Biological and Disease Patterns in South African Inter-racial Populations as Modified by Rise in Privilege*

ALEXANDER R. P. WALKER, D.SC. UNIV. CAPE TOWN, *MRC Human Biochemistry Research Unit, South African Institute for Medical Research, Johannesburg*

SUMMARY

Among the 4 ethnic groups in South Africa, populations may be observed in many stages of transition, from primitiveness to sophistication. With the rise in socio-economic circumstances, numerous changes have occurred. Those discussed include mortality rate and age structure, diet, growth, blood pressure, various biochemical measurements, physical activity, and disease pattern. The trend of changes implies that in the future, among non-Whites, diseases of nutritional inadequacy, especially protein-calorie malnutrition and pellagra, will decrease and will no longer be public health burdens. Simultaneously, however, there will be increases in conditions or diseases linked with nutritional excess, such as overweight and hypertension. In non-Whites, these and their ramifications are likely in time to exact the high tolls of mortality and morbidity from degenerative diseases which prevail in White populations. It is unlikely that recommendations directed at Whites and the affluent moieties of non-Whites will arrest the rising intensity of risk factors to health.

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At present, there are very roughly 15 million Bantu, 4 million Whites, 2 million Coloureds, and ¾ million Indians in South Africa. The local situation is therefore very favourable for studying changes in a whole variety of variables as they are affected by rise in privilege.

It is well known, of course, that not only in this country, but throughout the world, the standard of living of all populations has risen considerably during the last generation, especially during the last decade. In Whites, this has manifested itself in the consumption of a richer diet, in the acquiring of larger houses, more cars, modern appliances, and other possessions. In the case of the less privileged, however, the primary alteration affecting health has been the change from an insufficiency to a sufficiency of food, at least in so far as calories are concerned. Nevertheless, it must be kept in mind that within the lifetime of many of us, there have been large segments of White populations in many countries among whom there was widespread poverty and high prevalences of diseases due to undernutrition and malnutrition. This fact is not sufficiently appreciated.

In Britain, at the end of World War I, there was much concern by health authorities over the socio-economic circumstances of the poor. One outcome was the carrying out of an investigation by a Committee appointed by the Medical Research Council. The resulting report, published in 1926, was entitled 'Poverty, nutrition, and growth—studies of child life in cities and rural districts in Scotland.'[1] Admittedly, the inquiry was chiefly concerned with slum-dwellers, but these were common in large towns and cities. In Glasgow, for example, a quarter of the population lived in 1-room dwellings, and two thirds lived in 1- or 2-roomed dwellings. In Soweto, Johannesburg, there are no dwellings of 1 room for occupation by families.

In the USA, in the period between World Wars I and II, there remained much poverty among a large proportion of the population. The unsatisfactory situation, of course, was not limited to that prevailing among Negroes. Those who have read the book *Grapes of Wrath* by John Steinbeck will recollect the really distressing conditions among the poor, and the prevailing malnutrition and its sequelae, particularly pellagra, in large populations in Oklahoma and other southern States.

Quite apart from the squalid conditions which were previously common in Britain, USA, and other western countries, in South Africa, not so long ago, poverty and malnutrition diseases, including pellagra, were widespread in a large proportion of the White population. Many will remember or know of the excellent report of the Carnegie Commission on 'The poor-White problem in South Africa,'[2] published in 1932. At that time 'poor Whites' composed no less than 15% of the total White population. They were characterized by the same type of food habits, food preferences and prejudices, and nutritional ignorance that are seen today in the Bantu and similarly placed populations.

All that it is intended to emphasize is that the current health problems facing the non-White or underprivileged populations, are similar to those that confronted White populations of only one to two generations ago.

With this introduction, I will now describe some of the changes in health parameters or variables in our different populations that have been associated with rise in privilege.

It must be made clear at the outset that in most of the Tables that follow, data do not have molecular weight accuracy, nor are they necessarily representative. Moreover, only a selection of references is given. The sole intention is simply to demonstrate the trends of changes, and to arrive at some assessment of their beneficial or their deleterious results.

In Annual Reports of Public Health bodies, it is usual to begin with changes in vital statistics. That is where I propose to start.

