

# Survival Outlook for Middle-Aged Populations in South Africa

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## SUMMARY

The following topics are discussed, with special reference to changing patterns in the South African populations: (i) diet; (ii) mortality of the young; (iii) growth, overweight and obesity; (iv) arterial disease; (v) mortality in the middle-aged and elderly. The view is reached that with progressive sophistication of diet and manner of life, the concomitant change from infections and nutritional deficiencies to degenerative diseases, as main causes of death at middle-age and beyond, reduces rather than increases chances of survival. The possibility that the ultimate longevity of populations may be genetically programmed is briefly discussed.

*S. Afr. Med. J.*, 48, 2053 (1974).

A word which is more relevant than others to those engaged in insurance medicine, is the word *survival*. It is my intention to discuss some aspects of survival as it relates to middle-aged populations, particularly in South Africa. The subject is one highly apposite to all.

I have been privileged to have had the assistance of a Medical Research Unit for nearly 30 years, firstly under the Council for Scientific and Industrial Research, and latterly under the Medical Research Council. The chief endeavour has been to contribute information (dietary, biochemical, metabolic and epidemiological) on nutritional diseases, whether arising from a food supply which is insufficient or of inferior value, or arising from too large a consumption of total food or of particular nutrients. Sufferers in the first category are to be found almost exclusively among less privileged populations. Persons in the second include populations not in want, high in socio-economic status and pursuing a Western mode of life.

In South Africa we have a veritable paradise for research in epidemiology and in the changing pattern of disease. There are about 15 million Blacks, 4 million Whites, 2 million Coloureds and two-thirds of a million Indians. Among these populations there are contrasting segments — the rich and the poor, those who live in towns and those in country areas. Subpopulation groups, therefore, may be observed in various stages of transition. Many questions arise, such as whether all the changes consequent on westernisation are beneficial, and to what extent they resulted in improvement in health and expectation of life.

Certain specific topics concerning the changing patterns

of (i) diet; (ii) mortality among the young; (iii) growth, overweight, and obesity; (iv) emergence of arterial diseases; and (v) mortality in the middle-aged and elderly, will be discussed, especially in respect of our Black and Indian populations. I must emphasise that the subject under consideration includes populations in far wider fields, which I can scarcely touch upon, i.e. our ancestors compared with ourselves, rural compared with town populations in developing countries, as well as populations from developing countries who have emigrated and settled in westernised areas.

## THE CHANGING PATTERN OF DIET

### Breast Feeding

It is logical to refer firstly to the practice of breast feeding, which formerly was quite common, but which is now progressively declining. In Western countries, among the middle and upper classes, wet nurses used to be employed. In some parts of the USA there were wet nurse associations until the 1920s.<sup>1</sup> How relevant is this practice to the mortality rate? It is certainly very important among the less privileged. A recent report from Chile revealed that at 3 months of age, the mortality rate of infants was 3 times higher among artificially fed infants than among breast fed infants.<sup>2</sup> It was also pointed out, ironically enough, that the relevant mortality rate rose with increase in family income. Currently, there has been a resurgence of interest in breast feeding. Jelliffe and Jelliffe<sup>1</sup> now maintain that the known health advantages of the practice are such that instead of its having to be defended against artificial feeding, the situation has been reversed.

### Intake of Calories and Fat

With a rise in economic prosperity, there are increases in intake of calories and fat, especially animal fat.<sup>3</sup> There is a fall in the intake of calories from starch carbohydrate, notwithstanding a rise in the intake of sugar. The proportion of calories from total protein changes little, although there is a replacement of part of vegetable protein by animal protein. Mineral salt and vitamin intakes depend largely on the local situation; intakes are higher, of course, in parts where the staple food consists of unmilled or lightly milled cereals. There is also a marked fall in the diet's bulk-forming capacity. In terms of foodstuffs, there is a fall in the consumption of grain products (bread, oatmeal and other cereals), a rise in the consumption of fat, visible and invisible, animal protein products, and sugar,

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Paper presented at the Annual General Meeting of the South African Institute of Medical Underwriters, held in Johannesburg on 7 May 1974.

a marked fall in the consumption of potatoes and increases in the consumption of vegetables and fruit. There are considerable increases in minor contributions to the diet from various luxury commodities such as cream, peanuts, chocolate, dried and candied subtropical fruits.

