THE MAJOR RISK FACTORS FOR CORONARY ARTERY DISEASE IN THE COLOUREDS OF THE CAPE PENINSULA

THE CRISIC STUDY

Krisela Steyn

MSc MBChB

A thesis submitted for the degree of

Doctor of Medicine

University of Cape Town March 1987

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University of Cape Town

Met liefde opgedra aan my vier seuns

GROVE, JOUBERT

LOMBARD, en DIRK

STEYN

van wie ek geleer het dat DIT ALLES die moeite werd is.

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ABSTRACT

A cross-sectional study of risk factors for coronary heart disease (CHD) in a random sample of 976 coloured people revealed a population greatly at risk of CHD. The major reversible risk factors were very common: 57% of men and 41% of women smoked, 17,2% of men and 18,4% of women were hypertensive (≥160/95 mm Hg or receiving medication), and 17,4% of men and 16,2% of women had a total serum cholesterol value above 6,5 mmol/litre. The high cut-off points used to identify the above prevalence rate do not reflect the total population at risk. At lower but real levels of risk 94,6% of men and 89,8% of women carried some degree of CHD risk. Clustering of the major risk factors was found.

Men between 25 and 44 years had a markedly higher prevalence of hypertension than women of the same age. Above this age the situation was reversed. Correcting for under- and over-cuffing increased the mean pressures in men and decreased them in older women.

Only 42,2% of hypertensive men and 69,9% of women were aware of their condition. Only 41,3% were on medication for it and a mere 16% had blood pressures below 160/95 mm Hg. Hypertensives had significantly lower intakes of potassium, calcium, magnesium and saturated fat than normotensive subjects. Young hypertensives consumed more salt than older hypertensives. Both systolic and diastolic blood pressures were positively associated with alcohol consumption, smoking (in men), total serum cholesterol, low-density lipoprotein (LDL) cholesterol, non-fasting triglyceride and uric acid levels.

Hypertensive subjects were less educated and showed more type A coronary-prone behaviour than normotensive subjects.

A comparison of the prevalence of hypertension in the four South African ethnic groups revealed that coloured men and coloured women, along with black women, had the highest hypertension prevalence in South Africa. Multiple regression analysis identified variables that contributed significantly to the regression of systolic and diastolic blood pressure.

The study population smoked heavily, as indicated by a mean daily consumption of 14,2 and 13,1 cigarettes among male and female smokers respectively; only 33,5% of male and 39,6% of female smokers used less than 10 cigarettes per day. In 1982 the economically active coloured population of the Cape Peninsula spent an estimated R36,2 million on cigarettes.

Coloured smokers smoked more heavily during the weekend. Both men and women smoked mostly filter cigarettes. Forty-four per cent of male and 49,5% of female smokers stated that they had attempted to stop smoking, mainly for health reasons. More than one-third of the participants had a positive attitude to combating smoking, particularly those with an educational level higher than Standard 7.

Former smokers and heavy smokers had a significantly higher prevalence of coronary heart disease than the other participants. Smoking was associated with a low body mass index, low high-density lipoprotein (HDL)-cholesterol levels, low socio-economic standing, high alcohol consumption and type A coronary prone behaviour in men.

When hypercholesterolaemia was identified using a cut-off point of 5,7 mmol/litre the age standardised prevalence of hypercholesterolaemia was 34,5% for males and 32,9% for females. Age- and sex-specific cut-off points showed that 69,2% of males and 65,9% of females were at risk for CHD by virtue of the level of their total serum cholesterol.

Of the males 19,1% and 13,4% of the females warranted investigation for possible familial hypercholesterolaemia.

Hypercholesterolaemia was statistically significantly associated with a reported history of CHD and a familial history of CHD as well as with hypertension and diabetes in some groups studied.

Unlike most cross-sectional studies it was found in this study that hypercholesterolaemic participants consumed more saturated fat and their diets had a higher Keys score than did normocholesterolaemic participants. Only 16,5% of males and 21,7% of females had modified their diets to prevent heart disease.

Multiple regression analysis identified variables that contributed significantly to the regression of total, LDL- and HDL-cholesterol levels in the study population.

The study revealed a population with high HDL-cholesterol levels. The mean level for men was 1,43 $\pm$ standard deviation (SD) 0,42 mmol/litre and for women 1,57 $\pm$ 0,41 mmol/litre. The mean level and SD for the ratio of

HDL-cholesterol/total serum cholesterol (HDL/TC) for men was 26,3 ± 9,5% and for women 28,1 ± 9,3%. The HDL-cholesterol level did not increase with age. Of the men 80% had an HDL/TC ≥20% and 87% of women had such levels. The coloureds of the Cape had lower HDL-cholesterol levels than those of black and Negro populations, but higher levels than those of westernised white populations. Coloureds of a higher socio-economic standing had more adverse lipid levels than those of a lower socio-economic standing.

Persons with high HDL-cholesterol levels in the coloured population reported a history of CHD and diabetes statistically less frequently ($p<0,001$) than did persons with low HDL-cholesterol levels. The first group also reported a family history of CHD significantly less frequently than did the second group.

The London School of Hygiene questionnaire for chest pain proved ineffective to determine CHD in the coloured population. Above the age of 45 years 15,2% of men and 11,5% of women reported suffering from CHD.

Both private and public medical facilities were used by the study participants. The population had reasonable access to blood pressure measurements, as 52% of men and 63,7% of women had had their blood pressure measured in the year prior to the study. In addition to the significant number of participants who had attempted to stop smoking and small number who had attempted to improve their diet, 16,7% of men and 45,2% of women had attempted to lose weight. Twenty-eight percent of the men and 38,8% of the women had attempted to relieve their stress. Very few of the participants did sufficient physical activity to protect them against CHD.

Very few participants knew the lifestyle requirements for protection against CHD. Health information was mostly gained from public media such as television, followed by information from medical personnel and facilities, and least information was gained in schools or at the workplace.

When asked, the study population's first choice for health education to protect against CHD was by means of television. This was followed by the choice of schools to educate the young in early CHD prevention. The third choice of educational medium was newspaper articles, followed by lectures and posters in public places. Radio talks and teaching at the workplace, day hospitals and clinics were seldom suggested as effective media for CHD prevention.

In the last few decades health services in the Cape Peninsula were sufficient to have improved parameters reflecting the quality of health care in this area. In contrast health education, as part of the preventive health services is totally inadequate to provide sufficient education regarding CHD prevention.

The unfavourable risk factor profile of the coloured population is such that an effective CHD prevention programme would primarily have to be directed at the population as a whole. It should use, as health education tool, the public media, particularly television. Health education in schools and at the workplace should be greatly expanded and especially be directed at the young to develop healthy behaviour as the norm in the population. Health education should not be given in a pedantic prescriptive manner, but rather by means commonly employed in the advertising industry. Screening for high risk individuals should be an adjunct to the population approach to prevent CHD.

The coloured population CHD prevention programme should be part of a larger national CHD prevention programme for all the people of South Africa that have adopted a CHD-inducing western lifestyle.

Diagnosis and management of hypertension by health care providers will have to be improved, particularly in young coloured men of lower socio-economic class. Work-place screening and treatment programmes for hypertension would play an important role in this respect. Knowledge about hypertension and its management should be improved.

Urgent attention should be given to preventing the young coloured population from starting to smoke and those who do smoke should be assisted in stopping. Programmes to prevent coloured children from starting to smoke should be conducted in primary schools, as coloured school children start smoking at a younger age nowadays than was the case in previous decades. Adequate anti-smoking legislation should be passed to protect the young and adults who would be taken in by cigarette advertising.

Knowledge of the prudent diet is inadequate and a typical western diet is followed by the coloured population. Nutrition education should be directed at the whole coloured population and adoption of the prudent diet recommended to improve their lipid profiles. The use of the prudent diet would also reduce the number of overweight coloureds, especially the number of coloured women. The large number of young hyperlipidaemic coloureds will only be identified if appropriate age-specific cut-off points are used when determining total cholesterol levels among them.

Only 5,4% of coloured men and 10% of coloured women were completely free of CHD risk. Of the men 25,6% and 20,6% of the women had two or more major risk factors. This clustering of major risk factors was particularly found in the older age group. Health personnel should be on the look-out for other major CHD risk factors when a patient presents with one of them, and should then treat all risk factors in order to reduce the patient's overall risk profile.

The urgent implementing of a CHD prevention programme is thus essential for the coloured population of the Cape Peninsula, along with its other real third world health needs.

ACKNOWLEDGEMENTS

- This study was part of a collaborative project of the National Research Institute of Nutritional Diseases of the South African Medical Research Council and the Institute for Communication Research of the Human Sciences Research Council. The financing of the project and the permission to use the results for this thesis was kindly provided by both these organisations.

I wish to acknowledge the help and support of:

- The South African Medical Research Council for financial aid in completing this thesis.
- The Bureau for Research Support Services of the Human Science Research Council and in particular to Mr P Crause, the assistent Director of the Western Cape Regional Office, and Messrs O Valley, DA Louw and SA Persent fieldwork organisers and the panel of fieldworkers whose work made this study possible.
- The able and dedicated service of the school nursing sisters of the regional office of the Department of Health and Welfare contributed greatly to this study. Their sense of humor, enthusiasm and humane kindness made them a joy to work with.
- Sister Jean Fourie assisted in training and standardising the fieldworkers and with Miss M E J Louw and L J Levy, supervised the school nursing sisters' fieldwork. This was done with great precision and contributed significantly to the accuracy of the data. Her assistance in the preparation of this document has also been invaluable.

- The laboratory assistants of the National Research Institute for Nutritional Diseases who executed the biochemical analysis most ably.
- The statisticians Derick Chalton, Gina Joubert, Dennis Capatos and Charles Parry, of the Institute of Biostatistics of the South African Medical Research Council who were responsible for the analyses of the data and the statistical training of the author.
- Dr Pieter Jooste and Mrs Marietjie L Langenhoven whose advice and assistance was of great help to me throughout the duration of this project.
- Miss Grace Townshend and Mary Sandrock whose competent editing turned the writing in the dyslexic author's manuscript into readable English.
- Mrs Laetitia van der Merwe who ably typed and corrected this manuscript.
- Dr J E Rossouw who first whetted my appetite for cardiovascular disease epidemiology, whose clear and astute thinking has done much to train me in this field and whose scientific integrity could act as a role model for any worthwhile researcher.

ABBREVIATIONS

In alphabetical order:

BMI	Body mass index = $weight/height^2$
BP	Blood pressure
°C	Degrees centigrade
CASS	Centre for Applied Social Sciences. University of Natal
cm	Centimetre
cig	Cigarettes
CHD	Coronary heart disease
CVA	Cerebrovascular accident
CVD	Cerebrovascular disease
EPA	Eicosapentanoic acid
ESD	Enumerator sub-district
g	Gram
HDL	High-density lipoprotein
HSRC	Human Sciences Research Council
ICOMM	Institute for Communication Research
kg	Kilogram
kcal	Kilocalories
LDL	Low-density lipoprotein
mg%	Milligram per decilitre
MI	Myocardial infarction
mmHg	Millimetre of mercury
ml	Millilitre

NRIND National Research Institute for Nutritional Diseases
(Presently: RIND: Research Institute for Nutritional Diseases)

N Number

p Probability

RSA Republic of South Africa

r Correlation coefficient

SABC South African Broadcasting Corporation

SD Standard deviation

Std Standard

UK United Kingdom

USA United States of America

WHO World Health Organisation

% Percentage

$\geq$ Equal or larger than

$\leq$ Equal or smaller than

$>$ Larger than

$<$ Smaller than

/ Per

* Statistically significant at the 5% level

** Statistically significant at the 1% level

CHAPTER 1

CORONARY HEART DISEASE IN AND MOTIVATION FOR STUDYING CHD RISK FACTORS IN THE COLOURED POPULATION OF THE CAPE PENINSULA

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CHAPTER 1

1 THE COLOURED POPULATION OF THE CAPE PENINSULA

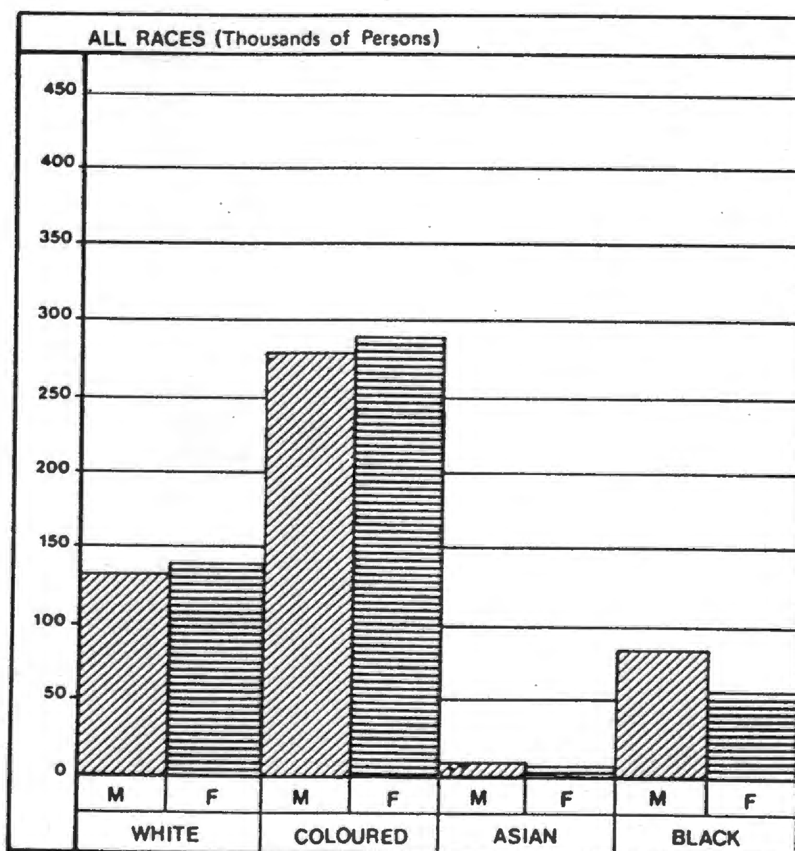
In a study done in 1939[1] of the history of the Cape coloured people between 1652 and 1937 they were described to originate from four principal stocks in the previous centuries: the slaves brought to the Cape, the Hottentots, the Bushmen and the Europeans. In recent times the black races also contributed to their stock. Brock[2] described the coloured population of the Cape in 1949 as "numbering 157 000 within the Cape Town municipal boundaries, living in small, relatively distinct residential areas scattered between European areas throughout the Cape Peninsula. They differ from the Europeans principally in their inferior social and economic position. All vital statistics show a very great difference between them and the European residents of Cape Town and the differences are nowhere more apparent than in those diseases which are coming to be called the social diseases of a low social and economic position."

In 1985 the coloured population of the City of Cape Town was estimated to be 566 560 and represented 57% of the total population of the City of Cape Town[3] (Fig 1). The Medical Officer of Health of this city wrote in his annual report of 1985:

"The social and economic conditions of the coloureds are on the whole unsatisfactory. A section of coloureds are skilled tradesmen who earn good wages, but the majority are unskilled workseekers who earn on an average of

less than R76,00 a week when in full employment. The position is aggravated by the large size of their families, through limited sick benefits and unemployment insurance payments being available only to registered workers. Mitchells Plain has provided opportunities for home ownership but the scarcity of rented accommodation in relation to escalating need has perpetuated overcrowding in existing townships. Housing accommodation, apart from municipal schemes, is relatively expensive and scarce. The gap between the social conditions of the white community and the coloured community remains; few whites live in unsatisfactory conditions, but the majority of coloured families live in poor social and economic conditions. Coloured families have been adversely affected by economic inflation, escalation of the price of basic food stuffs, transport costs and the escalation of unemployment. Social conditions have deteriorated because of consumer and school boycotts."

Figure 1 Population of the city of Cape Town by race and sex 1985[3]



Between these two quoted reports, dramatic differences did occur in the coloured population of the Cape Peninsula. In the following pages some indication will be given of progressive urbanisation, westernisation and sophistication that has befallen this population group. Although the coloureds are still stricken with diseases and needs of a third world population, first world problems and needs are becoming more apparent. The third world problems of disease and poverty, still operational in this population group, and which have no specific bearing on atherosclerosis induced disease and its risk factors, are not discussed in the following pages and are described in the references 3 to 9 of this chapter.

Thomas described[5-7] the coloured population of South Africa as one which had overcome the burdens of poverty to a degree in the two decades prior to 1985. In this time the gap between the coloured and white populations had narrowed. In 1976 the Theron commission reported[8] 40% of the coloured population of South Africa to be poverty stricken, by 1985 this group had been reduced to below 30% of the population, but still represented at least 500 000 people. This change represents a population's shift to predominantly a middle class population[7] with only 15% to 20% of the population being upper middle or upper class[6].

These changes are reflected in many demographic and social parameters. Figure 2[4] shows the decline of mortality and birthrates in the South African population groups between 1910 and 1980. The coloured population showed the most marked decrease in both these rates compared to the other population groups in South Africa[9]. This resulted in population growths as is shown in figure 3[4] between 1900 and 1980. At present the total South African coloured population with a growth rate of less than 2% is no longer threatened by a population explosion[5].

Figure 2 Mortality and birth rates for South African populations between 1910 and 1980[4]

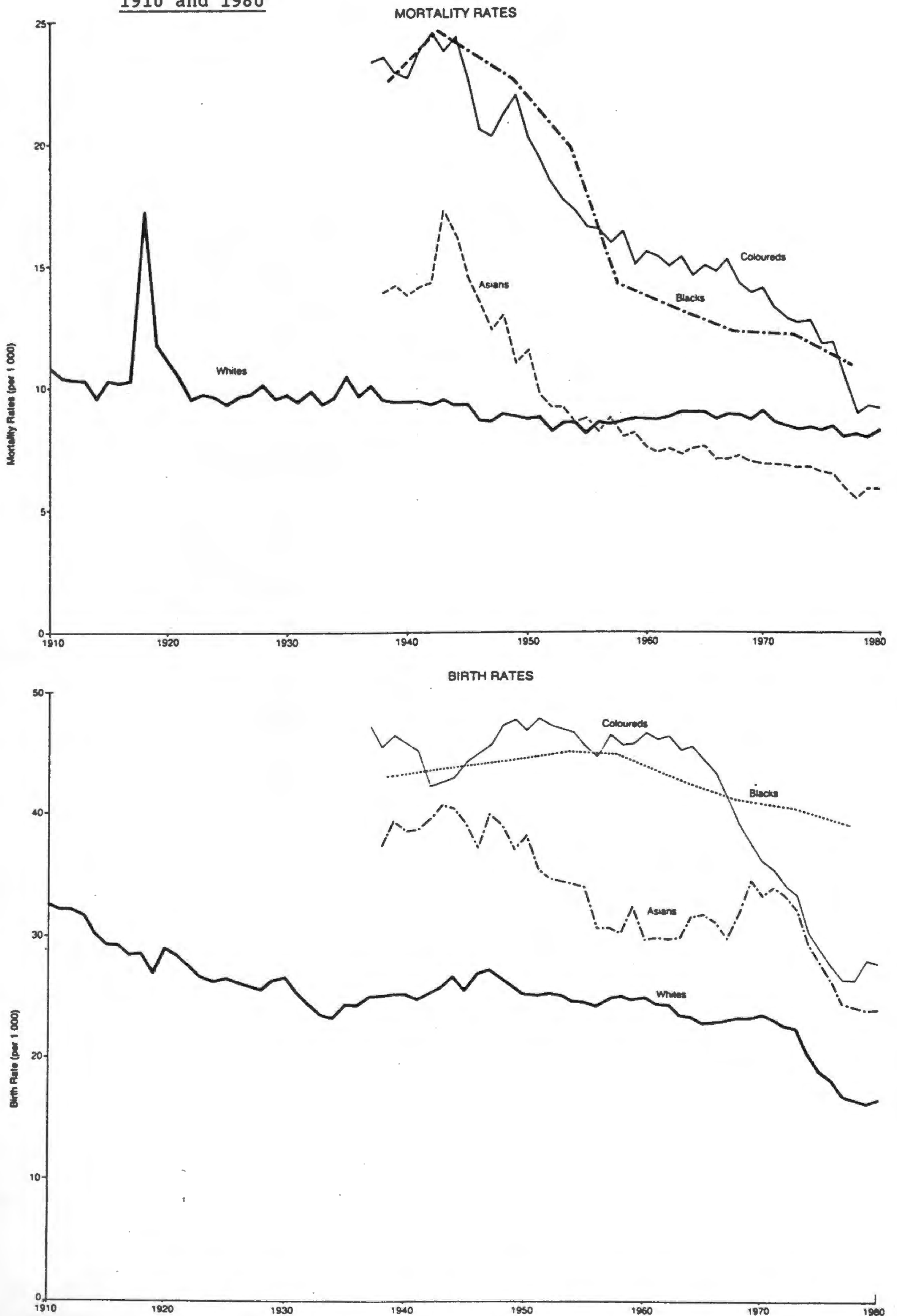
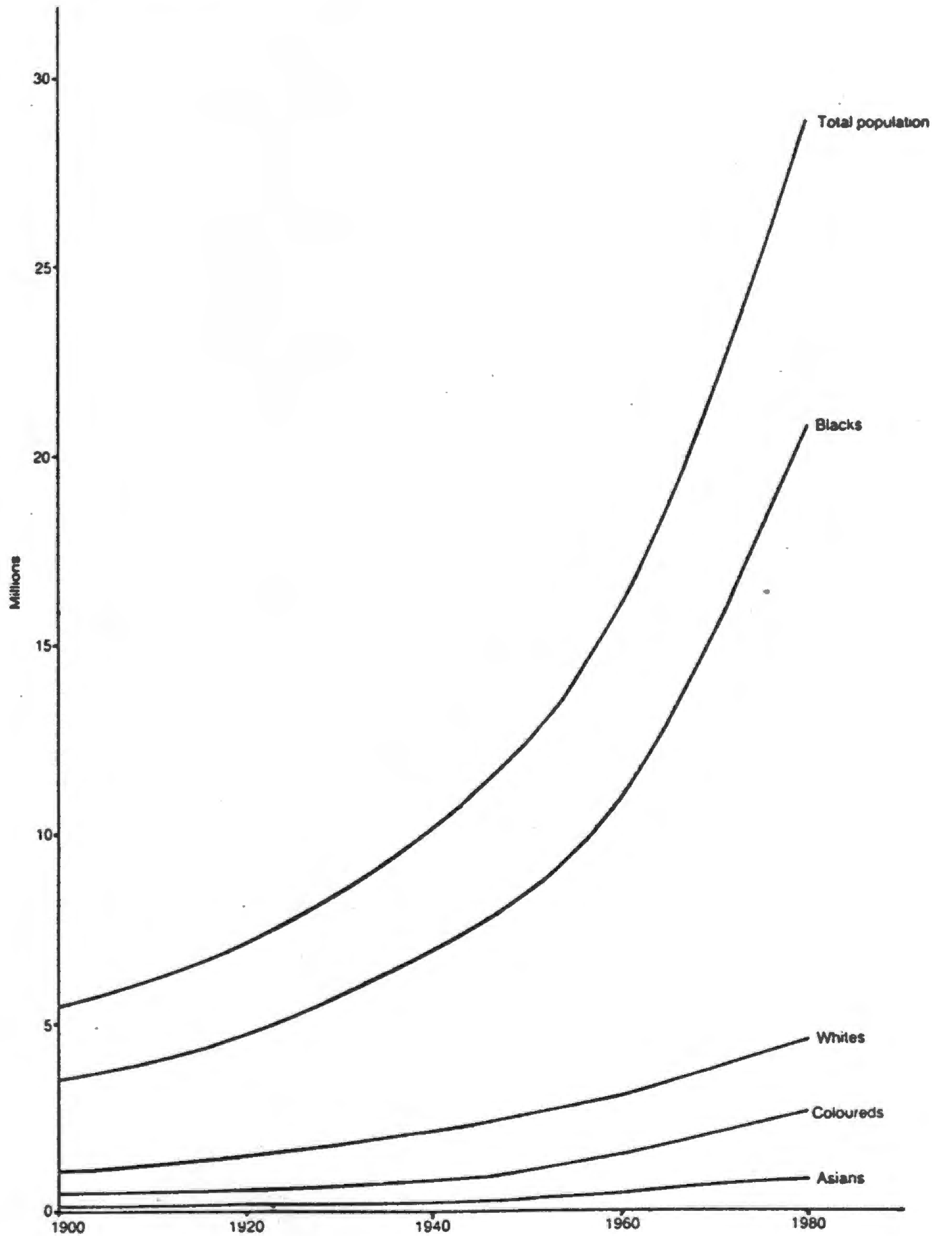
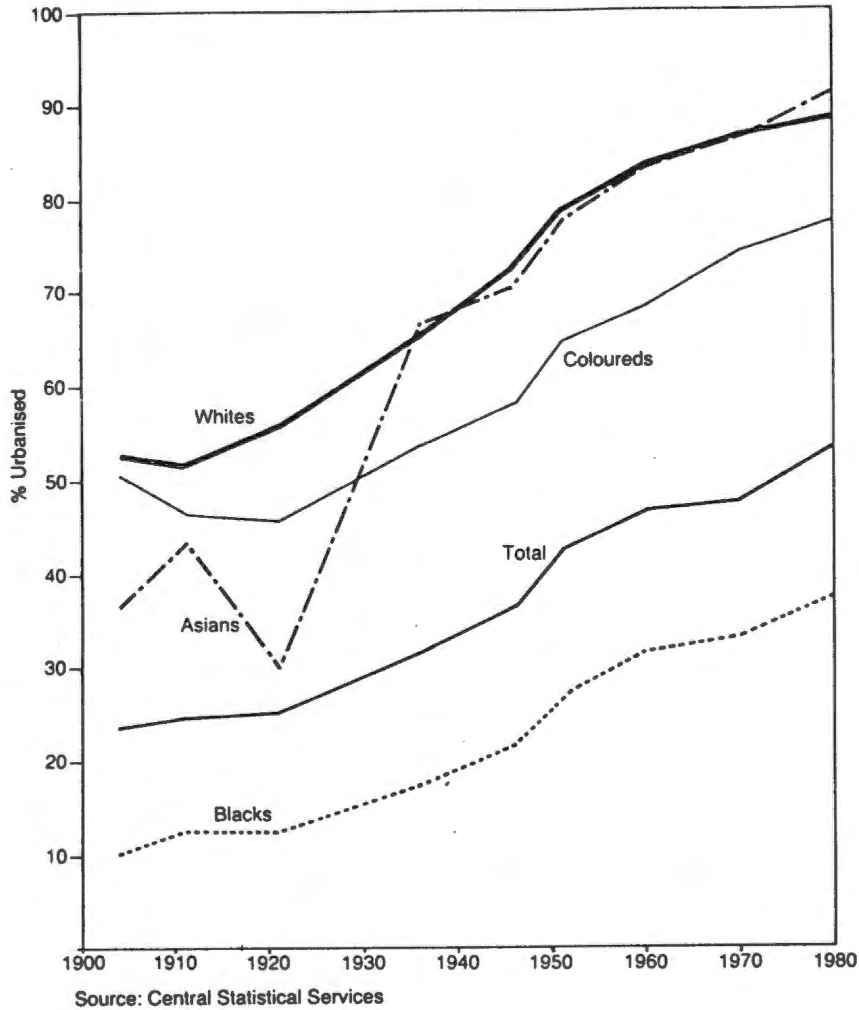


Figure 3 Growth of the South African population and the various population groups from 1904-1980[4]



Another feature of all the populations of the country as a whole, is the progressive urbanisation since the turn of the century as shown in figure 4[4].

Figure 4 Urbanisation trends in South Africa[4]



Source: Central Statistical Services

The city of Cape Town showed a greater coloured population growth than a black and white population growth between 1962 and 1985. Figure 5[3] illustrates this tendency. Table 1[4] shows the projected population growth in metropolitan area of greater Cape Town. This includes the areas of the statistical region 01 and 02, which is the Cape Peninsula as well as the districts of Stellenbosch, Strand, Somerset West, Paarl and Wellington.

Figure 5 Population growth of the city of Cape Town 1962 to 1985[3]

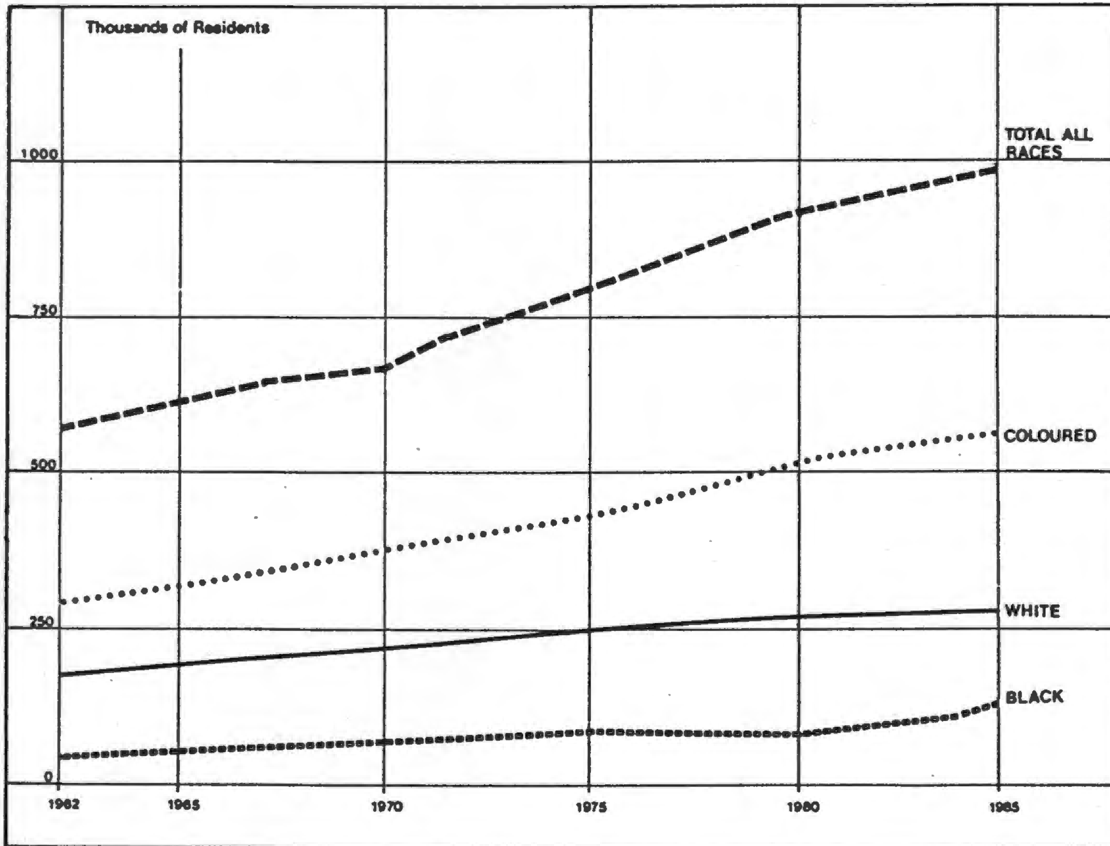


Table 1 Possible population growth in greater Cape Town (in thousands)[4]

Population group		Year						Growth rate %p.a.*
		1980	1985	1990	1995	2000	2050	
Asians		15	16	17	19	21	26	0,8
Whites		570	638	692	749	795	974	0,8
Coloureds		1 001	1 120	1 258	1 408	1 571	2 775	1,5
Blacks**	Low	200	241	297	359	425	1 109	2,5
	High	200	241	297	364	440	1 858	3,2
Total**	Low	1 785	2 016	2 265	2 535	2 812	4 884	1,4
	High	1 785	2 016	2 265	2 539	2 827	5 633	1,7

(** Two projections, 'low' and 'high' are made for blacks)

% p a = Percentage per annum.

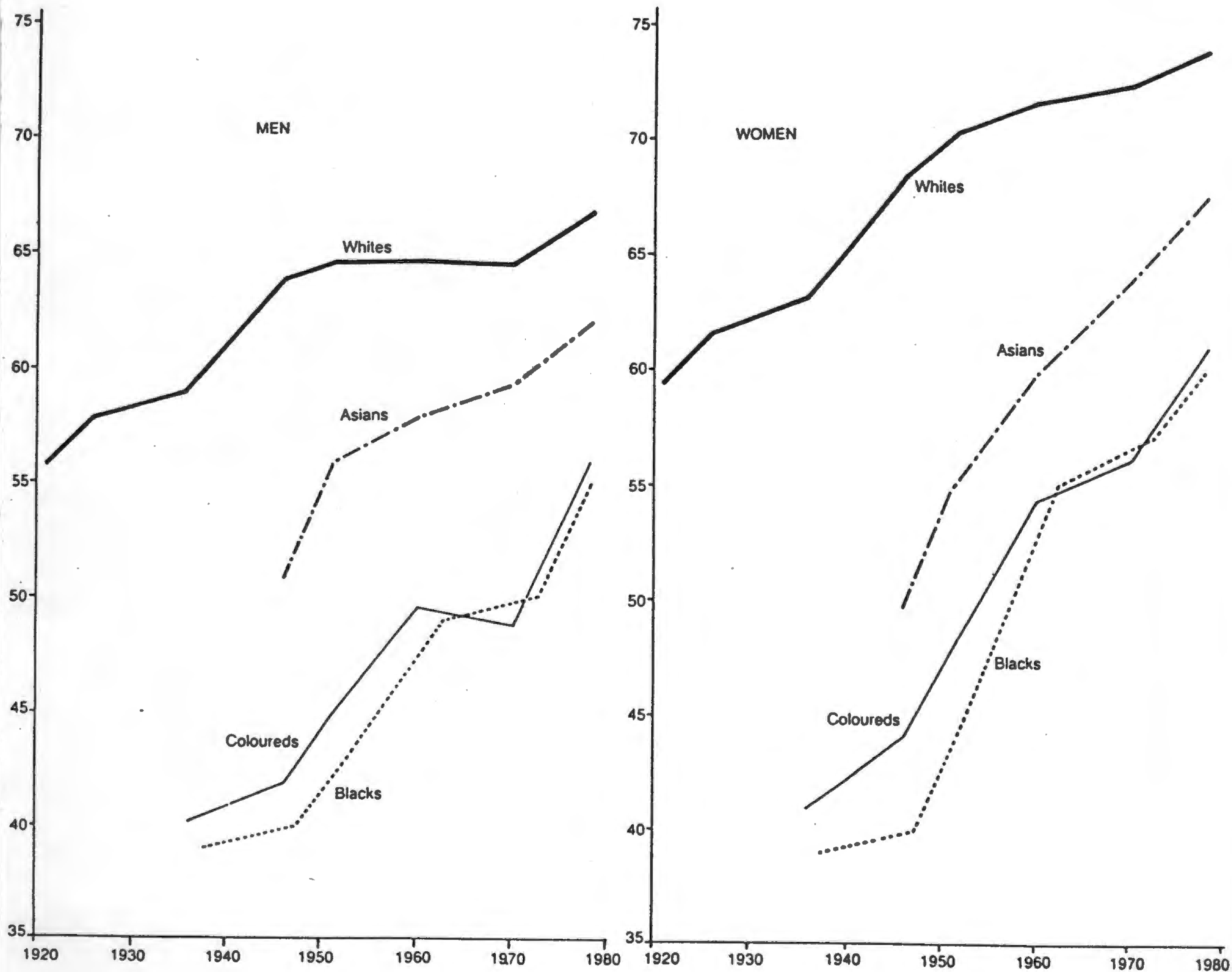
From these trends and figures it can be deduced that the coloured population will make up the major part of the population of the Cape Peninsula well into the 21st century.

Table 2 Level of education of the South African population, seven years and older, as determined at the 1960, 1970 and 1980 censuses[4]

Year	Below Std 5	To Std 5	Stds 6-7	Stds 8-9	Std 10	Diploma	Degree	Total
White men								
1960	3,5	23,4	30,3	19,2	12,2	7,4	4,0	100,0
1970	1,0	20,8	24,0	24,1	19,2	6,3	4,6	100,0
1980	3,7	17,3	16,8	23,0	23,2	9,5	6,5	100,0
White women								
1960	4,1	22,4	31,8	23,1	10,9	6,2	1,4	100,0
1970	1,2	19,9	25,1	28,2	17,3	6,5	1,9	100,0
1980	3,9	17,1	17,6	27,3	21,3	9,5	3,1	100,0
Coloured men								
1960	32,2	49,5	13,7	2,7	0,6	1,0	0,1	100,0
1970	21,7	55,1	16,2	4,7	1,3	0,9	0,1	100,0
1980	16,8	52,1	19,3	7,6	2,6	1,2	0,3	100,0
Coloured women								
1960	30,2	54,4	12,0	2,0	0,2	1,0	0,0	100,0
1970	20,4	59,0	15,1	4,0	0,5	1,0	0,0	100,0
1980	16,6	54,3	19,1	6,9	1,4	1,8	0,1	100,0

The increase in the level of eduction in the coloured population of the country between 1960 and 1980 is shown in Table 2[4]. In 1980 10,2% of coloured women compared to 3,2% in 1960 had education of Standard eight or higher. Of the coloured men 11,7% in 1980 compared to 4,4% in 1960 had such levels of education.