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CHANGES IN VITAL STATISTICS

The infant mortality rate for the Bantu general population (derived from house-to-house studies by Richardson)[3] is 2 - 3 times that for the Whites, although that for Bantu teachers is of the same order as that for Whites (Table I). High mortalities are still common in developing countries.

TABLE I. MORTALITY DURING FIRST YEAR PER 1 000 LIVE BIRTHS

Population	Infant mortality rate
Rural Bantu: General	82
Urban Bantu: General	79
Urban Bantu: Teachers	34
East Africa	170
Korea	123
Whites: Johannesburg, 1940	52
Whites: Johannesburg, 1965	22
Portugal	59
USA	20
UK	18
Netherlands	13

A marked fall in infant mortality rate (IMR) occurred in our White population (e.g. in Johannesburg) comparatively recently. Of course, decreases have been and still are taking place in virtually all populations throughout the world. It is heartening to learn that falls can occur rapidly; for example, among Negroes in Denver, USA, IMR was 42 in 1964, but only 25 in 1968. Further, at Imesi in Nigeria, Morley[4] reported a fall from 295 in 1957, to 72 in 1962. It is doubted whether low figures, e.g. those for the Netherlands, can be reduced much further.

Obviously, the validity of data depends entirely on correct registration of births and deaths. Registration for Bantu is far from perfect, including that in Soweto, Johannesburg. Even in Britain, Mr Enoch Powell has inveighed against the inaccuracy of the registration of births among the non-White population.

The figures for Bantu percentage mortality,[3] although lower in the families of teachers compared with the general population, remains far too high (Table II).

It would be unfair not to mention the high figure of 50% reported by Leary *et al.*[5] for Bantu in Sekhukhuniland. This result, however, should be checked by means of a *kraal*-to-*kraal* study, since the highest figure in our investigations on rural populations in the Transvaal, using this method, is 18%. It is necessary to keep in mind that in the times of our ancestors, say 200 years ago, 75% or more of all children (in England) died before their fifth birthday.[6]

In family size, there is a fall from rural to urban Bantu, especially among those in comfortable circumstances (Table III). In Sweden, current family composition only just permits maintenance of the size of the present population.

TABLE II. PERCENTAGE MORTALITY OF INFANTS 0 - 5 YEARS

Population	Percentage mortality
Rural Bantu: General	14
Rural Bantu: Teachers	9
Urban Bantu: General	12
Urban Bantu: Teachers	6
Uganda	30
Whites: Johannesburg	3
Sweden	2

TABLE III. FERTILITY AND FAMILY SIZE

Population	Average number of children per mother
Rural Bantu	6,5
Urban Bantu	5,5
Urban Bantu: Teachers	4,0
Whites: Johannesburg	2,5 - 4,0
Sweden	2,2

Demographers have emphasized that in a developing country, two generations of literacy ensure a marked fall in family size, the fall being hastened by urbanization. Family size was far greater in previous generations. Had present average figures in White populations prevailed in the past, there would have been no Napoleon, Winston Churchill, John Wesley (16th child), Charles Wesley (18th child), and a host of others, including our Prime Minister, Mr B. J. Vorster, who is a 13th child.

In comparing primitive or less privileged with sophisticated populations, there is a fall in the proportion of young and middle-aged, and a rise in the proportion of the elderly and aged (Table IV). Bantu, once they reach the age of 75 years, have a life expectancy which exceeds that of Whites, i.e. there are far more Bantu centenarians, proportionally, than White. Thus, studies on very old Bantu in country areas present no problem from the point of view of numbers.

In developing populations, death rates (especially among the young) fall progressively. But in sophisticated populations, there comes a time, presumably dependent on the ageing of populations and on mortalities from certain diseases, when death rates begin to rise. Recent reports show that of 22 western nations studied, the death rate rose from 8 in 1955 - 1960 to 16 in 1960 - 1969.[7]

Current life expectancies at birth of Coloureds and Indians are much lower than those of Whites (Table V).[8] Data on Bantu are not available, but it may be speculated that the figure in Soweto, Johannesburg, would be 45 - 55 years.