### Energy Value and Protein

Quantitative changes in respect of energy value and protein intakes are depicted in Table I.<sup>4</sup>

TABLE I. ENERGY AND PROTEIN SUPPLIES (S) AND REQUIREMENTS (R) BY REGIONS IN BASE YEARS (1962-64) AT PER CAPUT LEVEL (FOOD AND AGRICULTURE ORGANISATION 1969)

Region	Calories (per day)			Protein* (g/day)		
	S	R	S/R (%)	S†	R	S/R (%)
North America	3 090	2 710	114	91 (64)	74	123
Oceania	3 200	2 510	126	93 (62)	73	127
Eastern Europe	3 020	2 570	118	94 (34)		
Latin America	2 600	2 380	109	68 (25)	65	105
Africa south of Sahara	2 130	2 240	95	58 (9)	63	91
Near East and North Africa	2 140	2 310	91	64 (13)	64	100
Asia and Far East	1 990	2 210	90	51 (7)	58	88

\* Practical allowance.

† Total proteins, with animal sources shown in parentheses.

The more privileged populations have more than their needs of both energy and protein supplies, while the developing populations have less. The higher requirements among the more economically advanced populations are presumably based on their greater body mass. I must stress that the validity of recommended allowances of nutrients is constantly being re-examined. In the current issue of the Nutrition News Letter of the Food and Agriculture Organisation<sup>5</sup> it was stated that in the revised standards for calories the mean daily allowance of about 2 400 calories *per capita* is confirmed. But the recommendation for protein intake is reduced from 65 g to about 40 g per day. The view was expressed that globally there is a shortage neither of calories nor of protein, but a tremendous inequality in the distribution of food.

### THE CHANGING PATTERN OF MORTALITY IN THE YOUNG

A salient index by which the health status of a nation is adjudged is the infantile mortality rate. Actually, a more valid public health index is the mortality prevailing from 1 to 4 years. Other indices frequently used in making comparisons are the percentage mortality that occurs between birth and the beginning of the 5th year as a fraction of total mortality, and also the percentage wastage of child life during the same period.

Since the turn of the century, and especially within the last few decades, there have been considerable falls in infant and child mortality all over the world, even among

backward populations. In our Blacks in Cape Town and Johannesburg, the present infantile mortality rate is about 50-70/1 000 births.<sup>6,7</sup> These figures are still treble those of our White population, but are far less than data (about 200-250) reported a few years ago, and far less than those still prevailing among the less privileged in many parts of the world. Richardson<sup>8</sup> found that infantile mortality rates for Blacks in urban and rural areas were of the same order.

Considering the mortality of children under 5 years of age, it is reported: 'In Brazil, children under 5 years constitute less than one-fifth of the population, but account for four-fifths of all deaths; in India for 65% of the deaths; in Egypt for 68% — by comparison, in the USA, children at this age account for 8.8% of the population and 4.8% of the deaths'.<sup>9</sup> At present the corresponding mortality percentages for Blacks and Whites in Cape Town are about 36% and 3%, respectively. Because of the big disparity, there is little cause for pride, despite the fact that the figure for Blacks is much lower than those for populations in Brazil and other Latin American countries.

A study of the wastage of life in children under 5 years, i.e. the proportion of babies that fail to reach their 5th year, shows that in England and Wales, about 200 years ago, the proportion was about 75%.<sup>9</sup> The subject is a sensitive one to us, principally because of a report in 1965 from Sekhukhuniland, which indicated that about half of Pedi babies died before their 5th birthday.<sup>10</sup> Unfortunately this figure is quoted overseas as representative of the position among all our Blacks. It is also the figure favoured by some of our visitors, even by some who should know better, such as David Mechanic, an American professor who, after having been invited by the University of the Witwatersrand to initiate a teaching programme for medical students in the sociology of medicine, concluded: 'If you are born in some Black reserves you may have no more than a 50-50 chance of reaching five.'<sup>11</sup> He maintained: 'I have tried to state my observations with care, and I feel confident that they are valid', yet a report by Richardson,<sup>8</sup> giving data on carefully undertaken studies in a number of homeland areas, gave a proportion 12-14%. This information, although published in an international journal, was ignored by Mechanic in his subsequent paper on 'Apartheid medicine', published in *Transactions: Science and Modern Society*.<sup>11</sup> While the lower proportion has been confirmed by additional studies, it is readily admitted that the figure of 12-14% for Blacks remains far too high, since the figure for Whites is about 2-3%.