Figure 6 Life expectancy at birth of South African populations since 1920[4]



The improved schooling resulted in more coloured persons moving into tertiary education as well as technical training. This improvement in training has resulted in a shift in the type of occupations filled by coloureds as well as the ranks achieved in these occupations by the coloured labour force and represents a shift away from unskilled, or semi-skilled toward skilled, highly skilled and even, in a small way, to the executive level. Parallel to this upward occupational mobility a real increase in income was enjoyed by the coloureds between 1970 and 1983[7].

The improved socio-economic standard of South African populations and particularly the improved health care facilities in the country resulted in a marked increase in life expectancy of all the population groups in South Africa since 1920 (Fig 6)[4].

The result of all these factors on the age structure of the coloured population over time is a shift away from a youthful pyramidal population structure, typical of a third world population, to an aging population structure typical of first world populations, with fewer young people and children and more old people. Figure 7[4] shows this trend by comparing the age structure of the four South African population groups, figure 8[3] indicates this trend by comparing the coloured population of the Cape Peninsula (01 Economic region) between 1970 and 1980. In a projection of the age structure of the coloured population of South Africa in the year 2015, as shown in figure 9[4], it can clearly be seen that the coloured population will then be an aging population which will have all the associated problems such as the care of the aged and all the chronic diseases of middle and old age, of which CHD is a very prominent one. By the demographic criteria of Hauser[10]

the coloured population, particularly that in the Cape Peninsula, can be described as one fast moving away from a transitional community, to that of a modern community. In the future its needs will be closer to those of a modern westernised community than those of a third world transitional community, whose problems still significantly contribute to the health and socio-economic status of the coloured population of the Cape Peninsula.

Figure 7 Age structures of the four population groups in South Africa (1980)[4]

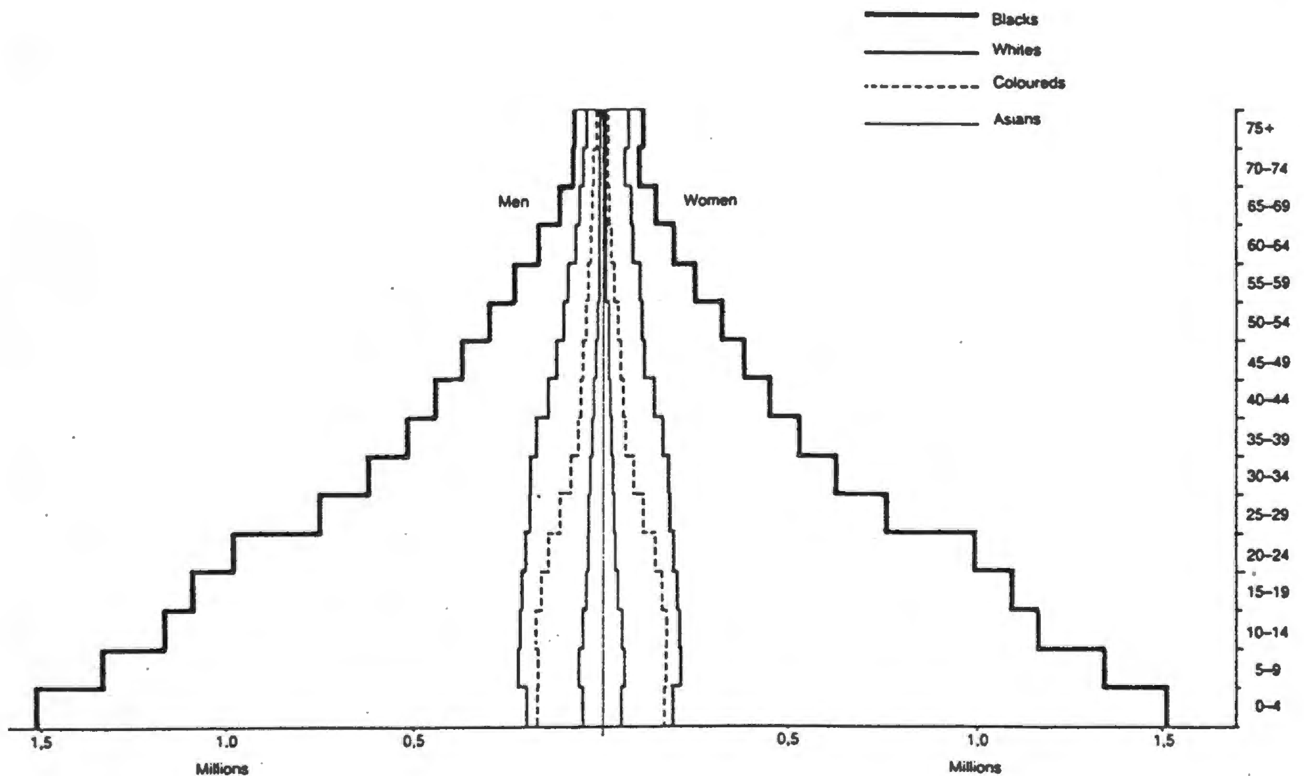


Figure 8 Population pyramids by sex and five year age group intervals for Coloureds in the 01 economic region (magisterial districts) of Cape Town, Wynberg, Simon's Town, Goodwood and Bellville) 1970 and 1980[3]

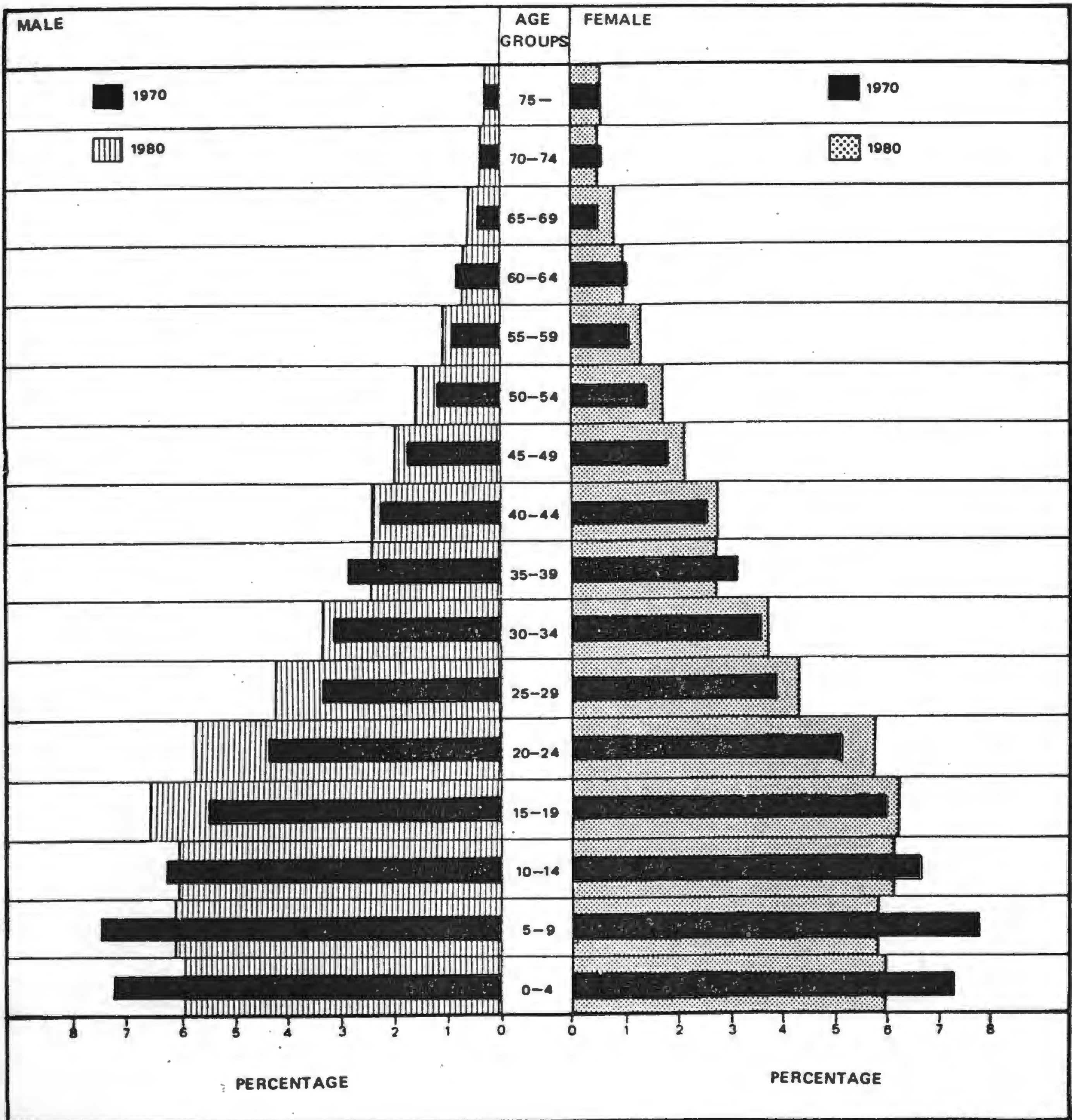
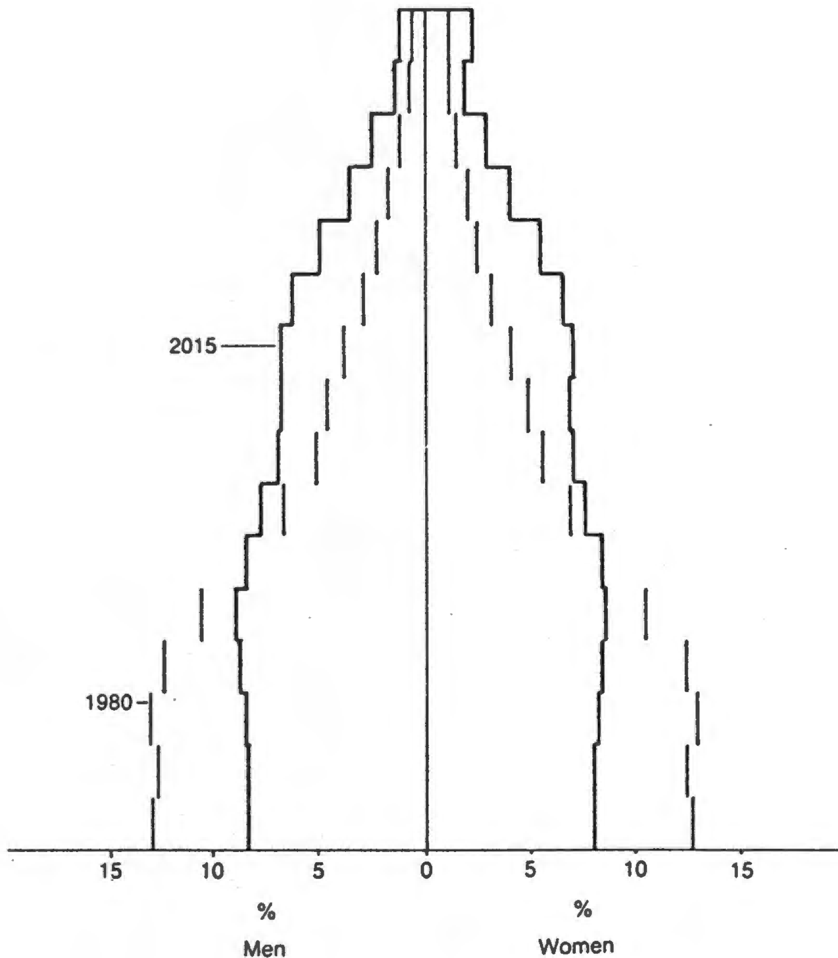


Figure 9 Age structure of Coloureds in 1980 and 2015[4]



2 THE HISTORY OF CORONARY HEART DISEASE IN THE COLOURED POPULATION OF THE CAPE PENINSULA

In an article by Brock[2], written in 1949, which discussed the disease pattern of the Cape coloured people, CHD is not mentioned as a major cause of death. Of the CHD-related conditions, only obesity and hypertension in middle-aged coloured women was mentioned. Brock concluded that the non-europeans in Cape Town at that time did not experience cardiac and arterial diseases as often as did the whites because of their shorter life

expectancy. They died of diseases like tuberculosis, pneumonia, diarrhoea and enteritis before they reached an age when degenerative diseases were likely to cause death. Bronte-Stewart et al.[11] reported in 1955 wide inter-racial differences in CHD in Cape Town with the whites at the one extreme, the blacks at the other and the Cape coloureds in between. They studied 364 apparently healthy men aged 40 to 58 years, of whom 132 were black, 118 Cape coloured and 114 European. Parallel to the racial differences in CHD disease found by Bronte-Stewart et al., highly significant differences in the mean serum cholesterol levels were found. The blacks at one extreme of 116 mg/dl (3,00mmol/litre), the whites at the other, 234 mg/dl (6,05 mmol/litre) and the Cape coloureds in between with a mean serum cholesterol level of 204 mg/dl (5,27 mmol/litre). The results of this small study prompted Vogelpoel and Schrire[12] to study 5004 electrocardiograms (ECGs) done at Groote Schuur hospital during 1953 and 1954. Of these ECGs 13,5% of those done on the whites, 6,8% of those done on Cape coloureds and 0,9% of those done on blacks showed the typical ECG criteria for myocardial infarction.

These racial differences in CHD morbidity seem to have persisted in the Western Cape at least until 1970 when Silbert reported the results of a general practice morbidity study in this area[13]. General practitioners participating in the study reported cardiovascular disorders less frequently in coloureds than in whites. The incidence of ischaemic heart disease in whites was found to be 20% of all cardiovascular disorders compared to 8% in coloureds. This reported incidence of ischaemic heart disease was in contrast to the racial difference in hypertension which accounted for 24% of all cardiovascular disorders in whites and 35% in coloureds. It thus follows that despite hypertension being found less frequently in whites than coloureds,

the other risk factors for CHD were probably found far more frequently in whites to account for the difference in CHD incidence in the two groups participating in the Cape morbidity study. Apart from Bronte-Stewart's[11] earlier reported small study and the later Cape morbidity study[13] very little is known about the prevalence of any of the major risk factors, smoking, hypertension or hypercholesterolaemia in the populations of the Cape Peninsula over the last half century.

3 CHD MORTALITY IN THE COLOURED POPULATION

From the previous sections describing the progressive westernisation of the coloured population it can be anticipated that CHD mortality would be increasing in this population group over time.

A Comparison of CHD mortality in different populations

Becker[14] published the results of 2 437 consecutive autopsies between 1924 and 1928 done in urbanised blacks and coloureds from Johannesburg. Of the autopsies on blacks 26% and of those on mixed races (coloureds) 37% showed atheromatous changes in their arteries.

The different CHD patterns in the South African race groups described thus far are also found when comparing the CHD mortality rates in the South African populations. Wyndham[15] reported the CHD mortality rates of the South African economically active manpower in 1970. The CHD and other related age adjusted mortality rates are shown in Table 3. More economically active Asians die due to CHD than do whites, the CHD mortality rates of coloureds are

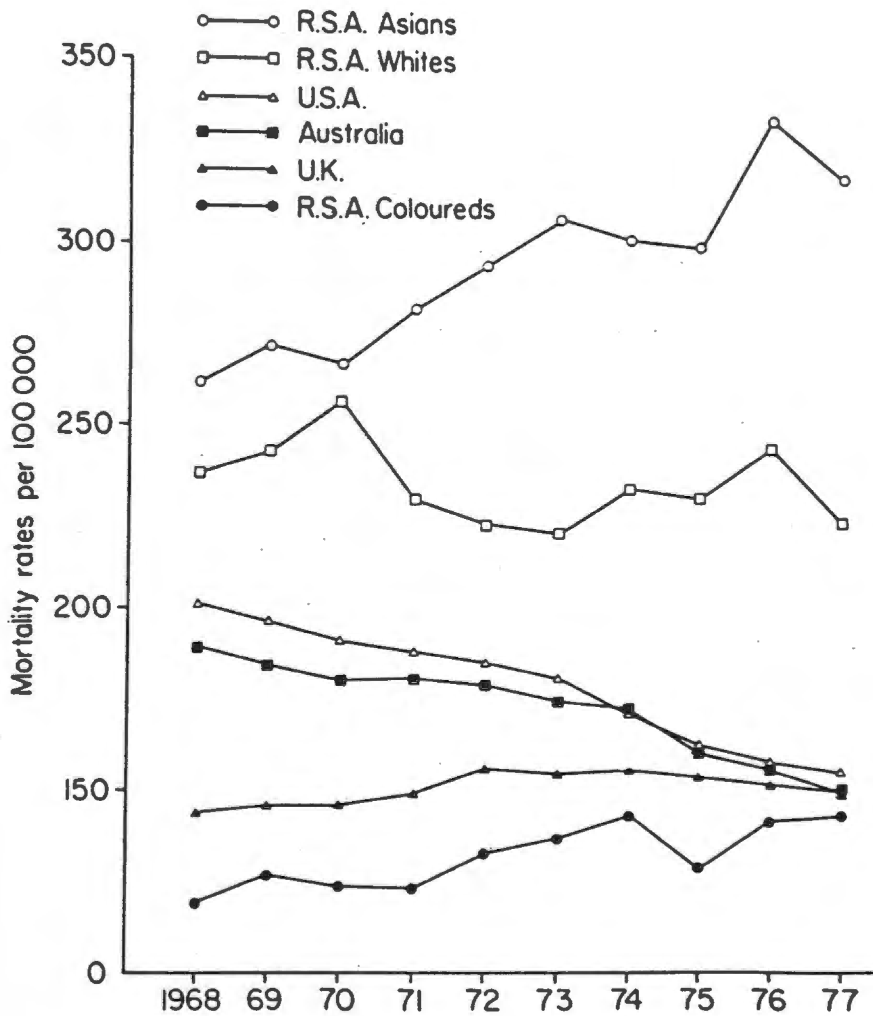
higher than those of blacks, but lower than those of whites. Deaths due to hypertensive disease and cerebrovascular accidents are most common in the coloured population, and closely followed by the Asians. These three circulatory diseases together account for 346,5 deaths/100 000 of the Asian labour force, 258,2 deaths/100 000 of the coloured labour force, 216,6 deaths/100 000 of the white labour force and 116,6 deaths/100 000 in the black labour force.

Table 3 Selected mortality rates (per 100 000) in South African population groups aged 15-64 years. (Age-adjusted to the white population) 1970[15]

	Mortality rates/100 00 (age adjusted)			
	Whites	Asians	Coloureds	Blacks
CHD	167,5	184,8	93,5	11,9
Cerebrovascular accidents	41,2	110,2	120,4	70,8
Hypertensive disease	7,9	51,2	44,3	33,9

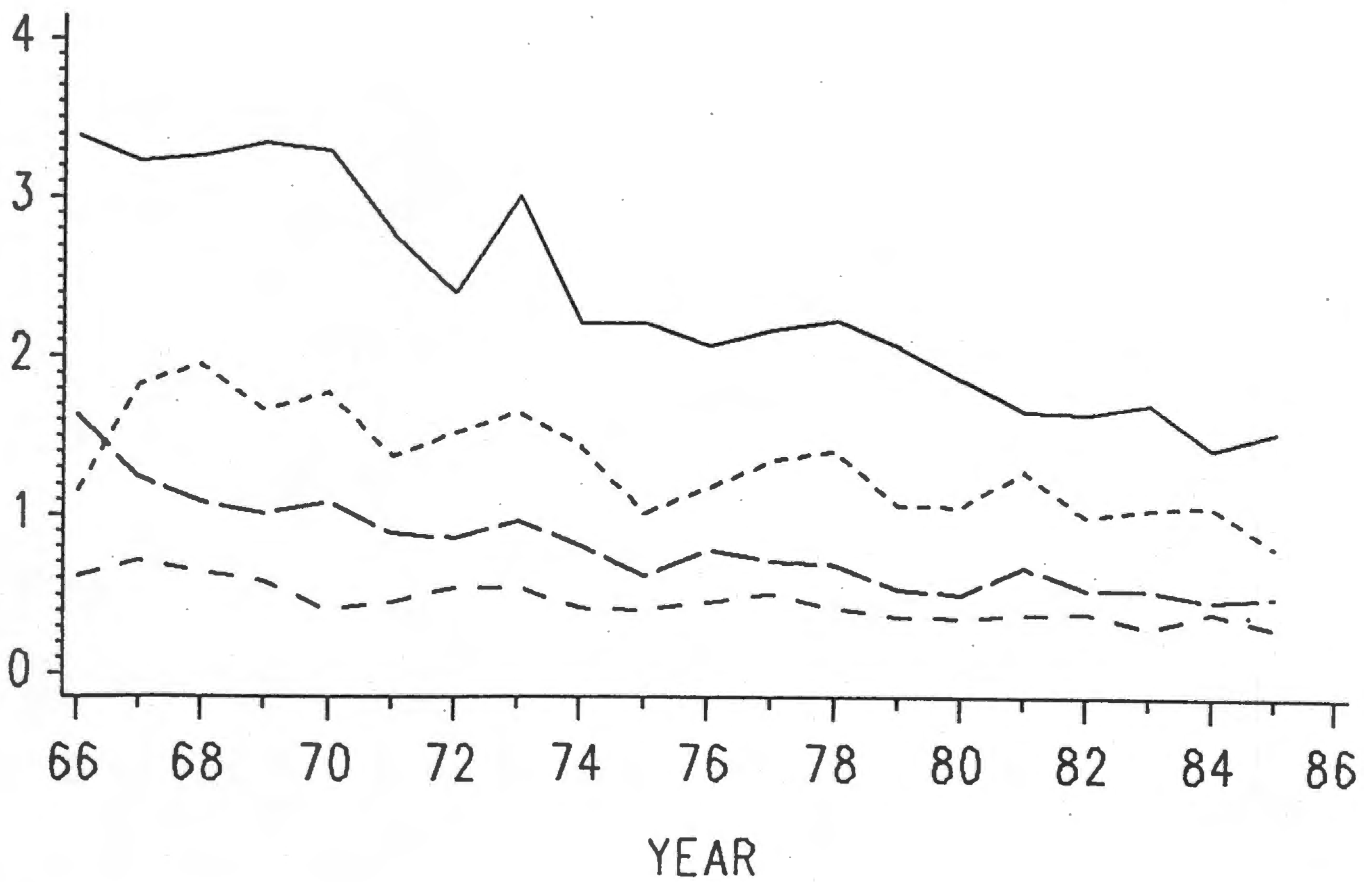
The trends with time of CHD mortality rates in males in the populations of South Africa for the period 1968 to 1977 are shown in Figure 10[16]. The trends are also compared with those of males in the USA, UK and Australia during the same period[17]. From this figure it can be seen that the coloured male mortality rate is just marginally lower than that for males from the United Kingdom. Unlike the CHD mortality rate for males in Australia and the USA, the CHD mortality for coloured males and males from the UK increased between 1968 and 1977. When the myocardial infarction rates for the city of

Figure 10 Mortality rate, age-adjusted, for ischaemic heart disease of various populations by year for 1968 to 1977[16]



Cape Town coloured and white males and females are compared between 1966 and 1985 a somewhat different picture emerges for the coloureds of Cape Town compared to the total South African population. Figure 11, based on the figures released in the Cape Town Medical Officer of Health's annual reports (not age-adjusted) shows a decrease in myocardial infarction rate for both coloured males and females during that period. The decrease was more marked in men than in women.

Figure 11 Myocardial infarction mortality in Cape Town between 1966 to 1985 per 1 000 of the population (MOH Cape Town Annual Reports)



White male
White female
Coloured male
Coloured female

One possible explanation could be found in the effective health service in Cape Town for the coloured population. This is reflected in the very much lower coloured infant mortality rate in Cape Town than in the rest of the country[17]. Level of education may also be higher in Cape Town than elsewhere.

Wyndham[18] calculated that 6% of total man-years lost due to premature death of the economically active coloured population of South Africa were due to CHD in 1970. For the country as a whole the CHD mortality in coloureds is increasing (Fig 10) and thus the man-years lost due to CHD mortality in the coloured population will also be increasing.

B Regional differences in CHD mortality in the Coloureds of South Africa

Analysis of CHD mortality rates for coloureds showed marked regional differences. The CHD mortality for the coloureds of South Africa was 93,5/100 000 in 1970[15]. In a study by J.P.G. Pretorius (Institute for Biostatistics of the South African Medical Research Council - personal communication) this rate was taken as unity and the CHD mortality rates for coloureds in other magisterial districts were compared with this figure. The ratio of the regional mortality rate to the national rate is shown for four districts in Table 4. It illustrates the differences in regions across the country. In the cities the coloureds generally suffered more CHD mortality than did the rural coloureds. In 1970 Cape Town had the highest coloured CHD mortality of all South African cities, suggesting that the risk factors for CHD might be more common in this area than elsewhere in South Africa.

Table 4 Ratio of regional to national CHD mortality for coloureds

	Ratio	
Area	Males	Females
South Africa	1,0	1,0
Cape Town	2,54	2,02
Ceres	0,74	0,72
Ladysmith	0,59	0,72
Namaqualand	0,38	0,41

4 MOTIVATION FOR THE STUDY OF THE MAJOR RISK FACTORS FOR CHD IN THE COLOUREDS OF THE CAPE PENINSULA

It has been shown that the coloured population of South Africa is a population undergoing urbanisation and westernisation; that the age structure of the population is moving from a young to an old population; that the disease patterns are shifting from typical third world patterns to include many first world diseases, and that degenerative diseases such as CHD are becoming, and will in future be, an important contributer to disease in the coloured population of South Africa.

Very little information exists on the prevalence of the known risk factors for CHD and the factors related to these risk factors in the coloured population. This prompted this study of the prevalence of hypertension, smoking and

hypercholesterolaemia, the three major risk factors for CHD in the coloured population. In addition the factors related to the major risk factors were to be identified as well as the interrelationship of all the risk factors for CHD in the coloured population.

The fact that the CHD mortality rates of coloureds were higher in the Cape Peninsula than elsewhere, dictated the choice of this region as the study area.

Besides information on CHD risk factor profiles it also was necessary to determine the health related behaviour of, and the health facilities available for the coloured population of the Cape Peninsula. This would enable one to formulate guidelines on which a CHD intervention programme could be based. Such a programme could contribute to preventing CHD becoming a major killer in the coloured population as it has in the white population of South Africa.

5 THE AIM OF, THE APPROACH TO AND THE HANDLING OF THE DATA IN THIS STUDY

The aim of the study was to determine the role of the major CHD risk factors, hypertension, smoking and hypercholesterolaemia in a random age- and sex-stratified sample aged 15 to 64 years in about 1 000 coloured persons of the Cape Peninsula. Guidelines on which to base an effective CHD intervention programme, based on the risk profile, health related behaviour and the health facilities available to the coloured population of the Cape Peninsula, were to be formulated.

Chapter two describes the methodology used for selecting the study population and the data collection. Particular attention is paid to describing the quality control measures in data gathering.

In Chapter three the study population and its characteristics are reported.

Chapters four, five and six cover the three major risk factors: hypertension, smoking and hypercholesterolaemia. In each of the three chapters a thorough literature review is given for the topics under scrutiny. This is followed by reporting and discussing the prevalence of the risk factor and its relationship to CHD in the study population, and each chapter is concluded by reporting on the factors that have been found to be associated with the particular risk factor which is the topic of that chapter. Only simple associations are reported in these chapters.

Chapter seven deals with HDL-cholesterol levels in the coloured population. Again the chapter is introduced with a literature survey on the topic, followed by the prevalence findings and then its association with CHD is described. The factors associated with HDL-cholesterol are identified by means of simple correlations as well as multiple regression techniques to identify factors independently associated with HDL-cholesterol in the coloured population of the Cape Peninsula.

Chapter eight describes the inter-relationship of the three major CHD risk factors as well as the truly independent factors related to hypertension and hypercholesterolaemia as determined by multiple regression techniques.

The target groups who need intervention to improve their major risk factor profile are thus identified in this chapter.

Chapter nine looks at the CHD related medical history of the coloured population as well as their health related behaviour and the health facilities available to the population. In the process the avenues and facilities necessary and likely to succeed for a CHD intervention programme are identified.

Chapter ten summarises guidelines, based on the results of the study, as well as other factors pertaining to intervention programmes on which to base an effective CHD intervention programme to reduce the major risk factors for CHD and thus eventually the prevalence of CHD in the coloured population.

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CHAPTER II

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CHAPTER II

1 METHODOLOGY FOR AND VALIDATION OF DATA GATHERING

Introduction

We based the methodology for the coloured risk factor study on the methods used for the 1979 baseline survey of coronary risk factors in three South African white rural communities (CORIS)[1]. This was done so that the results of the present study would be as comparable as possible to those of CORIS[1]. The selection of the areas and participants followed the methods used by the Human Sciences Research Council (HSRC) as described by Prof Stoker[2].

Preparation prior to the fieldwork involved the adaptation of the 1979 CORIS[1] risk factor questionnaire for use in the coloured population of the Cape Peninsula and the development of a dietary questionnaire as well as a short medical history questionnaire. The usefulness of the questionnaires and the effectiveness of fieldworker training in interviews by questionnaires, measurements of blood pressure, anthropometric parameters and blood sample taking, was tested in a trial run of all procedures.

Equipment was prepared and standardised. Fieldworker training programmes were completed. Logistical arrangements for collection of completed questionnaires and blood samples were established, fieldworker supervisors were appointed and

laboratory personnel, equipment and chemicals were prepared for the analyses of sera samples.

During the two weeks prior to the fieldwork a publicity campaign was launched to optimise the co-operation of the selected participants.

The fieldwork was executed by two teams of fieldworkers who visited 978 participants in their homes during September and October of 1982. On-going fieldworker supervision ensured adequate completion of questionnaires, full data sets on all participants and the selection of the necessary number of participants in each age and sex category. The fieldwork was done by the staff of the HSRC Public Opinion Research Centre in the Western-Cape, school nursing sisters of the Department of Health, and staff of the HSRC, the Institute for Communication Research (ICOMM), the MRC and the National Research Institute for Nutritional Diseases (NRIND). The serum analyses were performed in the NRIND laboratories. The data recorded in the risk factor questionnaire were computerised and analysed by the staff of ICOMM and the HSRC Institute for Statistical Research. All other data was handled by the staff of the Institute for Biostatistics and NRIND of the MRC.

All participants received a letter with their results, indicating any abnormal values and the suggestion to consult their doctors or to visit a day hospital if abnormal values were present. Guidelines for a lifestyle protective against coronary heart disease were also sent to each participant.

2 PREPARATION PRIOR TO THE FIELDWORK

A Preparation of questionnaires and equipment

Questionnaires

Three questionnaires were used in the study:

1 The Coronary Risk Factor Questionnaire (Appendix A)

2 The Dietary Questionnaire (Appendix D)

3 The Medical History Questionnaire (Appendix E)

1 The coronary risk factor questionnaire (Appendix A)

This questionnaire contained questions on:

a Personal background of the participant.

b A family history of coronary heart and related diseases of the parents and siblings of the participant.

c The present and past smoking patterns of the participant.

d The physical activity patterns at work and at leisure of the participants.

e Knowledge of some factors related to coronary heart disease.

f Health actions related to coronary heart disease taken by the participant in the last year.

g Sources and methods considered useful by the participant for learning about behaviour related to coronary heart disease.

h Bortner, "Pattern A" Behaviour scale[3] for coronary prone behaviour.

i Attitudes of the participant to coronary heart disease.

j Alcohol consumption.

k London School of Hygiene Questionnaire[4] for chest pain to diagnose the presence of angina and a previous myocardial infarct in the participant.

After testing the questionnaire in the hands of an experienced interviewer in a variety of settings the most important adaptations made to the questionnaire were:

1 A simplification of the language used in some of the questions.

2 The description of opposite criteria in questions on the Bortner scale had to be expanded as the criteria were not understood as formulated in the original Bortner scale.

3 The questionnaire had to be shortened to enable the average interviewer to complete the questionnaire with the average participant within 40 minutes.

Each fieldworker was supplied with a "General Guide for Co-workers" (Appendix B) explaining all procedures including record keeping during the fieldwork as well as detailed guidelines for answering of questions. A display card booklet (Appendix C) was also provided for each fieldworker. The display card booklet was given to the participant to follow the questions without seeing the possible answers. The fieldworker filled in the questionnaire for each participant.

2 The dietary questionnaire (Appendix D)

The questionnaire contained questions on:

a Habitual dietary patterns of foods containing nutrients related to coronary heart disease.

b A 24-hour dietary recall.

3 Medical history questionnaire (Appendix E)

This questionnaire contained questions on:

a Presence of diseases related to coronary heart disease.

b The use of medication related to these diseases.

c The following of a diet for any of the diseases.

The anthropometric measurements and blood pressure were recorded in this questionnaire and at a later date, the results of the serum analyses.

Equipment

As the study was home-based the nursing sisters needed portable light-weight equipment to do the anthropometric measurements, read the blood pressure and take a sterile blood sample. Each nursing sister was supplied with a carrybag containing:

1 A good quality bathroom scale for weighing participants.

2 Equipment to measure heights.

3 Tape measure to measure mid-upperarm circumference.

4 A Baumanometer fitted with a standard 12,5 X 23 cm cuff for blood pressure measurements.

5 Stethoscope.

6 Tourniquet.

7 Sterile swabs, cotton wool and sticking plaster.

8 Vacutainer needles, guide and evacuated test tubes for blood sample taking.

9 Necessary stationery.

10 Small coolbox and icepacks to keep clotted blood samples cold.

The bathroom scales were standardised weekly against a beam balance to determine the zero setting of the bathroom scale. Thereafter, in the field, the fieldworker's own weight was used as reference before weighing each participant.

All Baumanometers used were standardised by the suppliers prior to the fieldwork.

Four points for blood sample collection were set up in the field. These were equipped to prepare and freeze the serum samples prepared from the clotted blood within six hours of taking the non-fasting blood samples. The analyses of sera were to be done after the fieldwork was completed in suitably equipped laboratories of the NRIND by experienced laboratory technicians using standardised automated techniques.

B Procedures to be used

After the completion of the three questionnaires for each participant, the following measurements were made:

1 Height
2 Mass
3 Mid-upper arm circumference
4 Systolic and diastolic blood pressure
5 Total serum cholesterol
6 High-density lipoprotein cholesterol
7 Serum triglyceride (non-fasting)
8 Serum uric acid

Height

The height of the barefoot participant was measured to the nearest 0,5 cm using a metal measuring tape flat against a wall. The reading was obtained without parallax by holding a headboard against the tape at right angles to the wall and the participant's head positioned with the outer angle of the eye and the external auditory meatus forming a horizontal line. See figures 1 and 2.

Figures 1 and 2: The apparatus used to measure participants' height

Mass

Mass was determined to the nearest 0,5 kg in light clothing and without shoes on the bathroom scale after the fieldworker had zeroed the scale using her own weight as standard in the participant's home. Mid-upper arm circumference was measured to the nearest 0,5 cm.

Blood pressure

Blood pressures were recorded after subjects had been seated for at least five minutes. The American Heart Association guidelines for measuring blood pressures were applied[5]. The diastolic pressure was taken as the point of muffling of the Korotkoff sounds (phase IV). Three intermittent readings were taken and the lowest reading was recorded.

Serum analysis

A 10 ml blood sample was taken and the serum was separated from the clotted blood samples within six hours and frozen at -20°C. The total cholesterol and HDL-cholesterol were measured on a Gilford auto-analyser using the Boehringer CHOD-PAP enzymatic method. HDL-cholesterol was measured after precipitation of the Apo B containing lipoproteins with dextran sulphate-magnesium chloride. The non-fasting triglyceride levels were determined by the Boehringer enzymatic Peridochrom method.

C The pilot study

The trial run prior to the fieldwork involved the finalised questionnaires, all training programmes and all procedures to be used. Approximately 50 participants took part. The results of the trial run added the following to the arrangements of the actual fieldwork:

1 It was decided to have the nursing sisters complete the dietary questionnaire as they would acquire the skills for this with greater ease.

2 The need for a co-ordination sheet (Appendix F) to ensure clear communication between the two teams of fieldworkers became obvious. The first fieldworker made the appointment for the second fieldworker with the participant.

3 The need for adequate training programmes were clear.

D Training programmes for fieldworkers

Two teams of fieldworkers were used. The first team consisted of the 39 members of the coloured panel of interviewers of the western Cape branch of the Public Opinion Research Centre of the HSRC. This panel of interviewers is used for all questionnaire surveys handled by the HSRC in the coloured community in the Cape Peninsula. Each panel member is recruited from the occupants in the area in which they will conduct the interviews.

The second team of fieldworkers comprised 12 school nursing sisters who work for the Department of Health in the Western Cape. These sisters were experienced in community work and knew the areas they would be working in.

Training programmes for the use of questionnaires

Risk factor questionnaire

A two-day training period was given to the 30 panel members. Senior research officers of both the ICOMM and NRIND, all experienced interviewers and conversant with the questionnaire, led the training course. The co-worker guide (Appendix B) was used, explaining the meaning of questions, teaching interpretation of correspondent's answers, pointing out common pitfalls and ensuring good interview techniques. The panel had the opportunity to practice the use of the questionnaires under supervision of the trainers. The random selection procedure of participants and logistical arrangements were taught to the panel members.