TABLE IV. AGE STRUCTURE OF POPULATIONS

Population	Percentage 0 - 44 years	Percentage 45 - 64 years	Percentage 65 + years
Urban Bantu	88	10	2
S.A. Coloureds	86	12	2
S.A. Indians	84	13	3
S.A. Whites	76	17	7
Japan	80	15	5
USA	72	20	8
Sweden	66	23	10

TABLE V. EXPECTATION OF LIFE AT BIRTH (YEARS)

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

Data on South African Whites are much inferior to those on Whites in many western countries. In males, the very unsatisfactory situation is stated to be due to high mortalities from road accidents in the young, and from coronary heart disease. Locally, improvement in the expectation of life of Whites in the last decade was only a few months.

In virtually all western populations, the gain in expectation of life at 70 years, since 1900, has been extremely small, and in some populations, e.g. Jews in the USA, expectation has diminished. It is very important to appreciate that although nowadays far more children survive to reach a good age, of those who live to 70 - 80 years, further expectation is much the same as that obtaining as far back as 300 years ago. Unless expectation of life is accompanied by a corresponding lengthening of working life, the gain or victory will be Pyrrhic.[9]

CHANGES IN DIET

In western countries, changes in diet within the last 3 - 4 generations have followed much the same pattern. This pattern is beginning to be seen in populations in developing countries. There has been a fall in the intake of cereals and potatoes.

The most conspicuous increases have been in the fat and sugar fractions. For example, in the Netherlands,[10] in 1900, fat and sugar made up 30 - 35% of calories, whereas at present the proportion is 55 - 60%. This pattern of increase is also seen locally (Table VI).

The data on changes in fat and sugar intakes relate to populations in the Transvaal[11] and the figures given are approximate. There is a progressive rise in fat intake from country Bantu to urban 'better class' Whites. In contrast, although in Bantu sugar intake is still rising, it reaches a peak in 'working class' Whites, and then falls to a much lower figure in 'better class' Whites. This is not a local phenomenon; in England, consumptions of 120 - 140 g sugar are usual in the working class, and 60 - 90 g *per diem* in the more affluent classes. The exact causes of the fall are not known, but might include lower calorie intakes in the higher social classes, different food preferences, and perhaps the influence of health education.

TABLE VI. INTAKES OF FAT AND SUGAR IN SOUTH AFRICAN POPULATIONS

Population	Fat intake (g/day)	Sugar intake (g/day)
Rural Bantu	30 (10 - 12%)*	65
Urban Bantu	40	75
Urban Bantu: Teachers	75	85
Coloureds	80	90
Indians	85	80
S.A. Whites: 'Working class'	90	130
S.A. Whites: 'Better class' ...	100	90
UK	100 (35 - 40%)*	85

* Proportion of calories supplied by fat.

Some query should be raised over the validity of the view expressed in USA by Antar *et al.*[12] and in Britain by Michaels,[13] that only very slight rises in fat intake have occurred within the present century. Acceptance of their view has led a number of workers[14,15] to assert that it is the rise in sugar intake, rather than in fat intake, that has promoted the emergence of the present epidemic of coronary heart disease.

A major aspect of changing nutritional habits concerns decreases in the practice of breast feeding (Table VII). The majority of mothers in underprivileged populations lactate well and for long periods. However, the increasing proportion of mothers who work, plus plausible advertisements for made-up foods, are reducing the frequency of breast feeding. Decreases are particularly regrettable in developing populations, where milk substitutes are costly, bottle feeds usually prepared far too dilute, and standards of hygiene neither understood nor practised by large sections of such populations.

The situation in Whites varies from country to country, region to region, and social class to social class. In the USA, breast feeding is practised more extensively in the west than in the east, and in professional compared with working classes.[16]

Regarding physiological performance, there is no doubt that successful lactation is scarcely or not at all influenced by the state of nutrition of the mother. During wartime, and in concentration camps, there was ample evidence that lactation proceeded satisfactorily. A recent study in India has underlined that poorly nourished mothers can have excellent lactation;[17] conversely, adequately nourished mothers in western countries who fail in lactation performance do so for non-nutritional reasons.

