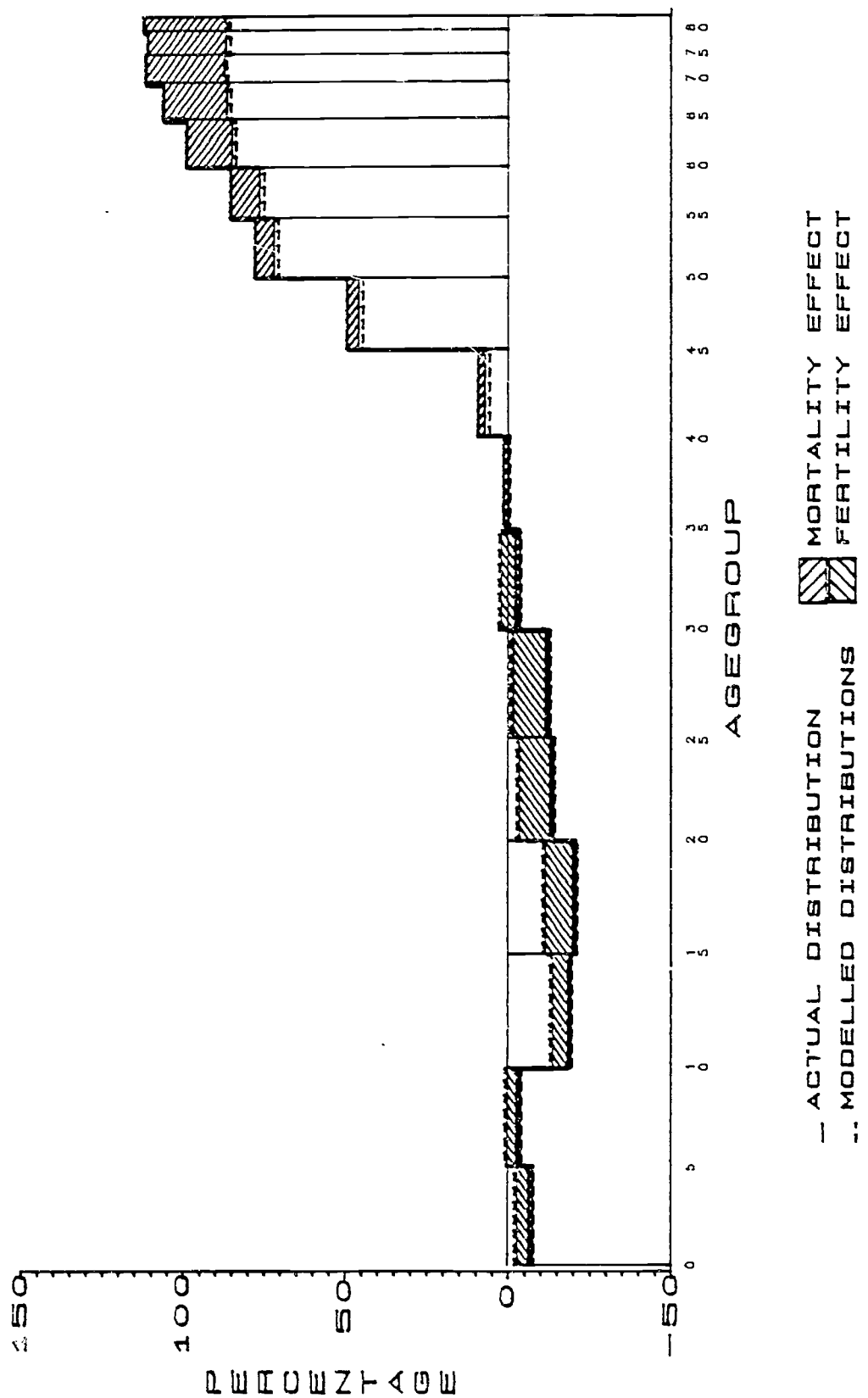


FIG. 21A: REAL AND MODELLED POPULATION INCREASE: WHITES
1950–1985
PERCENTAGE
150
100
50
0
AGEGROUP
0
5
10
15
20
25
30
35
40
45
50
55
60
65
70
75
80
ACTUAL DISTRIBUTION
MODELLED DISTRIBUTIONS
MORTALITY EFFECT
FERTILITY EFFECT

FIG. 21B: REAL AND MODELLED POPULATION INCREASE: WHITES 1985–2020



at high levels of mortality the greatest improvements in mortality occur at the young ages. However, when significant fertility decline sets in, its ageing effect on age distribution becomes the dominant factor. Continuing fertility decline and further reductions in mortality, which at already low mortality levels affect mainly the older age groups, produce a further ageing of the population.