Briefly then, changes in the pattern of diet and in other environmental factors have brought about enormous falls in the mortality of infants and young children. Certainly among Blacks and developing populations, further falls can confidently be expected.

### THE CHANGING PATTERN OF GROWTH, OVERWEIGHT AND OBESITY

#### Man Compared with Other Mammals

To begin with, let us compare the growth of man with other mammals. Tables II-IV are taken from 'The har-

mony of growth' by Widdowson.<sup>12</sup> Note the long gestation period of the elephant (nearly 2 years) and the weight of the blue whale at birth (3 000 kg). Although the period of gestation of man (280 days) is the same as that of the calf, the latter increases in weight 10 times more rapidly than man.

TABLE II. RATE OF GROWTH OF 10 SPECIES BEFORE BIRTH

Species	Length of gestation (days)	Weight at birth (g)	Mean growth rate (g/day)
Mouse	21	2	0,09
Rat	21	5	0,24
Cat	63	100	1,6
Dog	63	200	3,2
Pig	120	1 500	4,2
Man	280	3 500	12,5
Calf	280	35 000	125
Elephant	600	114 000	190
Hippopotamus	240	50 000	210
Blue whale	330	3 000 000	9 000

TABLE III. RATE OF GROWTH OF 9 SPECIES DURING SUCKLING

Species	Weight at birth (g)	Length of suckling (days)	Weight at weaning (g)	Mean growth rate (g/day)
Mouse	2	15	9	0,47
Rat	5	21	40	1,7
Cat	100	35	600	14
Dog	200	35	1 200	29
Pig	1 500	56	18 000	295
Man	3 500	180	8 000	25
Calf	35 000	60	70 000	530
Elephant	114 000	1 460	600 000	335
Blue whale	3 000 000	210	21 000 000	86 000

TABLE IV. COMPOSITION OF MILK OF 9 SPECIES (PER 100 g)

Species	Protein (g)	Fat (g)	Carbohydrate (g)	Calories
Rat	9	9	3	134
Cat	11	11	3	159
Dog	8	9	4	134
Pig	6	9	5	129
Man	1	4	7	70
Calf	3	4	5	70
Elephant	5	9	4	121
Hippopotamus	7	18	2	205
Blue whale	12	40	1	426

Table III compares rates of growth during suckling. The length of suckling time of the elephant, about 4 years, is noteworthy, also the tremendous daily growth rate of the blue whale (86 kg). It will be seen that although at birth

the pig has less than half the weight of a newborn baby, by weaning time the pig has grown 12 times faster.

Table IV compares the composition of breast milk of 9 species of mammals. The young of the blue whale receive a very rich cream, half as rich as butter, at the mean rate of about 44 gallons daily. It will be observed that the protein concentration of human breast milk is the lowest of those listed. Calorically, too, human breast milk has a low value.

### Changes and Current Profiles in Growth Rate

Children nowadays are taller and heavier for their age than in the past<sup>19</sup> (Table V).

TABLE V. SECULAR TREND FOR GROWTH OF 16-YEAR-OLD BOYS IN USA FROM 1880 TO 1960

Period	Height (cm)	Weight (kg)
1880	160,0	50,0
1960	171,0	62,5

There are differences in the height and weight of populations which differ ethnically and in socio-economic status. Some data on 14-year-old South African boys in different ethnic groups are given in Table VI.<sup>14</sup> Notice that South African White boys are taller and heavier than the international growth standard of Iowa.<sup>15</sup> We briefly mention some of our own observations in this field. We found that White pupils from higher socio-economic levels, attending the 'better' schools, are slightly taller and heavier than pupils of the same age attending State schools. Many Black girls at High Schools in Soweto, Johannesburg, as well as in some country areas, while not as tall, are heavier than White girls.<sup>16</sup> Yet, on the other hand, Indian pupils, even in groups from homes where there is ample food, are shorter and lighter than corresponding groups of White pupils. I believe that even where a sufficiency of food is available, there are ethnic differences in the growth response.<sup>17</sup>