TABLE VII. CHANGES IN THE PATTERN OF BREAST FEEDING

Population	Percentage practising breast feeding: At start	At 3 months	At 6 months
Rural Bantu	100		90
Urban Bantu	100		80
Maori (New Zealand)	30	2	
Negroes (Jamaica)	67	18	
Boston (USA)	22	17 (1968)	5
Tasmania	53	44 (1952)	

TABLE VIII. TRANSIT TIME OF DIGESTA IN CHILDREN 10 - 12 YEARS

Population	Percentage excreting red dye in faeces in 24 hours
Rural Bantu	80 - 85
Urban Bantu	70 - 80
S.A. Whites	25 - 35

CHANGES IN INTAKE OF PARTICULAR FOOD COMPONENTS

Crude Fibre

A very marked change in food habits is the enormous fall in crude fibre intake. In Whites, three generations ago, intake was several grams *per diem*; this is the current intake of country Bantu. At present daily intake among Whites scarcely exceeds 3 - 5 g.

One sequel is the fall in the amount of wet faeces voided *per diem*. There is a fall from about 400 g in country Bantu to 75 - 150 g in Whites. This is associated with a decrease in the frequency of defaecation, from 2 - 3 times a day to once a day or less (Table VIII).[18] These changes are accompanied, *inter alia*, by alterations in the amounts of bile acids and sterols excreted, and in the types and proportions of bacterial flora present.[19]

Early workers, such as Brunton, later workers such as Cleave *et al.*,[15] and more recently Burkitt,[20] believe that the fall in fibre intake has a strong influence in promoting the emergence of a variety of diseases, including appendicitis, diverticulitis, and cancer of the colon.

Calcium

Calcium intake is low in developing countries, and rises with privilege. Physiologically, in women, calcium need falls with privilege, due to smaller families and shorter periods of lactation. Yet change in intake apparently has very little influence on bone composition and dimension indices.[21]

Our observations have shown that cortical thickness and other indices of metacarpal dimensions are much the same in Bantu, Coloured and Indian compared with White children (local and overseas), and in aged Bantu males and females compared with aged White males and females (Tables IX, X). We have also found this similarity of data in Bantu and White mothers of small, compared with very large, families, in respect both of metacarpal and humerus. This is a remarkable finding, bearing in mind that a Bantu mother with 6 pregnancies and with average periods of 9 months' lactation, has to provide about 500 g calcium, whereas a White mother with 3 pregnancies and 3 months' lactation, needs to provide only 150 g calcium. For these and other reasons, it appears that calcium homoeostasis is scarcely affected by rise in privilege.[21] From the point of view of higher prevalences of arterial calcification and also of osteoporosis, it could be said that calcium homoeostasis is adversely affected by improvement in economic circumstances.

TABLE IX. CORTICAL DIMENSIONS OF SECOND METACARPAL IN BOYS AGED 14 YEARS IN PRETORIA

Population	Cortical thickness (mm)	Cortical volume index
Bantu	3,37	0,084
Coloureds	4,13	0,112
Indians	3,83	0,092
S.A. Whites	4,59	0,100
UK		0,091
USA	3,75	

TABLE X. CORTICAL DIMENSIONS OF SECOND METACARPAL IN MALES OVER 60 YEARS OF AGE

Population	Cortical thickness (mm)	Cortical volume index
Rural Bantu	4,44	0,095
Urban Bantu	4,45	0,093
UK	4,60	0,096
USA	4,80	

CHANGES IN ANTHROPOMETRIC DATA

Bantu nursery-school children, as studied by Richardson,[3] are heavier and taller than groups from the general Bantu population in both rural and urban areas (Table XI). Undoubtedly this is because the nursery-school children have an additional two meals each day while attending school. The White nursery-school children are somewhat heavier than their adequately fed American counterparts in Iowa,[22] a pattern revealed more prominently in older children.

The data in Table XII were obtained by the National Nutrition Research Institute in 1961 - 1963 from representative groups of school children of the four races in Pretoria.[23] There is a progression of increasing weight and height from Bantu to Coloured, to Indian, to White pupils. South African White boys are significantly heavier, 4,9 kg and taller, 2,9 cm, than their American counterparts. South African White girls, although slightly shorter, 0,6 cm, are 4,9 kg heavier than their American counterparts.