In this study it has been shown that the evolution of the age structures of the four South African population groups has been following, and is projected to follow, the historical process of demographic transition, although in 1985 it was considered to be at different stages of demographic transition and subject to different transition rates.

The black group is at a rather early stage of demographic transition. Its age structure became somewhat younger in the 1950s and 1960s, due to declining infant and childhood mortality rates. The opposite trend emerged in the early 1970s, when a significant fertility decline started. Although symptoms of the ageing process are discernible and are projected to become stronger, population ageing is unlikely to be a significant factor in this population group during the projection period. Although the age structures at the end of the projection period show larger differences under the low and high fertility assumptions underlying the projections, this group is expected to retain a rather youthful age composition during this period.

Whites, who went through the earlier stages of demographic transition before the period under review, are the most advanced in the process of demographic transition and may be characterized as demographically old. A continuation of the ageing process should be expected.

In the case of Asians, the continued sharp fertility decline starting in the middle of the 1940s, coincided with a continued rise in life expectancy, thus inducing the process of demographic transition without clear signs of a phase of juvenation. Despite an extremely low percentage of elderly persons aged 65 and over, the age structure has been ageing since then and this trend is projected to continue.

The coloureds experienced a phase of juvenation in the 1940s and 1950s as a result of both increasing fertility and declining mortality (although the infant mortality rate did not decline significantly during that period). The turning point was during the sixties after which fertility declined extremely rapidly. Since then, the age structure of the coloured group has been ageing and this trend is projected to continue. These two population groups (coloureds and Asians) occupy an intermediate position: Although still demographically young, their age structures have already undergone profound changes.

Among the three non-black population groups population ageing is projected to advance virtually inevitably: Under the low as well as the high fertility assumptions their age structures reveal the characteristics of demographic old age in the course of the projection period. The expected rapid ageing of the coloured and Asian groups, which corresponds to East Asian projections (United Nations 1985), has no historical precedent in large populations. Again this confirms the East Asian model for these two population groups. This is largely the result of the rapid decline in fertility over a relatively short period. In the white group, because of a slower decline in fertility, the ageing process was more gradual, in line with what happened in the more developed regions. The black group has as yet shown little structural changes and is similar to the pattern in Africa (United Nations 1988b).

The following aspects of population ageing in South Africa should be noted: Firstly, although the blacks had a small percentage of elderly people 65 and over in 1985, in terms of absolute numbers they had the most numerous elderly population, which is projected to increase appreciably its share in the total elderly population. South Africa's total population may be described as relatively young at the end of the projection period, but the rapid increase in the absolute numbers of the elderly should be kept in mind. Until 2035 the number of elderly persons depends mainly on changes in mortality, since these persons were already alive in 1985. Secondly, among each population group the elderly female population is more numerous than the corresponding male population and this imbalance is expected to remain. Thirdly, although the size of the non-productive population relative to the size of the productive population (the dependency ratio) is expected to increase during the projection period among Asians, coloureds and whites, the declining trend of the dependency ratio among blacks, and thereby among the total population, is expected to continue, thus making the total age structure economically more favourable. However, the age coefficient of the productive population, as defined in Section 4.1, is expected to rise

significantly among Asians, coloureds and whites, whereas only a slight rise is expected for the black group. Fourthly, over the period 1980-1985 there was an observed trend among the elderly of the non-black population groups to move to the periphery of metropolitan areas; certain coastal resorts were attractive to elderly (probably retired) whites. There was an apparent trend for the black elderly to settle (probably with their families) in areas within the black states adjacent to metropolitan areas. Future studies will be able to show whether the abolishment of influx control (in 1986) has influenced this trend.

The general finding has been corroborated in South Africa that:

(a) changes in fertility affect the age structure to a much greater extent than changes in mortality;

(b) at low mortality levels the significance of mortality changes is expected to increase, and

(c) the effect of the current age distribution on the intensification of population ageing is considerable.

It is important to keep in mind that projections are subject to an element of uncertainty. However, it is generally accepted that the prospects for significant reversal of past fertility and mortality declines in industrialized societies seem remote (United Nations 1973). In addition, the ageing process of the Asian, coloured and white populations will continue because of the current age structures of these populations. Regarding the demographic situation of the black group, dependable projections are much more difficult. Even if it is accepted that this group will also follow the general pattern of the transition model, the historical diversity in the time of occurrence and pace of the processes involved, makes the quantification of these trends and their consequences less certain.

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