TABLE VI. HEIGHTS AND WEIGHTS OF GROUPS OF 14-YEAR-OLD SOUTH AFRICAN BOYS IN PRETORIA

Population	Height (cm)	Weight (kg)
Blacks	150,4	38,3
Coloureds	154,1	40,9
Indians	154,7	40,7
Whites	163,4	51,9
USA Iowa	160,5	47,0

Among the affluent, the growth rate is certainly slowing down, while the proportion of overweight persons has been increasing decade by decade.<sup>18</sup> Prospective studies<sup>19,20</sup> revealed that the overweight baby is likely to become the overweight child, the overweight adolescent, and the over-

weight adult. The situation in adults is shown in Table VII, which compares the progressive gain in weight with age of adult men in a less privileged population with those in a privileged population.<sup>21-23</sup> The slight rise in the former contrasts with the considerable rise in the latter.

TABLE VII. CHANGES IN WEIGHT (kg) WITH AGE IN ADULT MALES IN LESS PRIVILEGED POPULATIONS AND IN A WESTERN POPULATION (UK)

Period (years)	India (indigent) <sup>21</sup>	Central Africa (Samburu) <sup>22</sup>	UK
			General practice study <sup>23</sup>
20 - 29	53,4	57,9	70,0
30 - 39	54,5	57,5	75,5
40 - 49	54,7	57,3	80,0
50 - 59	57,5	57,4	73,2
60 - 69	44,9	57,6	66,8

Among Western populations, numerous studies revealed that about half the adult population is overweight, in comparison with 'desirable' weight for height, issued by the Metropolitan Life Insurance Company.<sup>24</sup> Can we restrain or modify this trend? I doubt it. Doesn't it begin as a paediatric problem? Dr F. W. Fox<sup>25</sup> recently suggested that one factor contributory to the increasing prevalence of overweight in the very young was the replacement of breast feeding by artificial feeding, and more important, the increasingly early introduction of solid foods.

To what extent is overweight an insurance risk, and likely to prejudice survival? Gubner<sup>26</sup> concluded that the adverse effects of obesity are greater in males than in females, and greater in younger than in older persons. The burden of ill-health due to overweight and obesity has been the subject of much recent comment. 'It may be true . . . that obesity itself does not necessarily increase the risk of coronary artery disease. How then, should the physician advise the overweight patient? The answer would seem to be that, though overweight may not be an independent risk factor, there are many compelling grounds for weight reduction. In the first place, a diseased heart should not be subjected to the unnecessary strain of perfusing an overweight body. Secondly, obesity is associated with the development of hypertension, hyperlipidaemia, and diabetes, all of which are aetiologically important in coronary heart disease, and weight reduction should be the first (and is often the most successful) treatment for these conditions.'<sup>27</sup>

Briefly, the increasing height and weight of the young, associated with changes in diet and manner of life, are to the good, to the extent that the increases are linked with improvements in health, and particularly with lowered prevalences of nutritional diseases and infections. However, the increases have also been associated with a rising prevalence of overweight and obesity. In this respect, and in the segment affected, the changes have been detrimental to health.

## THE EMERGENCE OF ARTERIAL DISEASES

A recent study from Uganda revealed that in an African population pursuing a primitive existence — consuming a frugal non-rich diet and leading a physically active manner of life — the elderly die, not from degenerative diseases, but mainly from preventable causes, i.e. 'from diseases of childhood, such as infections, acute tuberculosis, neglect and malnutrition'.<sup>28</sup> A leading article concluded that 'even in the aged African, degenerative cardiovascular disease is of little importance . . . Thus ischaemic heart disease, arteriosclerosis and other cardiovascular conditions so common in elderly Whites, remain uncommon in the elderly Ugandan, as elsewhere in Africa'.<sup>29</sup> In stark contrast, among Whites in Australia in 1970, in persons under 65 years of age, coronary heart disease (CHD) plus cerebral vascular disease (CVD) accounted for almost half (44%) of all deaths.<sup>30</sup>

It might be asked, what are the minimum sequelae of ageing in respect of atherosclerotic lesions of the vascular system and the associated diseases, CHD, CVD, and peripheral vascular disease (PVD)? Furthermore, in developing populations, in what order, and to what extent, epidemiologically, do these diseases emerge with rise in socio-economic circumstances?