The comments on the gradation of changes in the ethnic groups of pupils for weight and height also apply to the

TABLE XI. WEIGHT AND HEIGHT OF SOUTH AFRICAN PRE-SCHOOL CHILDREN AGED 5 YEARS

Population	Weight (kg)	Height (cm)
Rural Bantu	16,3	103,5
Urban Bantu	16,0	101,7
Urban Bantu: Nursery school	17,7	106,0
S.A. Whites	19,5	110,6
USA (Iowa)	18,4	110,0

TABLE XII. WEIGHTS AND HEIGHTS OF GROUPS OF SCHOOL CHILDREN AGED 14 YEARS IN PRETORIA

	Boys		Girls	
Population	Weight (kg)	Height (cm)	Weight (kg)	Height (cm)
Bantu	38,3	150,4	41,5	151,5
Coloureds	40,9	154,1	44,2	154,1
Indians	40,7	154,7	44,3	155,0
Whites	51,9	163,4	51,9	160,9
USA (Iowa)	47,0	160,5	47,0	161,5

changes in measurements of triceps and scapula skinfolds (Table XIII). Values for South African White boys and girls are greater, respectively, than those reported for English boys and girls in London,[24] whose data are given, since those for Iowa pupils are not available.

TABLE XIII. SKINFOLDS OF GROUPS OF SOUTH AFRICAN SCHOOL CHILDREN AGED 14 YEARS IN PRETORIA

	Boys		Girls	
Population	Triceps (mm)	Scapula (mm)	Triceps (mm)	Scapula (mm)
Bantu	**6,4**	**5,2**	**9,4**	**7,6**
Coloureds	**6,6**	**5,7**	**10,5**	**8,6**
Indians	**7,7**	**5,9**	**13,3**	**11,8**
Whites	**8,9**	**7,2**	**14,4**	**10,7**
UK (London)	**8,0**	**6,9**	**12,2**	**9,6**

General Comments on Anthropometric Data

Children: Not unexpectedly, there are increases in weight, height, and skinfold measurements, with increase in privilege from Bantu to Whites. A point of great importance is that South African White children have higher values than well-fed USA Iowa children, and English children in London. The crucial question is, at what stage does nutritional and physiological advantage end, and nutritional and physiological disadvantage begin? It may well be that the South African White children have passed beyond the advantage stage. Moreover, the data given on pupils of 14 years relate to the situation almost 10 years ago; it is possible that further increases have occurred since that time. Recently, some studies on German children showed that they were consuming 5 - 15% more calories, and 20 - 30% more fat, than are usually recommended; large proportions of these children were stated to be overnourished and overweight.[25] Surely, there are limits to the advantages possessed by 'bigger and better' children. May not 'average' weights of children in affluent populations well exceed 'desirable' weights, comparable to the situation in adults? Before long it could well be that overnutrition in children, consequent on further rise in privilege, will require to be combated perhaps with the same intensity of thought and effort as is now being directed to the eradication of protein-calorie malnutrition.

Adults: Among adults, there are ample data from insurance company investigations that overweight carries a very definite and definable handicap to health and expectation of life. But whereas among children, those in jeopardy mainly are a proportion among White children, among adults the danger is present in all racial groups. In Durban, excellent investigations demonstrating the commonness of overweight in urban compared with rural Bantu were carried out several years ago.[26] Similar observations have been made regarding Tswana in Rustenburg region, and Venda in Vendaland, compared with groups of the same tribes in Johannesburg. From current studies on Coloured and Indian communities in Johannesburg, we know that overweight in males and females at middle age is a very real problem and one for which there is no ready answer. The overweight position in Whites is singularly parlous. Adult males of middle age in England are 7 kg heavier than was the case 30 years ago;[27] further, adult males in the USA are 8,5 kg heavier than their present English counterparts.[28]

CHANGES IN BLOOD PRESSURE

Rise in blood pressure is a common sequel of urbanization and sophistication. The presentation of blood pressure data in inter-racial South African populations, in a single table, is not feasible. The situation is too complex. We have found, for example, that in country areas, data on particular sex-age groups of Bantu adults differ from region to region.[29] Added to such differences are variations in mean values between populations in country and town, etc.

Very briefly, among Bantu, levels in the country are lower than in towns. In some rural populations there is scarcely any rise with age. With urbanization, observations indicate considerable elevations of blood pressure, for example, in Zulu adults in Durban compared with populations in Zululand.[26] Somewhat similar observations have been made on groups of Tswana. Regarding Coloured and Indian communities, our studies on random populations on the Witwatersrand have shown that hypertension is certainly a problem in the elderly, particularly the female moiety.