Dietary questionnaire

A two-day training course was led by the head of the Dietetic Section at the NRIND the week prior to the fieldwork. The ability to record a 24-hour dietary recall correctly, was developed using food models and a variety of aids. Special attention was given in the training to uniform reporting of food portion sizes, details of food preparation, and correct description of the types of food eaten. Commonly made mistakes were cautioned against as the interviewers practised 24-hour dietary recall reporting under supervision.

Medical questionnaire

A medical doctor trained the nursing sisters in the use of this questionnaire.

Practice for blood sample collection

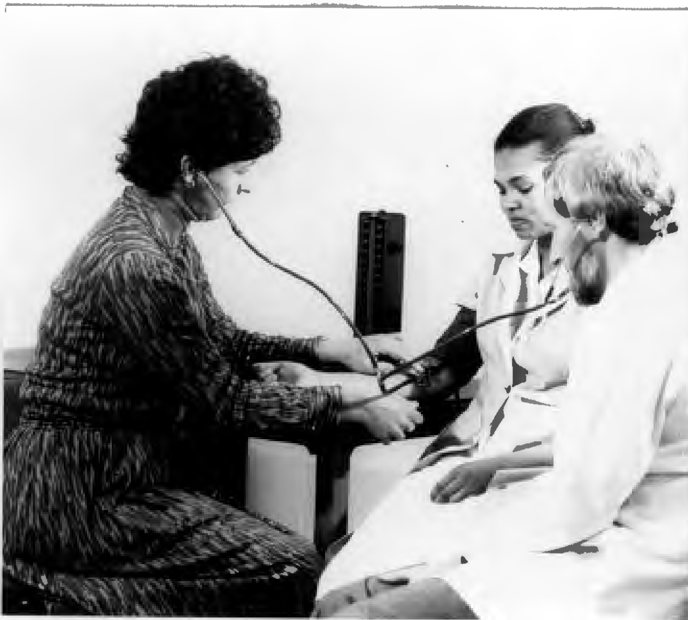
On three occasions in the month prior to the fieldwork each school nursing sister attended Tygerberg Hospital's Out-Patient Department where blood samples were collected for analysis from hospital patients. Under supervision each sister practised collecting blood samples under sterile conditions, using the fieldwork apparatus. The nursing sisters who would man the blood sample collection points were taught to prepare the serum samples for freezing.

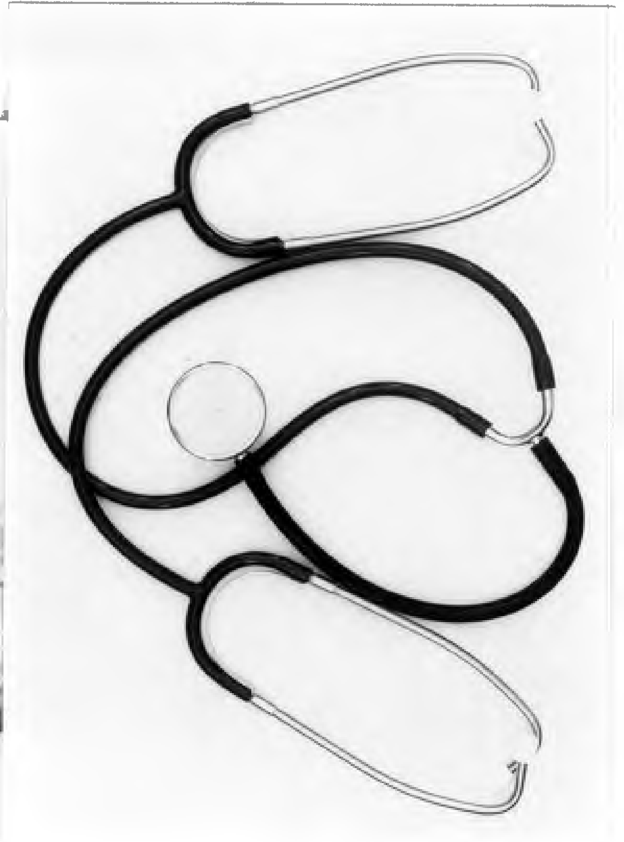
Practice for standardised blood pressure readings

On the above three visits the school nursing sisters were trained in the American Heart Association guidelines[5] for measuring blood pressures. The nursing sister from NRIND, who would act as reference person for the reading of blood pressure, supervised the training. Standardisation of blood pressure readings was achieved using a stethoscope with two headpieces to enable two people to listen simultaneously (Fig. 3 and 4).

The week prior to the fieldwork the proficiency of each nursing sister was standardised against the reference person.

Figures 3 and 4: The apparatus used to standardise fieldworkers in blood pressure readings





Practice for anthropometric measurements

In the same week the 12 nursing sisters practised measuring height, mass and mid-upper arm circumferences with the fieldwork equipment.

To determine the intra- and inter-observer variation for height and weight measurements, all 12 sisters measured and weighed 31 persons on two different days during the last week prior to the fieldwork.

All logistical and supervisory arrangements were explained.

E Publicity campaign

The need to encourage the co-operation of the selected participants led to the use of a media campaign, which announced the study widely, during the two weeks prior to the fieldwork. A media release by the MRC's Public Relations Department to the newspapers read most by the target population was accompanied by a photograph showing a leader in the coloured community participating in the study.

The SABC announced the study on the radio and a television news item further publicised the study, the beginning of which co-incided with the National Heart Week of 1982.

3 SELECTION OF STUDY AREAS AND PARTICIPANTS

Since 1981 the HSRC has used multi-stage probability sampling techniques described by Stoker[2] for all surveys conducted by the Public Opinion Research Centre. For this study these procedures were strictly adhered to.

A Addresses to be approached

The target region of the study was the Cape Peninsula, defined as the combined districts of Cape Town, Simonstown, Wynberg, Goodwood, Bellville and Kuilsrivier. The 1980 census enumerator subdistricts (ESDs) were chosen as primary sampling units. From these ESDs 39 were randomly selected.

The panel of coloured fieldworkers of the Public Opinion Research Centre operates in these ESDs. All the addresses of occupied stands in each selected ESD were computerised. From these addresses a list of 50 addresses per ESD was randomly generated. Each ESD fieldworker received an address list in order to select one participant per address randomly.

B Selection of participants

The target population was the coloured population of the Cape Peninsula between the ages of 15 to 64 years and resident at the time of the survey at the occupied stands in all the ESDs in the Cape Peninsula. The target population were stratified by five age groups of each sex. It was planned to select 100 persons for each age and sex category, a total of 1 000 people. Exclusion criteria were: pregnancy, being bedridden, mental retardation, carcinoma, leg amputation, anti-tuberculous drug therapy, hospitalisation for surgery for a period of more than a week in the previous three months. People unwilling or unable to complete the whole study were also excluded.

From the address lists for each ESD approximately 26 men and women in the five age categories were selected randomly according to the numbers set out in Table 1.

Table I

Number of participants per ESD

	Men age					Women age					Total per ESD
ESD	16-24	25-34	35-44	45-54	55-64	16-24	25-34	35-44	45-54	55-64	
1	3	3	2	3	2	3	3	2	3	2	26
2	3	3	2	3	2	3	3	2	3	2	26
3	3	3	2	3	2	3	3	2	3	2	26
4	3	3	2	3	2	3	3	2	3	2	26
5	3	3	2	3	2	3	3	2	3	2	26
6	3	3	2	3	2	3	3	2	3	2	26
7	3	3	2	3	2	3	3	2	3	2	26
8	3	3	2	3	2	3	3	2	3	2	26
9	3	3	2	3	2	3	3	2	3	2	26
10	3	3	2	3	2	3	3	2	3	2	26
11	3	3	2	3	2	3	3	2	3	2	26
12	3	3	2	3	2	3	3	2	3	2	26
13	3	3	2	3	2	3	3	2	3	2	26
14	3	3	2	3	2	3	3	2	3	2	26
15	3	2	2	3	3	3	2	2	3	3	26
16	3	3	3	1	3	3	3	3	1	3	26
17	3	2	3	2	3	3	2	3	2	3	26
18	3	2	3	2	3	3	2	3	2	3	26
19	3	2	3	2	3	3	2	3	2	3	26
20	3	2	3	2	3	3	2	3	2	3	26
21	3	2	3	2	3	3	2	3	2	3	26
22	3	2	3	2	3	3	2	3	2	3	26
23	3	2	3	2	3	3	2	3	2	3	26
24	2	3	3	2	3	2	3	3	2	3	26
25	2	3	3	2	3	2	3	3	2	3	26
26	2	3	3	2	3	1	2	3	3	3	25
27	2	3	3	2	3	2	2	3	2	3	25
28	2	3	3	2	3	2	2	3	3	2	25
29	2	3	3	2	3	2	2	3	3	2	25
30	2	3	3	2	3	2	2	3	3	2	25
31	2	2	3	3	3	2	3	1	3	3	25
32	2	2	3	3	3	2	1	3	3	3	25
33	2	2	3	2	3	2	3	3	2	3	25
34	2	2	3	3	2	2	3	3	2	3	25
35	2	2	3	3	2	2	3	3	2	3	25
36	2	2	3	3	2	2	3	3	2	3	25
37	2	3	1	3	3	2	3	3	2	3	25
38	2	1	3	3	3	2	2	3	3	3	25
39	1	2	3	3	3	2	2	3	3	2	25
									TOTAL		1 000

To select the one qualifying person at each address the procedure described in the cover questionnaire (Appendix G) was used. This entailed using the charts on Appendix G which randomly selected the participant from the number of qualifying persons at that address and the integer assigned randomly to the address. If more than one household lived at the same address, all qualifying persons were eligible for selection as a participant and not only the persons belonging to one of these households. If the selected person at this address belonged to a sex or age category already filled according to Table 1, or if the selected person refused to participate, the fieldworker would then move on to the next address on their address list.

Some selected persons were willing to co-operate and complete the risk factor questionnaire, but then refused, or could not be traced, to participate in the rest of the survey conducted by the nursing sisters. The name, age and sex was then supplied to the first fieldworkers, who would, using their address lists randomly select a suitable person to fill each age and sex category in Table 1 for their ESD, using the above selection procedures.

4 FIELDWORK

A Logistics

The 39 members of the HSRC panel randomly selected 478 men and 498 women between the ages of 15 and 64 years, approximately 100 persons for every ten-year age category. One person was selected per household using the cover questionnaire (Appendix G). The purpose of the study was explained, the risk factor questionnaire was completed and an appointment made for the nursing

sister within the next two weeks. All necessary details were entered on the co-ordinater's sheet (Appendix F).

The three HSRC panel supervisors collected all cover questionnaires, risk factor questionnaires and co-ordination sheets. These were delivered to the NRIND's supervisor team who recorded all names and addresses of participants. The co-ordination sheets were given to the relevant nursing sisters. The nursing sisters then visited the participants at the appointed time and, completed the other questionnaires, which took approximately 20 minutes. The blood pressure was recorded, followed by the anthropometric measurements and finally the blood sample was taken. The nursing sisters delivered the completed questionnaires and frozen serum samples to the NRIND's supervisor team. Participants' addresses with completed sets of data were then confirmed. The area, age and sex of the persons who would not complete the study were reported to the HSRC panel supervisors who then arranged for the interview team to select another suitable participant for the study in the usual way.

B Supervision and quality control

Questionnaires

All questionnaires were checked by the supervisors as they came in. If they were not completed satisfactorily they were returned to the fieldworkers to complete. The reported 24-hour dietary recalls were checked by the qualified dieticians who would code all the foods eaten, at a later date, according to the NRIND Food Composition Tables[6].

Other measurements

Once a week each school sister again standardised her bathroom scale against the reference beam balance to determine the zero point of that bathroom scale, for reading the same weight of the sister as the reference scale.

On the same visit each school nursing sister would standardise her own blood pressure readings against the reference person's blood pressure readings. A hundred random blood pressure readings were repeated not sooner than seven days after the first readings to determine variation. All 12 nursing sisters were involved in doing the 100 repeated blood pressure readings.

For all the determinations of the frozen serum, the Gilford auto-analyser was calibrated in each case against the Boehringer Mannheim GMbH Precilip or Precilip EL control sera, which was corrected by Boehringer Mannheim for the specific test kit in question. Two control samples were included in each batch analysed. A hundred random blood samples were collected not sooner than seven days after the first sample to determine biological and technique variation.

5 DATA HANDLING AFTER THE COMPLETED FIELDWORK

A Questionnaires

The data on the completed risk factor questionnaires was computerised and analysed in Pretoria by the HSRC's Institutes for Communications Research and statistical research staff. The data on the medical and dietary questionnaires (except the 24-hour dietary recall data) was computerised and analysed at Tygerberg by the MRC's Institute for Biostatistics and NRIND.

For the 24-hour dietary recall, the amounts of food were recorded in terms of household measures or usual portion sizes. Experienced dieticians of NRIND converted the household measures and usual portion sizes to weights of food eaten and coded these, using the NRIND Food Composition Tables[6] for computerisation. The coding enabled analysis of food intake in terms of nutrient intake.

B Other data

The analyses of sera were completed in the NRIND's laboratories. The anthropometric measurements, diastolic and systolic blood pressures, total serum and HDL-cholesterol, serum triglycerides and uric acids were computerised at the MRC's Institute for Biostatistics.

C Feedback of results to participants

All participants were informed at the beginning of the study that they would receive their results, indicating the abnormal ones and advice on a lifestyle that would protect against coronary heart disease. Each participant who was seen by both fieldworkers and from whom a blood sample was collected, received a computerised letter indicating their weight, height, blood pressure, total serum cholesterol, non-fasting serum trigylceride and serum uric acid levels at the time of the study. The values given in the letter were classified as normal or raised. If the participant had only normal values the letter he received (Appendix H) was accompanied by a description of the risk factors for coronary heart disease and guidelines for a lifestyle to decrease the risk for coronary heart disease (Appendix J). If the participant had raised values, a

paragraph was added to the letter (Appendix I) suggesting that the letter should be taken to a doctor or day-hospital for further investigation by the medical personnel.

D Statistical analysis

All statistical analysis was carried out by the personnel of the Institute of Biostatistics of the MRC using the SAS system of the SAS Institute Inc 1985 for analysis. For multiple regression analysis the regression package REGPAC (version 3) of the National Research Institute of Medical Statistics of the Council of Scientific and Industrial Research was used.

6 SUMMARY OF QUALITY CONTROL PROCEDURES

Questionnaires

- All questions were tested on a variety of people from the target population prior to the pilot study.

- Language was simplified and additional examples given to enable optimal understanding of the questions where necessary.

- Training programmes for the fieldworkers were tested in the pilot study and adapted thereafter, where necessary.

- Training was done by experienced senior personnel who could standardise interview procedures and who also supervised the practice sessions of the fieldworkers in handling the questionnaires. Common pitfalls in interview techniques were cautioned against in the training.

- All completed questionnaires handed in by fieldworkers were checked by the supervisor teams and returned to fieldworkers if not adequately completed while the fieldwork was in progress.

- Coding of nutrients from the 24-hour dietary recall was done by experienced dieticians and double checked before being computerised.

- All data punched at the Institute for Biostatistics of the MRC was checked against the original data to exclude punching errors.

- All data was thoroughly cleaned before computerised analysis proceeded.

Heights

- Equipment was standardised prior to fieldwork.

- Training programmes ensured proper posture of the participant and use of equipment.

- Parallax was avoided by using the horizontal headboards.

- Training procedures were followed until intra- and inter-observer variation was reduced to a desirable minimum.

Mass

- Bathroom scales were all standardised against one beam scale using the fieldworker's own mass before and at weekly intervals during the fieldwork.

- Before weighing each participant the bathroom scale was zeroed using the fieldworker's own mass as reference.

- Training procedures were continued until intra- and inter-observer variation was reduced to a desirable minimum.

Blood pressure

- The Baumanometers were standardised by the manufacturers prior to the study.

- Training according to the American Heart Association Guidelines for blood pressure readings was started six weeks prior to the fieldwork.

- Throughout the training period a double-headed stethoscope was used by the trainer, who was also the reference person for the study.

- Standardisation of all fieldworkers against the reference person was done prior to the fieldstudy and repeated at weekly intervals during the fieldwork.

- One hundred blood pressure readings were repeated not sooner than seven days after the first reading.

Serum analyses

- Serum was prepared not longer than six hours after the blood sample was collected. It was then frozen at -20°C.

- The Gilford auto-analyser was calibrated for each batch against control sera and two control samples were included in each batch.

- A hundred random blood samples were repeated not sooner than seven days after the first sample.

7 REFERENCES

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5 American Heart Association: Recommendations for blood pressure determinations by sphygmomanometers. Dallas: AHA 1967.

6 Gouws E, Langenhoven ML. NRIND Food Composition Tables 1981. SA Medical Research Council. Parow (1982).

APPENDIX A

MPS/OV/20

Respondentnommer (nie gekodeer nie)/
Number of respondent (not to be coded)

Raad vir Geesteswetenskaplike Navorsing

Human Sciences Research Council

MENINGSPEILINGSENTRUM / OPINION SURVEY CENTRE

KORONêRE RISIKOFAKTORSTUDIE 1982 CORONARY RISK FACTOR STUDY

Alle inligting is vertroulik en word slegs vir navorsing gebruik.
All information is confidential and used for research only.

Aangesien hartsiekte al hoe meer in Suid-Afrika voorkom, onderneem die Mediese Navorsingsraad (Nasionale Navorsingsinstituut vir Voedingsiektes) en die Raad vir Geesteswetenskaplike Navorsing (Instituut vir Kommunikasienavorsing) 'n ondersoek wat gerig is op die voorkoming daarvan. In hierdie opname word gelet op die mate waarin hierdie siekte voorkom asook op mense se menings en gebruike met betrekking tot faktore wat met hartsiekte verband hou. 'n Verpleegkundige sal u ook later besoek om u bloeddruk en bloedmonster te neem.

U samewerking in hierdie belangrike navorsing word hoog op prys gestel.

The increasing prevalence of heart-disease in South Africa has led to a survey undertaken by the Medical Research Council (National Research Institute for Nutri= tional Diseases) and the Human Sciences Research Council (Institute for Communica= tion Research) aimed at the prevention thereof. In this survey the incidence of the disease as well as people's opinions and behaviour regarding factors associated with heart-disease has been taken into account. A nurse will visit you at a later stage to take your blood pressure and draw a blood sample.

Your co-operation in this important research is highly appreciated.

Medewerkernommer/Co-worker number										1-9

DEEL I/PART I

A Algemeen/General

1 Geslag/Sex

Manlik/Male	1		
Vroulik/Female	2		10

2 U ouderdom met u laaste verjaarsdag (jare)/
Your age at your last birthday (years) 11-12

1

3 Hoe ver het u geleer?/How far did you study?

Geen onderwyskwalifikasie/No educational qualifications	01
Sub A tot st. 2/Sub A to Std 2	02
St. 3 tot st. 5/Std 3 to Std 5	03
St. 6/Std 6	04
St. 7/Std 7	05
St. 8 of 9 of gelykwaardig (bv. NTS I of NTS II)/Std 8 or 9 or equivalent (e.g. NTC I or NTC II)	06
St. 10, matrikulasie of gelykwaardig (bv. NTS III)/Std 10, matriculation or equivalent (e.g. NTC III)	07
St. 10 en 1 of 2 jaar verdere opleiding (bv. NTS IV/V of NTD)/Std 10 and 1 or 2 years further training (e.g. NTC IV/V or NTD)	08
St. 10 en 3 jaar verdere opleiding (bv. B.A. of Nas. Diploma vir Technici)/Std 10 and 3 years further training (e.g. BA or Nat. Diploma for Technicians)	09
St. 10 en 4 of meer jare verdere opleiding (bv. M.Sc., B.A. en H.O.D., B.Arch.)/Std 10 and 4 or more years further training (e.g. M.Sc., B.A. and H.E.D., B.Arch.)	10

13-14

4 Watter soort werk doen u?/What kind of work do you do?

.... (Werk/Work)

.... (Werkgewer/Employer)

(bv. winkeleienaar, eie besigheid; huisvrou, geen/e.g. shopkeeper, own business; housewife, none)

1

Dui soort werk hieronder aan/Indicate type of job below:

Category	Job type	Code
Professioneel/ Professional	Opvoedkundig, bv. onderwyser, dosent/ Educational, e.g. teacher, lecturer	01
	Medies en verwant, bv. dokter, verpleër/ Medical and related, e.g. doctor, nurse	02
	Tegnies, bv. in laboratorium, elektronika, plastiek/ Technical, e.g. in laboratory, electronics, plastics	03
	Ander, bv. prokureur, ingenieur, wetenskaplike/ Other, e.g. attorney, engineer, scientist	04
Besturende en klerklike werkers, bv. klerk, besturende direkteur, boekhouer/Managerial and clerical worker, e.g. clerk, company direc= tor, bookkeeper		05
Verkoopswerkers, bv. winkelassistent, petroljoggie, versekerings= agent, smous, winkeleienaar/Salesworker, e.g. shop assistant, petrol-pump attendant, insurance salesman, shop-owner		06
Vervoer en kommunikasiewerkers, bv. vragmotorbestuurder, taxi= bestuurder, telefonis, busbestuurder, posbesteller/Transport and communication worker, e.g. lorry-driver, stoker, taxi-driver, telephone operator, bus-driver, postman		07
Diens-, sport- en ontspanningswerkers, bv. kok, kelner, haar= kapper, polisie, ens./Service, sport and recreational work, e.g. chef, waiter, hairdresser, policeman, etc.		08
Myn- en steengroefwerkers/Mining and quarry workers		09
Ambagsmanne en halfgeskoolde wer= kers/Artisans and semi-skilled work= ers	Vakmanne en vakleerlinge, bv. skilders, loodgieters, messelaars/Skilled artisans and apprentices, e.g. painters, plumbers, brick layers	10
	Halfgeskoolde werkers, bv. operateurs/Semi-skilled, e.g. operators	11
	Halfgeskoolde werkers, bv. toesighouers en voormanne/ Semi-skilled, e.g. supervisors and foremen	12
Arbeiders (behalwe plaasarbeiders)/Labourers (except farm labour= ers) "Char" "Council worker"		13
Boere en plaasarbeiders/Farmers and farm labourers		14
Huisvrou/Housewife		15
Persone wat nie werk nie: werkloos, student, liggaamlik ongeskik, afgetree, skolier, pensioenaris/Unemployed: Seeking employment, unfit for work, student, retired		16

15-16

1

B Familiegeskiedenis/Family history

1 (a) Lewe u eie moeder?/Is your own mother alive?

Ja Yes	Nee No	Weet nie Do not know		
1	2	3		17

(b) Indien sy dood is, is sy dood aan 'n hartaanval?/
If she is dead, did she die from a heart attack?

Ja Yes	Nee No	Weet nie Do not know	N.v.t. N.a.		
1	2	3	0		18

(c) Hoe oud is u moeder, of hoe oud was sy by haar dood? (jare)/
How old is your mother or what was her age at death? (years)

Weet nie
Do not know = 999

19-21

(d) Het u moeder enige van die volgende toestande (gehad)?/
Does your mother have, or did she have any of the following?

	Ja/Yes	Nee/No	Weet nie/ Do not know		
Suikersiekte/Diabetes	1	2	3		22
Hoë bloeddruk/High blood pressure	1	2	3		23
Hartaanval/Hartkramp/ Heart attack/Angina	1	2	3		24
Hoë cholesterol (bloed)/ High cholesterol (blood)	1	2	3		25
Beroerte/Stroke	1	2	3		26

2 (a) Lewe u eie vader?/Is your own father alive?

Ja Yes	1	Nee No	2	Weet nie Do not know	3		27

Vraag 2(b) (vervolg)

1

2 (b) Indien hy dood is, is hy dood aan 'n hartaanval?/
If he is dead, did he die from a heart attack?

Ja Yes	1	Nee No	2	Weet nie Do not know	3	N.v.t. N.a.	0		28

2 (c) Hoe oud is u vader of hoe oud was hy by sy dood (jare)?/
How old is your father or what was his age at death (years)?

Weet nie
Do not know = 9 9 9

29-31

2 (d) Het u vader enige van die volgende toestande (gehad)?/
Does your father have, or did he have any of the following conditions?

	Ja/Yes	Nee/No	Weet nie/Do not know		
Suikersiekte/Diabetes	1	2	3		32
Hoë bloeddruk/High blood pressure	1	2	3		33
Hartaanval/Hartkramp Heart attack/Angina	1	2	3		34
Hoë cholesterol (bloed)/ High cholesterol (blood)	1	2	3		35
Beroerte/Stroke	1	2	3		36

3 (a) Hoeveel eie broers het u (lewend of dood)?/How many bro= thers do you have by birth (alive or dead)?

Geen
None = 00

37-38

3 (b) Hoeveel van hulle kry hartkrampe (angina) of het 'n hartaan= val gehad?/How many of them suffer from angina or had a heart attack?

Weet nie Do not know	9	Geen broers/niemand kry dit No brothers/none suffer from it	0		39

3 (c) Hoeveel van hulle is dood aan 'n hartaanval?/How many of them died of a heart attack?

Weet nie Do not know	9	Geen broers/Geen oorlede broers No brothers/No dead brothers	0		40

1

4 (a) Hoeveel eie susters het u (lewend of dood)?/How many sisters do you have by birth (alive or dead)?

Geen / None = 00

41-42

(b) Hoeveel van hulle kry hartkrampe (angina) of het 'n hartaanval gehad?/How many of them suffer from angina or had a heart attack?

Weet nie / Do not know =	9	Geen susters/niemand kry dit / No sisters/none suffer from it =	0		43

(c) Hoeveel van hulle is dood aan 'n hartaanval?/How many of them died of a heart attack?

Weet nie / Do not know	9	Geen susters/Geen oorlede suster / No sisters/No dead sisters	0		44

C Rook/Smoking

1 Rook u? (Indien nie, het u vroeër in u lewe gerook?)/Do you smoke? (If not, did you smoke before?)

Rook tans/Smoke at present (GAAN NA VRAAG 2/PROCEED TO QUESTION 2)	1		
Rook nie maar het vroeër gerook/Do not smoke but did before (GAAN NA VRAAG D1/PROCEED TO QUESTION D1)	2		
Het nog nooit gerook nie/Have never smoked (GAAN NA VRAAG D1/PROCEED TO QUESTION D1)	3		45

2 Indien u tans rook

(a) Hoeveel jaar rook u nou aanmekaar?/How many years have you been smoking continuously up to now?

46-47

1

(b) Wat rook u?/What do you smoke?

	Ja/Yes	Nee/No		
Filtersigarette/Filter cigarettes	1	2		48
Sigarette sonder filter/Cigarettes without filter	1	2		49
Draai eie sigarette met pyptabak/ Roll own cigarettes with pipe tabacco	1	2		50
Pyp/Pipe	1	2		51
Ander (spesifiseer)/Other (specify)	1	2		52

(c) Indien u sigarette rook, hoeveel rook u gewoonlik/If you smoke cigarettes, how many do you usually smoke

Oor naweke per dag?/During weekends per day?			53-54
In die week per dag?/During the week per day?			55-56
Pyp, sigare en ander/ Pipe, cigars and other = 000			

(d) Het u in die laaste 12 maande probeer om op te hou rook of minder te rook?/Did you try to stop smoking or to smoke less during the past 12 months?

Ja/Yes	Nee/No		
1	2		57

(e) Indien u probeer ophou rook/minder rook het, hoekom het u probeer?/If you tried to stop smoking/smoke less, why did you try?

Gesondheidsredes Health reasons	1	Ander Other	2	N.v.t. N.a.	0		58

1

D Liggaamlike aktiwiteit

1 (a) Hoe lank is u werksdag (ure)?.....................
How many hours a day do you work?

(b) Hoeveel dae per week? ....
How many days a week?

2 Hoeveel van u werksdag is/How much of your working day is:

(a) baie loopwerk/walking a lot ....(ure/hours)
Klas/Class 2 (bv. alle huiswerk, verpleging, tuinwerk, houtwerk, visvang)?(e.g. housework, nursing, gardening, carpentry, fishing)?

PER WEEK [ ][ ][ ] 59-61

(b) liggaamlike baie harde werk (sweetwerk)/Hard physical labour (sweat work) .... (ure/hours) Klas/Class 3
(bv. harde tuinwerk(spit), boubedryfarbeider, padwerker)?
(e.g. strenuous gardening, building labourer, road worker)?

PER WEEK [ ][ ][ ] 62-64

3 Kry u buite werksure enige oefening (bv. stap, insluitende stap na en van die werk, wasgoedwas, sport)?/Do you get any exercise outside working hours (e.g. walking, including walking to and from work, wash of laundry, sport)?

JA/YES (GAAN NA VRAAG 4/PROCEED TO QUESTION 4)	1		
NEE/NO (GAAN NA DEEL II/PROCEED TO PART II	2	[ ]	65

KAART NR./CARD NO.	1	68
REKORD NR./RECORD NO.	[ ][ ][ ][ ]	69-72
PROJEK NR./PROJECT NO.	KOMM 17-3	73-80

1

*4 Na-werksure aktiwiteite/Outside working hours activities

AKTIWITEIT/ ACTIVITY	SOMER/SUMMER			WINTER			
	Frekw./Freq. per week	Ure per sessie/ Hours per session	Totale ure/Total hours per week	Frekw./Freq. per week	Ure per sessie/ Hours per session	Totale ure/Total hours per week	Gemiddelde ure/ Average hours per week
KLAS/CLASS 2 (x2)							
Fietsry/Cycling (non-compet.)							
Huiswerk/Housework							
Krieket/Cricket							
Rolskaats/Rollerskating							
Stap/Walking							
Tennis (non-compet.)							
Ander/Other							
KLAS/CLASS 3 (x4)							
Boks/Boxing							
Dans/Dancing							
Karate							
Oefeninge/Exercises							
Stoei/Wrestling							
Tafeltennis/Table tennis							
Tennis (competitive)							
Touspring/Skipping							
Ander/Other							
KLAS/CLASS 4 (x6)							
Draf/Jogging							
Fietsry/Cycling (compet.)							
Hokkie/Hockey							
Muurbal/Squash							
Netbal/Netball							
Pluimbal/Badminton							
Rugby							
Sokker/Soccer							
Swem/Swimming							
Ander/Other							

1-4

5-8

9-12

2

*DEEL II/PART II

1 Hoe dink u, watter mens sal eerder 'n hartaanval kry?/Which person do you think would sooner get a heart attack?

1) 'n Mens wat kos eet wat met olie voorberei is of wat kos eet wat met kook= vet voorberei is/A person who eats food prepared with oil or who eats food prepared with cooking fat?	Olie/ Oil 1	Kookvet/ Cooking fat 2	Weet nie/ Do not know 3	Verstaan nie/ Do not under= stand 4		13
2) 'n Mens met hoë bloeddruk of met lae bloeddruk?/A person with high blood pressure or with low blood pressure?	Hoë/ High 1	Lae/ Low 2	3	4		14
3) 'n Mens wat baie vet eet of wat baie styselkos (bv. brood, rys, aartappels, pap) eet?/A person who eats a lot of fat or who eats a lot of starch (e.g. bread, rice, potatoes, porridge)?	Vet/ Fat 1	Stysel-kos/ Starch 2	3	4		15
4) 'n Mens wat volmelk gebruik of wat afgeroomde melk gebruik?/A person who uses full-cream milk or who uses skim milk?	Vol= melk/ Full cream milk 1	Afge= roomde melk/ Skim milk 2	3	4		16
5) 'n Mens wat bees- en skaap= vleis eet of wat hoender en vis eet/A person who eats beef and mutton or who eats chicken and fish?	Bees en skaap/ Beef and mutton 1	Hoender en vis/ Chicken and fish 2	3	4		17

2

		Ja/Yes	Nee/No	Weet nie/ Do not know	Verstaan nie/ Do not un= derstand		
2	Het alle mense cholesterol in die bloed?/Do all people have cholesterol in their blood?	1	2	3	4		18
3	Kan die cholesterol in 'n mens se bloed verander as hy sy eetgewoontes verander?/Can the choles= terol in the blood change when one changes one's eating habits?	1	2	3	4		19
4	Kan sout hoë bloeddruk gee?/ Can salt cause high blood pressure?	1	2	3	4		20
5	Is mense gewoonlik vet omdat hulle kliere nie reg werk nie?/Are people usually fat because their glands do not work properly?	1	2	3	4		21
6	Is mense gewoonlik vet omdat hulle te veel eet?/Are people usually fat because they eat too much?	1	2	3	4		22
7	Bevat maer vleis ook choles= terol?/Does lean meat also contain cholesterol?	1	2	3	4		23

DEEL III/PART III

1 Het u in die laaste 12 maande gewig probeer verloor?/
Did you try to lose weight during the past 12 months?

Nie nodig om te verloor nie/Not overweight (GAAN NA VRAAG 3/PROCEED TO QUESTION 3)	0		
Ja/Yes (GAAN NA VRAAG 2/PROCEED TO QUESTION 2)	1		
Nee/No (GAAN NA VRAAG 3/PROCEED TO QUESTION 3)	2		24

2

2 Indien Ja, wat het u gedoen?/If yes, what did you do?

(VELDWERKER MOET NIE ANTWOORDMOONTLIKHEDE LEES NIE/FIELDWORKER DO NOT READ POSSIBLE ANSWERS)

	N.v.t. N.a.	Genoem Mentioned	Nie genoem nie/ Not mentioned	
'n Spesifieke dieet gevolg of minder geëet/Followed a specific diet or ate less	0	1	2	25
Meer oefening gekry/More active, exercise	0	1	2	26
Pille gebruik (eetlusdempers/ Used tablets (appetite suppres= sants)	0	1	2	27
Verslankingspreparate geneem Prota-slim, slimshake)/Used slimming preparations	0	1	2	28
Verslankingsapparate gebruik (massering, plastiekpakke)/Used slimming apparatus (massaging, plastic suits)	0	1	2	29
Ander (spesifiseer) Other (specify)				

3 Het u in die laaste 12 maande u eetgewoontes verander om die hart ge= sond te hou (bv. om cholesterol te verlaag?)/Did you change your eating habits during the past 12 months to prevent heart disease (e.g. to lower cholesterol?)

Ja/Yes (GAAN NA VRAAG 4/PROCEED TO QUESTION 4)	1	
Nee/No (GAAN NA VRAAG 5/PROCEED TO QUESTION 5)	2	
Weet nie/Verstaan nie/Do not know/Do not understand (GAAN NA VRAAG 5/PROCEED TO QUESTION 5)	3	31

2

4 Indien Ja, wat het u gedoen?/If Yes, what did you do?
(VELDWERKER MOET NIE ANTWOORDMOONTLIKHEDE LEES NIE/FIELDWORKER DO NOT READ POSSIBLE ANSWERS)

	N.v.t./ N.a.	Genoem/ Mentioned	Nie genoem nie/ Not mentioned		
Minder vette geëet/Ate less fats	0	1	2		32
Gebruik bakkies (sagte) marga=rien/olie in plaas van pakkies (harde) margarien/botter/vet/ Use tubs (soft) margarine/oil in stead of wrapped (hard) mar=garine/butter/fat	0	1	2		33
Eet minder, eiers, lewer, afval/ Eat less eggs, liver, tripe	0	1	2		34
Gewig verloor/Lost weight	0	1	2		35
Geneesmiddels gebruik/Used medication	0	1	2		36
Ander (spesifiseer) Other (specify)					

5 Probeer u vir u gesondheid om:/Do you try for your health's sake to:

	Ja/ Yes	Nee/ No		
min sout te gebruik?/use little salt?	1	2		38
min suiker en versoete voedsels te gebruik?/ eat little sugar and sweetened foods?	1	2		39
veselbevattende kosse te eet, soos volkoringbrood, semels, baie groente en vrugte, droëboontjies?/eat fibre foods such as wholewheat bread, bran, lots of vegetables and fruit, dry beans	1	2		40

2

6 Het u in die afgelope 12 maande probeer om u spanning te verminder (of het u nie spanningsprobleme nie)?/Did you try to reduce your tension during the past 12 months (or don't you have tension pro= blems)?

Ja/Yes (GAAN NA VRAAG 7/PROCEED TO QUESTION 7)	1	
Nee/No (GAAN NA VRAAG 8/PROCEED TO QUESTION 8)	2	
Nie gespanne/Weet nie/Verstaan nie. Not tense /Do not know/Do not understand (GAAN NA VRAAG 8/PROCEED TO QUESTION 8	3	41

7 Indien Ja, wat het u gedoen?/If Yes, what did you do?

(VELDWERKER MOET NIE ANTWOORDMOONTLIKHEDE LEES NIE/FIELDWORKER DO NOT READ POSSIBLE ANSWERS)

	N.v.t. N.a.	Genoem Mentioned	Nie genoem nie/ Not mentioned	
Minder verantwoordelikhede/werk op u geneem/Accepted fewer responsi= bilities/took on less work	0	1	2	42
Minder bekommer, hoewel die pro= bleme dieselfde gebly het/Worried less, although problems remained the same	0	1	2	43
Probleme opgelos/Solved the pro= blems	0	1	2	44
Kalmeermiddels geneem/Took tran= quillisers	0	1	2	45
Liggaamlik meer oefening gedoen/ Did more physical exercise	0	1	2	46
Sielkundige hulp/maatskaplike werk= ster/Psychiatric help/social worker	0	1	2	47
Ander (bv. stokperdjie, drink) (spesifiseer)/Other (e.g. hobby, drinking) (specify)	0	1	2	48

2

8 Is u bloeddruk in die afgelope 12 maande gemeet?/
Has your blood pressure been measured in the last 12 months?

Ja/ Yes	Nee/ No	Weet nie/ Do not know		
1	2	3		49

9 Het u in die afgelope 12 maande enige van die volgende besoek?/
Have you attended any of the following during the past 12 months?