The first arterial disease to emerge is cerebral vascular disease. In Uganda, and other parts of Africa, death from this cause remains rare, especially in country areas.<sup>31</sup> This situation contrasts with that in Soweto, Johannesburg, where  $\frac{1}{3}$  million of the most highly urbanised Black populations reside. In postmortem studies on a series of Blacks and Whites, the scores in grading of lesions in cerebral arteries were lower for Blacks than for Whites.<sup>31</sup> In 1960, in Johannesburg, of total deaths, the age-specific percentage from CVD was slightly higher for Blacks than for Whites.<sup>32</sup> However, the deaths among Blacks from CVD were, and still are, much less frequently due to infarction or thrombosis, but mainly due to cerebral haemorrhage, which is associated with high blood pressure. In the USA, in an investigation on CVD made at Evans County, Georgia, it was found that the age-specific prevalence rate of 'stroke' was higher in Negroes than in Whites, the rate being almost three times greater in Negro women than in White women.<sup>33</sup> As to trends in mortality rate, in many White populations there have been reductions, as a result of antihypertensive treatment, during the period of the last generation.

In the coronary vessels, with rise in sophistication, lesions of clinical significance are slower in becoming manifest. In Nigeria, it has been stated that 'Nigerians' arteries . . . are smooth as velvet', and that 'coronary heart disease . . . is virtually non-existent, even in the bustling capital of Lagos'.<sup>34</sup> In Johannesburg, in 1954, it was reported that Blacks had less aortic and coronary atherosclerosis than Whites.<sup>35</sup> In a later necropsy study, it was noted that 66% of coronaries in Blacks showed no lesions.<sup>36</sup> As to deaths of Blacks from CHD, it is considered that, in Johannesburg, there are less than 20 per year; yet in a local White population of the same age and sex structure as Blacks in Soweto, I calculated that about 1 200 sudden deaths or episodes would be expected.<sup>37</sup> While Blacks will in time undoubtedly experience an increase in the occurrence of

CHD, it is not inevitable that the disease will necessarily reach the present prevalence in Whites. Actually, the current mortality situation among urban Blacks is much less severe than would be expected, bearing in mind the high prevalence of risk factors (high serum cholesterol levels, hypertension, cigarette smoking, obesity) which have prevailed for some time in an appreciable segment of the Soweto Black population.<sup>38</sup> In the USA, a National Survey indicated only a small disparity in mortality from CHD between White and Negro males.<sup>39</sup> Among Whites in that country, the disease now accounts for about a third of all deaths; the mortality rate from CHD has reached a plateau and is even reported to be receding. However, the rate is still rising in other countries.

Epidemiological information on the natural history and emergence of peripheral vascular disease is meagre. The disease is extremely uncommon in rural Black populations. In Johannesburg, in a necropsy study, it was reported that 'atheroma of the peripheral vessels is rarely seen . . . even in the presence of significant aortic and iliac atheroma'.<sup>40</sup> Among these people PVD is very uncommon in males, and rare in females; when present, the disease occurs chiefly in males with diabetes, and in heavy smokers. In the USA no investigations appear to have been carried out to determine comparative PVD rates in representative series of Negroes and Whites. In England it has been claimed that chronic ischaemia due to PVD is one of the most common conditions seen in clinical practice.<sup>41</sup> At the present time, in westernised populations, it is not known whether prevalence or incidence of PVD is increasing, steady, or decreasing. As a matter of interest, there is some comparative information on White populations available from other parts. A study made in Israel showed that the rate for PVD among immigrant Jews from North Africa was about a fifth of that prevailing among Jewish immigrants from South Eastern Europe.<sup>42</sup> In Greece, an inquiry into PVD in rural populations indicated that the occurrence of the disease was 'extremely low'; CHD was also uncommon.<sup>43</sup> As a cause of mortality, the health hazard from PVD lies mainly in its association with an increased mortality from CVD and CHD.

The changing pattern of diet and other environmental factors has resulted in the emergence and rising prevalence of arterial diseases. Whereas formerly in certain primitive populations the prevalence was virtually nil, nowadays in Western populations arterial diseases account for nearly half the total mortality.