In investigations on Bantu, no correlation has been noted between level of blood pressure and salt intake. However, the intakes of these people are not high, ranging roughly from 5 g to 12 g *per diem*. This amount is far lower than the figure of 25 - 30 g found in a large proportion of the population in Japan,[30] where hypertension is very common and cerebral vascular disease the leading cause of death.

The deleterious effect of elevated blood pressure on expectation of life is well known. One actuarial authority in the USA has stated that at 40 years of age a modest elevation, namely, 135/90 mmHg is equatable to a 15% decrease in life expectancy, i.e. a decrease of 4 to 5 years.[31]

CHANGES IN BIOCHEMICAL COMPONENTS

Serum cholesterol level rises with privilege, as expected (Table XIV). Limited data on Coloureds and Indians suggest that their mean cholesterol levels are much the same as those of Bantu teachers, and a little lower than those of Whites.

It must be recognized, however, that in inter-racial groups of populations of the same age and sex, similar mean cholesterol levels do not necessarily denote a similar proneness to coronary heart disease. Among South African Indians the disease is common, but among Bantu, even among the sophisticated segment, the disease remains rare. Coloureds occupy an intermediate position. The situation described is analogous to the situation overseas concerning serum cholesterol levels on groups of coronary patients;

in the USA, Italy and Norway, groups of such patients have been found to have different mean levels.[32]

In Bantu children, a rise in the fasting blood sugar level with rise in privilege has been noted by many groups of workers (Table XV).

Among country Bantu, some children have very low fasting levels of blood sugar, 30 - 40 mg/100 ml,[33] yet hypoglycaemia of this order is compatible with good health. According to textbooks, however, the lower limit of normal for fasting blood sugar is 60 - 65 mg/100 ml. Clearly, some revision is required.

In Bantu children, we have found, like others, that 1 hour after consumption of 50 g glucose, there is only a slight elevation of blood sugar level; in some country Bantu, no rise could be detected. This is also the case in the country among aged persons accustomed to a frugal way of life.

A fall in serum gamma globulin with rise in privilege is well known (Table XVI). We have noted somewhat similar changes in respect of immunoglobulins. In populations with high values, the extent of the responsibility borne by race, inadequate nutrition, and infections, remains to be defined.

TABLE XIV. SERUM CHOLESTEROL CONCENTRATION IN SOUTH AFRICAN POPULATIONS AGED 20 - 30 YEARS

Population	Serum cholesterol (mg/100 ml)
Rural Bantu	170
Urban Bantu: General	195
Urban Bantu: Teachers	215
S.A. Whites	220

TABLE XV. FASTING BLOOD SUGAR IN GROUPS OF SOUTH AFRICAN CHILDREN AGED 10 - 12 YEARS

Population	Blood glucose (mg/100 ml)
Rural Bantu	45
Urban Bantu: General	57
Urban Bantu: Teachers' families	65
S.A. Whites	80

TABLE XVI. SERUM GAMMA GLOBULIN CONCENTRATION IN GROUPS OF SOUTH AFRICAN CHILDREN

Population	Serum gamma globulin (mg/100 ml)
Rural Bantu	1,90
Urban Bantu: General	1,55
Urban Bantu: Teachers	1,40
Coloureds	1,35
Indians	1,30
S.A. Whites	1,15
USA: Negroes	1,43
USA: Puerto Ricans	1,26
USA: Whites	1,05

CHANGES IN LEVELS OF PHYSICAL FITNESS AND ACTIVITY

Our grandparents were far more physically active than we are, rural Bantu are more active than town Bantu, and peasant cultivators in India are far more active than Indian traders in South Africa. Changes in the habitual activity of children in town compared with country is reflected in their performances in running races. A generation ago, Botha and co-workers[34] investigated the times for running 600 yards in Bantu children in Letaba compared with those in Pietermaritzburg. We have made similar investigations at Komatipoort and Soweto, Johannesburg (Table XVII).[35] In Cape Town, Sloan has been studying physical prowess in inter-racial groups.[36] Briefly, country Bantu run well, often despite poor nutritional status and infections. Town dwellers, although better nourished, display inferior performances, sometimes very poor performances. We have carried out additional investigations, in which we determined the distance covered in a 12-minute walk-run, accepted as being a good measure of maximum oxygen consumption. Country Bantu, both boys and girls, reached high scores, but town dwellers less so, although their distances were still superior to those of children in the USA.[37]

Overseas, many studies have shown the low physical activity of young adults. At Edinburgh University, it was found that only 1 of 5 students took real exercise over weekends. On the Continent, in a recent investigation on the activity of young women office workers, it was found that 80% of their time was occupied by sleep or keeping still, and that only for 20 - 60 minutes did their energy expenditure exceed that of walking.