	Ja/ Yes	Nee/ No		
Daghospitaal/Day hospital	1	2		50
Kliniek/Clinic	1	2		51
Privaatdokter/Private doctor	1	2		52
Provinsiale hospitaal/Provincial hospital	1	2		53
Privaathospitaal/Private hospital	1	2		54

*10 Het u geleer hoe 'n mens jou hart gesond kan hou by:/Have you learnt how to keep your heart healthy from:
(Merk by elkeen/Mark each one)

	Ja/ Yes	Nee No	Weet nie/ Do not know		
Vriende of familie?/Friends or family	1	2	3		55
Onderwysers by skool?/Teachers at school?	1	2	3		56
Leesstof (bv. tydskrifte, pamflette, boeke, koerante, ens.)?/Reading matter (e.g. maga= zines, pamphlets, books, newspapers)?	1	2	3		57
Radio?	1	2	3		58
TV?	1	2	3		59
Daghospitaal of kliniek?/Day hospital or clinic?	1	2	3		60
Dokters of verpleegsters?/Doctors or nurses?	1	2	3		61
By die werk?/At work?	1	2	3		62
By 'n skoolkind?/From a school-child?	1	2	3		63
Plakkate?/Posters?	1	2	3		64
Ander? (spesifiseer)/Other? (specify)	1	2	3		65

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*11 Indien ons die mense in hierdie gemeenskap sou wou leer om so te lewe dat hulle harte gesond bly, hoe dink u sal ons dit beste kan doen? Kies die belangrikste drie uit die volgende lys:/ Should we want to teach people in this community to live in a way that will keep their hearts healthy, how do you think we could best achieve this? Choose the most important three from the following list:

Plakkate/Posters	01		
Lesings/Lectures	02		
By die werk/At work	03		
Onderrig aan skoolkinders/Educating school-children	04		
Deur daghospitaal en kliniek/Through day-hospital and clinic	05		1-2
TV	06		3-4
Radio	07		5-6
Koerante/Newspapers	08		
Pamflette/Pamphlets	09		
Tydskrifte/Magazines (bv. Keur, Living and Loving)	10		

* DEEL IV/PART IV

BORTNER SKAAL/SCALE

Nou wil ons 'n paar vrae oor u geaardheid vra. Ons noem twee uiterste eienskappe, sal u dan vir ons sê waar u pas tussen 1 en 7. Daar is nie 'n regte of 'n verkeerde antwoord nie. Antwoord net soos u uself sien./

Now we would like to ask a few questions about your personality. We mention two extreme characteristics. Will you tell us where you fit in on a scale between 1 and 7. There is no correct or incorrect answer. Please answer as you see yourself.

Voorbeeld/Example

Word u gou kwaad of vat dit baie voor u kwaad word?/Do you get angry quickly or does it take a lot to make you loose your temper?

As "gou kwaad" = 1 tot 3 en "vat lank" of "word selde kwaad" = 5 tot 7, waar pas u in?/

If "get angry quickly" = 1 to 3 and "seldom gets angry" or "take a lot to get angry" = 5 to 7, where do you fit in?

1 2 3 4 5 6 7

3

1	Is u nooit laat nie - altyd betyds/ Are you never late - always on time	1 2 3 4 5 6 7	Of is u nie gepla nie/ bekommerd om laat te kom nie/Or are you ca= sual about appointments. Do not watch the clock?	7
2	Speel u 'n spel net vir die lekker; wen maak nie saak nie. Tevrede om net deel te neem. Nie-mededingend Do you play a game just for fun; to win is not important. Satisfied to just par= cipate. Non-competi= tive.	1 2 3 4 5 6 7	Of speel u 'n spel om te wen en voel ongelukkig as u verloor. Wil altyd die beste wees. Mede= dingend./Do you play a game to win and do you feel unhappy if you lose. Always want to be the best. Very competitive.	8
3	Is u tevrede om nie altyd met alles in die lewe die beste te wees nie/bo uit te kom nie? Are you content not always being the best at everything in life/ not always coming out on top?	1 2 3 4 5 6 7	Of wil u altyd in alles in die lewe die beste wees/bo uitkom?/Or do you want to be the best at everything in life/ always want to come out on top?	9
4	Val u ander mense in die rede as hulle iets vertel?/Do you inter= rupt people when they tell a story?	1 2 3 4 5 6 7	Of luister u na ander mense enduit as hulle iets vertel?/Or do you hear others out when they tell a story?	10
5	Voel u altyd haastig, gejaagd?/Do you al= ways feel rushed?	1 2 3 4 5 6 7	Of voel u altyd rustig selfs onder druk, nie gejaagd nie?/Or do you never feel rushed even under pressure?	11
6	Kan u geduldig wag?/ Can you wait patient= ly?	1 2 3 4 5 6 7	Of raak u ongeduldig as daar gewag moet word?/ Or do you feel impatient when waiting?	12
7	Probeer u baie hard om suksesvol te wees in u werk en ontspan= ning?/Do you go all out to be succesful in your work and relaxation?	1 2 3 4 5 6 7	Of doen u take sommer so-so. Min gepla, onge= erg?/Or are you casual about tasks. Not bothered?	13
8	As u 'n aantal take/ werkies het, doen u een klaar voor u aangaan met die vol= gende?/If you have a number of tasks, do you do one at a time?	1 2 3 4 5 6 7	Of probeer u baie dinge gelyk doen?/Or do you try to do many things at the same time?	14

3

9	As u iets vertel, praat u baie opgewon=de met gebare?/When you tell a story, do you speak excitedly, emphatically with gestures?	1 2 3 4 5 6 7	Of praat u stadig, rus=tig en kalm?/Or do you speak slowly, delibera=tely and calmly?	15
10	As u werk gedoen het, wil u hê dat iemand moet sê dit is goed voor u tevrede is?/ When you finish a task, do you want somebody to approve your work before you feel satisfied?	1 2 3 4 5 6 7	Of gee u nie om wat an=der dink nie, solank as wat u uself tevrede stel?/Or don't you mind what others think, as long as you yourself are satisfied?	16
11	Is u 'n haastige mens wanneer u loop of eet Take moet vinnig klaarkom./Are you a hurried person when you walk or eat. Tasks must be com=pleted fast.	1 2 3 4 5 6 7	Of is u nie 'n haastige mens nie. Doen dinge rustig. Kan 'n ding sy eie tyd laat neem./Or are you not a hurried person. Do tasks peace=fully. Can allow a task to take its own time.	17
12	Vat u u dag rustig en gemaklik, sorgeloos?/ Are you easy-going?	1 2 3 4 5 6 7	Of werk u aanmekaar son=der rus. Dryf u uself?/ Or are you hard-driving. Do you work without resting?	18
13	As u kwaad of ont=steld is, hou u dit binnekant en praat nie daaroor nie. Krop gevoelens op?/ When you are angry or upset, do you conceal your feelings. Do not discuss them. Suppress feelings?	1 2 3 4 5 6 7	Of wys u dit of praat dit uit?/Or do you show your feelings or speak about it?	19
14	Stel u belang in baie dinge buite u werk?/ Do you have many in=terests outside your work?	1 2 3 4 5 6 7	Of stel u in min dinge buite u werk belang?/ Or do you have few interests outside your work?	20
15	Is u tevrede in u werk of situasie?/ Are you satisfied with your job/situ=ation?	1 2 3 4 5 6 7	Of wil u graag beter doen/meer bereik?/ Or would you like to better yourself. Ambitious?	21

3

DEEL V/PART V

*1 Spanningsbeheer/Coping with stress

(VELDWERKER VERDUIDELIK: HIERMEE WORD BEDOEL GESPANNENHEID, "TENSION", "WORRIES", SENUWEESAGTIGHEID./FIELDWORKER EXPLAINS: STRESS MEANS TENSION, WORRIES, NERVOUSNESS)

		Ja/ Yes	Nee/ No	Onseker/ Weet nie/ Uncertain/Do not know		
1.1	Is die lewe vandag so gejaagd dat mens nie meer sonder senuweepille kan klaar=kom nie?/Is life so rushed nowadays that one can no longer cope without tranquil=lisers?	1	2	3		22
1.2	Is harde liggaamlike werk 'n goeie manier om senuweeagtigheid te verlig?/Is Stre=nuous physical work a good way of re=lieving nervousness?	1	2	3		23
1.3	Is dit altyd sleg vir 'n mens se gesond=heid om vir 'n lang tyd gespanne te wees?/ Is it always bad for one's health to be tense for a long time?	1	2	3		24
1.4	Word daar genoeg gedoen om gespanne mense te laat ontspan?/Is enough being done to help tense people relax?	1	2	3		25
1.5	Sal dit help om jou spanning te probeer verlig as jy nie weet wat dit veroorsaak nie?/Will it help to try to relieve one's nervousness if one does not know what causes it?	1	2	3		26
1.6	Behoort 'n mens senuweepille sonder 'n dokter se voorskrif te kan koop?/Should one be able to buy tranquillisers without a doctor's prescription?	1	2	3		27
1.7	Is dit die moeite werd om 'n stokperdjie te begin met die doel om spanning te verlig?/Is it worth the trouble to start a hobby with the intention of relieving tension?	1	2	3		28
1.8	Is gereelde ontspanning met jou familie 'n goeie manier om alledaagse spanning te beheer?/Is relaxing regularly with one's family a good way to control everyday tension?	1	2	3		29

3

VRAAG 1 (vervolg)

		Ja/ Yes	Nee/ No	Onseker/ Weet nie/ Uncertain/Do not know	
1.9	Is dit mense se eie skuld dat hul werk hulle gespanne maak?/Do people whose work makes them tense have only them= selves to blame?	1	2	3	30
1.10	Help gereelde liggaamlike oefening om spanning te verlig?/Does regular physical exercise help to relieve nervousness?	1	2	3	31

*2 Liggaamlike oefening /Physical exercise

(VELDWERKER VERDUIDELIK: MET LIGGAAMLIKE OEFENING WORD BEDOEL ENIGE OEFENING WAT GEKRY WORD DEUR BYVOORBEELD HARDE LIGGAAMLIKE WERK SOOS TUINWERK, SPORT SOOS RUGBY, DRAF, ENSOVOORTS EN LIGAAMLIKE OEFENINGE. FIELDWORKER EXPLAINS: PHYSICAL EXERCISE MEANS ANY EXERCISE ONE GETS FROM E.G. STRENUOUS PHYSICAL WORK SUCH AS GARDENING, SPORT SUCH AS RUGBY, JOGGING, ETC. AND PHYSICAL TRAINING)

		Ja/ Yes	Nee/ No	Onseker/ Weet nie/ Uncertain/Do not know	
2.1	Kan gereelde oefening hartkwale ver= hoed?/Can regular exercising prevent heart disease?	1	2	3	32
2.2	Is mense wat gereeld oefening kry, ge= sonder as dié wat nie gereeld oefening kry nie?/Are people who get regular exercise healthier than those who do not?	1	2	3	33
2.3	Moet 'n kind self besluit of hy aan enige sport wil deelneem?/Must a child decide for himself whether he wants to take part in any sport?	1	2	3	34
2.4	Behoort mense wat nie elke dag harde sweetwerk doen nie, ander oefening te kry?/Should people who do not do strenuous physical work every day get other exercise?	1	2	3	35

3

VRAAG 2 (vervolg)

		Ja/ Yes	Nee/ No	Onseker/ Weet nie/ Uncertain/Do not know		
2.5	Is dit genoeg oefening om gereeld vir lang ente vinnig te stap?/Is it enough exercise to take regular long brisk walks?	1	2	3		36
2.6	Is dit lekkerder om na sport te kyk as om self daaraan deel te neem?/Is it more pleasant watching sport than taking part?	1	2	3		37
2.7	Word daar te veel bohaai oor die voor=dele van oefening gemaak?/Is too much fuss being made about physical exer=cise?	1	2	3		38
2.8	Help gereelde liggaamlike oefening vir oorgewig?/Does regular physical exer=cise help overweight?	1	2	3		39
2.9	Is dit nodig vir mense wat ouer as 50 jaar is om gereeld liggaamlike oefening te kry?/Is it necessary for people ol=der than 50 years to get regular exer=cise?	1	2	3		40
2.10	Word daar genoeg gedoen om mense bewus te maak van die voordele van gereelde liggaamlike oefening?/Is enough being done to make people aware of the ad=vantages of regular physical exercise?	1	2	3		41

*3 Rook/Smoking

		Ja/ Yes	Nee/ No	Onseker/ Weet nie/ Uncertain/Do not know		
3.1	Is dit mooi as vroue rook?/Is it smart for ladies to smoke?	1	2	3		42
3.2	Is mans wat rook, manliker as diê wat nie rook nie?/Are men who smoke more masculine than those who do not smoke?	1	2	3		43
3.3	Sal meeste rokers graag wil ophou rook?/Would most smokers like to stop smoking?	1	2	3		44

3

VRAAG 3 (vervolg)/QUESTION 3 (contd.)

		Ja/ Yes	Nee/ No	Onseker/ Weet nie/ Uncertain/Do not know		
3.4	Behoort 'n mens toegelaat te word om te rook net waar jy wil?/Should one be allowed to smoke anywhere one likes?	1	2	3		45
3.5	Word mense wat ophou rook, vet?/Do people who stop smoking become fat?	1	2	3		46
3.6	Kalmeer rook 'n mens se senuwees?/Does smoking calm one's nerves?	1	2	3		47
3.7	Behoort daar op elke pakkie sigarette te staan dat rook ongesond is?/Should each packet of cigarettes carry a warning that smoking is unhealthy?	1	2	3		48
3.8	Behoort mense wat aan sport deelneem, te rook?/Should people who take part in sport smoke?	1	2	3		49
3.9	Behoort rook in openbare plekke soos bioskope verbied te word?/Should smoking be prohibited in public areas such as bioscopes?	1	2	3		50
3.10	Leef mense wat nie rook nie, gewoonlik langer as mense wat rook?/Do people who do not smoke usually live longer than those who do?	1	2	3		51

*4 Voeding/Nutrition

		Ja/ Yes	Nee/ No	Onseker/ Weet nie/ Uncertain/Do not know		
4.1	Behoort slegs mense wat oorgewig is of hartsiektes het, te sorg dat hulle ge=sond eet?/Should only people who are overweight or who suffer from heart disease eat in a healthy way?	1	2	3		52
4.2	Kan jy enigiets eet wat jy wil, solank jy net genoeg eet?/Can one eat what=ever one wants as long as one eats enough?	1	2	3		53

3

VRAAG 4 (vervolg)/QUESTION 4 (contd.)

		Ja/ Yes	Nee/ No	Onseker/ Weet nie/ Uncertain/Do not know		
4.3	Word daar te veel bohaai gemaak oor die gevare van vet kosse vir hartsiektes?/ Is too much fuss being made about the dangers of fatty foods for heart diseases?	1	2	3		54
4.4	Is duur kos gesonder as goedkoper kos?/ Is expensive food healthier than cheaper food?	1	2	3		55
4.5	Is meeste vet mense vanself vet?/Are most fat people fat by nature?	1	2	3		56
4.6	Is dit net so goed om maerwordpille te drink as om op dieet te gaan wanneer jy oorgewig is?/Is it as good to take slim=ming tablets as it is too change one's diet when one is overweight?	1	2	3		57
4.7	Word daar deesdae te veel bohaai gemaak oor wat 'n mens moet eet?/Is too much fuss made nowadays about what one should eat?	1	2	3		58
4.8	Is dit nodig dat kinders wat nie van groente hou nie, dit moet eet?/Is it necessary for children who do not like vegetables to eat them?	1	2	3		59
4.9	Het vet mense dieselfde kans om lank te lewe as ander mense?/Do fat people have the same chance as other people of living a long life?	1	2	3		60
4,10	Word mense genoeg geleer hoe om gesond te eet?/Are people taught enough about how to eat in a healthy way?	1	2	3		61

3

DEEL VI/PART VI

1 Behuising/Housing

1.1 Hoeveel vertrekke (slaapkamers en woonvertrekke met uitsluiting van aparte badkamers en kombuis) is daar tot die beskikking van die huishouding waaraan u behoort?/
How many rooms (bedrooms and living rooms, excluding bathrooms and kitchen) are available to the household to which you belong? 62

1.2 Hoeveel mense behoort aan u huishouding?/
How many people form part of the household to which you belong? 63-64

2 Watter taal praat u meeste in die huis?/
What is your home language?

Afrikaans	1
Engels/English	2
Afrikaans en Engels/English and Afrikaans	3
Ander (spesifiseer)/Other (specify)	4

65

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4

3 Alkoholinname/Alcohol intake

(a) Gebruik u ooit enige drank (wat alkohol bevat)?/
Do you take any alcohol?

Ja/ Yes	Nee/ No		
1	2		1

(b) Wanneer drink u - in die week of oor naweke?/
When do you drink - during the week or over week-ends?

N.v.t./N.a. = 0

	Ja/Yes	Nee/No		
In die week/During the week	1	2		2
Oor naweke/Over week-ends	1	2		3
Selde, net by geleenthede/ Occasionally only	1	2		4

(c) Watter tipe drank koop u gewoonlik?/
What do you usually buy?

	Ja/Yes	Nee/No		
Bier/Beer	1	2		5
Wyn/Wine	1	2		6
Hardehout (brandewyn, whisky, jenewer, rietspiritus, vodka)/Hot Stuff (brandy, whisky, gin, cane, vodka)	1	2		7

(d) Hoeveel koop u gewoonlik in 'n week? (Aantal bot= tels, blikkies, tweemankan, kraantjie, 6-man-kan, liters, ens.)/How much do you usually buy per week? (Number of bottles, cans, flagon, 6-shooter, litres, etc.)

	PER WEEK				
Bier/Beer:					8-11
Wyn/Wine:					12-15
Hardehout/Hot stuff:					16-19

4

DEEL VII/PART VII

Afdeling A: Pyn met inspanning

Section A: Effort pain

1 Het u al ooit pyn of ongemak in die borskas ondervind?/
Have you ever had any pain or discomfort in your chest?

Ja/Yes (GAAN NA VRAAG 3/PROCEED TO QUESTION 3)	1		
Nee/No	2		20

2 Indien NEE, het u al ooit enige drukking of swaar gevoel in u bors=kas ondervind?/IF NO, have you ever had any pressure or heaviness in your chest?

N.v.t./N.a.	0		
Ja/Yes	1		
Nee/No	2		21

Indien Nee, gaan na AFDELING B/
If No, proceed to SECTION B

Indien 'n antwoord in die res van AFDELING A saam met 'n * val, gaan dadelik oor na AFDELING B/If during the remainder of section A an answer is recorded in a box marked * proceed immediately to SECTION B

3 Kry u dit wanneer u opdraand stap of vinnig loop?/Do you get it when you walk uphill or when you walk fast?

Ja/Yes	1		
Nee/No	2		
Stap nooit opdraand/Loop nooit vinnig/ Never walks fast nor walks uphill	3*		22

4 Kry u dit wanneer u teen 'n normale tempo of gelykpad stap?/
Do you get it when you walk at an ordinary place or on the level?

Ja/Yes	1		
Nee/No	2		23

4

5 Wat doen u wanneer u dit met stap kry? (Merk by stop of stap sta= diger as die persoon aanhou na neem van TNT)/What do you do if you get it while you are walking? (Record stop or slow down if subject carries on after taking TNT)

Stop of stap stadiger/Stop or slow down	1		
Hou aan/Carry on	2*		24

6 Wat gebeur wanneer u gaan stilstaan (sonder TNT)?/If you stand still what happens to it (without taking TNT)?

Verlig/Relieved	1		
Nie verlig/Not relieved	2*		25

7 Hoe gou?/How soon?

Minder as 10 min./Ten minutes or less	1		
Meer as 10 min./More than ten minutes	2*		26

8 Wys my waar die pyn was?/Show me where you felt the pain?

Borsbeen (bo of middel) Sternum (upper or middle)	(a)	1		
Borsbeen (onder) Sternum (lower)	(b)	2		
Linker borskas voor Left antenior chest	(c)	4		
Linker arm Left arm	(d)	8		
Ander (merk op diagram) Other (mark on diagram)	(e)	16		
			27-28	

Het u dit op 'n ander plek gevoel? (bv. rug of elders)/Did you feel it anywhere else? (e.g. back or elsewhere). Gee besonderhede/Record details:

....

....

Ja/Yes	1		
Nee/No	2		29

4

10 Het u 'n dokter geraadpleeg oor die pyn?/Did you see a doctor about this pain?

Ja/Yes	1	
Nee/No	2	30

11 Indien JA, wat het hy gesê is die oorsaak van die pyn?/If YES, what did he say is the cause of this pain?

....

.... 31

(kodeer op kantoor/code in office)

12 Word die pyn binne 5 minute verlig wanneer u die klein hartpilletjie (TNT pil) onder die tong sit?/Is the pain relieved within 5 minutes after putting the small white pill for your heart (TNT) under your tongue?

N.v.t. (geen pil)/N.a. (no pill)	0	
Ja/Yes	1	
Nee/No	2	32

AFDELING B/SECTION B

13 Het u al ooit 'n erge pyn voor op u bors gehad wat vir 'n halfuur of meer geduur het?/Have you ever had a severe pain across the front of your chest lasting for half an hour or more?

Ja/Yes	1	
Nee/No (GAAN NA VRAAG 18/PROCEED TO QUESTION 18)	2	33

4

14 Hoeveel aanvalle het u al gehad?/How many of these attacks have you had?

34-35

	Datum/ Date	Duur (min.) Duration (mins.)	Ander inligting (gevoel) sweet, naarheid, ens. Other information (sensa= tion) perspiration, nausea, etc.
Laaste aanval/ Last attack	....	....	....
Eerste aanval/ First attack	....	....	....

15 Het u 'n dokter geraadpleeg oor die pyn?/Did you see a doctor about this pain?

Ja/Yes	1	
Nee/No	2	36

16 Indien JA, wat het hy gesê is die oorsaak van die pyn?/If YES, what did he say is the cause of this pain?

.... 37

(Kodeer op kantoor/Code in the office)

17 Was u in die hospitaal opgeneem vir die pyn?/Were you admitted to the hospital for the pain?

Ja/Yes	1	
Nee/No	2	38

5

18 OPSOMMING/SUMMARY

Kry die respondent angina? JA, indien ja by vraag 8 (a, b, c of d)/ Does the respondent have angina? YES, if yes at Question 8 (a, b, c or d).

Ja/Yes	1		
Nee/No	2		39

Het die respondent reeds 'n miokardiale infarksie gehad? JA indien ja by vraag 13?/Has the patient had a myocardial infarct? YES, if yes at Question 13.

Ja/Yes	1		
Nee/No	2		40

KAART NR./CARD NO.	4	68
REKORD NR./RECORD NO.		69-72
PROJEK NR./PROJECT NO.	K O M M 17 - 3	73-80

Ek, die ondergetekende, sertifiseer hiermee dat al die vrae in die vraelys gedurende die onderhoud aan die respondent gestel is./ I, the undersigned, hereby certify that the respondent was asked all the questions in the questionnaire during the interview.

HANDTEKENING: MEDEWERKER ....
SIGNATURE: CO-WORKER

APPENDIX B

GENERAL GUIDE FOR CO-WORKERS

PROJECT OSC/OV/20

Co-worker's No:

Number of questionnaires to be completed:

GENERAL

Included are the following documents required for the survey:

1 Questionnaires

2 Cover questionnaires

3 Claim form

4 Tariff list

5 A list of the addresses at which interviews may be conducted - to be provided during training.

6 Envelopes in which completed questionnaires should be returned.

7 Letter of introduction for this investigation.

8 Display card booklet.

9 Personal questionnaire that must be completed by each co-worker.

NB: All the documents should be returned after completion of the survey.

10 Forms to be completed in respect of each respondent and which will be collected by the nurse.

THE SURVEY

1 It is expected of you to conduct a given number of successful interviews and to complete the questionnaires fully during interviews with the respondents.

2 You will be given a list of addresses in your area, near where you are currently working. The number of addresses will be twice the number of interviews that should be conducted. These addresses will be numbered 01, 02, 03... to approximately 50.

3 The number of respondents with whom interviews should be conducted, will be divided according to sex and age. You will be given a list with these particulars.

4 During your training, which may last approximately two days, you will be given full instructions on the selection of a respondent from the number of addresses provided, and on conducting the required number of interviews.

5 Because the study involves two interviews, the resultant completion of two questionnaires and a brief medical examination during the second interview, it is essential that the procedure and course of the full study be explained thoroughly to each selected respondent. An interview should therefore not be conducted unless the respondent is willing to participate in the full study.

6 Included among your documents are a number of forms on which data should be provided in respect of the respondents interviewed. These completed forms will be collected by the nurse who is responsible for conducting a further interview with the respondents and for carrying out a brief medical examination.

CO-WORKER'S NUMBER

Some co-workers fail to write their number on all the documents. It should always be entered in the appropriate space in order to facilitate the keeping of records and the work flow.

RESPONDENT'S NUMBER

This number refers to the number of the addresses (01, 02, 03, etc.) at which interviews may be conducted, and should be written on the respondent's questionnaire as well as on the form to be completed for the nurse.

COVER QUESTIONNAIRE

The purpose of this questionnaire will be explained during your training. The cover questionnaire has been amended on page 3 to assist you in obtaining the additional data required to select the respondent at each address. Write down the ages of all likely respondents.

HOUSEHOLD

For the purposes of this investigation a household is defined as persons or a group of persons who prepare food and take their meals together.

According to this definition a given address may represent more than one household. During training it will be explained to you how to select a household in these cases.

DISPLAY CARD BOOKLET

Some of the questions in the questionnaires have been marked with an *, indicating a choice of answers. The possible answers to such a question are also given opposite the particular question in the DISPLAY CARD BOOKLET. Hand the DISPLAY CARD BOOKLET to the respondent and ask him/her to state the number of the answers that he/she feels applies to the particular questions (i.e. those marked with an *). On your questionnaire you then mark the code opposite the answer given and transfer this code to the appropriate square.

SELECTING RESPONDENTS

During training you will be given instructions on the selection of a respondent at a particular address.

Please note that a respondent may not be selected at random. A fixed procedure has been laid down from which you may not deviate.

CO-WORKER CONTROL

Remember that the HSRC reserves the right during this and any other investigation to enquire from respondents as to whether the interview was in fact conducted, whether all the questions were asked, the standard of the

co-worker's interview, whether the reasons given for describing an interview as unsuccessful were true, etc. If it is determined that a co-worker is guilty of negligence or cheating, all the work is checked thoroughly for further errors, and appropriate action is taken.

MAPS

Since your work concerns a new area, you will be provided with a map and a description of this area. These items should be returned to the regional office in Parow after the completion of the survey.

LETTER OF INTRODUCTION

The documents provided include a letter of introduction which is valid only for the duration of this investigation. After completion of the survey it should be returned with the other documents.

CONFIDENTIALITY

All the data collected and the material provided should be treated as strictly confidential. You may therefore not give or lend any document or a copy thereof to anyone else. During your interview you commit yourself to treating the data provided by individual respondents as strictly confidential.

TARIFFS OF PAYMENT

It is expected of you to conduct interviews with approximately 25 persons between the ages of 16 and 64 years (inclusive). To enable you to carry out

this task successfully, you will be provided with approximately 50 addresses of possible respondents. This means that a cover questionnaire will have to be completed at each address visited, irrespective of whether a respondent is not found with whom an interview can be conducted.

To compensate you for these extra visits, a tariff of R4,00 is paid per completed questionnaire.

IMPORTANT

It is important to note that a cover questionnaire should be completed for each address visited which occurs on your address list. Your co-worker number and the respondent number should appear on the cover questionnaire. If for any reason whatsoever an interview cannot be conducted at a particular address, a cover questionnaire should still be completed. This procedure is vital to this investigation.

ADDITIONAL ADDRESSES

If you are unable to obtain the required number of respondents from the large number of addresses provided, additional addresses should be obtained from the particular fieldwork organiser under whom you will be working.

COMPLETION OF QUESTIONNAIRE

GENERAL

1 Questions are answered by encircling the figure that indicates the respondent's answer. This figure must be written in the square on the right-hand side of the page.

2 Questions marked with a * must be answered with the aid of the display card booklet that you must give to the respondent. The do not know or uncertain responses do not appear in the questions in the display card booklet. Only if the co-worker is convinced that the respondent is really ignorant or uncertain, must he/she mark the uncertain/do not know choice.

3 If the respondent has difficulty understanding certain terms in one language, name the corresponding term in the other language.

PART 1A QUESTION 3

Std 8 plus two years teacher training is equivalent to Std 10.

PART 1A QUESTION 4

Distinguish between "housewives" and women who are at home because they cannot find work.

PART 1A QUESTION 4

Here the type of work and then the employer must be given.

PART 1B QUESTIONS 1(c) and 2(c)

An approximate age of ± 5 years is better than do not know

PART 1B QUESTION 3(a)

If the respondent you are interviewing is male, he must be excluded from the answer.

QUESTION 4(a)

If the respondent you are interviewing is female, she must be excluded from the answer.

INSTRUCTIONS REGARDING SPECIFIC QUESTIONS

SECTION B

Question 1(a)

If Yes (17/1) or Do not know (17/3) then N.a. (18/0) in Question 1(b).

If No (17/2) then Yes (18/1), No (1802) or Do not know (18/3) in Question b.

Question 1(b)

If Yes (18/1) then Yes (24/1) in Question 1(d).

Question 2(a)

If Yes (27/1) or Do not know (27/3) then N.a. (28/0) in Question 2(b).

If No (27/2) then Yes (28/1) No (28/2) or Do not know (28/3) in Question 2(b).

Question 2(b)

If Yes (28/1) then Yes (34/1) in Question 2(d).

Question 3(a)

If None (37-38/00) then None (29/0) in Question 3(b) and then None (40/0) in Question 3(c).

Question 3(a)

If None (41-42/00) then None (43/0) in Question 4(b) and then None (44/0) in Question 4(c).

PART 1 SECTION B

The figures in Question 3(b), 3(c) and 4(c) are entered directly in the square if the answer is not Codes 9 or 0.

PART 1 SECTION C

Write the number of years directly in the square.

PART 1D: Physical activity

General daily walking, sitting and standing work is regarded as Class I exercise and is not to be indicated here (e.g. teacher, scholar, sitting factory worker, operator).

GENERAL INSTRUCTIONS FOR CLASSES 2, 3 AND 4

We want to make provision for the additional use of energy demanded by certain additional activities, for example certain occupations, a housewife without a servant, as well as sporting activities.

QUESTION 2

Give the number of hours a week spent on additional activities only, in other words in addition to the sitting and standing of Class I. Example: Of a nurse's working day of eight hours she may only be intensively physically active for three hours a day for five days of the week over and above normal sitting, standing and moving - in other words, 15 hours a week of Class II activities. You must therefore indicate in:

Class II 015

Class III 000

QUESTION 3

If a person answers "No" to Question 3, cross-check by asking the following questions, for example: "Do you not do your own gardening?" "Do you not skip or do any other exercise?" "Do you not do your own housework?"

QUESTION 4

First determine in which activities in the different classes the respondent takes part. Then collect further information.

a Frequency: Number of times a week.

Average hours a week: Determine the number of hours a week for each season and indicate as:

$$\frac{\text{Summer and winter}}{2} = \text{average number of hours a week over a year}$$

Example: Sport = badminton (= Class 4)
Frequency: 3 x a week, 1 hour each time, 8 months a year.
Summer = 0 Winter: Frequency = 3 x a week

Hours = 3 hours a session

$$\text{Average} = \frac{3 \times 8}{2} = 2$$

Complete all seven columns and indicate the total for each class separately.

Class 2 exercises

Class 2 cycling (non-competitive) distinguished from

Class 4 cycling (competitive)

Housework includes window-washing, washing and scrubbing floors, hanging up washing and ironing, moving furniture and other strenuous activities - in other words the strenuous work is not done by someone else. When a domestic servant does the strenuous work, the remaining work goes through as Class I activity and is not reported here.

Distinguish walking 2 from social strolling. Remember to take into account walking to and from work/station.

Distinguish between tennis (competitive) Class 3 and tennis (non-competitive) Class 2. The time spent playing tennis and not the time spent at the court is important.

Class 4

Serious swimming and not social paddling.

PART II (page 10)

It is imperative that you keep to the specific wording and sequence of the questions as they appear in the questionnaire. If the respondent does not understand the question properly, repeat it exactly as it appears in the questionnaire - but under no circumstances influence the respondent's choice of answer. Give the respondent enough time to answer. All the questions must be answered even if the answer is "do not know". A "Yes" or "No" answer must be based on definite knowledge. Discourage guessing if the respondent reacts with "Yes, probably" or "rather say no"; suggest - "you don't really know, do you?" - and mark "do not know". If the respondent cannot answer because he does not understand, mark Code 4.

PART II Question 5

Important: The question concerns purposeful action for health reasons and not simply because the person prefers it.

PART III

Questions 2, 4 and 7: The possible answers must not be put to the respondents.

PART IV - BORTNER SCALE

All the questions must be answered by all the respondents.

Question 2 refers to any game, for example cards, sport, etc.

Questions 14 and 15: "work" includes the work of housewives and students as well as the unemployed (i.e. what they usually do to keep themselves occupied).

PART V

All the questions must be answered by all the respondents. If necessary, repeat the question exactly as it appears in the questionnaire.

PART VI - Question 3(d)

Indicate as accurately as possible how much liquor is bought and whether it is bought weekly, monthly, etc.

PART VII

Any uncertainty is marked as "No" except for Question 1 in Section A and Question 1 in Section B.

SECTION A - Question 1

If the respondent says he never walks because he gets angina, mark "Yes".

SECTION A - Question 6

You must establish whether or not the pain subsides as a result of stopping or walking more slowly without the use of TNT. If the person does not know because he takes TNT immediately, try and ascertain what had happened before he took TNT. If it is still not clear, write down the relevant information and continue with the questionnaire.

SECTION A - Question 8

All kinds of pain that can be indicated on the diagram (front view of chest) are filled in for this question, for example, right arm, right breast, neck, etc.

SECTION A - Question 9

This means any pain not covered in the front view of the chest (Question 8), for example pain in the back or left leg. Full particulars should be supplied as far as possible.

SECTION B - Question 14

For "other information", fill in any additional descriptive information, for example the intensity of the pain, the nature of the pain, whether or not the respondent perspired, felt faint, became unconscious or felt nauseous.

IMPORTANT: REMEMBER TO SIGN THE QUESTIONNAIRE. FIRST CHECK THAT YOU HAVE OBTAINED AND FILLED IN THE ANSWERS TO ALL THE QUESTIONS.

APPENDIX C

TOONKAARTBOEKIE/
DISPLAY CARD BOOKLET

PROJEK
PROJECT MPS/OV/20

MENINGSPEILINGSENTRUM/
OPINION SURVEY CENTRE

RAAD VIR GEESTESWETENSKAPLIKE NAVORSING/
HUMAN SCIENCES RESEARCH COUNCIL

Hierdie Toonkaartboekie moet deur die respondent gebruik word om op sekere vrae te kan antwoord./This Display Card Booklet must be used by the respondent to give answers to certain questions.

*4 Na-werksure aktiwiteite/Outside working hours activities

AKTIWITEIT/ ACTIVITY
KLAS/CLASS 2 (x2)
Fietsry/Cycling (non-compet.)
Huiswerk/Housework
Krieket/Cricket
Rolskaats/Rollerskating
Stap/Walking
Tennis (non-compet.)
Ander/Other ....
KLAS/CLASS 3 (x4)
Boks/Boxing
Dans/Dancing
Karate
Oefeninge/Exercises
Stoei/Wrestling
Tafeltennis/Table tennis
Tennis (competitive)
Touspring/Skipping
Ander/Other ....
KLAS/CLASS 4 (x6)
Draf/Jogging
Fietsry/Cycling (compet.)
Hokkie/Hockey
Muurbal/Squash
Netbal/Netball
Pluimbal/Badminton
Rugby
Sokker/Soccer
Swem/Swimming
Ander/Other ....