### CHANGES IN EXPECTATION OF LIFE OF THE YOUNG, AND OF THE MIDDLE-AGED AND ELDERLY

Obviously, among the young, improvements in diet and in other very important environmental factors, e.g. the degree of crowding, have resulted in huge reductions in mortality. Probably in all parts of the world, those born in present times have a far greater chance of surviving youth and reaching old age than their parents and grandparents had. In South Africa, with its variety of populations at various levels of privilege, differences in expectation of

life at birth remain, as depicted in Table VIII.<sup>44</sup> In the USA, it has recently been stated that expectations of life at birth for Whites and Negroes reached plateaux 20 years ago.<sup>45</sup>

TABLE VIII. EXPECTATION OF LIFE AT BIRTH (YEARS)

Population	Males	Females
SA Coloureds . . . . .	49,6	54,2
SA Indians . . . . .	57,7	59,6
SA Whites . . . . .	65,5	71,9
Swedes . . . . .	71,7	76,1

It has to be faced that among the middle-aged and elderly in Western societies, the gain in expectation of life, even over the past century (actually over the last 3 centuries), has been disappointingly small. At 60 years, the gain is about 3-4 years; at 80 years, a year or so.<sup>46</sup> This is shown in Table IX.

TABLE IX. EXPECTATION OF LIFE OF SWISS MALES (YEARS)

Age	Period			
	1876 - 80	1929 - 32	1941 - 50	1948 - 53
0	40,6	59,3	64,0	66,4
20	38,8	45,4	48,8	50,2
40	24,8	28,6	31,0	31,9
60	12,2	13,9	15,1	15,7
80	4,1	4,6	4,9	5,2

Within the last few years, in some Western populations, the expectation of life at middle-age has been stated to be decreasing. This is reported to be the case with the Jewish population in the USA.<sup>47</sup>

Recently, I made a rough comparison between the survival outlook of middle-aged and elderly populations in this country and those in some other countries. In the absence of more suitable data, I used as a survival index the number who are 70 years or more at present, as a percentage of the number who were 50 years or more 2 decades earlier.<sup>48</sup> The results are given in Table X.

TABLE X. PERCENTAGES OF PERSONS OF >70 YEARS AND OF THOSE OF >50 YEARS OF AGE

Population	Male	Female	Total
<b>Blacks</b>			
South Africa . . . . .	34,7	43,8	39,5
USA* . . . . .	29,3	40,5	34,8
<b>Indians</b>			
South Africa . . . . .	17,8	27,8	21,6
India . . . . .	20,7	22,6	21,7
<b>Whites</b>			
South Africa . . . . .	26,4	38,5	32,7
USA* . . . . .	31,2	43,3	37,4
England and Wales	25,8	38,0	32,7

\* Data on USA populations relate to the period 1950 - 1969.

Clearly, with progressive sophistication of diet and manner of life, the concomitant change from infections and nutritional deficiencies to degenerative diseases, as main causes of death at middle-age and beyond, reduces rather than increases chance of survival.

A number of other points emerged. Table XI shows the sex ratios in different populations at 50 years and more, and at 70 years and more. At 70 years and thereafter, among Indians both in India and South Africa, males approximately equal females in number. Among Negroes in the USA and Blacks in South Africa, the male-female ratio is about 1 : 1,4. Among Whites in the USA and South Africa, the ratio is about 1 : 1,5. Yet in England and Wales the ratio is about 1 : 1,9. This is indeed startling! Why should the survival of elderly males in England and Wales be so much inferior to that of elderly females?

TABLE XI. SEX RATIOS OF POPULATIONS OF >70 YEARS OF AGE IN 1951 AND 1970

Population	1951	1970
<b>Blacks</b>		
South Africa ... ..	1 : 1,22	1 : 1,38
USA* ... ..	1 : 1,04	1 : 1,37
<b>Indians</b>		
South Africa ... ..	1 : 0,47	1 : 0,93
India ... ..	1 : 1,04	1 : 1,05
<b>Whites</b>		
South Africa ... ..	1 : 1,08	1 : 1,56
USA* ... ..	1 : 1,16	1 : 1,45
England and Wales ...	1 : 1,52	1 : 1,90

\* Data on USA populations relate to the period 1950 - 1969.