One correlate of activity, or rather inactivity, is the number of cars per family, or per 100 families (Table XVIII). This type of index was used previously by Yudkin[34] in England when seeking indices of rise in privilege which could be correlated with rise in prevalence of coronary heart disease. Actually, urban Bantu in Soweto as a whole have more cars per 100 families than in certain European countries, and Russia. There is now one new car per year per 20 persons in the USA, per 150 persons in South Africa (all races), and per 400 persons in Russia. While caution must be exercised in making comparisons and in drawing conclusions from data of this type, there is no

TABLE XVII. TIME TAKEN (IN SECONDS) TO RUN 600 YARDS BY SOUTH AFRICAN BANTU AND WHITE CHILDREN AGED 14 YEARS

Population	Boys	Girls
Bantu		
Letaba[34]	125	134
Pietermaritzburg[34]	133	151
Komatipoort[35]	124	137
Johannesburg[35]	140	158
Cape Town[36]	160	168
Whites		
Cape Town[36]	113	148
UK[37]	122	153
USA[37]	144	194

TABLE XVIII. CARS PER 100 HOUSES IN SOUTH AFRICAN POPULATIONS

Population	Cars per 100 houses
Rural Bantu	2 - 5
Urban Bantu: Chiawelo, Orlando (poor)	6
Urban Bantu: Dube	25
Urban Bantu: Rockville (best class)	40
Indians: Lenasia (poor)	46
Indians: Lenasia (middle-class)	70
Malays: Bosmont	78
Coloureds: Edenvale (poor)	12
Coloureds: Bosmont (middle-class)	98
Whites: Linden, Johannesburg	175
Whites: Sandringham, Johannesburg	200

doubt that in a large proportion of western populations, and in an increasing proportion of populations in developing countries, physical activity is at a low level and likely to decrease still further in the future.

The bearing of habitual exercise on the long-term health pattern has been insufficiently studied, but many investigators are persuaded that the habitually active are at an advantage in respect of a lower proneness to coronary heart disease, and lower morbidity and mortality rates consequent on episodes of the disease.

CHANGES IN DISEASE PATTERN

Thus far a description has been given of the bearing of rise in privilege on some aspects of vital statistics, diet, anthropometric measurements, blood composition, and physical activity. Yet the most important questions concern the changes in disease pattern in the different ethnic groups associated with increase in prosperity, and the further changes likely to occur in the future.

Obviously, in the non-White races diseases of deficiency as listed in Table XIX, also infections (such as gastro-enteritis in the young, and tuberculosis at all ages), will soon have far less devastating effects, and mortality rates in the young will improve and tend towards the situation prevailing in Whites.

Simultaneously, however, prevalences of, and mortalities from, degenerative diseases (including diabetes and coronary heart disease) will increase in the non-White races, again tending toward the pattern found in Whites. In the Bantu, cancer of the oesophagus and of the liver (primary) will decrease, but almost certainly there will be increases in cancer of the lung, colon, and other organs and tissues.

TABLE XIX. CURRENT DIFFERENTIAL DISEASE PATTERN IN SOUTH AFRICAN BANTU AND WHITES

Disease	Bantu	Whites
Kwashiorkor	+++++	–
Marasmus	+++	–
Pellagra	++++	–
Rickets (town dwellers)	+++	+
Scurvy	+	–
Diabetes	++	+++
Coronary heart disease	+	+++++
'Strokes'	+++	+++
Cancer	++	++++

Without question, in all populations, particularly the Bantu, there will be further rises in privilege and almost invariably these will be accompanied by less physical activity, and the consumption of richer diets. Hence, assuming that within the time of one generation or less, the disease and mortality patterns in the non-White populations become closely similar to those of Whites, what can be done to continue to enjoy the delights of privilege, yet at the same time to maintain, if not to increase, expectation of life?