*DEEL II/PART II

1 Hoe dink u, watter mens sal eerder 'n hartaanval kry?/Which person do you think would sooner get a heart attack?

1) 'n Mens wat kos eet wat met olie voorberei is of wat kos eet wat met kook=vet voorberei is/A person who eats food prepared with oil or who eats food prepared with cooking fat?	Olie/ Oil 1	Kookvet/ Cooking fat 2
2) 'n Mens met hoë bloeddruk of met lae bloeddruk?/A person with high blood pressure or with low blood pressure?	Hoë/ High 1	Lae/ Low 2
3) 'n Mens wat baie vet eet of wat baie styselkos (bv. brood, rys, aartappels, pap) eet?/A person who eats a lot of fat or who eats a lot of starch (e.g. bread, rice, potatoes, porridge)?	Vet/ Fat 1	Stysel-kos/ Starch 2
4) 'n Mens wat volmelk gebruik of wat afgeroomde melk gebruik?/A person who uses full-cream milk or who uses skim milk?	Vol=melk/ Full cream milk 1	Afge=roomde melk/ Skim milk 2
5) 'n Mens wat bees- en skaap=vleis eet of wat hoender en vis eet/A person who eats beef and mutton or who eats chicken and fish?	Bees en skaap/ Beef and mutton 1	Hoender en vis/ Chicken and fish 2

		Ja/Yes	Nee/No
2	Het alle mense cholesterol in die bloed?/Do all people have cholesterol in their blood?	1	2
3	Kan die cholesterol in 'n mens se bloed verander as hy sy eetgewoontes verander?/Can the choles= terol in the blood change when one changes one's eating habits?	1	2
4	Kan sout hoë bloeddruk gee?/ Can salt cause high blood pressure?	1	2
5	Is mense gewoonlik vet omdat hulle kliere nie reg werk nie?/Are people usually fat because their glands do not work properly?	1	2
6	Is mense gewoonlik vet omdat hulle te veel eet?/Are people usually fat because they eat too much?	1	2
7	Bevat maer vleis ook choles= terol?/Does lean meat also contain cholesterol?	1	2

*10 Het u geleer hoe 'n mens jou hart gesond kan hou by:/Have you learnt how to keep your heart healthy from:

(Merk by elkeen/Mark each one)

	Ja/ Yes	Nee No
Vriende of familie?/Friends or family	1	2
Onderwysers by skool?/Teachers at school?	1	2
Leesstof (bv. tydskrifte, pamflette, boeke, koerante, ens.)?/Reading matter (e.g. maga= zines, pamphlets, books, newspapers)?	1	2
Radio?	1	2
TV?	1	2
Daghospitaal of kliniek?/Day hospital or clinic?	1	2
Dokters of verpleegsters?/Doctors or nurses?	1	2
By die werk?/At work?	1	2
By 'n skoolkind?/From a school-child?	1	2
Plakkate?/Posters?	1	2
Ander? (spesifiseer)/Other? (specify)	1	2

*11 Indien ons die mense in hierdie gemeenskap sou wou leer om so te lewe dat hulle harte gesond bly, hoe dink u sal ons dit beste kan doen? Kies die belangrikste drie uit die volgende lys:/ Should we want to teach people in this community to live in a way that will keep their hearts healthy, how do you think we could best achieve this? Choose the most important three from the following list:

Plakkate/Posters
Lesings/Lectures
By die werk/At work
Onderrig aan skoolkinders/Educating school-children
Deur daghospitaal en kliniek/Through day-hospital and clinic
TV
Radio
Koerante/Newspapers
Pamflette/Pamphlets
Tydskrifte/Magazines (bv. Keur, Living and Loving)

* DEEL IV/PART IV

BORTNER SKAAL/SCALE

Nou wil ons 'n paar vrae oor u geaardheid vra. Ons noem twee uiterste eienskappe, sal u dan vir ons sê waar u pas tussen 1 en 7. Daar is nie 'n regte of 'n verkeerde antwoord nie. Antwoord net soos u uself sien./

Now we would like to ask a few questions about your personality. We mention two extreme characteristics. Will you tell us where you fit in on a scale between 1 and 7. There is no correct or incorrect answer Please answer as you see yourself.

Voorbeeld/Example

Word u gou kwaad of vat dit baie voor u kwaad word?/Do you get angry quickly or does it take a lot to make you loose your temper?

As "gou kwaad" = 1 tot 3 en "vat lank" of "word selde kwaad" = 5 tot 7, waar pas u in?/

If "get angry quickly" = 1 to 3 and "seldom gets angry" or "take a lot to get angry" = 5 to 7, where do you fit in?

1 2 3 4 5 6 7

07

06

05

04

03

02

01

1	Is u nooit laat nie - altyd betyds/ Are you never late - always on time	1 2 3 4 5 6 7	Of is u nie gepla nie/ bekommerd om laat te kom nie/Or are you ca= sual about appointments. Do not watch the clock?
2	Speel u 'n spel net vir die lekker; wen maak nie saak nie. Tevrede om net deel te neem. Nie-mededingend Do you play a game just for fun; to win is not important. Satisfied to just par= cipate. Non-competi= tive.	1 2 3 4 5 6 7	Of speel u 'n spel om te wen en voel ongelukkig as u verloor. Wil altyd die beste wees. Mede= dingend./Do you play a game to win and do you feel unhappy if you lose. Always want to be the best. Very competitive.
3	Is u tevrede om nie altyd met alles in die lewe die beste te wees nie/bo uit te kom nie? Are you content not always being the best at everything in life/ not always coming out on top?	1 2 3 4 5 6 7	Of wil u altyd in alles in die lewe die beste wees/bo uitkom?/Or do you want to be the best at everything in life/ always want to come out on top?
4	Val u ander mense in die rede as hulle iets vertel?/Do you inter= rupt people when they tell a story?	1 2 3 4 5 6 7	Of luister u na ander mense enduit as hulle iets vertel?/Or do you hear others out when they tell a story?
5	Voel u altyd haastig, gejaagd?/Do you al= ways feel rushed?	1 2 3 4 5 6 7	Of voel u altyd rustig selfs onder druk, nie gejaagd nie?/Or do you never feel rushed even under pressure?
6	Kan u geduldig wag?/ Can you wait patient= ly?	1 2 3 4 5 6 7	Of raak u ongeduldig as daar gewag moet word?/ Or do you feel impatient when waiting?
7	Probeer u baie hard om suksesvol te wees in u werk en ontspan= ning?/Do you go all out to be succesful in your work and relaxation?	1 2 3 4 5 6 7	Of doen u take sommer so-so. Min gepla, onge= erg?/Or are you casual about tasks. Not bothered?
8	As u 'n aantal take/ werkies het, doen u een klaar voor u aangaan met die vol= gende?/If you have a number of tasks, do you do one at a time?	1 2 3 4 5 6 7	Of probeer u baie dinge gelyk doen?/Or do you try to do many things at the same time?

9	As u iets vertel, praat u baie opgewonde met gebare?/When you tell a story, do you speak excitedly, emphatically with gestures?	1 2 3 4 5 6 7	Of praat u stadig, rustig en kalm?/Or do you speak slowly, deliberately and calmly?
10	As u werk gedoen het, wil u hê dat iemand moet sê dit is goed voor u tevrede is?/ When you finish a task, do you want somebody to approve your work before you feel satisfied?	1 2 3 4 5 6 7	Of gee u nie om wat ander dink nie, solank as wat u uself tevrede stel?/Or don't you mind what others think, as long as you yourself are satisfied?
11	Is u 'n haastige mens wanneer u loop of eet Take moet vinnig klaarkom./Are you a hurried person when you walk or eat. Tasks must be completed fast.	1 2 3 4 5 6 7	Of is u nie 'n haastige mens nie. Doen dinge rustig. Kan 'n ding sy eie tyd laat neem./Or are you not a hurried person. Do tasks peacefully. Can allow a task to take its own time.
12	Vat u u dag rustig en gemaklik, sorgeloos?/ Are you easy-going?	1 2 3 4 5 6 7	Of werk u aanmekaar sonder rus. Dryf u uself?/ Or are you hard-driving. Do you work without resting?
13	As u kwaad of ontsteld is, hou u dit binnekant en praat nie daaroor nie. Krop gevoelens op?/ When you are angry or upset, do you conceal your feelings. Do not discuss them. Suppress feelings?	1 2 3 4 5 6 7	Of wys u dit of praat dit uit?/Or do you show your feelings or speak about it?
14	Stel u belang in baie dinge buite u werk?/ Do you have many interests outside your work?	1 2 3 4 5 6 7	Of stel u in min dinge buite u werk belang?/ Or do you have few interests outside your work?
15	Is u tevrede in u werk of situasie?/ Are you satisfied with your job/situation?	1 2 3 4 5 6 7	Of wil u graag beter doen/meer bereik?/ Or would you like to better yourself. Ambitious?

DEEL V/PART V

*1 Spanningsbeheer/Coping with stress

(VELDWERKER VERDUIDELIK: HIERMEE WORD BEDOEL GESPANNENHEID, "TENSION" "WORRIES", SENUWEESAGTIGHEID./FIELDWORKER EXPLAINS: STRESS MEANS TENSION, WORRIES, NERVOUSNESS)

		Ja/ Yes	Nee/ No
1.1	Is die lewe vandag so gejaagd dat mens nie meer sonder senuweepille kan klaar=kom nie?/Is life so rushed nowadays that one can no longer cope without tranquil=lisers?	1	2
1.2	Is harde liggaamlike werk 'n goeie manier om senuweeagtigheid te verlig?/Is Stre=nuous physical work a good way of re=lieving nervousness?	1	2
1.3	Is dit altyd sleg vir 'n mens se gesond=heid om vir 'n lang tyd gespanne te wees?/ Is it always bad for one's health to be tense for a long time?	1	2
1.4	Word daar genoeg gedoen om gespanne mense te laat ontspan?/Is enough being done to help tense people relax?	1	2
1.5	Sal dit help om jou spanning te probeer verlig as jy nie weet wat dit veroorsaak nie?/Will it help to try to relieve one's nervousness if one does not know what causes it?	1	2
1.6	Behoort 'n mens senuweepille sonder 'n dokter se voorskrif te kan koop?/Should one be able to buy tranquillisers without a doctor's prescription?	1	2
1.7	Is dit die moeite werd om 'n stokperdjie te begin met die doel om spanning te verlig?/Is it worth the trouble to start a hobby with the intention of relieving tension?	1	2
1.8	Is gereelde ontspanning met jou familie 'n goeie manier om alledaagse spanning te beheer?/Is relaxing regularly with one's family a good way to control everyday tension?	1	2
1.9	Is dit mense se eie skuld dat hul werk hulle gespanne maak?/Do people whose work makes them tense have only them=selves to blame?	1	2
1.10	Help gereelde liggaamlike oefening om spanning te verlig?/Does regular physical exercise help to relieve nervousness?	1	2

*2 Liggaamlike oefening /Physical exercise

(VELDWERKER VERDUIDELIK: MET LIGGAAMLIKE OEFENING WORD BEDOEL ENIGE OEFENING WAT GEKRY WORD DEUR BYVOORBEELD HARDE LIGGAAMLIKE WERK SOOS TUINWERK, SPORT SOOS RUGBY, DRAF, ENSOVOORTS EN LIGAAMLIKE OEFENINGE. FIELDWORKER EXPLAINS: PHYSICAL EXERCISE MEANS ANY EXERCISE ONE GETS FROM E.G. STRENUOUS PHYSICAL WORK SUCH AS GARDENING, SPORT SUCH AS RUGBY, JOGGING, ETC. AND PHYSICAL TRAINING)

		Ja/ Yes	Nee/ No
2.1	Kan gereelde oefening hartkwale ver=hoed?/Can regular exercising prevent heart disease?	1	2
2.2	Is mense wat gereeld oefening kry, ge=sonder as dié wat nie gereeld oefening kry nie?/Are people who get regular exercise healthier than those who do not?	1	2
2.3	Moet 'n kind self besluit of hy aan enige sport wil deelneem?/Must a child decide for himself whether he wants to take part in any sport?	1	2
2.4	Behoort mense wat nie elke dag harde sweetwerk doen nie, ander oefening te kry?/Should people who do not do strenuous physical work every day get other exercise?	1	2
2.5	Is dit genoeg oefening om gereeld vir lang ente vinnig te stap?/Is it enough exercise to take regular long brisk walks?	1	2
2.6	Is dit lekkerder om na sport te kyk as om self daaraan deel te neem?/Is it more pleasant watching sport than taking part?	1	2
2.7	Word daar te veel bohaai oor die voor=dele van oefening gemaak?/Is too much fuss being made about physical exer=cise?	1	2
2.8	Help gereelde liggaamlike oefening vir oorgewig?/Does regular physical exer=cise help overweight?	1	2
2.9	Is dit nodig vir mense wat ouer as 50 jaar is om gereeld liggaamlike oefening te kry?/Is it necessary for people ol=der than 50 years to get regular exer=cise?	1	2
2.10	Word daar genoeg gedoen om mense bewus te maak van die voordele van gereelde liggaamlike oefening?/Is enough being done to make people aware of the ad=vantages of regular physical exercise?	1	2

*3 Rook/Smoking

		Ja/ Yes	Nee/ No
3.1	Is dit mooi as vroue rook?/Is it smart for ladies to smoke?	1	2
3.2	Is mans wat rook, manliker as diê wat nie rook nie?/Are men who smoke more masculine than those who do not smoke?	1	2
3.3	Sal meeste rokers graag wil ophou rook?/Would most smokers like to stop smoking?	1	2
3.4	Behoort 'n mens toegelaat te word om te rook net waar jy wil?/Should one be allowed to smoke anywhere one likes?	1	2
3.5	Word mense wat ophou rook, vet?/Do people who stop smoking become fat?	1	2
3.6	Kalmeer rook 'n mens se senuwees?/Does smoking calm one's nerves?	1	2
3.7	Behoort daar op elke pakkie sigarette te staan dat rook ongesond is?/Should each packet of cigarettes carry a warning that smoking is unhealthy?	1	2
3.8	Behoort mense wat aan sport deelneem, te rook?/Should people who take part in sport smoke?	1	2
3.9	Behoort rook in openbare plekke soos bioskope verbied te word?/Should smoking be prohibited in public areas such as bioscopes?	1	2
3.10	Leef mense wat nie rook nie, gewoonlik langer as mense wat rook?/Do people who do not smoke usually live longer than those who do?	1	2

*4 Voeding/Nutrition

		Ja/ Yes	Nee/ No
4.1	Behoort slegs mense wat oorgewig is of hartsiektes het, te sorg dat hulle ge= sond eet?/Should only people who are overweight or who suffer from heart disease eat in a healthy way?	1	2
4.2	Kan jy enigiets eet wat jy wil, solank jy net genoeg eet?/Can one eat what= ever one wants as long as one eats enough?	1	2
4.3	Word daar te veel bohaai gemaak oor die gevare van vet kosse vir hartsiektes?/ Is too much fuss being made about the dangers of fatty foods for heart diseases?	1	2
4.4	Is duur kos gesonder as goedkoper kos?/ Is expensive food healthier than cheaper food?	1	2
4.5	Is meeste vet mense vanself vet?/Are most fat people fat by nature?	1	2
4.6	Is dit net so goed om maerwordpille te drink as om op dieet te gaan wanneer jy oorgewig is?/Is it as good to take slim= ming tablets as it is too change one's diet when one is overweight?	1	2
4.7	Word daar deesdae te veel bohaai gemaak oor wat 'n mens moet eet?/Is too much fuss made nowadays about what one should eat?	1	2
4.8	Is dit nodig dat kinders wat nie van groente hou nie, dit moet eet?/Is it necessary for children who do not like vegetables to eat them?	1	2
4.9	Het vet mense dieselfde kans om lank te lewe as ander mense?/Do fat people have the same chance as other people of living a long life?	1	2
4.10	Word mense genoeg geleer hoe om gesond te eet?/Are people taught enough about how to eat in a healthy way?	1	2

<u>KORONêRE RISIKOFAKTORSTUDIE</u> <u>1982</u> <u>CORONARY RISK FACTOR STUDY</u>

<u>MNR & RGN</u> <u>MRC & HSRC</u>

Aangesien hartsiekte al hoe meer in Suid-Afrika voorkom, onderneem die Mediese Navorsingsraad (Nasionale Navorsingsinstituut vir Voedingsiektes) en die Raad vir Geesteswetenskaplike Navorsing (Instituut vir Kommunikasie-navorsing) 'n ondersoek wat gerig is op die voorkoming daarvan. In hierdie opname word gelet op die mate waarin hierdie siekte voorkom, asook op mense se menings en gebruike met betrekking tot faktore wat met hartsiekte verband hou. Die ervare suster sal 'n dieetgeskiedenis en 'n kort mediese geskiedenis neem. U gewig, lengte en bloeddruk sal bepaal word; so ook sal 'n bloedmonster geneem word

Alle inligting is vertroulik en word <u>slegs</u> vir navorsing gebruik.

Die resultate van die toetse sal aan u gestuur word en u sal van goeie raad bedien word om u hart so gesond as moontlik te hou.

U samewerking in hierdie belangrike navorsing word hoog op prys gestel.

oooOooo

The increasing prevalence of heart-disease in South Africa has led to a survey undertaken by the Medical Research Council (National Research Institute for Nutritional Diseases) and the Human Sciences Research Council (Institute for Communication Research) aimed at the prevention thereof. In this survey the prevalence of the disease as well as people's opinions and behaviour regarding factors associated with heart-disease has been taken into account. The experienced sister will take a diet history and a short medical history. Your weight, height and blood pressure will be determined, and a blood sample will be taken.

All information is confidential and used for research <u>only</u>.

The results of the tests will be posted to you and good advise will be given to keep your heart as healthy as possible.

Your co-operation in this important research is highly appreciated.

APPENDIX D DIETARY QUESTIONNAIRE

KORONêRE RISIKOFAKTORSTUDIE 1982 CORONARY RISK FACTOR STUDY

MNR & RGN MRC & HSRC

Respondent nr./no. [ ][ ]

Medewerkernommer/
Co-worker number [ ][ ][ ][ ][ ][ ][ ][ ][ ]

Datum/
Date [ ][ ][ ][ ][ ][ ]

Gevalnommer/
Case number [ ][ ][ ][ ]

Skoolsusternommer
School sister number [ ][ ] 2

1. Die dag waarop hierdie onderhoud gevoer word/
Day of the interview: [ ] 3

Maandag/Monday [1] Dinsdag/Tuesday [2] Woensdag/Wednesday [3]
Donderdag/Thursday [4] Vrydag/Friday [5] Saterdag/Saturday [6]
Sondag/Sunday [7]

2. Die proefpersoon is manlik/male [1] vroulik/female [2]
The subject is: [ ] 4

3. U ouderdom met u laaste verjaarsdag(jare)/
Your age at your last birthday(years): [ ][ ] 6

4. Watter soort werk doen u?/
What is your occupation? .... [ ][ ] 8

5. Vroue alleenlik: Borsvoed u tans? Ja/Yes [1] Nee/No [2]
   Women only: Are you breastfeeding?
   Mans/Men = NvT/N/A [0]

[ ] 9

6. Hoeveel eiers eet u gewoonlik in 'n week (7 dae)?/
   How many eggs do you usually eat a week (7 days)?

   Eet nie eiers nie/Do not eat eggs [0 0]

[|] 11

7. Eet u die vet aan vleis?/Do you eat the fat on meat?

   Ja/Yes [1]
   Nee/No [2]
   Eet slegs maer vleis/Eat only lean meat [3]
   Eet geen vleis nie/Do not eat any meat [4]

[ ] 12

8. Hoeveel keer in 'n week eet u van die volgende (net so, óf op toebroodjies óf in kospakkies)?/
How often in a week do you eat the following (as such, on sandwiches or in a lunch box)?

(In die week - Maandag tot Vrydag/Naweek - Saterdag en Sondag)
(During the week - Monday to Friday/Weekend - Saturday and Sunday)

	Meer as 3x/ More than 3 times		1-2 keer/ 1-2 times		Selde/nooit Seldom/never				
	In die week/ During the week	Naweke/ Weekends	In die week/ During the week	Naweke Weekends	In die week/ During the week	Naweke/ Weekends	In die week/During the week	Naweke/Weekends	
Kaas/Cheese	3	3	2	2	0	0			14
Vis (vars en blikkies) Fish (fresh & tinned)	3	3	2	2	0	0			16
Hoendervleis/Chicken	3	3	2	2	0	0			18
Maalvleis en wors/ Mince and sausage	3	3	2	2	0	0			20
Bees-, skaap-, en varkvleis/ Beef, mutton, pork	3	3	2	2	0	0			22
Lewer/Liver	3	3	2	2	0	0			24
Afval/Offal (tripe)	3	3	2	2	0	0			26
Kouevleise (polonie, salami, weense worsies, e.a.)/ Cold meats (polony, salami, viennas, others)	3	3	2	2	0	0			28
Grondbonebotter/ Peanut butter	3	3	2	2	0	0			30
Droëbone-, erte, lensies/ Dried beans, peas, lentils	3	3	2	2	0	0			32

9. Hoeveel snye brood eet u gewoonlik op:/
How many slices of bread do you usually eat on:

'n weeksdag?/a weekday? [ ][ ] 34

'n Saterdag?/a Saturday? [ ][ ] 36

10. Watter tipe margarien smeer u gewoonlik op u brood?/
Which type of margarine do you usually use on bread?
(Merk net een/Mark one only)

Pakkies (harde) geel margarien/ Wrapped (hard) yellow margarine	1
Bakkies (sagte) geel margarien/ Tubs (soft) yellow margarine	2
Wit margarien; Holsum /White margarine; Holsum	3
Botter/Butter	4
Skaap-, bees-, varkvet/Mutton fat, dripping, lard	5
Smeer gewoonlik nie op nie/Usually none	6
Weet nie/Do not know	7

[ ] --

11. Hoe dik smeer u margarien/botter/vet op u brood?/
How do you spread your bread with margarine/butter/fat?

Dun geskraap/Very lightly	1
Matig/Medium	2
Baie dik/Very thick	3
Smeer niks op nie/Usually none	4
Weet nie/Do not know	5

[ ] 38

12. Watter soort vet gebruik u meestal in kos? (Merk net een)/
What kind of fat do you use mostly in food preparation?
(Mark one only)

"Visolie"/"Fish" oil	1
Pakkies (harde) geel margarien/ Wrapped (hard) yellow margarine	2
Bakkies (sagte) geel margarien/ Tubs (soft) yellow margarien	3
Wit margarien; Holsum /White margarine; Holsum	4
Skaap-, bees-, varkvet/Mutton fat, dripping, lard	5
Botter/Butter	6
Gooi nie vet in kos nie/Usually none	7
Weet nie/Do not know	8

[ ] 39

13. Hoe dikwels eet u lekkers?/How often do you eat sweets?

Elke dag/Every day	1	
4-6 keer per week/4-6 times per week	2	40
2-3 keer per week/2-3 times per week	3	
1 keer per week/once a week	4	
Soms, nooit/Seldom, never	5	

14. Verkies u u kos / Do you like your food

aan die sout kant / well salted	1	41
of aan die vars kant? / or lightly salted?	2	

15. Hoe dikwels gooi u ekstra sout by u bord kos as u eet? How often do you add extra salt to your plate of food?

Gooi u nooit ekstra sout by nie/Do you never add extra salt	1	
of proe u eers en gooi dan by/ or do you taste first and then add	2	42
of gooi u by voordat u aan die kos geproe het/ or do you add before you have tasted the food?	3	

16. Eet u meer as 3 keer per week souterige "snacks" soos "chips", niknaks, gesoute grondbone, e.a.?/
Do you eat salty snacks more often than 3 times per week, i.e. chips, niknaks, salted peanuts, etc.?

Ja/Yes 1 Nee/No 2 43

17. Kry u u loon/salaris / Do you "pay"

weekliks?/weekly?	1	
maandeliks?/monthly?	2	44
Kry nie loon/salaris nie/ Do not "pay"	3	

KAARTNOMMER/CARD NUMBER 67-68

GEVALNOMMER/CASE NUMBER 69-72

oooOooo

24-UUR HERROEP/24-HOUR RECALL

Kan u asseblief nou vir my sê presies wat u gister alles geëet het? U moet asseblief goed dink en ALLES noem, ook wat u gedrink het - net water gaan ek nie neerskryf nie! Ek wil graag alles weet in verband met wat u geëet het vandat u opgestaan totdat u gaan slaap het.

Hoe laat het u gister opgestaan? Wat was toe die eerste wat u geëet of gedrink het?

Wat het u toe gedoen? Wanneer het u toe weer iets geëet of gedrink? Is dit al wat u gehad het?

oooOooo

Now I would like you to tell me what you had to eat and drink yesterday. I am going to write down what you ate, as well as how much for the whole day yesterday - I need not write down anything about water! From the moment that you woke up yesterday until you went to sleep last night - what did you have to eat and drink?

What time did you get up yesterday morning? What did you have to eat or drink first of all?

Where did you go then? When did you have something to eat or drink next? Was that all?

What did you do next? Did you have anything to eat or drink? When was that?

GEVALNOMMER/CASE NUMBER ☐☐☐☐

24-UUR HERROEP/24-HOUR RECALL

Tyd/Time	Wat is geëet?/What was eaten?	Hoeveel?/ How much?	Hoe is dit voorberei?/ How prepared?

Eet u ander .... dae ook so?/
Do you usually eat like this on .... days? Ja/Yes [1] Nee/No [2]

APPENDIX E MEDICAL QUESTIONNAIRE

KORONêRE RISIKOFAKTORSTUDIE 1982 CORONARY RISK FACTOR STUDY

MNR & RGN MRC & HSRC

Respondent nr./no [ ][ ]

Medewerkernommer/
Co-worker number [ ][ ][ ][ ][ ][ ][ ][ ][ ]

Datum/
Date [ ][ ][ ][ ][ ][ ]

Gevalnommer/
Case number [ ][ ][ ][ ]

Naam/Name: ....

Adres/Address: ....
....
....

Skoolsusternommer/
School sister number [ ][ ] 2

GESLAG/SEX: Manlik/Male = 1 [ ] 3

Vroulik/Female = 2

Ouderdom met u laaste verjaarsdag (jaar)/
Your age at your last birthday (years) [ ][ ] 5

I. Is u ooit in kennis gestel/of weet u dat u een van die volgende het/of gehad het?
Were you informed/or do you know whether you have/or have had any of the following?

Ja/Yes = 1 Nee/No = 2 Weet nie/Don't know = 9

Hoë bloeddruk/Hypertension [ ] 6

Suikersiekte/Diabetes [ ] 7

Oorgewig/Obesity [ ] 8

Verhoogde cholesterol of bloedvette/High cholesterol or blood fats [ ] 9

Hardlywigheid/Constipation [ ] 10

Hartaanval/Heart attack [ ] 11

Beroerte/Stroke [ ] 12

Hartkrampe/Angina [ ] 13

II. Gebruik u enige medisyne gereeld vir:/Do you use any medication regularly for:

	Elke dag/Every day	Paar keer per week/ Few times a week	Een keer per week/ Once a week	Nou en dan/ Occasionally	Nooit/Never	
Hoë bloeddruk/ Hypertension	1	2	3	4	5	14
Verhoogde cholesterol/ High cholesterol	1	2	3	4	5	15
Oorgewig/ Obesity	1	2	3	4	5	16
Suikersiekte/ Diabetes	1	2	3	4	5	17
Hartkrampe/ Angina	1	2	3	4	5	18
Na Hartaanval/ After Heart Attack	1	2	3	4	5	19
Hardlywigheid/ Constipation	1	2	3	4	5	20

IV. Is u op 'n spesiale dieet vir:/Are you on a special diet for:

Ja/Yes = 1 Nee/No = 2 Weet nie/Don't know = 9

Hoë bloeddruk/Hypertension 21

Suikersiekte/Diabetes 22

Oorgewig/Obesity 23

Verhoogde cholesterol of bloedvette/High cholesterol or blood fats 24

Hardlywigheid/Constipation 25

RESULT SHEET

GEWIG/ .... kg
WEIGHT

LENGTE/ .... cm
HEIGHT

OMTREK VAN ARM/ .... cm
ARM CIRCUMFERENCE

BLOEDDRUK/ Sistolies/Systolic .... mm Hg
BLOOD PRESSURE Diastolies/Diastolic .... mm Hg

TOTAL(E) SERUM CHOLESTEROL .... mg %

HDL-CHOLESTEROL .... mg %

URIENSUUR/SERUM/URIC ACID .... mg %

TRIGLISERIEDE/SERUM/TRIGLYCERIDE .... mg %

KAARTNOMMER/CARD NUMBER

GEVALNOMMER/CASE NUMBER

APPENDIX F

CO-ORDINATION SHEET

RGN - HSRC

RAAD VIR GEESTESWETENSKAPLIKE NAVORSING
MENINGSPEILSENTRUM

HUMAN SCIENCES RESEARCH COUNCIL
OPINION SURVEY CENTRE

INLIGTING AAN VERPLEEGKUNDIGE
(Moet deur medewerker ingevul word)

INFORMATION TO NURSING SISTER
(Must be completed by co-worker)

1 Naam van medewerker ....
Name of co-worker

2 Nommer van medewerker ....
Number of co-worker

3 Respondentnommer (volgens adreslys)
Respondent's number (as per address list)

4 Naam en adres van respondent
Name and address of respondent

Mnr/mev/mej ....

Mr/Mrs/Miss ....

....

5 Telefoon ....

Telephone

6 Ouderdom van respondent

Age of respondent

7 Geslag — Manlik — Vroulik

Sex — Male — Female

8 Voorgestelde tyd van onderhoud/Suggested time for the interview

....

.... 1982-09-
Handtekening van medewerker/Signature of the co-worker

APPENDIX G

OMSLAGVRAELYS/COVER QUESTIONNAIRE

Respondentnommer

RAAD VIR GEESTESWETENSKAPLIKE NAVORSING
MENINGSPEILSENTRUM

HUMAN SCIENCES RESEARCH COUNTIL
OPINION SURVEY CENTRE

MPS/OV/20

Naam van medewerker ....
Name of co-worker

Medewerkernommer ....
Co-worker's number

VIR KANTOOR GEBRUIK ALLEEN/FOR OFFICE USE ONLY

Vraelysnommer/Number of questionnaire

Opnamenommer/Number of survey O V

Streekkantoor/Regional Office

Kategorie/Category

BESONDERHEDE VAN BESOEKE/PARTICULARS OF VISITS

	Maand Month	Datum Date	Tyd Time	Respons(*) Response
Eerste besoek/First visit	......	......	......	....
Tweede besoek/Second visit	......	......	......	....
Derde besoek/Third visit	......	......	......	....
Vierde besoek/Fourth visit	......	......	......	....
Vyfde besoek/Fifth visit	......	......	......	....

(*)Tyd/Time			(**)Respons/Response		
Voormiddag tot 12h00	=	1	Onderhoud voltooi/Completed interview	=	1
Morning till 12h00	=	2	Afspraak gemaak/Appointment made	=	2
12h00-15h00	=	3	Uitgesoekte respondent nie tuis nie/ Selected respondent not at home	=	3
17h00-19h00	=	4	Niemand tuis nie/No one home	=	4
19h00-21h00	=	5	Vakante huis/woonstel/perseel Vacant house/flat/stand	=	5
21h00-22h00	=	6	Weier siftingsinligting/Refused screening information	=	6
			Onderhoud geweier deur uitgesoekte respondent/Refused interview by selected respondent	=	7
			Onderhoud geweier deur ouer van respondent/Refused interview by parent of respondent	=	8
			Nie 'n huis of woonstel nie/Not a house or flat	=	9
			Ander/Other (spesifiseer/specify)	=	0

MOET DEUR MEDEWERKER INGEVUL WORD/MUST BE COMPLETED BY CO-WORKER

1 Getal persone tussen 16 to 64 jaar oud in die huishouding/Number of persons between 16 and 64 years of age in the household.

2 Volgens ouderdom, wat is die rangordenommer* van die respondent/ According to age what is the rank order* number of the respondent.

		Ja/ Yes	Nee/ No
3	Was die samewerking van die respondent bevredigend?/Was the co-operation of the respondent satisfactory?	1	2
4	Kon u by die volgorde van die vrae in die vraelys hou?/Could you maintain the sequence of the questions?	1	2
5	Het die respondent die vrae verstaan?/Did the respondent understand the questions?	1	2
	Indien "Nee" meld watter vrae die respondent nie verstaan het nie/If answered "No" please indicate which questions the respondent did not understand		
6	Moes u meer verduidelikings gee as wat in die vraelys was?/Was it necessary to give more explanations than contained in the questionnaire?	1	2
	Indien "Ja" meld by welke vrae u meer verduidelikings moes gee./If answered "Yes" indicate at which questions it was necessary to give more explanation.	1	2
7	Was dit nodig dat u moes afwyk van die presiese bewoording van die vrae?/Was it necessary to deviate from the exact phrasing of the questions?	1	2
	Indien "Ja" meld by welke vrae u moes afwyk van die presiese bewoording./If answered "Yes" indicate at which questions it was necessary to deviate from the exact phrasing.		

8 Ouderdom van respondent/Age of respondent ....

Vroulik/Female	1
Manlik/Male	2

Enige kommentaar/Any comments: ....

....

(*Kyk punt 4 op bladsy 139) Projeknommer/ M P S / O V

A HOE OM TE BESLUIT MET WATTER PERSOON BY 'N BEPAALDE ADRES 'N ONDERHOUD GEVOER MOET WORD/HOW TO SELECT WHICH PERSON AT A PARTICULAR ADDRESS SHOULD BE INTERVIEWED

Maak in die tabel hieronder 'n ontleding van al die manlike en vroulike lede van die gekose huishouding in die ouderdomsgroep 15 tot 64 jaar (albei ouderdomme ingesluit) wat vir die duur van die ondersoek beskikbaar sal wees./Use the table below to make an analysis of the male and female members of the particular household in the age group 15 to 64 years (inclusive), who will be available for the duration of the investigation.

OUDERDOM/AGE	MANS/MALES	VROUE/FEMALES
15-24	....	....
25-34	....	....
35-44	....	....
45-54	....	....
55-64	....	....

Raadpleeg die tabel waarop aangetoon word met hoeveel persone volgens geslag en ouderdom u 'n onderhoud moet voer en skryf dan in die tabel hieronder neer hoeveel van die persone in die huishouding soos hierbo uiteengesit beskikbaar is vir die onderhoud./Consult the table which indicates the number of persons with whom interviews should be conducted according to sex and age and then write in the table below the number of persons in the household (consult table above) who will be available for interviews.

OUDERDOM/AGE	MANS/MALES		VROUE/FEMALES	
	A	B	A	B
15-24	....		....	
25-34	....		....	
35-44	....		....	
45-54	....		....	
55-64	....		....	

NOTA 1A/NOTE 1 A - Skryf telkens in kolom A die getal wat beskikbaar is neer;/In column A write the number of persons available.

B - Rangskik telkens in kolom B die name van persone aangedui in kolom A in rangorde van oudste tot jongste/In column B arrange the names of the persons indicated in column B according to age. Number 1, 2, 3, etc. from oldest to youngest.

2 Gebruik die tabel op bladsy 4 om te bepaal met watter persoon die onderhoud gevoer moet word./Use the table on page 4 to determine with whom the interview should be conducted.

B HOE OM TE BESLUIT MET WATTER PERSOON BY 'N BEPAALDE ADRES 'N ONDERHOUD GEVOER MOET WORD/HOW TO DECIDE WHICH PERSON AT A SPECIFIC ADDRESS MUST BE INTERVIEWED

Om 'n respondent by die adresse wat aan u gegee is te selekteer, moet u die tabel ("grid") gebruik./To select the respondent at the addresses given to you, use the table ("grid") (p 141).

1 Die nommers aan die linkerkant van die tabel (genommer 1 tot 25) stem ooreen met die volgorde (op die adreslys aan die linkerkant genommer) van die adresse waar u onderhoude moet gaan voer./The numbers on the left side of the table (numbered 1 to 25) agree with the order (numbered on the left side on the address list) of the addresses where you must conduct interviews.

Indien u by adres nommer 5 is, trek 'n kringetjie om die syfer en trek dan 'n lyn dwars oor die tabel na regs./If you are at address number 5, encircle number 5 and draw a line from that number across the table from left to right.

2 Die nommers bo aan die tabel verwys na die getal persone in daardie huishouding wat 15 tot 64 jaar oud is./The numbers at the top of the table refer to the number of people 15 to 64 years of age in that household.

Bepaal hoeveel persone daar is. Trek 'n kringetjie om daardie getal en 'n lyn na onder vanaf daardie getal./Enquire how many persons there are. Encircle the number concerned and draw a line from that number downwards.

3 Trek 'n kringetjie om die nommer in die blokkie waar hierdie lyn die ander lyn wat u van links na regs getrek het, kruis. Dit is die rangordenommer van die persoon met wie u die onderhoud moet voer./Where this line crosses the line that you have drawn from left to right, encircle the number in the block (cell). This is the rank order number of the person that must be interviewed.

4 Die rangordenommer van 'n persoon in 'n huishouding word verkry deur al die persone wat 15 tot 64 jaar oud is van die oudste tot die jongste te rangskik. Die rangordenommer is die "soveelste" persoon./The rank order number of a person in the household is established by arranging all the persons 15 to 64 years of age from the oldest to the youngest. The rank order number is the "nth" person.

VOORBEELD:/EXAMPLE:

By adres nommer 6 is daar 5 persone* tussen 18 en 64 jaar. (Persone 17 jaar en jonger word uitgesluit.) Die rangordenommer is nommer 3. Dit wil sê die respondent is die derde oudste persoon naamlik die man van 33 jaar./At address number 6 are 5 persons* between 18 and 64 years of age. (Persons 17 years and younger are excluded.) The rank order number is Number 3. That is, the respondent to be interviewed is the third oldest person, namely the man who is 33 years of age.