### Survival among Blacks

The wastage of life among Blacks under 50 years of age is far higher than among Whites under 50 years, but will undoubtedly decrease rapidly in the future. It might be illuminating to give comparative wastage data for USA Whites. According to Comfort,<sup>48</sup> in 1900 about 60% reached their 50th year; in 1948 the figure was about 86%. The long-living segment of Blacks, to which we have been specifically referring, is admittedly a selected group, i.e. those who did not die earlier from kwashiorkor, marasmus, gastro-enteritis, respiratory and other infections, by violence, etc. Yet, had these younger people lived, I cannot see that in later life their proneness to degenerative diseases (not infections), e.g. arterial diseases and cancer, would have been appreciably different from that of those who survived, namely, the long-living segment under discussion. Here again, the survival differential between this segment and that of Whites is likely to decrease in the future, as urban Blacks become more prone to degenerative diseases.

### White Survival

The situation regarding middle-aged Whites is not hopeful. Recently, an analysis of the effectiveness and effi-

ciency of the British National Health Service was made by Cochrane.<sup>49</sup> On the 'input side' he noted that from 1959 to 1969 there were tremendous increases in most of the services, and he 'expected a very considerable output from the therapeutic side of the NHS because of the magnificent quality of the "external input"'. Yet he found 'that the increase in input has not been matched by any marked increase in output in the "cure" section'. Burch<sup>48</sup> averred that 'people live no longer anymore'; he also referred to the large sums of money spent on medical research and medical services.

### Indian Survival

A situation which I find most alarming is that of the Indians. In rural India, where the bulk of the Indian population dwells, the vast majority of deaths are due to infections, and one report listed the following causes of death in the total population, in order of lethality — diarrhoea and dysentery, respiratory diseases, fevers, cholera, malaria, tuberculosis, smallpox, typhoid, plague and leprosy.<sup>50</sup> Among South African Indians, adult deaths are due mainly to degenerative diseases — to coronary heart disease, 'strokes', diabetes, and cancer.<sup>51</sup> Since, as Table X indicates, the survival figure for middle-aged and elderly South African Indians is not better than that of corresponding Indians in India, it is inferred that at middle-age and thereafter, the degenerative diseases associated with westernisation are just as noxious and lethal as the infections which are linked with the adverse environmental conditions usual to primitive and developing populations. As for Indians under the age of 50 years, it is remarkable that the rural population in India's table of life expectation, from 5 years onwards,<sup>51</sup> is very similar to that of South African Indians at the same period. That no improvement in longevity has occurred, especially after middle-age, is extremely disappointing, since the socio-economic circumstances of, and the medical services available to, South African Indians are far superior to those of Indians in India.

There are several puzzling features about Indians: (i) Seftel<sup>52</sup> considers that coronary heart disease is more common in Indians in India than in Blacks, although rural Indians in India live under poorer economic circumstances; (ii) peak mortality of coronary heart disease in Indians occurs a decade earlier than in Whites;<sup>53</sup> (iii) the mean serum cholesterol level in patients with coronary heart disease in India is far lower than the mean for corresponding Whites in the USA;<sup>54</sup> (iv) serum insulin level, 1 hour after a glucose dose, is higher in South African Indians than in Whites, Coloureds, or Blacks — this phenomenon has been observed in Indian students.<sup>55</sup> and we found the greater elevation to be apparent as early as at 12 years of age.<sup>52</sup>

Evidently, with rise in prosperity, Indians over-react to noxious environmental factors. Why should this be so? Among Whites, as already indicated, the outlook is depressing for the middle-aged, in that efforts to make really worthwhile reductions in mortality rates from killer diseases have been unsuccessful. The outlook for Indian populations, however, is far more sombre.

## COMMENT

Dr George Burch,<sup>45</sup> Editor of the *American Heart Journal*, has considered the possibility that some populations may be genetically programmed to live longer than others, although he thought this possibility to be unlikely. Burnet<sup>57</sup> concluded that 'the characteristic life span of man and any other mammal is genetically determined . . .'. I must confess I am extremely intrigued and fascinated by the conception that the ultimate attainable longevity of populations may be programmed, bearing in mind especially the experience of Indians, not to speak of the desired old age figure of 'three score and ten years' in biblical times — a figure so close to the best that White populations are able to reach nowadays.

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