Two specific measures would be to reduce deaths on the road, and deaths by violence, and to reduce the prevalence and intensity of smoking. In South African White males, unnatural deaths plus deaths from lung cancer constitute no less than 20 - 25% of all deaths.

Less specific measures would be to promote weight reduction and to lower blood pressure. The reduced life expectancy associated with these conditions has already been referred to; their aggravational role in 'killer' diseases (diabetes, coronary heart diseases, strokes) is incontestable.

To lessen morbidity and mortality from the 4 causes mentioned is extremely difficult. Some workers take a gloomy view of the future, and aver that the chance of adopting measures to evoke a meaningful change is remote. Others are sanguine that if only people could be sufficiently frightened, they would alter their ways. The crucial point, however, is that to make a worth-while dent in the mortality figures of the conditions or diseases which are prematurely killing us, it is young adults who must be persuaded to alter or to limit some of the enjoyable aspects of living (fast driving, smoking, gorging). But who can communicate with them? From earliest times the young have always regarded the old as stupid fools; and at present with the world-wide ferment and restlessness among them, that conviction is firmer than ever.

Nevertheless, it would be defeatist to believe that a change of heart or a re-orientation of attitude cannot take place. In this connection, I sometimes think of the great gin menace that prevailed in England from 1700 - 1750.[40] Some may remember the picture by Hogarth depicting the times, called 'Gin Lane.' In London, in most areas, every fourth house was a 'dive' or 'speakeasy' for the sale of gin, and the writer Henry Fielding told of large numbers who 'swallow pints of this poison within the 24 hours.' It would take too long to tell how the authorities overcame this menace—but it was overcome. In the British Navy in the last war, it used to be said, 'Very difficult problems are dealt with routinely; the impossible takes a bit longer.' It is in this spirit we have demonstrated the capacity to put men on the moon. In the great matter in hand, however, we must be realists and it is doubtful whether we have the necessary self-discipline to apply available knowledge to combat the increasing prevalence of lethal diseases and situations associated with rise in privilege.

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Effects of an Acidified and a Non-Acidified Milk Formula on Diarrhoea, Body Mass and Serum Albumin Levels of Kwashiorkor Patients*

HERNA ROODE, M.B. CH.B. AND J. G. PRINSLOO, M.B. CH.B., M.MED. (PAED.), (*with the technical assistance of* MRS H. KRUGER, B.SC. *and* MRS E. FREIER); *from the National Research Institute for Nutritional Diseases of the South African Medical Research Council, and the Department of Paediatrics, University of Pretoria, Pretoria*

SUMMARY

Forty-two Bantu children with classical kwashiorkor were randomly allocated 2 milk formulae which were identical in all respects except that 1 formula was acidified by the manufacturer. The body mass of the patients was recorded daily; stool mass and lactic acid concentrations were measured on days 3 and 4, 10 and 11, and 20 and 21. The serum albumin levels of the patients were measured at the beginning, in the middle, and at the end of the trial, which lasted 3 weeks. The haemoglobin concentrations were also estimated.

According to this data, no significant differences were found between the 2 formulae. It is concluded that there is no clear advantage of an acidified over a non-acidified milk feed, as an infant food for the treatment of kwashiorkor.

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Modification of cow's milk by chemical means such as the addition of acids has been common practice for many years. Fermented milks have been used as a food since biblical times. According to Heineman,[1] such products were popular among the peoples of Asia, Europe, and Africa, at least as early as the beginning of the 19th century. Buttermilk was thought to be the most easily digestible form of cow's milk and it was popular for the feeding of babies, especially in Holland.[2] In the past, some authorities maintained that fermented milk was especially suitable for use in diarrhoeal disorders and for treating malnourished infants.[2,3] Attention was drawn to the fact that, due to its low pH, acidified milk usually contained no pathogenic bacteria. It was also believed that it stimulated bile flow, pancreatic and intestinal secretions, and facilitated the absorption of fat, iron, calcium, and phosphorus.[4,5] Subsequently it became known that casein in cow's milk is denaturated by acidification, resulting in the formation of smaller and less tough curds in the infant's stomach.[4,6] Currently, acidified milk formulae are less popular, although they are still available, and are used fairly extensively on the European continent.

More recently some investigators have suggested that the incidence of gastro-intestinal, as well as general systemic infections, in infants being fed an acidified milk

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