*Die volgende persone (Pa 55, Ma 53, seun 33, dogter 26 en skoondogter 31) word soos volg gerangskik:/The following persons (Father 55, Mother 53, son 33, daughter 26 and daughter-in-law 31) are arranged as follows:

Pa/Father	55	1
Ma/Mother	53	2
Seun/Son	33	3
Skoondogter/Daughter-in-law	31	4
Dogter/Daughter	26	5

TABEL OM 'N RESPONDENT AAN TE TOON/
TABLE TO FIND THE PERSON TO BE INTERVIEWED

Ouderdomme van moontlike respondent/Ages of possible respondents

____
____
____
____
____
____
____
____
____
____
____

Adresnr./ Number of address	Getal persone in die huishouding/ Number of people in household							
	1	2	3	4	5	6	7	8
1	1	1	1	3	2	4	1	3
2	1	2	3	4	3	1	2	2
3	1	1	2	1	4	2	7	6
4	1	2	3	2	1	3	5	8
5	1	1	1	4	5	6	3	5
6	1	2	2	2	3	5	6	7
7	1	2	1	1	4	1	4	1
8	1	1	2	3	2	5	1	4
9	1	1	3	2	5	6	2	2
10	1	2	2	4	1	3	3	6
11	1	1	1	3	1	4	5	3
12	1	2	3	1	3	2	7	5
13	1	1	2	1	5	3	6	4
14	1	2	3	2	4	1	4	7
15	1	2	1	4	2	4	3	8
16	1	1	3	3	1	6	5	1
17	1	1	2	3	4	2	6	4
18	1	2	1	4	3	5	4	1
19	1	2	1	4	3	5	4	1
20	1	1	3	2	5	4	1	3
21	1	1	1	2	5	1	7	2
22	1	2	1	3	1	3	2	6
23	1	2	3	4	2	2	6	7
24	1	1	2	1	4	6	3	5
25	1	1	2	3	3	2	4	6

Skryf die naam en adres en indien moontlik die telefoonnommer van die respondent hier neer:/Please write the name and address and if possible the telephone number of the respondent here:

....

....

....

Telefoonnommer/Telephone number

....

APPENDIX H

Example of a letter to a participant whose results were normal

Geagte/Dear Mrs E Fransman

U samewerking in die studie van September/Oktober 1982 oor risikofaktore vir koronêre bloedvatsiekte, word hoog op prys gestel.

Your co-operation in the study during September/October 1982 on risk factors associated with the coronary artery disease, is greatly appreciated.

Die ontleding van die resultate het die volgende gewys:

Gewig .... 60,50 kg. Lengte .... 160,5 cm.
U is nie oorgewig nie.

U bloeddruk in September/Oktober 1982 was ..128/90.
Dit is 'n normale bloeddruk.

U bloedtoets resultate is as volg:
Totale cholesterol .... 225,0 mg% N
Trigliseriedes (nie vastend nie) ... 176,9 mg% N
Uriensuur .... 4,1 mg% N

Die "H" waarde(s) is hoog. Die "N" is normaal.

The analyses of the results showed the following:

Weight .... 60,50 kg. Height .... 160,5 cm.
You are not overweight

Your blood pressure in September/October 1982 was .. 128/90
This is a normal blood pressure.

Your bloodtests showed the following:
Total cholesterol .... 225,0 mg% N
Triglycerides (non-fasting) .... 176,9 mg% N
Uric acid.......................... 4,1 mg% N

The "H" value(s) is above normal. The "N" is normal.

Aangeheg is riglyne vir 'n leefwyse wat gesondheid vir die hart sal bevorder.
Attached you will find guidelines for a healthy life style for the heart.

Die uwe
Krisela Steyn (Dr.)
SEKSIE GEMEENSKAPSGESONDHEID
AFDELING VOEDING

vir DIREKTEUR
Ks/coh

Yours sincerely
Krisela Steyn (Dr.)
SECTION COMMUNITY HEALTH
DIVISION OF NUTRITION

for DIRECTOR

APPENDIX I

Example of a letter to a participant who had results that carried risk

Geagte/Dear Mrs S Agulhas

U samewerking in die studie van September/Oktober 1982 oor risikofaktore vir koronêre bloedvatsiekte, word hoog op prys gestel.

Your co-operation in the study during September/October 1982 on risk factors associated with the coronary artery disease, is greatly appreciated.

Die ontleding van die resultate het die volgende gewys:

Gewig .... 88,50 kg. Lengte .... 157,2 cm.
U is 58% oorgewig.

U bloeddruk in September/Oktober 1982 was ..116/76.
Dit is 'n normale bloeddruk.

U bloedtoets resultate is as volg:
Totale cholesterol .... 207,3 mg% N
Trigliseriedes (nie vastend nie) ... 230,9 mg% H
Uriensuur .... 4,5 mg% N

Die "H" waarde(s) is hoog. Die "N" is normaal.

The analyses of the results showed the following:

Weight .... 88,50 kg. Height .... 157,2 cm.
You are 58% overweight

Your blood pressure in September/October 1982 was .. 116/76
This is a normal blood pressure.

Your bloodtests showed the following:
Total cholesterol .... 207,3 mg% N
Triglycerides (non-fasting) .... 230,9 mg% H
Uric acid......................... 4,5 mg% N

The "H" value(s) is above normal. The "N" is normal.

Ons stel voor dat u hierdie verslag na u dokter of dag-hospitaal neem ten einde die verhoogde waardes verder te ondersoek.
We suggest that you take this report to your doctor or day hospital to investigate the raised findings.

Aangeheg is riglyne vir 'n leefwyse wat gesondheid vir die hart sal bevorder.
Attached you will find guidelines for a healthy life style for the heart.

Die uwe
Krisela Steyn (Dr.)
SEKSIE GEMEENSKAPSGESONDHEID
AFDELING VOEDING

vir DIREKTEUR

Yours sincerely
Krisela Steyn (Dr.)
SECTION COMMUNITY HEALTH
DIVISION OF NUTRITION

for DIRECTOR

Ks/coh

APPENDIX J

HOE OM U HART GESOND TE HOU

HOW TO KEEP YOUR HEART HEALTHY

Die belangrikste risikofaktore in die ontwikkeling van koronêre hartvatsiekte is: hoë bloeddruk (hipertensie), verhoogde bloedcholesterol (bloedvette) en sigaretrook. Ander faktore van belang is spanning, liggaamlike onfiksheid, oorgewig en die eet van te veel vet, veral versadigde vette.

The major risk factors in the development of coronary heart disease are: high blood pressure, high blood cholesterol and cigarette smoking. Other important factors are tension, physical inactivity, obesity and a diet rich in fat, particularly saturated fats.

Indien u enige van hierdie risikofaktore het, of 'n familiegeskiedenis van hartsiekte op 'n vroeë ouderdom het, raai ons u aan om die volgende gesonde lewenswyse te volg:

If you have any of these risk factors, or a family history of heart disease at a young age, we recommend the following healthy life-style:

Om u hart dus gesond te hou moet u/Therefore, to keep your heart healthy:

1 u gewig normaal hou of verminder tot normale vlakke/do not become overweight;

2 gereëlde maaltye nuttig, naamlik drie of meer etes per dag, dit wil sê kleiner hoeveelhede meer kere per dag/eat regular meals - three or more meals per day, i.e. small quantities of food at short intervals;

3 gebalanseerde eetgewoontes handhaaf met volop groente en vars vrugte. Growwe grane soos volkoringbrood, ongesifte mieliemeel, semels, hawermoutpap of onverfynde ontbytgrane maak 'n belangrike deel van hierdie dieet uit/a balanced food intake is important with plenty of vegetables and fresh fruit. Whole grain products e.g. whole wheat bread, bran, unsifted mealie meal, oats and whole grain breakfast cereals should be eaten;

4 min vet (b.v. botter en dierevet) eet. Probeer klein hoeveelhede poli-onversadigde vette en olies daagliks in te neem, dit kan gedoen word deur:/eat less fat and try to include small amounts of polyunsaturated fats and oils daily. This can be done by:

a alle sigbare vet van vleis te verwyder/cutting off all visible fat from meat;

b die inname van "versteekte" vet soos in gebraaide kosse, pasteie, e.a. gebak en verwerkte produkte soos wors, polonie, spek, ens. te beperk/limiting the intake of invisible fat e.g. fried foods, pies, pastries and processed meats such as sausage, polony and bacon, etc.;

c sonneblomolie vir bak en braaidoeleindes en slaaisouse en poli-onversadigde margarien (bakkie margarien) as broodsmeer matig gebruik (margarien bevat geen cholesterol nie)/use sunflower oil in baking and salad dressings and polyunsaturated margarine (tub margarine) as a spread on bread. Use it in moderation (margarine contains no cholesterol);

d maer vleis eet/eat lean meat;

e pluimvee en vis meer dikwels gebruik/use poultry and fish more often;

f afgeroomde melk en afgeroomde melkprodukte in plaas van volroommelk gebruik/use skimmed milk and skimmed milk products instead of whole milk.

5 nie te veel voedsel wat hoog in cholesterol is, inneem nie, nl. harsings, lewer, niertjies, eiergeel en murg. Twee tot drie eiers per week wat ook die eiergebruik in geregte insluit, word aanbeveel/do not eat too much food that is rich in cholesterol e.g. brains, liver, kidneys, egg yolk and marrow bone. Two to three eggs per week, including those used in the preparation of food, are recommended;

6 nie te veel suiker of soetgoed soos lekkers, konfyt, heuning, beskuitjies, koek, ens. eet nie/do not eat too much sugar or foods that contain a lot of sugar, e.g. sweets, jam, honey, biscuits, cakes, etc.;

7 'n matige alkoholinname verhoog nie die bloed cholesterol nie, maar 'n groter inname van alkohol verhoog die trigliseriedvlak van bloed wat ook 'n bloedvet is/a moderate intake of alcohol raises the blood triglycerides (another blood fat), but not the blood cholesterol;

8 minder sout en soutkosse soos verwerkte produkte, southappies, aartappelskyfies, biltong, pakkies sop, ens. eet/do not eat too much salt or foods which have a lot of salt in them, e.g. processed foods, savoury biscuits, potato chips, biltong, soup powders, etc.;

9 gereelde oefening doen (drie of vier keer per week vir ten minste 20 minute) - flink stap, touspring, draf, fietsry en swem kan gedoen word. Onthou ongereelde ooreising is gevaarlik. Alvorens u met 'n oefenprogram begin is dit raadsaam om eers u dokter te raadpleeg/take regular exercise (three or four times a week for at least 20 minutes). Brisk walking, skipping, jogging, cycling and swimming can be done. Remember irregular overexertion can be dangerous. Before starting on an exercise programme, consult your doctor;

10 ophou met rook of glad nie daarmee begin nie/do not smoke.

CHAPTER III

THE STUDY POPULATION

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CHAPTER III

THE STUDY POPULATION

1 RESULTS OF THE SELECTION PROCEDURE

The 39 HSRC fieldworkers paid 1 837 visits to 1 361 out of the 1 950 addresses generated by the described random procedure. Some addresses were visited up to five times[1]. The panel completed 1 047 risk factor questionnaires. Only 58 (4,3%) outright refusals were experienced. At all the 302 other addresses which did not yield completed risk factor questionnaires, persons did not qualify, because of the exclusion criteria or by nobody being home even at the fifth visit. No addresses yielded vacant plots, empty homes or other types of buildings.

The second team of fieldworkers was faced with an additional 47 refusals and four persons who could not be traced. Most people who refused reported fear of having a bloodsample taken as the reason for refusal. Another 17 people conformed to the exclusion criteria and three sets of data were found to be incomplete. This yielded a study sample of 976 persons with completed sets of data (Table 1) out of a possible 485 120 coloured persons between 15 and 64. The overall outright refusal rate was 105 persons (7,7%) at the 1 361 addresses visited. More older people refused to participate than younger people.

2 RESPONSE TO THE RISK FACTOR QUESTIONNAIRE

From the cover questionnaire (Appendix G) it was clear that 99% of the participants co-operated well. With 99% of participants the fieldworkers could keep to the sequence of questions in the questionnaire. Ninety-six percent of the participants understood the questions, but 5% needed additional explanation of some questions and with 4% of the participants the phrasing of the questions had to be altered before the participants understood the questions.

3 THE STUDY POPULATION

In the next sections the demographic and social details of the study population will be described and where possible compared to the coloured population of the Cape Peninsula as a whole.

Table 1 sets out the age and sex composition of the study population. As the quota system was followed to fill each age and sex category it was expected that the study sample would differ statistically significantly from the actual population of the Cape Peninsula.

This was confirmed by comparing the study population with the population figures of the 5% subsample of the 1980 census coloured population figures of the Cape Peninsula, using loglinear model analysis techniques[2]. There were proportionally fewer people in the age groups 15 to 24 years and 25 to 34

Table 1: Population sample distribution

AGE (in years)	MALE	FEMALE
15 - 24	94	103
25 - 34	96	94
35 - 44	103	112
45 - 54	95	95
55 - 64	90	95
TOTAL	478	498

years and more persons in the age groups 45 to 54 and 55 to 64 years in the study population as compared to the population census of 1980.

The study population is a clearly bilingual group as shown in Table 2.

Table 2: Language use of study populations

	% Males	% Females
Afrikaans	56,9	56,4
English	20,5	23,3
Both	22,6	20,3

4 THE OCCUPATIONS OF THE STUDY POPULATION

Table 3 shows the classification of the study population according to the occupational grouping used by the South African census. Among the men 24,3% and among the women 15,3% were unemployed. From the census data[3] it is reported that 13,73% of men in the Cape Peninsula were unemployed. The census figure does not include persons out of work for less than two weeks and can therefore not be compared to the figure found in the study sample. Unemployment was highest in the age category 55 to 64 years, and 48,4% of all unemployed people were older than 24 years.

Forty-six percent of women were housewives, of these 29,4% were between the ages of 55 to 64 years and only 18,6% were in the age group 25 to 34 years - the commonest childbearing age. For the women the most common occupations were semi-skilled operators and supervisors (13%), and labourers (8,8%). The most common occupation for men was that of skilled artisan (17,2%). Of the artisans 67% were below the age of 45 years. Semi-skilled operators and supervisors made up 15,5% of the male study population.

The occupations of those participants who were employed were classified using the coding of Schlemmer and Stopforth[4]. The CASS occupational categories and prestige scales used by Schlemmer *et al.*[4] are set out in Table 4.

These categories were used, to classify 301 employed male participants' and 172 employed female participants' occupations. Tables 5 and 6 show the percentage of employed participants in each CASS occupational category.

Table 3: Occupational classification of the study population

	% Males (478)	% Females (498)
Education	3,1	3,6
Medical and related occupations	0,4	2,0
Technical occupations	0,8	0,2
Other professional occupations	0,8	0,0
Managerial and clerical workers	10,9	5,0
Sales personnel	2,7	3,4
Transport and communications personnel	7,9	0,4
Service and recreational workers	5,0	1,6
Skilled artisans	17,2	0,2
Semi-skilled operators	9,0	13,0
Semi-skilled supervisors	6,5	5,4
Labourers	11,3	8,8
Housewives	0,0	46,4
Unemployed	24,3	15,3

Table 4 Rank order of CASS occupational categories and CASS prestige scale[4]

CASS occupational category	Rank order	Prestige scale
Professional and managerial	1	82-73
Middle white-collar	2	72-64
Manual foreman, skilled artisans and status equivalents	3	58-52
Routine non-manual and semi-skilled manual	4	52-48
Unskilled manual and menial	5	26-20

Table 5 The CASS occupational categories (%) of the employed male participants

	Age groups in years				
CASS Occupational Rank order	15-24 N = 42	25-34 N = 71	35-44 N = 76	45-54 N = 65	55-64 N = 47
1	2,4	9,9	10,5	10,8	6,4
2	19,0	16,9	18,4	10,8	14,9
3	26,2	33,8	30,3	35,4	29,8
4	35,7	31,0	31,6	27,7	31,9
5	16,7	8,5	9,2	15,4	17,0

Of the employed men in the youngest and oldest age group fewer filled professional and managerial positions than did employed men in the other age categories and more men in these two age categories, worked as unskilled labourers than men between the ages of 25 and 54 years. More men than women were employed.

Table 6 The CASS occupational categories (%) of the employed female participants

CASS Occupational Rank order	Age groups in years 15-24 N = 38	25-34 N = 39	35-44 N = 47	45-54 N = 33	55-64 N = 15
1	15,8	20,5	12,8	21,2	13,3
2	23,7	28,5	12,8	6,1	6,7
3	7,9	5,1	12,8	15,2	13,7
4	36,8	33,3	46,8	33,3	6,7
5	15,8	12,8	14,9	24,2	60,0

Many more working women below the age of 35 years were employed in occupations of higher social standing than were women above this age. This tendency was not found in the group of employed males.

5 EDUCATIONAL LEVEL OF THE STUDY POPULATION

Tables 7 and 8 show the educational level of the study population.

The educational level by age gives the same tendency as was reflected by the occupations of the study population. More younger women than older women had high school or post matric training. A similar trend was seen for the men, but not as marked. In the youngest age group of 15-24 years no person reported having no formal education. In comparing the educational level of

Table 7: Level of education of the study population

	% Males (478)	% Females (498)
No education	2,7	4,6
Up to Standard II	5,9	7,4
Std III to Std V	21,8	31,7
Standard VI	21,8	19,5
Standard VII	14,4	13,9
Std VIII to Std IX	19,9	15,1
Matric	8,2	5,0
Matric plus 1 to 2 years	1,7	1,6
Matric plus 3 years	2,1	0,8
Matric plus 3 or more years	1,7	0,2

the study sample with the 1980 census data[3] of the economically active coloured population (Table 9), it is found that the study sample shows a higher level of education than the census data. This is particularly so for the men.

6 HOUSING OF THE STUDY POPULATION

For the purpose of calculating the occupancy rate of the study population the number of habitable rooms per household was asked for. For the study population as a whole a mean number of 3,5 habitable rooms per household was reported. This figure holds for both men and women, of all age groups. The

Table 8: Educational level by age and sex of the study population

		No education %	Primary School only %	High School or equivalent %	Post Matric %
Men	15 - 24 years	0	24,4	68,1	7,5
	25 - 34 "	1	33,3	60,5	5,2
	35 - 44 "	2	28,1	62,1	7,8
	45 - 54 "	5	27,4	64,2	2,1
	55 - 64 "	5,6	24,5	66,7	3,3
Women	15 - 24 years	0	21,4	74,8	3,9
	25 - 34 "	1,1	43,6	53,2	2,1
	35 - 44 "	1,8	35,7	59,8	2,7
	45 - 54 "	12,8	40,4	43,6	3,2
	55 - 64 "	8,4	56,8	33,7	1,1

mean number of people per household for the whole group was 5,8 persons. There was a mean of 6,8 persons per household in the age group 15 to 64 years and a mean of 5,2 persons per household in the oldest age group of 55 to 64 years. From these figures were calculated the occupancy rate per habitable room of the study population. The occupancy rate for the study population as a whole was 1,78 persons per habitable room. Table 10 shows the occupancy rate per room by age and sex categories of the study population.

Table 9: Comparison of education levels of the study sample and 1980 census data of the coloured population of the Cape Peninsula

	% Men		% Women	
	≤ Std 7	≥ Std 8	≤ Std 7	≥ Std 8
Study sample	66,5	33,5	77,0	23,0
Census data[3]	75,0	25,0	82,0	18,0

For women the occupancy rate clearly declines with age while for men a similar trend is seen, but not as marked. These findings compare very well with that of the 1980 census data on housing[5] for coloureds in the Cape Peninsula.

The mean number of persons per coloured household from the 1980 census[5] for the economic area 01 plus Kuilsriver (the Cape Peninsula) is 5,7. The mean number of habitable rooms per household for the Cape Peninsula is not available, but the commonest house-type for the coloured population in this

area has three habitable rooms. Using this figure to calculate an overall occupancy rate per habitable room a figure of 1,9 is arrived at. This compares favourably with the figure of 1,78 for the whole study population.

Table 10 Occupancy rate per room of the study population

Age in years	15 - 24	25 - 34	35 - 44	45 - 54	55 - 64
Men	1,87	1,76	1,75	1,78	1,59
Women	2,08	1,88	1,74	1,69	1,56

These parameters of socio-economic standing of the study population is used in the following chapters to look for an association between the major risk factors for CHD and the social class of the participants.

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CHAPTER IV

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CHAPTER IV

HYPERTENSION IN THE COLOURED POPULATION OF THE CAPE PENINSULA

1 INTRODUCTION

The clear dose dependant relationship between hypertension and risk of CHD has repeatedly been illustrated in many studies and fulfills the criteria of causality[1-5]. In addition, the presence of hypertension negatively affects short- and longterm survival after a myocardial infarction[6,7] and the risk of non-fatal reinfarction[8]. Also, systolic blood pressure in men is found to be a predictor for the all-cause death rate[2]. Of all the associations with hypertension, the risk of stroke following hypertension is most clearly illustrated[9-12]. Associations between hypertension, cardiac and renal failure and sudden death have been clearly demonstrated[13].

The need for diagnosis of hypertension at an early age becomes clear as the propensity of hypertension to tract throughout life has been shown in prospective population studies[14-16].

Both the diastolic and systolic components of blood pressure have been implicated in cardiovascular sequelae and even isolated systolic hypertension and mild hypertension have been found not to be innocuous[17-20].

Generally the benefit of treating hypertension has been proved beyond doubt for all age groups, both sexes and all ethnic groups in prospective

studies accross the world[2,18-25] and is reflected in the decline in USA hypertension associated mortality Rates. Feinleib[26] pointed out that a mild drop in the mean diastolic pressure of 6 mm Hg of the American population can lead to an expected decline of 4,3% in CHD mortality rate. Recently a note of caution has been issued in the use of some hypertensive agents for mild hypertension. The treatment of hypertension with commonly used drugs has, in some prospective studies, not led to the expected reduction in coronary heart disease mortality[27-29]. A possible explanation could be found in the effects of these drugs on plasma lipids[30-31]. The side-effects of these drugs such as effects on, patient's well-being[32] and other potentially harmful factors[25,29,33] are also often reported. At present studies in lifestyle modifications, including a variety of dietary modifications, are pointing to useful non-drug control mechanisms for mild hypertension[33].

The need for hypertension control on a national and international level is clear. The answer to the question of the feasibility of such control and the planning for such control can be found in projects like the hypertension detection and follow-up program[20,21] in the USA, the Australian National Blood Pressure study[19], the MRC trial in Britain[22], and many others throughout the world which have succeeded in reducing the prevalence of hypertension and, in most cases, its sequelae in populations.

Of crucial importance in the diagnosis of hypertension in population screening procedures is the technique of blood pressure measurement[25,34], the standardisation of screening personnel, the use of appropriate equipment[34-38] and a sufficient number of readings, preferably on different occasions to allow for variability of blood pressure readings[39-42]

before diagnosing a person as hypertensive and evaluating treatment regimes for hypertension management.

2 PREVALENCE OF HYPERTENSION

A Hypertension in Southern African populations

From their prevalence studies of hypertension (WHO criteria for hypertension $\geq$160/95 mm Hg) Seedat[43] deduced that at least four million people in South Africa suffer from hypertension and that many of these were undiagnosed and untreated. There is an indication that at least for the black population urbanisation accompanied by a change in sodium intake, obesity and psychosocial factors account for the higher prevalence of hypertension in urban Xhosas[44] and Zulus[45] than in their rural counterparts. This urban-rural hypertension prevalence discrepancy does not seem to apply to the white population of South Africa, as the rural whites of the South Western Cape have a 24,3% prevalence of hypertension[46] and the Durban whites[47] a 22,8% prevalence of hypertension.

The rural Zulus have a 4,1% prevalence of hypertension and Durban Zulus have a 25% prevalence rate of hypertension[45]. The mean blood pressure of the rural Xhosa[44] is significantly lower than the urban Xhosas. This prevalence rate has been shown by Myers _et al_[48] to be not statistically significantly different from a group of urban black stevedores in Cape Town. Seftel[49] found that the mean systolic and diastolic blood pressures in a large group of urban blacks in Johannesburg are similar to the findings of Seedat in urban Zulus[45]. In the Johannesburg blacks the association between hypertension

and some social variables was unimpressive[49,50]. There was some evidence that blood pressure was inversely related to educational status, and young adults who lived apart from their families and who grew up in rural areas before moving to Johannesburg had higher blood pressures than those young adults who grew up in Johannesburg and who lived with their families[51].

The prevalence of hypertension in the Indian community of Durban[52] was 19%, with 22% of females and 15% of males suffering from hypertension. Of importance was the finding that 58% of hypertensive Indians were untreated or had discontinued therapy. In a small sample of Transvaal Indians[53] 12% were hypertensive, but only 37% of these were undiagnosed or had discontinued therapy.

Hypertension was reported to be very uncommon in the nomadic Bushmen in the Kalahari desert[54,55] but later reports indicate that the situation was different[56] in 1981. In an isolated Venda community of more than 600 individuals not a single case of hypertension was found[57].

Information on the prevalence of hypertension in the coloured population of South Africa is very scant. In the Cape morbidity survey[58] general pracitioners who participated, reported in 1969 that 1,2% of their consultations involved coloured patients who suffered from hypertension. These were mostly older patients. In a group of coloured male stevedores in Cape Town[48] a prevalence of 34,9% with hypertension was found when the study results were age standardised against the South African coloured population of 1980.

B Hypertension in other populations

In comparing the prevalence of hypertension in South African populations with the prevalence in other populations similarities are seen particularly in the urbanised, westernised populations. For example, the 25% prevalence of hypertension in urban Zulus[45,50] is similar to that in American Negroes, who had a 27% prevalence of hypertension in 1962[59]. Urban black males in Johannesburg[49] had a slightly lower diastolic blood pressure than Georgia Negroes[60], while the two groups of women had similar diastolic blood pressures. Johannesburg blacks had higher blood pressures than London whites[49]. More South African urban Indians had hypertension than urban Indians in a variety of urban settings in India[52]. In India the urban-rural blood pressure difference was also noticed[61]. Seedat[47] showed that the mean diastolic and systolic blood pressures of urban whites in Durban were very similar to those in Georgian whites and white Londoners.

In most communities hypertension showed a positive association with increasing age[1]. Although this pattern holds for most populations studied in the world there are some populations that do not show the increase of blood pressure with age. These are all populations who have not been westernised and live according to their primitive lifestyles for example, the Samburu warriors in Kenya[62], Bushmen of the Kalahari[54], Australian Aborigines, Pacific Islanders and New Guinea Highlanders[63].

The seven country study[1] showed that the prevalence of hypertension varied greatly in different countries in men between 40 and 59 years. For example in Japan the prevalence of hypertension for men was 9,7% and in Eastern Finland it was more than 20%. In the USA it was found that the black population had a higher prevalence of hypertension than their white counterparts[64]. Between

the ages of 18 and 74 years 18,5% of white men and 15,7% of white women were hypertensive during 1971 to 1974. For the same age group and same period 27,8% of Negro males and 28,6% of Negro females were hypertensive. In Western Australia[65] 16,8% of men and women aged 30 to 69 years had a diastolic blood pressure $\geq$95 mm Hg or were on treatment for hypertension.

From the seven country study[1,2] Keys showed that in different populations the same level of hypertension is associated with a differing prevalence of CHD. This finding has not been fully explained. Similarly, it has been shown[66] that the Japanese in Hawaii with the same level of hypertension as the Japanese in Japan have markedly lower prevalence of stroke than their counterparts in Japan.

3 TREATMENT STATUS OF HYPERTENSIVES

A Treatment status at screening

Table 1 summarises the treatment status of hypertensive patients diagnosed in four population screening surveys in four countries on four continents during the last 20 years.

From these results one can deduce that hypertension is a common disease, that in all four of these studies 20% or fewer hypertensives were adequately controlled at screening, and that the other 80% and more were either undiagnosed, untreated or inadequately treated. It becomes clear why the World Health Organisation and many countries are advocating population screening and treatment programmes to prevent raised blood pressure in populations as a whole.

Table 1 Treatment status of hypertensive patients at screening

Studies	Age and sex categories	Prevalence %	% Hypertensives previously undetected or untreated	% Hypertensives with inadequate control	% Hypertensives controlled
Belgium multifactorial prevention trial in CVD 1977[67]	Men aged 44-59 years	8,0	39,0	41,0	20,0
USA Health and Nutrition[64] Examination 1971-74	Men and women Ages 18-74 years	18,1	54,9	29,1	16,0
Australia Busselton study[65] 1969	Men and women	16,8	81,6	(18,4	)
South Africa[46,68] Coris study 1979	Men and women	24,3	65,0	22,0	13,0

B Effects on hypertension prevalence of intervention programmes

In many communities across the world hypertension screening and treatment programmes have been initiated[69-71]. For example in the USA the National Institutes of Health embarked on the High Blood Pressure Education Programme in 1971 which gave impetus to broader community efforts for the control of hypertension[72]. A number of treatment modules have been tried all over the world[73]. In all cases remarkable decreases in prevalence of raised blood pressure have been achieved and many more hypertensives are on adequate treatment after being diagnosed during population screening. Typical examples of the improved profile of hypertension in populations can be seen in Table 2.

Table 2 Results of treating hypertensives after population screening

Studies	Age and sex categories	Prevalence %	% Hypertensives previously undetected or untreated	% Hypertensives with inadequate control	% Hypertensives controlled
Minnesota heart survey[69]	Aged 25- 39 years				
	Males	9,9	34,6	36,2	29,2
1973-74 Screening	Females	7,8	15,6	31,8	52,9
1980-81 after	Males	12,5	8,9	19,2	71,9
intervention	Females	9,8	3,8	15,0	81,2
Chicago hypertension programme	Males and females Aged 25-64 years				
1972 screening		13,2	48,7	30,7	20,6
1977 After intervention[70]		8,4	7,0	19,8	73,2
South Africa[46] Coris study	Men and women Aged 15-64 years				
Screening	1979 Males	25,5	75,8	18,8	5,4
	1979 Females	24,9	50,7	29,3	20,0
After intervention (Unpublished data)	1983 Males	22,5	47,5	19,6	32,9
	1983 Females	19,2	27,1	30,2	42,7

In the USA by 1974, three years after its inception, the High Blood Pressure Program led to an approximate decrease of 50% in the hypertensive patients being inadequately treated and almost a halving of the proportion of the hypertensive population who did not know that they suffered hypertension. This desirable trend has continued in the USA[71] to the present. In 1979 Krishan[72] estimated that there were well over 2 000 hypertension control programmes in operation in the USA. In all three examples in Table 2 a decrease in the prevalence of hypertension as defined by the WHO (a person with systolic and/or diastolic blood pressure $\geq$160/95 mm Hg as well as persons on anti-hypertensive therapy with blood pressure readings below

160/95 mm Hg) is seen after some years of intervention. This could probably be explained by the lifestyle modifications, including dietary adaptations, that are increasingly becoming part of the treatment regimes for mild hypertensives[73]. It has been estimated[74] that, if arterial pressure is lowered by 5 mm Hg using non-drug means, the benefit in the whole population would be the same as if all diastolic pressure in excess of 100 mm Hg were restored to ideal values by drug treatment.

4 FACTORS ASSOCIATED WITH HYPERTENSION

A variety of factors have been associated with hypertension. These factors do not seem to operate equally in all populations. In the last ten years particular interest has been given to dietary factors.

A Dietary factors associated with hypertension

In summarising the proceedings of a symposium held in 1982 on nutrition and blood pressure control Callaway[75] pointed out that the data linking dietary sodium, potassium and alcohol consumption to hypertension are abundant, although not sufficient. Data regarding calcium, magnesium and dietary fats should still be regarded as preliminary awaiting their association with hypertension to be proved or disproved. The data on the association between hypertension and dietary carbohydrates, fibre, and trace elements are insufficient to warrant further analysis. It has also been shown that dietary modification can potentiate drug therapy[76] and possibly therefore reduce the cost and risk[77] of hypertension treatment.

A brief summary of the relevant dietary factors associated with hypertension is given.

Sodium intake: The ingestion of sodium over usual ranges of dietary intake does not affect all hypertensives equally and cannot be considered a precursor in all essential hypertensives[78]. Clearly there is a group of sodium sensitive persons whose blood pressure will be raised by the usual ranges of dietary sodium intake and decreased by sodium restriction[76]. This difference in sodium sensitivity explains the apparent contradictions and ambiguities of existing data[75-79]. In the management of a hypertensive patient it seems prudent to advise the reduction of daily sodium intake to 100 mmol/day (1 to 1,5 teaspoons of salt) as arterial pressure can be lowered by 6% in sodium sensitive hypertensives[80].

Potassium intake: It has been proved that an increase in potassium intake from 60 to 120 mmole reduces arterial pressure by 4% without changes in sodium excretion[81]. The first study[82] relating potassium to blood pressure was done in Japan in 1959. More important than either the sodium or potassium intake on their own is the sodium: potassium ratio of the diet in relation to hypertension[83]. A racial difference in potassium excretion has been shown between blacks and whites. This could explain the higher prevalence of hypertension in the black community in the USA[84]. MacGregor[85] points out that human eating habits have changed over the centuries leading to an adverse and very high sodium intake and a concommitant low potassium intake which, when rectified, might greatly affect the prevalence of hypertension in the community.

Alcohol intake: The relationship between alcohol consumption and hypertension had been found in a variety of epidemiological studies across the world[86-89]. According to the series of Klatsky *et al.*[90] the threshold was

3 to 5 alcoholic drinks per day. Above this, the prevalence of hypertension increased as did the prevalence of CHD[91]. The moderate use of alcohol seems to be part of good hypertensive management as indicated by Arkwright *et al.*[87]. Alcohol intake above 3,5 drinks per day ranks close to obesity as a potentially preventable cause of hypertension in the community.

Calcium and magnesium intake: Initially the association between calcium intake and hypertension came out of observations that in areas of high water hardness there is low risk for CHD and that mean blood pressure levels are also low[92]. Calcium is the primary determinant of water hardness. More recently, a review of the incidence of gestational hypertension[93] found that the average calcium intake was inversely correlated with the frequency of pregnancy related hypertension in the countries surveyed. So the evidence for the calcium hypertension hypothesis was strengthened. In the United States, an increased prevalence of hypertension has been reported in white women with untreated osteoporosis[94], a disorder associated with inadequate calcium intake. In an analysis[95] comparing hypertensives and matched normotensives the only significant dietary differences in looking at 19 nutrients were found to be calcium intake and magnesium intake, both were markedly lower in the hypertensives than in the normotensives.

All four of the examples above suggest that inadequate dietary calcium intake can result in the development of hypertension.

The evidence for the possible association between low magnesium intake and hypertension is more scant than for calcium[95,96]. It is important that persons at risk for hypertension according to the above evidence i.e. pregnant

females and menopausal osteoporotic females maintain the minimal daily requirements of 800 mg Ca/day and 300 mg magnesium/day pending the results of adequate epidemiological studies to confirm this association or otherwise.

Dietary fat: In 1962 Groen[97] postulated an association between fat consumption patterns and hypertension after studying Trappist and Benedictine monks. Both groups consumed similar amounts of fat but Trappist monks consumed a greater percentage of their fat as vegetable fat and had a lower prevalence of hypertension than Benedictine monks (12% versus 51%) with hypertension. A number of studies has supported the finding of diets containing high levels of polyunsaturated fats having a hypertensive effect over time, whereas high saturated fat feeding elevates blood pressure in animal and human models[98-100].

Carbohydrates, fibre and trace elements: Each of these foodstuffs have been studied. In each case inconclusive results prevent acceptance of any significant association with hypertension[101-103].

Vegetarian diet: It has frequently been shown that vegetarians have lower blood pressure than carnivores[104-107]. It would seem that this lower blood pressure in vetegarians can be ascribed to a combination of factors previously mentioned. Rouse *et al.*[107] showed that vegetarians eat more dietary fibre, polyunsaturated fat, magnesium and potassium than carnivores. They eat significantly less total fat and in particular saturated fat, cholesterol and vitamin B12. Similar quantities of sodium, protein and calories are eaten by the two groups.

B Other factors associated with hypertension

The association between hypertension and some factors not amenable to intervention has already been mentioned in the discussion on the prevalence of hypertension in different population groups. These include the well-known association of hypertension with age and race and will not be repeated. In youth in the western world, blood pressure is higher in males, whereas in females blood pressure rises with age, so that after middle age blood pressure is higher in females[108]. There is some evidence of familial aggregation of essential hypertension[108,109], more so for mild than severe hypertension. Although it appears that there is a hereditary factor in hypertension, the mode of inheritance is uncertain.

The factors associated with hypertension amenable to intervention will briefly be pointed out:

Adiposity: An independent association between weight and blood pressure has been found in many studies[110-112]. In the Community Hypertension Evaluation Clinic screening of more than one million people in the USA in the age group 20 to 39 years, overweight was associated with at least double the prevalence of diastolic blood pressure of 95 mm Hg and higher[110]. For those screened from 40 to 64 years the prevalence of hypertension was 50% higher among overweight persons and double that found in underweight persons. This association is also in keeping with results showing that both obesity in young adulthood and weight gain from young adulthood to middle age is associated with increased risk of becoming hypertensive[113,114]. Many studies[112,115,116] have shown weight reduction in the obese hypertensive to be effective in reducing hypertension. Both hypertension and overweight are

common in westernised societies and weight reduction in obese hypertensives will affect the overall prevalence of hypertension in such societies[116].

Level of education: In many adult populations epidemiological studies have shown both systolic and diastolic blood pressures to be consistently negatively related to the level of education[110,117,118]. In the Lipid Research Clinics Prevalence Study[119] this association was not consistent for all the groups studied. Low social class, of which education would be one parameter, has been found to be associated with hypertension. Both mortality and morbidity rates from hypertension related disease are higher among semi-skilled and unskilled workers[120,121].

Exercise patterns: A report by Paffenbarger[122] indicated that men who had a composite index of energy output of 2 000 kcal/week or more were 23% less likely to develop hypertension than their sedentary counterparts. Earlier conflicting results were found in studies on the interaction of physical exercise and hypertension[123]. There is little doubt that blood pressure increases during exercise both in normo- and hypertensive persons[123]. The longterm beneficial effects of regular strenuous excercise on hypertension are illustrated more frequently in later publications. Bonnano and Lies[124] showed that physical training reduced blood pressure in normotensive and hypertensive persons, but more so in hypertensive than normotensive persons. Hypertension reduction by exercise is usually accompanied by a reduction in weight and percentage body fat[125]. This would be an additional reason to incorporate regular exercise with a hypertension management scheme.

Smoking: The Lipid Research Clinics Prevalence Study[119] found a consistent negative association between smoking and systolic and diastolic pressure in both men and women studied. Most studies indicate little or inconsistent

changes in blood pressure after smoking cessation[126-129]. These findings would support the findings of the independent contribution made by both smoking and hypertension to the risk for CHD. Some studies have shown an association between smoking and accelerated hypertension[130].

<u>Stress</u>: Some evidence is accumulating that essential hypertension is a stress-linked disease. In particular stress in the work situation and its link to hypertension has been reported on[131-133].

<u>Plasma constituents</u>: A possible link between some plasma constituents and hypertension has been noted. Some of these constituents are determined by the dietary intake of the participants for example in the North Karelia Intervention Study[134] a random cohort which was studied before and after an intervention programme had both reduced blood pressure and serum cholesterol without the use of anti-hypertensive therapy. These two findings were positively associated even when age, initial blood pressure and changes in body mass were allowed for. In the Cincinnati Lipid Research Clinic's Princeton School Prevalence Study[135] there was no difference in blood pressure when comparing a group of hyperlipidaemic and normal school children.

An association between hypertension and plasma uric acid levels has been reported[136] and in one prospective study symptomless hyperuricaemic subjects showed an increased incidence of raised blood pressure during follow-up[137].

5 A SUMMARY OF THE ASPECTS OF HYPERTENSION EVALUATED IN THIS STUDY

A Validity of the blood pressure measurements.

B Prevalence of hypertension in the study population.

C Comparison of hypertension prevalence with other South African populations and elsewhere.

D Hypertension-associated medical history of the study population.

E The treatment status of the coloured hypertensives.

F Factors, other than dietary, associated with hypertension in the study population.

G Dietary factors associated with hypertension in the study population.

6 VALIDITY OF BLOOD PRESSURE MEASUREMENTS

A Results of standardisation procedures

The procedures followed in this study to record valid blood pressures of participants are summarised in Chapter II:6.

The equipment standardisation and fieldworker training resulted in a systolic and diastolic reading difference of 4 mm Hg or less for each of the 12 fieldworkers standardised against the reference person just prior to the fieldwork. The standardisation procedure was repeated at weekly intervals for each fieldworker and again a maximum difference of 4 mm Hg was found for each fieldworker on both systolic and diastolic reading. Each fieldworker's equipment was also checked weekly. No equipment faults were identified during the fieldwork period.

B Variability of blood pressure measurements at two visits

A hundred random participants were visited a second time to again have their blood pressure measured by the same fieldworker. All 12 fieldworkers participated. Table 3 shows the results of the two blood pressure readings.

The correlation coefficients are of the same magnitude as those reported elsewhere[40,41,138]. These findings again highlight the necessity for repeated blood pressure readings, even by the same observer, before a person is labelled as hypertensive, to allow for biological variation and such factors as regression to the mean[42] in the measurements of blood pressure of an individual.

Table 3 Comparison of blood pressure readings at two visits

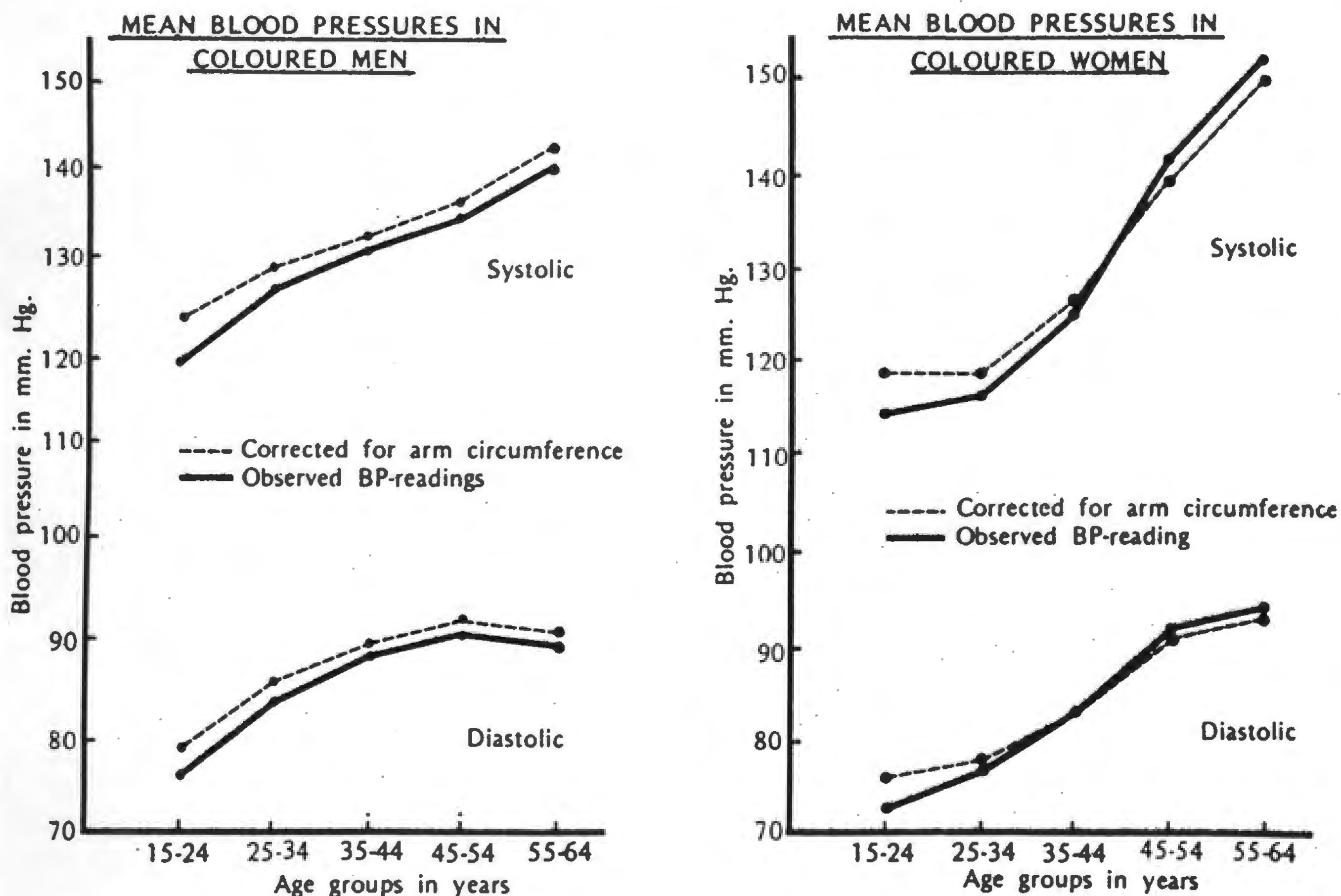
N = 100 readings	Systolic BP in mm Hg	Standard deviation	Diastolic BP in mm Hg	Standard deviation
First visit - mean value	129,5	24,9	85,2	15
Second visit - mean value	129,1	23,2	83,8	13,9
Pearson's correlation coefficient: r	0,765		,748	

In a random population, on the other hand, repeated sampling gives very reproducible mean blood pressure readings.

C Effect of arm circumference on blood pressure readings

It has repeatedly been pointed out that the use of a cuff of incorrect size can lead to an error in blood pressure measurements due to undercuffing thick arms and overcuffing thin arms[38,139,140]. Maxwell *et al.*[37] formulated correction factors when a standard (12 X 23 cm) cuff was used, based on the mid-arm circumference other than a 30 cm mid-arm circumference. These correction factors were used in this study and the manner in which this effected the observed values of the men and women of the study population is shown in figure 1.

Figure 1 Blood pressure readings corrected for arm circumference



For all the age groups of males the corrected mean diastolic and systolic blood pressure was higher than the observed mean values, implying that the mean arm circumference of males was narrower than 30 cm. For females younger than 35 years a similar result was seen, but for females older than 44 years the corrected systolic and diastolic reading was lower than the observed value, indicating an arm circumference of more than 30 cm[37] and possibly a higher prevalence of adiposity. The standard deviations of the distributions of each age group are little affected by the use of the correction factors for arm circumference.

Figure 2 Mean blood pressure in coloured women

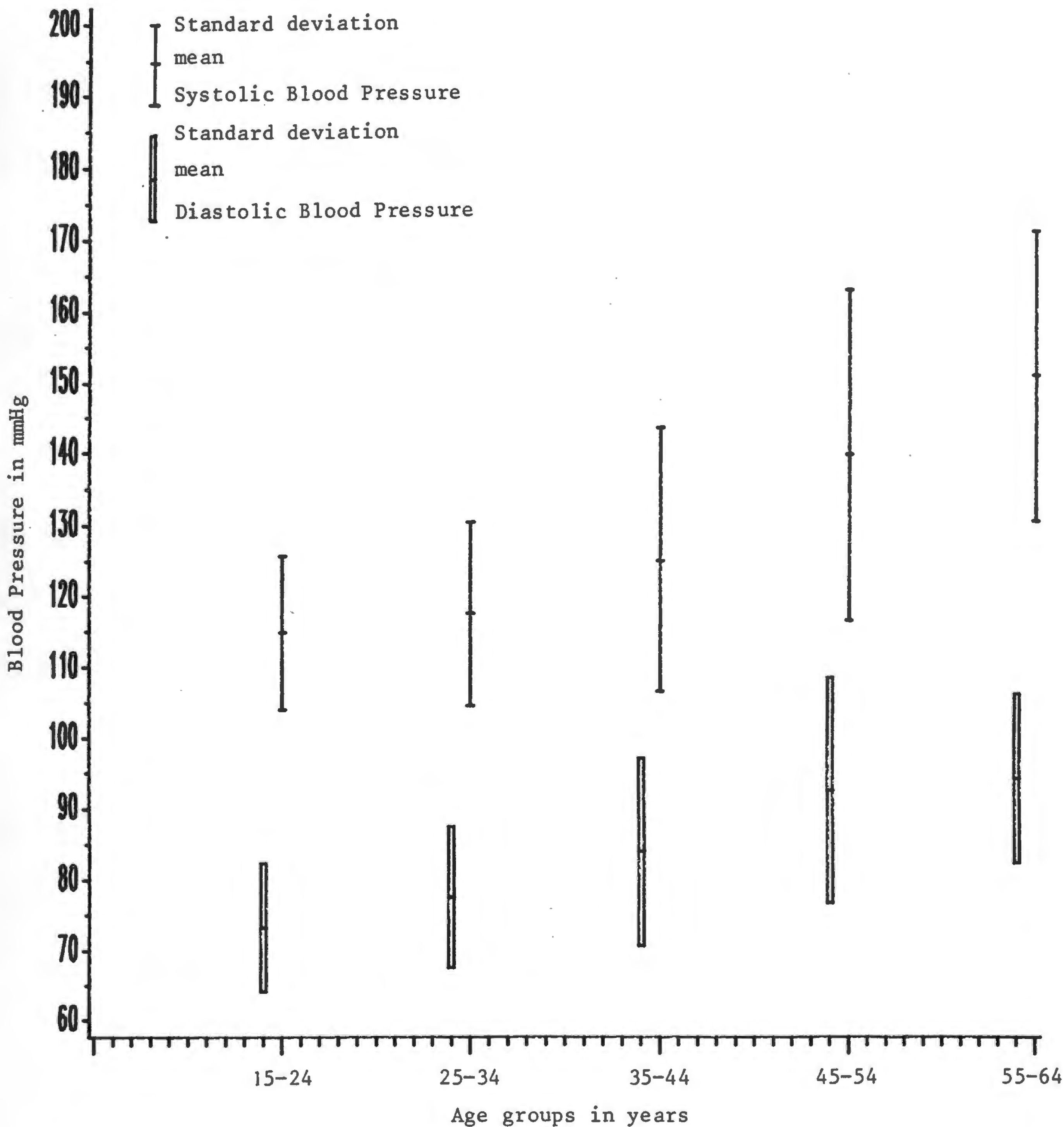
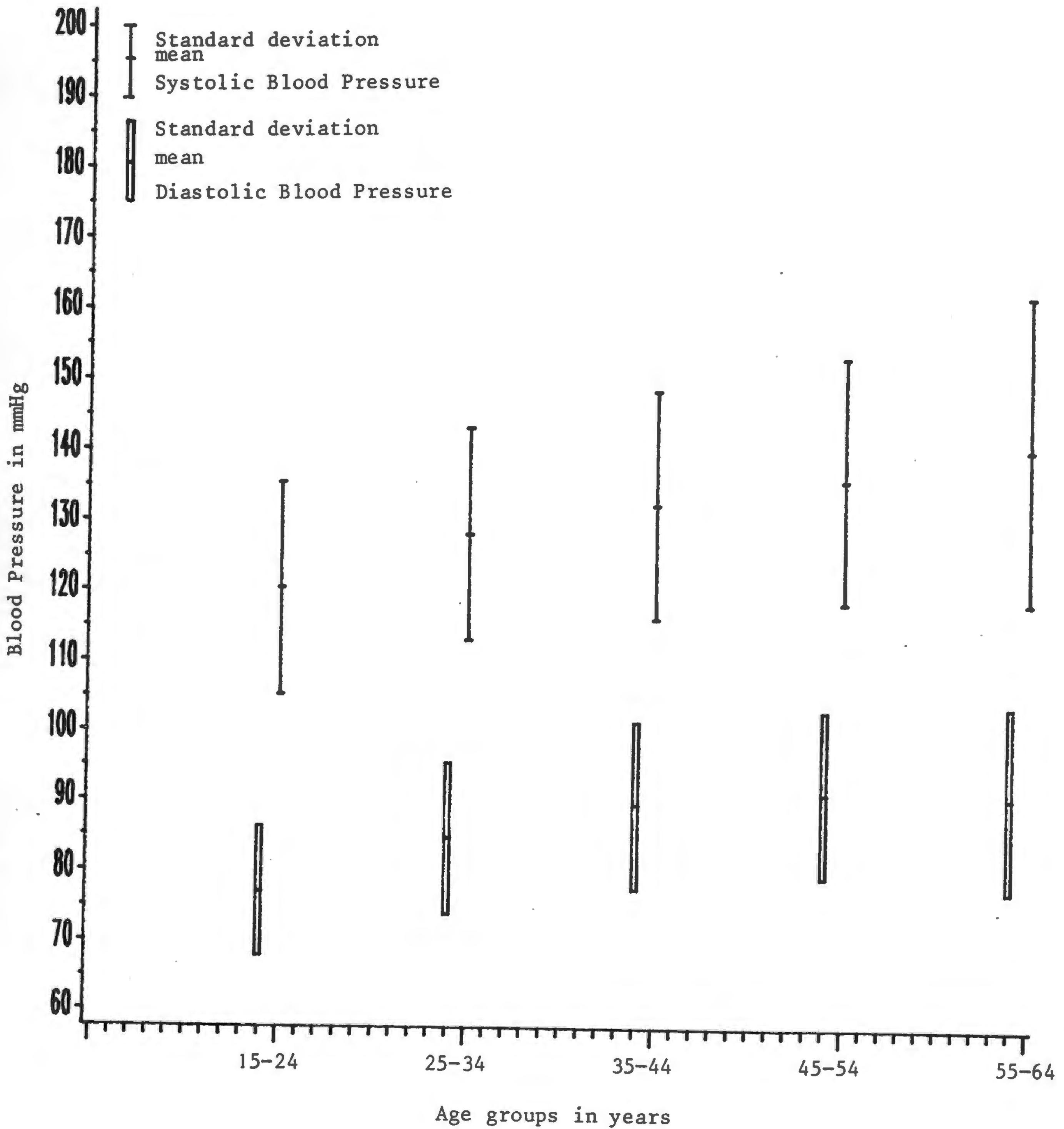


Figure 3 Mean blood pressure in coloured men



The importance of correct equipment and standardised procedure of blood pressure readings is clear, as was also shown by Webster *et al.*[34]. In the rest of this chapter the observed blood pressure readings are reported and not the corrected values.

7 BLOOD PRESSURE IN THE STUDY POPULATION

A Mean systolic and diastolic values in the study population

The mean systolic and diastolic blood pressure for each age group is shown in Table 4 and also in Figs 2 and 3.

Table 4 Systolic and diastolic blood pressure in the study population

	MALES				FEMALES			
Age group years	Systolic in mm Hg		Diastolic in mm Hg		Systolic in mm Hg		Diastolic in mm Hg	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
15 - 24	120,4	15,6	76,3	10,0	114,9	10,8	73,2	9,1
25 - 34	128,0	15,1	84,7	10,7	117,5	12,9	77,2	10,2
35 - 44	132,2	16,7	89,5	11,9	125,8	19,8	83,4	13,9
45 - 54	135,5	17,3	91,2	11,9	141,4	25,8	92,6	16,0
55 - 64	141,6	24,4	90,6	13,2	152,2	22,7	94,4	12,1

Like most other westernised populations studied, the mean blood pressure of each age group increased with age, both for the systolic and diastolic pressure, with the exception of the diastolic blood pressure of the oldest group of men. As with other studies the standard deviation also increased with age with the exception being the oldest group of females.

B Prevalence of hypertension in the study population with age standardisation

For the purpose of this study a hypertensive was defined as a person who had a diastolic blood pressure equal to or greater than 95 mm Hg and/or a systolic blood pressure equal to or greater than 160 mm Hg, as well as any person whose diastolic and systolic blood pressure was lower than these values, but who reported taking anti-hypertensive medication. Table 5 shows the prevalence

Table 5 Prevalence of hypertension in the study population of the Cape Peninsula

AGE IN YEARS	MALE	FEMALE
	% with Hypertension	% with Hypertension
15 - 24	2,1	3,9
25 - 34	16,7	5,3
35 - 44	31,1	21,3
45 - 54	39,0	53,2
55 - 64	45,6	72,6
15 - 64		
Crude rate	26,8	30,8
Cape Peninsula (a)	17,2	18,4
SA coloured rate (b)	17,7	18,1
International rate (c)	23,7	26,2

Table 6 Prevalence of different types of hypertension in the study population*

	Males				Females			
Age group in years	% Total hypertension	% Joint hypertension	% Isolated systolic hypertension	%Isolated diastolic hypertension	% Total hypertension	% Joint hypertension	% Isolated systolic hypertension	%Isolated diastolic hypertension
15 - 24	18,1	0	1,1	1,1	6,8	0	0	3,9
25 - 34	37,5	2,1	1,0	13,5	16,0	0	0	4,3
35 - 44	48,5	5,8	0	21,4	28,6	5,4	0	13,4
45 - 54	63,2	9,5	2,1	24,2	59,6	18,1	5,3	18,1
55 - 64	61,1	21,1	3,3	10,0	82,1	25,3	11,6	23,2
15 - 64								
Crude rate	45,6	7,5	1,5	14,2	37,75	9,4	3,2	12,5
Cape Peninsula rate(a)	35,6	3,8	1,1	10,6	24,7	4,9	1,5	8,7
SA coloured rate(b)	36,1	4,0	1,6	10,9	24,4	4,8	1,5	13,14
International rate (c)	42,3	6,3	1,4	13,0	33,1	7,81	2,6	11,0

a Prevalence rate age standardised against the coloured population of the Cape Peninsula (Census 1980)
b Prevalence rate age standardised against the coloured population of the RSA (Census 1980)
c Prevalence rate age standardised against an international reference population[141]
* See text for definitions of the types of hypertension

found in the study population as well as an age standardised prevalence rate against the coloured population of the Cape Peninsula (a), the coloured population of South Africa (b), (Census 1980) and a reference international population(c)[141].

In the women above 44 years of age a much higher prevalence of hypertension was found than in the men of the same age, indeed 72,6% of the females older than 54 years suffered from hypertension, while only 45,6% of men in this age group were classified as hypertensive. What was striking was the high prevalence of hypertension in the younger males between 25 and 44 years as compared to the females of the same age. This was more significant in the face of the fact that the BMI of the males was consistantly lower than that of the females. (see chapter X)

The prevalence of additional forms of raised blood pressure is shown in Table 6. Total hypertension is defined as a diastolic blood pressure of 90 mm Hg or higher and/or a systolic blood pressure of 140 mm Hg or higher. Joint hypertension is defined as having a blood pressure where the diastolic pressure is 95 mm Hg or higher as well as a systolic pressure of 160 mm Hg or higher. Isolated systolic hypertension is present when the systolic blood pressure is 160 mm Hg or higher while the diastolic pressure is below 95 mm Hg. In contrast isolated diastolic hypertension is defined as having a diastolic pressure of 95 mm Hg or higher while the systolic pressure is below 160 mm Hg.

<u>Total hypertension</u>[5]: Looking back at the mean diastolic blood pressure of the study population it is seen that for both sexes after the age of 44 years

the mean level exceeded the cut-off points of 90 mm Hg for diastolic blood pressure. For the mean systolic blood pressure, females after the age of 44 and males after the age of 54 years also exceeded the cut-off points of systolic blood pressure 140 mm Hg. The age standardised prevalence rate (standardised against the coloured population aged 15-64 years of the Cape Peninsula) for men was 35,6% and for females 24,7%. This prevalence rate for men is about double that found for hypertension ($\geq$160/95 mm Hg) of 17,2%. For women the difference in prevalence rate of total hypertension (24,7%) and WHO hypertension (18,4%) was not so marked. The high rate in men can be ascribed to the high prevalence rate in the younger group of men. In considering that hypertensives have a higher than average risk for coronary heart disease above a blood pressure of 140/90 mm Hg[5] it is clear that hypertension is a major problem in this population group and needs urgent attention.

Isolated systolic and diastolic hypertension: Isolated systolic hypertension is a condition of older people[17,142]. In this study 11,6% of females and 3,3% of males in the 55 to 64 year old age group were found with this condition. As in other studies[17,142] women had a higher hypertension prevalence rate than men. In the Framingham Study isolated hypertension was found to be related to hypertensive cardiac failure, stroke, coronary heart disease and occlusive peripheral arterial disease. There is also an indication that it is a distinct syndrome with different characteristics than essential hypertension[142]. The value of treating elderly hypertensives, including isolated systolic hypertensives, has been shown in the hypertension detection and follow-up program[143].

Isolated diastolic hypertension is much more common in the study population than isolated systolic hypertension with 10,6% of males and 8,7% of females suffering from this condition (age standardised values - against coloured population of the Cape Peninsula).

Of the hypertensives (WHO definition) 83,7% of males and 73,4% of females had diastolic blood pressures ≥95 mm Hg, while systolic blood pressure was ≥160 mm Hg in 28,5% of males and 34,8% of females. Only 22,1% of male and 26,6% of female hypertensives had both their diastolic and systolic blood pressures equal or above the WHO cut-off points.

8 COMPARISON OF HYPERTENSION PREVALENCE WITH OTHER POPULATIONS

The only other home-based hypertension prevalence studies in South Africa comparable in technique of data collection are those done by Seedat *et al.*[43,45,47,50,52] in his studies on urban whites, Indians and blacks as well as on rural blacks.

Tables 7, 8, 9 and 10 show the differences between the results of this study and those of the urban whites, Zulus and Indians studied by Seedat *et al.*[144].

The systolic blood pressure of the coloured males was significantly higher than those of any of the other three groups of males between the ages of 25 to 44 years. It was also significantly higher than those of Zulu and Indian males between the ages of 15 to 24 years, as well as significantly higher than the systolic blood pressure of Indian males between 45 to 54 years (Table 7).

The diastolic blood pressure of the coloured males was significantly higher than those of the Zulu and Indian males between ages 15 to 54 years. It was also significantly higher than that of the white males above 25 years of age (Table 8).

Table 7 Comparison of mean systolic reading on the coloured males with those of three other groups of urban South African males[144]

		Age groups in Years				
		15-24	25-34	35-44	45-54	55-64
Coloureds	Systolic BP in mm Hg	120,4	128,0	132,2	135,5	141,6
	SD	15,6	15,1	16,7	17,3	24,4
Zulus	Systolic BP in mm Hg	111,9	118,8	123,1	129,0	137,8
	SD	16,0	19,9	22,5	25,8	30,5
T-test results with Zulus		3,95**	3,74**	3,32**	1,96	0,71
Degrees of freedom		212,0	212,0	201,0	167,0	120,0
Level of significance - p		<0,001	<0,001	<0,001	0,051	0,48
Indians	Systolic BP in mm Hg	108,8	113,3	116,7	125,2	137,4
	SD	12,6	13,0	16,0	17,1	25,1
T-test results with Indians		5,54**	7,36**	6,92**	3,85**	1,08
Degrees of freedom		177,0	196,0	204,0	166,0	158,0
Level of significance - p		<0,001	<0,001	<0,001	<0,001	0,28
Whites	Systolic BP in mm Hg	120,8	121,3	122,1	131,2	142,2
	SD	14,9	12,7	13,4	17,6	23,6
T-test results with whites		-0,18	3,61**	4,38**	1,39	-0,15
Degrees of freedom		184,0	219,0	174,0	141,0	171,0
Level of significance - p		<0,001	<0,001	<0,001	0,17	0,88

In the youngest age groups of 15 to 24 years the mean systolic blood pressure of the coloured females was significantly higher than those of all three of the other groups of females (Table 9). In the age group 25 to 34 years the coloured females systolic blood pressure was significantly higher than those

of the Indians and whites, while at all ages above 34 years the diastolic blood pressure of the coloured females was significantly higher than that of the white females (Table 10). When the prevalence rates of hypertension in the previous four population groups are compared (Table 11), again the high prevalence of hypertension in the coloured population becomes obvious.

Table 8 Comparison of mean diastolic BP of coloured males with those of three other groups of urban South African males[144]

		Age groups in Years				
		15-24	25-34	35-44	45-54	55-64
Coloureds	Diastolic BP in mm Hg	76,3	84,7	89,2	91,2	90,6
	SD	10,0	10,7	11,9	11,9	13,2
Zulus	Diastolic BP in mm Hg	70,7	76,7	81,2	83,7	85,1
	SD	12,4	15,4	15,9	17,7	18,2
T-test results with Zulus		3,55**	4,31**	4,24**	3,28	1,84
Degrees of freedom		212,0	212,0	201,0	167,0	120,0
Level of significance - p		<0,001	<0,001	<0,001	<0,001	0,069
Indians	Diastolic BP in mm Hg	65,0	72,4	75,7	82,2	82,8
	SD	9,9	10,8	13,0	12,0	14,5
T-test results with Indians		7,62**	8,03**	7,97**	4,81**	3,56
Degrees of freedom		177,0	196,0	204,0	166,0	158,0
Level of significance - p		<0,001	<0,001	<0,001	<0,001	<0,001
Whites	Diastolic BP in mm Hg	78,2	82,0	82,3	85,2	89,8
	SD	10,4	9,1	11,0	11,5	12,5
T-test results with whites		-1,25	2,01*	4,06**	2,88**	0,39**
Degrees of freedom		184,0	219,0	174,0	141,0	171,0
Level of significance - p		0,21	0,046	<0,001	<0,001	0,69

In comparing the prevalence of hypertension in the coloured population of the Cape Peninsula with that of the rural white South African population of CORIS[46] the age standardised rate (against a reference international

population)[141] again shows that the coloureds had a higher prevalence rate than the whites. Figures 4 and 5 show that this finding applied to all age groups of coloured men above 24 years and markedly so for coloured women above 34 years. The CORIS study was not a home-based study and therefore the prevalence of hypertension reported on the CORIS study was probably higher than it would have been in a domiciliary study.

Table 9 Comparison of mean systolic BP of coloured females with those of three other groups of urban females[144]

		Age groups in Years				
		15-24	25-34	35-44	45-54	55-64
Coloureds	Systolic BP in mm Hg	114,9	117,5	125,8	141,4	152,5
	SD	10,8	12,9	19,8	25,8	22,7
Zulus	Systolic BP in mm Hg	104,8	114,8	126,3	144,5	147,6
	SD	13,8	20,9	28,8	31,5	26,6
T-test results with Zulus		6,29**	1,08	-0,14	-0,7	1,10
Degrees of freedom		262,0	226,0	211,0	167,0	133,0
Level of significance - p		<0,001	0,281	0,887	0,479	0,274
Indians	Systolic BP in mm Hg	105,47	108,7	121,4	141,1	143,5
	SD	14,5	15,8	23,6	29,3	26,5
T-test results with Indians		4,77**	4,49**	1,53	0,06	2,35
Degrees of freedom		165,0	240,0	231,0	198,0	162,0
Level of significance - p		<0,001	<0,001	0,127	0,948	0,020
Whites	Systolic BP in mm Hg	107,3	110,1	112,4	127,8	143,5
	SD	15,3	13,1	17,7	23,7	28,3
T-test results with whites		3,41**	4,11**	5,34**	3,78**	2,28*
Degrees of freedom		146,0	209,0	223,0	186,0	164,0
Level of significance - p		<0,001	<0,001	<0,001	<0,001	0,025

Table 10 Comparison of mean diastolic BP of coloured females with those of three other groups of urban females[144]

		Age groups in Years				
		15-24	25-34	35-44	45-54	55-64
Coloureds	Diastolic BP in mm Hg	73,3	77,2	83,4	92,6	94,4
	SD	9,1	10,2	13,9	16,0	12,1
Zulus	Diastolic BP in mm Hg	65,2	74,1	82,4	93,1	91,3
	SD	13,1	16,3	19,9	17,6	14,9
T-test results with Zulus		5,40**	1,60	0,40	-0,19	1,12
Degrees of freedom		262,0	226,0	211,0	167,0	133,0
Level of significance - p		<0,001	0,111	0,688	0,848	0,265
Indians	Diastolic BP in mm Hg	64,9	68,8	76,6	84,9	84,5
	SD	10,3	10,6	13,7	15,2	12,7
T-test results with Indians		5,45**	6,07**	3,75**	3,49**	5,04**
Degrees of freedom		165,0	240,0	231,0	198,0	162,0
Level of significance - p		<0,001	<0,001	<0,001	<0,001	<0,001
Whites	Diastolic BP in mm Hg	72,9	75,6	78,1	84,4	88,0
	SD	11,9	10,9	10,3	12,9	13,3
T-test results with whites		0,17	1,07	3,25**	3,85**	4,25**
Degrees of freedom		146,0	209,0	223,0	186,0	164,0
Level of significance - p		0,86	0,28	<0,001	<0,001	<0,001

Table 11 Comparison of hypertension prevalence in four urban populations of South Africa

	% Males		% Females	
Ages 15 - 64 years	Crude rate	Standardised rate*	Crude rate	Standardised rate*
Coloured population Cape Peninsula	26,8	23,7	30,8	26,2
Zulu population Durban[144]	21,4	23,8	25,4	29,2
Indian population Durban[144]	13,7	12,5	21,34	17,4
White population Durban[144]	23,5	22,9	16,5	15,1

*Age-adjusted rates against the international reference population[141].

Figure 4 Prevalence of hypertension in two groups of men in the western Cape

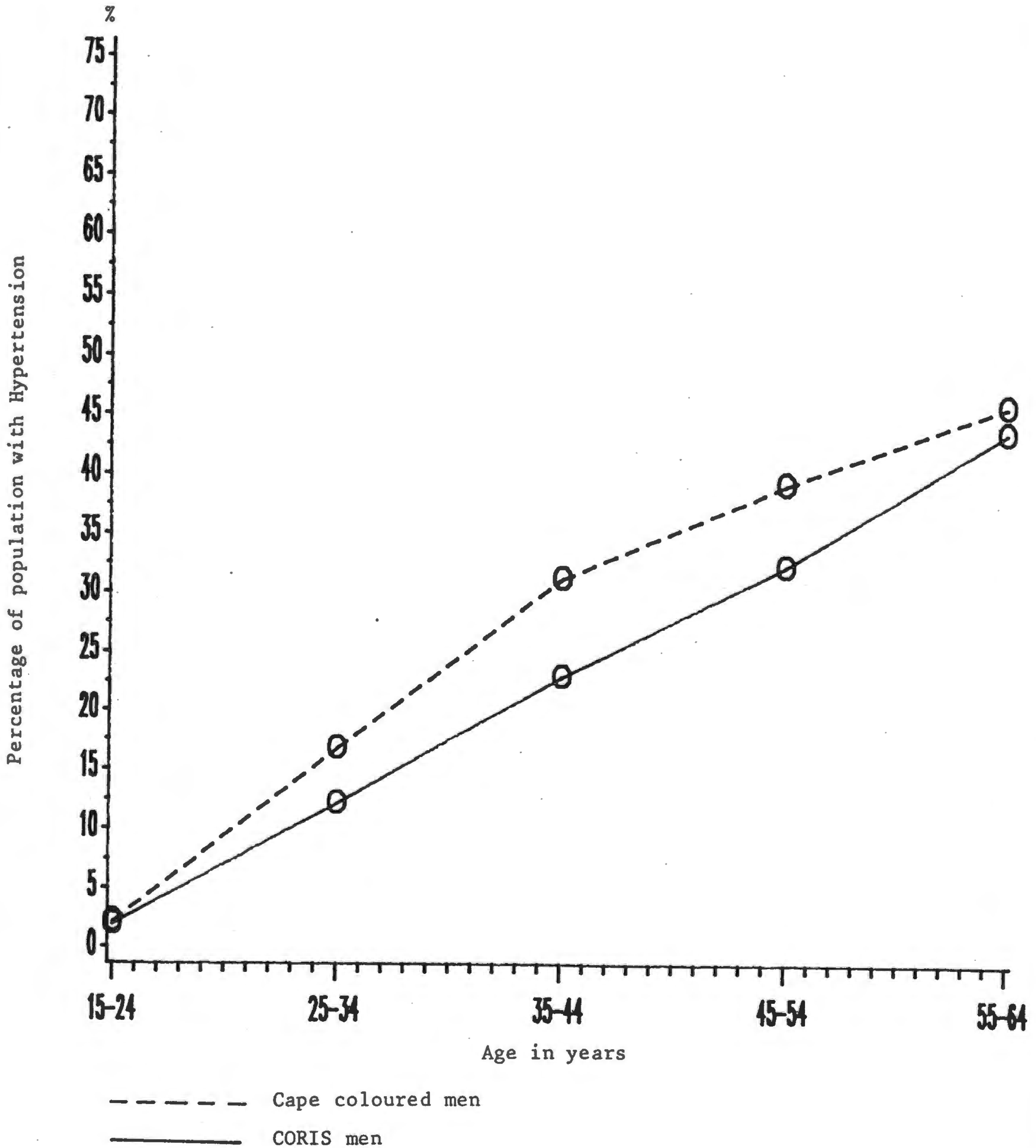
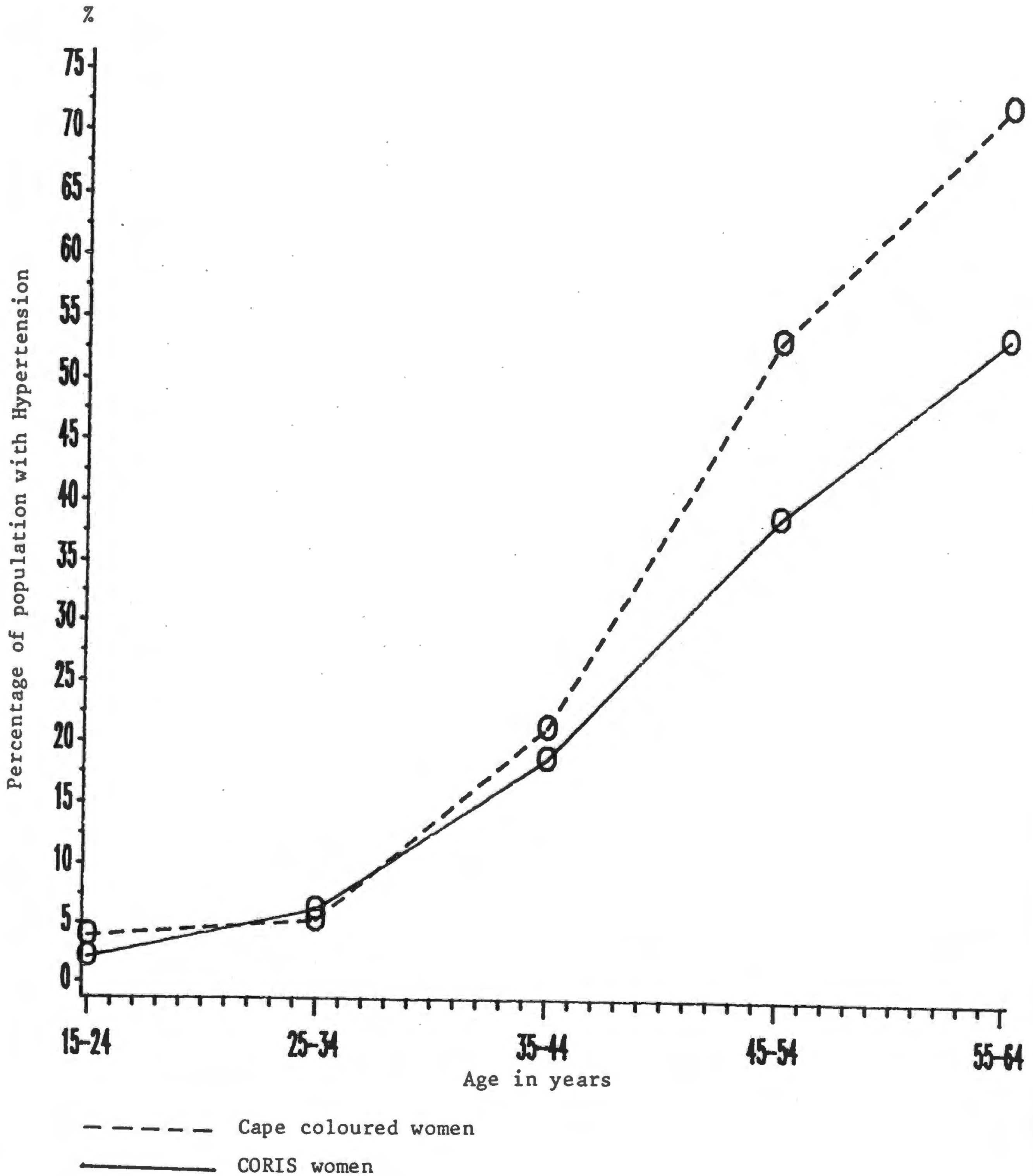


Figure 5 Prevalence of hypertension in two groups of women in the western Cape



Myers _et_ _al_. reported a very high prevalence rate of hypertension in coloured stevedores in Cape Town (Section IV:2:9). The present study did not bear out the findings of Myers[48]. This could perhaps be explained by looking at the very few participants in the younger age groups included in Myers' study. The results show that the coloured population of the Cape Peninsula had a prevalence rate of hypertension very similar to urban blacks in Durban[144] and Johannesburg[49]. Both these groups of blacks had similar blood pressures to Georgia Negroes[60]. American blacks had higher prevalence rates of hypertension than American whites. It then follows that the coloured population of the Cape Peninsula had a level of hypertension comparable to American blacks, but higher than that of American whites and also whites elsewhere[49].

9 HYPERTENSION-ASSOCIATED MEDICAL HISTORY OF THE HYPERTENSIVES

The medical histories of the hypertensive patients are reflected in Table 12.

A family history of hypertension-associated disease is defined as a person who reports having a parent and/or sibling with a history of CHD and/or a parent who suffered from hypertension and/or who had had a cerebrovascular accident.

In this table there is a marked discrepancy between the reported prevalence of a history of angina and myocardial infarction and that of the history for these two conditions as elicited by the Rose questionnaire (London School of Hygiene questionnaire for chest pain)[145]. The prevalence rates for angina, particularly, but also for myocardial infarction as estimated by the Rose

Table 12 Medical history of coloured hypertensives

% Hypertensives who report having:	Males N = 128	Females N = 153
Hypertension	42,2	69,9
Had a cerebral vascular accident (CVA)	3,9	2,6
Angina	10,9	9,2
Myocardial infarct	4,7	3,9
Angina by Rose questionnaire	23,4	24,8
Myocardial infarction by Rose questionnaire	7,8	4,6
A family history of hypertension associated disease	58,6	62,8

questionnaire were unrealistically high and certainly did not reflect the true prevalence rate of angina in this population. This inaccuracy is further illustrated by the fact that the usual rise in prevalence rate for CHD with age was not shown by persons answering positively to the Rose questionnaire. According to the Rose questionnaire the prevalence rate for CHD in the 15 to 24 year age group of the study population was 17,2%. This figure does not reflect the true situation in the population in any way. Furthermore no significant difference could be shown between the hypertensive and normotensive participants in the number of Rose CHD positive (angina and/or myocardial infarction) responses. It would seem that the Rose questionnaire has proved not to be a useful tool in measuring the prevalence of CHD in the coloured population of the Cape Peninsula.

Only 42,2% of male hypertensives and 69,6% of female hypertensives reported suffering from hypertension. The question that presents itself is whether it is possible to attain control of hypertension in a patient, or in a population if so few hypertensives know that they are hypertensive.

Very few participants reported having had a CVA. This is surprising in a population with such a high prevalence of hypertension and such a high CVA mortality rate.

In looking for significant differences between hypertensive and normotensive participants in terms of their medical history it was shown that there were no significant differences between the two groups when looking for an association with a family history of hypertension-associated diseases. There was a significant association ($p<0,001$) between being a hypertensive and a person reporting suffering from hypertension. There was also a significant association ($p<0,05$) between being a 45 to 64 year old hypertensive and giving a history of CVA. This association was not found in the younger hypertensives. Reporting on having had a heart attack is significantly associated ($p<0,05$) with being a hypertensive when looking at the group as a whole, but not when looking at male and female hypertensives separately or at the hypertensives group above and below 45 years of age. There is a positive association ($p<0,01$) between being hypertensive and reporting the presence of angina. This significant association was found when looking at the hypertensive group as a whole and in the two sex categories, but not when splitting the hypertensives in two groups above and below 45 years of age.

10 TREATMENT STATUS OF THE HYPERTENSIVES

In Table 13 the treatment status of the hypertensives is shown

Table 13 Treatment status of coloured hypertensives

% Hypertensives who were:	N = 281
On daily hypertensive treatment	32,9
On occasional hypertensive treatment	8,4
Total on hypertensive treatment	41,3
*Controlled on hypertensive treatment	16,0
On inadequate hypertensive treatment	25,3
#Controlled on daily hypertensive treatment	48,9
Had blood pressure measured in last year	71,9
On diet for hypertension	5,0
% of those on treatment who knew the name of the medication	33,6

*Controlled hypertension is defined as a blood pressure of lower than 160/95 mm Hg while reporting the taking of anti-hypertensive medication.

#The percentage reported here is a percentage of those hypertensives who reported taking anti-hypertensive medication daily.

Of the hypertensives in this study only 41,3% reported taking any medication for their hypertension. This percentage consists of 32,9% who took medication daily and 8,4% who took medication occasionally. This then implies that 58,7% of coloured hypertensives were either previously undiagnosed, untreated or were uninformed about medication prescribed or had stopped their previous anti-hypertensive medication. The blood pressure of only 16% of the hypertensives was controlled in this study. This figure compares in magnitude to the level of hypertensive control found in many studies around the world, at screening (see table 1). Of the hypertensive patients who report taking medication daily, i.e. regularly, 48,9% had controlled blood pressures. This finding was supported by the significant difference (p = 0,0004) in diastolic blood pressure of those hypertensives who took medication daily and those who

Table 14 Medication status of the coloured hypertensives

	Number N	% with raised BP, no medication	% with raised BP, inadequate medication	% with normal BP, sufficient medication
All the hypertensives	281	58,7	25,3	16,0
All the male hypertensives	128	70,3	16,4	13,3
Male hypertensives younger than 45 years	50	86,0	6,0	8,0
Male hypertensives older than 45 years	78	60,3	23,1	16,7
All the female hypertensives	153	49,0	32,7	18,3
Female hypertensives younger than 45 years	34	61,7	23,5	14,7
Female hypertensives older than 45 years	119	45,4	35,3	19,3

took no medication at all. The systolic blood pressure of these two groups did not differ significantly. In Table 14 the adequacy of drug control and number of untreated hypertensives is shown.

Noticably more female (18,3%) hypertensives were controlled than male hypertensives (13,3%) and markedly more males (70,3%) than females (49%) had no medication and were probably undiagnosed. The most worrying finding is the fact that of the male group of hypertensives below 45 years of age, 86% were not on medication and only 8% had controlled hypertension. The group of female hypertensives above 44 years seem to have had the lowest rate of untreated hypertension and the highest of controlled hypertension, but even in this group 45,4% had not received treatment and only 19,3% were controlled.

Of those hypertensives who reported taking drugs only 33,6% knew the name of the drugs they were taking (Table 13). The knowledge of the drug's name did not seem to affect the degree of hypertension control, as no significant difference of controlled hypertension was noted when comparing those hypertensives who knew the name of the drug they reported taking and those who did not.

In the year prior to the study 71,9% of the hypertensives had had their blood pressure measured (Table 13). The blood pressure control of this group was significantly better, ($p<0,05$), than that of those hypertensives who had not had their blood pressure measured in the year prior to this study. Only 5% of the hypertensives reported following a diet in order to control their blood pressure. Considering the high prevalence of mild hypertension, where diet modifications would be a useful part of the initial treatment, this lack of appropriate diet constitutes an area of hypertension management in the group of hypertensives that is inadequately utilised.

11 FACTORS ASSOCIATED WITH HYPERTENSION

A Dietary factors associated with hypertension

As was pointed out in section 4:A of this chapter a variety of dietary factors have been examined and reported in the literature in association with hypertension. In this study the influence of dietary factors on the diet was looked at in two ways. Firstly a significant difference in nutrient intake was looked for when comparing hypertensives and normotensives. The nutrient intake was taken from the 24-hour dietary recall results (ML Langenhoven of RIND of the MRC - unpublished data); secondly a number of food indices were generated (ML Langenhoven of RIND of the MRC - unpublished data) from the

Table 15 Comparison of the nutrient intake of the hypertensive and normal study populations

Indices	Mean value for hypertensives N = 281	Mean value for non-hypertensives N = 695	Level of significance p value
Total fat intake index	7,4	9,0	<0,001
Saturated fat intake index	9,9	11,5	>0,001
Polyunsaturated fat intake index	4,3	4,4	0,409 NS
Cholesterol index	1519	1856	<0,001
Salt index	0,7	0,9	<0,001

NS = Not statistically significantly different.

questions on the habitual food intake asked for in the dietary questionnaire. Table 15 shows the differences between hypertensives and normotensives when comparing their nutrient intake indices.

For the polyunsaturated fat intake index there was no significant difference between the two groups. For all the other indices the hypertensives had significantly lower values than the normotensives. From the literature[97-100] one would expect these findings with respect to the saturated fat index but not with respect to the other four indexes. In fact one would expect the salt indices of hypertensives to be higher[76] than those of the normotensives. In an effort to explain this discrepancy, it was found that the younger males and females had higher salt indices than the older males and females (see table 16). There were no significant differences in salt indices when comparing the groups of hypertensive and normotensive persons. In each group the males had higher salt indices than the females.

Table 16 Salt indices in different age and sex categories

	Salt index		
	Hypertensive	Normotensive	Differences
Females <45 years	0,88	0,93	Not significant
Males <45 years	0,98	1,11	Not significant
Females ≥ 45 years	0,51	0,60	Not significant
Males ≥ 45 years	0,74	0,79	Not significant

The need for concern is obvious when considering the high salt intake in the younger coloureds, particularly the men of a population which already has such a high prevalence of hypertension, even though no significant differences could be seen between hypertensive and normotensive persons.

From the nutrient intake of this population as calculated from the 24-hour dietary recall significant differences could be found in most groups when comparing the hypertensives and normotensives for the following nutrient intakes: hypertensives had eaten significanctly less potassium, calcium, magnesium and saturated fat than normotensives.

The nutrients studied were:

total protein	plant protein	animal protein
total fat	saturated fat	polyunsaturated fat
P/S ratio	cholesterol	fibre
magnesium	calcium	potassium
sodium	kilojoule	

To look at the influence of alcohol intake on the diastolic and systolic blood pressure the drinkers and non-drinkers were compared as two groups. Table 17 shows the groups where significant differences were found.

Table 17 Significant differences in diastolic and systolic blood pressure when comparing drinkers and non-drinkers

Groups of drinkers and non-drinkers compared	p-value for diastolic BP	p-value for systolic BP
All participants aged 15 to 64 years	<0,0001	<0,0001
Males aged 35 to 44	<0,0001	0,001
All participants aged 15 to 24 years	0,036	Not significant
All participants aged 25 to 34 years	0,023	0,001
All participants aged 35 to 44 years	<0,0001	<0,0001

When comparing all drinkers to all non-drinkers the drinkers had significantly higher diastolic and systolic blood pressures (<0,0001), than the non-drinkers. Also all three age groups of drinkers up to the age of 44 years had significantly higher diastolic blood pressure than the same age non-drinkers. For systolic blood pressure this difference was also seen for all drinkers between the ages of 25 to 44 years. When testing the correlation between the amount of alcohol consumed and the level of diastolic and systolic blood pressure no significant associations were found between systolic blood pressure and amounts of alcohol consumed for all the age and sex categories examined. With the exception of the groups, males plus females together, aged 35 to 44 and males, aged 35 to 44, no significant correlations were found between diastolic blood pressure and amount of alcohol consumed.

B Non-dietary factors associated with hypertension

Adiposity: The association between hypertension and body mass as seen in many other studies[110-112] was also found in this study. For all males an association was found between BMI and both diastolic and systolic blood pressure ($p<0,05$). For all females the same association was also found ($p<0,01$). Table 18 shows the significant associations between diastolic and systolic blood pressure and BMI for the different age groups.

Table 18 Associations between blood pressure and body mass index

		Systolic BP and BMI		Diastolic BP and BMI	
Sex	Age	r	p	r	p
Male	15 - 24	0,275	0,007**	0,275	0,007**
	25 - 34	0,141	0,169	0,116	0,259
	35 - 44	0,081	0,415	0,149	0,134
	45 - 54	0,257	0,012*	0,338	0,001**
	55 - 64	0,211	0,046*	0,183	0,084
Female	15 - 24	0,151	0,129	0,038	0,706
	25 - 34	0,322	0,002**	0,313	0,002**
	35 - 44	0,337	0,000**	0,387	0,000**
	45 - 54	0,307	0,003**	0,265	0,001**
	55 - 64	0,144	0,164	0,299	0,003**

r = Spearman's rank correlation

p = probability

* Statistically significantly different

For females above 24 years there is a significant positive correlation between BMI and systolic blood pressure. For females the positive significant correlation of BMI with diastolic blood pressure is seen between ages 25 to 54 years. For males this positive significant association is seen in fewer age groups. For systolic and diastolic blood pressure a significant positive correlation is seen in age groups 15 to 24 years and 45 to 54 years. For diastolic blood pressure it is also seen for males in age group 55 to 64 years.

Having shown that the use of a standard cuff in obese and thin arms does affect the observed blood pressure (section 6:C of this chapter) the possibility of a spurious association between body mass index and hypertension was looked into. No significant correlations were found between the corrected systolic and diastolic blood pressures and BMI using univariate comparisons. Since the significant association found between BMI and the observed systolic and diastolic reading became insignificant when correcting for the use of an inappropriate blood pressure-cuff[37], the question is then raised as to the validity of other studies, which have found an association between blood pressure and BMI.

Physical activity patterns: For the purposes of this study physical activity patterns were looked at in two ways. Firstly energy expenditure at work was considered and secondly energy expenditure during leisure time was looked at. When looking for an association between physical activity patterns and systolic and diastolic blood pressure an interesting pattern emerged. When comparing those people who reported no physical activity other than base-line activity at work with those who spent additional energy at work, their systolic blood pressures differed significantly only in males of ages 15 to 24

years (p = 0,025) and 35 to 44 years (p = 0,046). For the same comparison with diastolic blood pressure the only significant difference was in males aged 35 to 44 years (p = 0,023). In all three of these age groups the association was a positive one, indicating that a higher energy expenditure at work is associated with a higher blood pressure. This finding is contrary to the expected finding. A possible explanation could be that although more energy is spent at work, this group of males had a higher prevalence of other risk factors for hypertension. High energy expenditure at work is usually found in the lower social classes which are known to have a high prevalence of other risk factors[48].

The comparison of blood pressures of people who have leisure energy expenditure with those who do not, showed a significant difference only in two groups of females. There was a significant negative association between the diastolic blood pressure and leisure energy expenditure (p = 0,021) in females aged 25 to 34 years and between the systolic blood pressure and leisure energy expenditure in females aged 45 to 54 years (p = 0,027). The association between hypertension and physical activity pattern was inconclusive, as has previously been reported for other studies.

Smoking: There were significantly higher systolic blood pressures in the smokers than in non-smokers, when the two groups as a whole were compared (p = 0,011), as well as between the two groups of males aged 45 to 64 (p = 0,001) and between the two groups of males aged 35 to 44 years. The diastolic blood pressure of smokers were significantly higher than that of non-smokers when the two groups of (p = 0,027) were compared. When focussing attention on those who smoke and testing the correlation between the number of

cigarettes smoked per day with the systolic and diastolic blood pressure, no significant correlations were found except for a positive significant correlation (r = 0,400) between systolic blood pressure and the number of cigarettes smoked by females aged 45 to 54 years (p = 0,014). In the scatter plots used for analyses a clear digit preference for either 10 or 20 reported cigarettes smoked per day was seen. An association between other risk factors, possibly even the use of alcohol, and hypertension in the smoking male hypertensives could possibly explain their raised blood pressure.

Level of education and other social class indicators: In this study the association between a low level of education and the presence of hypertension could be shown with the Mann-Whitney rank test only for the hypertensive group as a whole and the three categories of female hypertensives at the levels of significance shown in Table 19.

Table 19 Comparison of level of education in hypertensives and normotensives

Hypertensive and normotensive groups compared	Level of significance p
Total sample	<0,0001**
All males	0,112
Males <45 years	0,1561
Males ≥45 years	0,8259
All females	<0,0001**
Females <45 years	0,031*
Females ≥45 years	0,0031*

Another parameter of social class that was looked at was occupancy rate (number of persons occupying a habitable room). No significant difference could be shown when comparing hypertensives and normotensives with respect to occupancy rate.

In a sub-sample of the study population, consisting of those who were working, the occupations could be classified according to the Schlemmer classification[146] (see section 7 of Chapter III). Comparing the occupational categories (these are parallel to social class one to five) of the hypertensives and normotensives a significantly higher prevalence of hypertension was found (p = 0,0148) for the categories signifying a lower social class.

Type A coronary prone personality: The Type A personality was determined by an adapted Bortner scale. By the use of discriminant analyses[147] a positive association was seen between Type A coronary prone behaviour and systolic blood pressure. Analyses of covariance[147] showed that systolic blood pressure variance mostly explained the variance found in Type A personality of men in the study population.

Plasma constituents: Low levels of significant association could be seen between diastolic and systolic blood pressure for both males and females for a number of plasma constituents. These are shown in Table 20.

Table 20 Associations between blood pressure and plasma constituents

Pearson's correlation coefficient between BP and:		Total Cholesterol	HDL-Cholesterol	Uric Acid	Triglycerides	LDL-Cholesterol
Females	Systolic BP	0,328**	-0,1178**	0,3902**	0,3149**	0,2753**
	p	0,0001	0,0085	0,0001	0,0001	0,0001
	Diastolic BP	0,3133**	-0,07635	0,4085**	0,3149**	0,2753**
	p	0,001	0,0887	0,0001	<0,0001	0,0001
Males	Systolic BP	0,2204**	-0,0837	0,2099**	0,1949**	0,0730
	p	0,0001	0,0674	0,0001	0,0001	0,1242
	Diastolic BP	0,2639**	-0,1364**	0,1862**	0,1748**	0,1135*
	p	0,0001	0,0028	0,0001	0,0001	0,016

In females the higher association between uric acid and triglycerides could possibly be ascribed to the degree of obesity in the females. For the other positive significant associations there is a degree of covariance indicating possibly a clustering of these plasma constituents and hypertension in certain individuals.

12 A SUMMARY OF THE FINDINGS REPORTED IN THIS CHAPTER

A Validity of the blood pressure readings was shown, at least to the same level as reported elsewhere.

B The mean systolic and diastolic blood pressure increased with age as in other westernised populations.

C The prevalence of hypertension in the coloured population is high, particularly in younger groups of males.

D The prevalence of total hypertension is remarkably high in this population group.

E The number of hypertensives with isolated raised diastolic pressure was greater than those with raised isolated systolic pressure.

F Isolated systolic hypertension was found mostly in older female hypertensives.

G In comparing the mean systolic and diastolic blood pressures of the coloured, Indian, Zulu and white males the coloureds' values were significantly higher in most age groups. In the case of females the coloured values were similar to that of the black females but significantly higher for most age groups of whites and Indians. Similar observations were made when age-standardised prevalence rates were compared.

H The medical history of the hypertensives showed that too few hypertensives knew they had hypertension and very few had had a CVA.

I Only 16% of hypertensives were adequately controlled and only 32,9% took medication daily.

J Fewer male hypertensives had previously been diagnosed or had controlled hypertension than female hypertensives.

K The younger study participants ate more salt than the older participants.

L The use of alcohol was associated with higher diastolic and systolic blood pressure.

M Adiposity was associated with raised blood pressure only when the observed blood pressure was considered, but not when the blood pressure corrected for arm circumference was used.

N Higher blood pressures were measured in male hypertensives who had a high calorie expenditure at work.

O Smoking was associated with higher blood pressure in older female hypertensives.

P Low level of education was associated with raised blood pressure in women.

Q Type A coronary prone personality was associated with systolic blood pressure in males and females.

R Blood pressure was associated with total serum cholesterol, triglycerides and uric acid, and LDL-cholesterol, particularly in females.

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CHAPTER V

SMOKING IN THE COLOURED POPULATION OF THE CAPE PENINSULA

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CHAPTER V

SMOKING IN THE COLOURED POPULATION OF THE CAPE PENINSULA

INTRODUCTION

The detrimental effects of tobacco smoking on health became common knowledge with the publication in the early sixties, of the first Royal College of Physicians Report on Smoking and Health[1] in the UK and in the USA in 1964 with the first report on the subject by the Surgeon-General of the USA. These findings were augmented in the second report[2] of the Surgeon-General of the USA of 1979 and the association between coronary heart disease and smoking was particularly highlighted.

In the UK, which had one of the highest death rates from smoking in the world, at least half of the excess mortality caused by smoking was from CHD. Lung cancer, bronchitis and emphysema were the other main sources of excess mortality among smokers compared to non-smokers[3,4].

These reports led to a decline in the proportion of men who smoked. In the USA more than half the men smoked cigarettes in 1965, by 1979 just over one third of men smoked cigarettes. This example set by men was not followed by USA women, whose rate of smoking did not decline until much later[4]. In the seventies fewer teenage boys were reported to commence smoking than their fathers had done at the same age. USA teenage girls continued increasing their cigarette consumption until the mid seventies[5]. In the UK the

prevalence rate has been declining since 1973, but to a greater extent in smokers who smoked less than 30 cigarettes per day than those who smoked more than that number of cigarettes[6].

The risk of CHD associated with smoking is dose dependent and increases with the number of cigarettes smoked per day, more so than with the duration of smoking[7,8]. Indications are that smoking can be rated as the most important of all risk factors for CHD[9-11]. The excess risk of death in heavy smokers was particularly marked in younger smokers[3], but smokers over 65 years of age also had an increased CHD risk in comparison to non-smokers of the same age[12]. Women are equally at risk for CHD[13] and other smoking-associated diseases such as lung cancer[14].

The pathophysiological mechanisms whereby cigarette smoking are detrimental to human health are many. Those that contribute to the development of atherosclerotic disease were extensively reviewed by Kannel[15]. Some of the salient features of the effects of smoking in relation to atherosclerosis are the reduction in HDL-cholesterol levels[16,17], the aggrevation of angina[18] due to acute coronary vasoconstriction[19], the increased risk of stroke due to decreased cerebral blood flow[20], and the effect on platelets[21].

The need to stop smoking is clear, and the benefit gleaned by the individual and society as a whole is irrefutable[3,4]. Even after a myocardial infarction subjects who stopped smoking cigarettes had an improved rate of survival compared with those who continued and the findings in some studies suggest that stopping cigarette smoking was the most effective single action

in the management of patients with coronary heart disease[6,22]. Kannel[15] pointed out that the elmination of smoking from society would actually save more lives from coronary heart disease than from lung cancer, since so many more people contracted coronary heart disease. The beneficial effects of cessation of smoking can be seen within one year[15] and even the risk for lung cancer after not smoking for 10 years, for both men and women who had previously smoked for less than 20 years, was roughly the same as for those who were life long non-smokers[23].

The issue of passive smoking has been raised in studies where smoking is shown to affect spouses of smokers[24], children of smokers[25], even the unborn child of a smoking mother[26] and any person often exposed to smoke-polluted air[27].

2 PREVALENCE OF SMOKING

From the foregoing it would be appropriate to anticipate that smoking should be a dying habit in society. In most groups of people this is unfortunately not so.

A Smoking in South African populations

The Institute for Sociological, Demographic and Criminological Research of the HSRC reported in 1978 that the prevalence of smoking in South Africa in persons 20 to 59 years, was as shown in Table 1[28]. The coloured men and women were the heaviest smokers of all four groups. White men and women had the highest rate of former smokers.

Table 1 Smoking status of white, black, coloured and Indian South African men and women[28]

Percentage

	Whites (1975)		Blacks (1976)		Coloureds (1977)		Indians (1977)	
	Men	Women	Men	Women	Men	Women	Men	Women
Non-smokers*	21	57	25	78	15	41	25	90
Former smokers!	21	12	5	2	6	7	7	5
Current smokers+	58	31	70	20	79	52	68	5
Total	100	100	100	100	100	100	100	100
Number	2 500	2 500	2 000	2 000	1 500	1 000	1 500	1 000

* Persons who have never smoked at any stage

! Persons who have formerly smoked but who were non-smokers at the time of the respective surveys

\+ Persons who were smokers at the time of the respective surveys

White smokers of both sexes smoked more heavily than any of the other three population groups. As age increased so did the proportion of heavy smokers in the white, coloured and Indian populations[28]. These figures are different to those reported in 1978 by Coetzee[29]. He reported that 24% of blacks over the age of 16 years smoked and that 43% of coloureds above the same age smoked. Olivier found that 16% of school children in Bloemfontein smoked[30]. In Cape Town Benatar reported[31] that 2,5% of white children and 15,2% of coloured children between age 11 to 15 years smoked. In a later study by the same group of workers[32] 21% of white school children aged 12 to 19 years were reported to smoke in Cape Town.

B Smoking in other populations

As was indicated earlier[4-6] in the western world the prevalence of smoking has declined since the adverse effects of this habit have become widely known, but the decline in smoking prevalence is insufficient. This was highlighted in an 1983 editorial in the British Medical Journal[33] which pointed out that for every 1 000 smoking men, 250 will die before their time due to their use of tobacco.

In many industrialised countries the mortality related to smoking has not yet declined[34]. But at present the greatest threat to the world population associated with smoking is the spread of the smoking epidemic to underdeveloped countries, exacerbating the already grim problems attributable to malnutrition and communicable diseases[35-38].

3 SOCIO-ECONOMIC ASPECT OF SMOKING

The smoking pattern in society has changed over time[39] with more persons in lower social classes smoking at present than in the higher social classes. This is a reversal of the finding of fifty years ago[40]. Other parameters of low socio-economic class such as level of education[41,42] and unemployment[43] have also been shown to be associated with high prevalence of smoking.

The picture that emerges is that of a growing smoking epidemic in underdeveloped and undereducated poor populations. One of the major reasons for this developing epidemic[35,38] seems to be the irresponsible behaviour of

the international tobacco industry's massive advertising and promotional campaigns directed at the developing countries, as a better informed public in developed countries increasingly eschews smoking. The editor of the Lancet[44] referred to this movement as the New Slave Trade.

The profit motive of the international tobacco industry must surely explain this mercenary dealing in human health and life. It is shortsighted for world governments to allow the tobacco industry to continue such activity, for any country's economy will gain more from developing a healthy non-smoking population, than it will lose from a declining tobacco industry[45-47].

At present the tobacco industry's promotional campaigns include techniques such as sponsorship of big sports events, which largely circumvent the effects of banning television cigarette advertising. For example, in Great Britain at present the cigarette company's name is invariably featured in television or radio cover of such sports events and the link between healthy outdoor activity and cigarette smoking is clearly promoted[48]. Direct advertising has also been replaced by sponsoring adventure holidays, clothing manufacturing[49] and by the supply of free cigarettes to large social gatherings. The commercial production of tobacco in the Third World has sharply increased since the 1950s and large tobacco companies offer inducements to smaller developing countries to grow tobacco, which is done at the expense of food producing crops[45].

4 SMOKING INTERVENTION PROGRAMMES

The threat that smoking poses to the health of the world population has been enjoying attention in many countries and some unusual techniques have been

used, particularly in Australia, to counter the influence of the tobacco industry[50-52]. The World Health Organisation felt that the risk of coronary heart disease and smoking could be averted in developing countries by ensuring that its coronary heart disease prevention programme is applied particularly actively and effectively in these countries[53]. In 1983, at the fifth World Conference on Smoking and Health[50,54] 1 000 delegates from 79 countries formulated policies, as had the World Health Organisation, to attempt control of smoking[34,37,38].

Preventing the onset of the smoking habit, especially in the young, would be the most effective way in the long run to curb cigarette smoking in society[53]. The general impression in urbanised societies is that the rate of onset of cigarette smoking in adolescents is declining, but a critical evaluation of the available data questions the validity of this impression[55].

Educational programmes, which stress short-term physiological and social consequences of smoking, rather than approaches stressing the long-term health hazards, have been used in adolescent intervention programmes. Although smoking in adolescents seems to have declined after such programmes, the accuracy of the self-reported change in smoking habits is questionable[55]. What was useful in such studies was the identification of the groups of adolescents who were more likely to start smoking than others[56-58] and the types of educational modules that seemed to be more effective than others[59,60].

If preventing the onset of smoking has proved difficult to achieve in populations, reducing the prevalence of smoking in society has proven to date to be even more difficult[61,62]. The only programmes that yielded reasonable

success were those based on multifaceted approaches that were very labour intensive and utilised a variety of support systems involving much community support[63]. It would also seem that compliance with physicians' advice to stop smoking was related to the severity of the smoke-related disease and the imminence of the danger from continued smoking for the patient[64] - a point in time is reached when stopping smoking is often too late to benefit that patient significantly.

From the foregoing it is clear that the need to reduce smoking in the community is common in most communities, as is the need to prevent the onset of smoking in the young and to prevent the increase of smoking in the underdeveloped nations of the world. But the way to counteract the financially powerful tobacco industry and man's own inability to change his habits and addictions, is not at all clear and will need a much greater input from science, governments and the financial world if diseases caused by smoking are to be diminished in the human race.

5 A SUMMARY OF ASPECTS OF SMOKING EVALUATED IN THIS STUDY

A The prevalence of smokers, non-smokers and ex-smokers in the different age and sex categories.

B The number of cigarettes smoked per day.

C The age of onset and duration of the smoking habit.

D The total exposure to tobacco smoke was evaluated by calculating a smoking index.

E The types of tobacco used.

F The proportion of smokers who attempted to relinquish the habit, and for what reasons.

G The attitudes of the participants to smoking and to measures for limiting the habit.

H The reported CHD-related medical history of smokers compared to non-smokers.

I The factors associated with smoking.

6 SMOKING PATTERN IN THE STUDY POPULATION

A Prevalence of smoking

The pattern of the use of tobacco in the study population is shown in Table 2. Of the men participating in the study 61,3% smoked. Between the ages of 15 to 24 years 40,4% of men smoked, the lowest of all the age groups of men. The highest prevalence of smoking in men, 71,9%, was found in the age group 25 to 34 years. Above this age a fairly constant prevalence of smoking was found for all three age groups of men. Only 26,2% of men participating in the study had never smoked, while 12,5% of men reported having stopped smoking. Of the ex-smokers most (17,8%) were found in the oldest group of men and fewest (5,3%) in the young men aged 15 to 24 years. Of the young men aged 15 to 24 years 54,3% had never smoked. In the, group ten years older only 14,6% had never smoked. A very similar figure of 15,6% of men who had never smoked was found in the oldest group of men of 55 to 64 years.

Although these figures for the prevalence of smoking are not as high as those reported for men by the HSRC[28] (Table 1), they are certainly higher than those reported by Coetzee[29].

Of the women 41,4% of the study population smoked. The lowest prevalence (34%) was again found in the youngest age group of 15 to 24 years and again the highest prevalence rate (50%) was found in the next age group of 25 to 34 years and then declined in each age group thereafter to reach a rate of 35,8% in the oldest group of 55 to 64 years. Fewer women were found to smoke than reported by the HSRC[28].

Table 2 Prevalence of tobacco smoking in the study population (%)

Age groups in years	MALES					FEMALES				
	Never smoked %	Ex-smokers %	All non-smokers %	Smokers of cig only %	All smokers %	Never smoked %	Ex-smokers %	All non-smokers %	Smokers of cig only %	All smokers %
15-24	54,3	5,3	59,6	40,4	40,4	60,2	5,8	66,0	34,0	34,0
25-34	14,6	13,5	28,1	68,8	71,9	38,3	11,7	5,0	47,9	50,0
35-44	21,4	11,7	33,8	65,0	67,0	38,4	15,2	53,6	45,5	46,4
45-54	25,3	14,7	40,0	57,9	60,0	50,0	9,6	59,6	39,0	40,4
55-64	15,6	17,8	33,4	61,1	66,7	53,7	10,5	64,2	35,8	35,8
15-64 Crude rates	26,2	12,5	38,7	58,8	61,3	48,0	10,6	58,6	40,6	41,4
Cape Peninsula coloured rate	32,6	10,4	43,0	55,2	57,0	49,3	9,6	59,0	40,2	41,0
SA coloured rate	32,7	10,0	42,7	55,0	57,3	49,5	9,3	58,8	40,4	41,2
Standard million rate	27,4	11,9	39,3	57,6	60,7	48,1	10,5	58,6	40,7	41,4

In comparing the prevalence of smoking in men and women in each age group, it is seen that, except for the youngest group about 20% more men than women smoked. Between the ages of 15 to 24 years the difference between men and women is only 6%. This probably shows a trend similar to that found elsewhere in the western world, where more young women are starting to smoke than previously and the prevalence rates are approaching those of men. Of women, 10,6% reported having stopped smoking. Forty-eight percent of women never smoked, with the greatest percentage of non-smokers in the group of age 15 to 24 years. When comparing the differences in smoking prevalence between the youngest age group of men and the next age group of men, with the difference in smoking prevalence between the same two age groups of women, it is seen that this difference is much larger (31,5%) for men than for women (16%). This could signify that at present the number of men starting could be declining relative to what it was previously, whereas the number of women starting is increasing relative to previously.

In the study of Benatar[31], done approximately 4 years prior to this study, 15,2% of coloured children between 11 and 15 years smoked. At the time of this study the age group of children reported on by Benatar[31] would have fallen into our age category of 15 to 24 years where, on average, 37% of these people smoked. Although this age category includes older smokers, and this could partially explain the higher prevalence, one should also consider the possibility that many young people who had not smoked when they were between 11 to 15 years had started smoking in the interim.

Table 3 The cigarette consumption of the study population

Age groups in years	MALES.					FEMALES				
	Mean cigarette use and standard deviation	Total no of cig smokers	Light 1-9 cig/day %	Medium 10-19 cig/day %	Heavy ≥20 cig/day %	Mean cigarette use and standard deviation	Total no of cig smokers	Light 1-9 cig/day %	Medium 10-19 cig/day %	Heavy >20 cig/day %
15-24	11,4 ±7,5	38	50,0	26,3	23,7	9,8 ±5,7	35	48,6	37,1	14,3
25-34	13,6 ±8,0	68	36,4	28,8	34,8	12,2 ±8,8	47	42,2	33,3	24,4
35-44	14,8 ±10,7	67	29,8	40,8	28,4	14,6 ±8,1	51	35,3	25,5	39,2
45-54	14,7 ±8,8	55	32,7	27,3	40,0	14,6 9,9	37	32,4	29,7	37,8
55-64	15,6 ±10,2	55	23,6	38,2	38,2	13,5 ±10,2	34	41,2	32,4	26,5
15-64	14,2 ±9,3	281	33,5	33,1	33,5	13,1 ±8,9	202	39,6	31,2	29,2

B Number of cigarettes smoked

Table 3 shows the mean cigarette consumption as well as the prevalence of light, medium and heavy smoking in the study population. Light smoking is defined as smoking one to nine cigarettes per day, medium smoking as ten to nineteen cigarettes per day and heavy smoking as smoking a packet of at least twenty cigarettes per day.

The risk for CHD ascribed to cigarette smoking increases when ten or more cigarettes are smoked per day (medium and heavy smokers). Among the smokers this level of smoking was found in 66,6% of men and 60,4% of women. More of the men and women of the younger age groups smoked less than ten cigarettes per day, while more of the older age groups of both sexes smoked more than ten cigarettes per day. More women than men smoked less than ten cigarettes per day. From the foregoing and as is indicated by the mean cigarette consumption per day, it is clear that not only do many coloureds smoke but they also smoke heavily.

In asking about the cigarette consumption of the participants a distinction was made between smoking on a weekday and a weekend day. Tables 4 and 5 show the differences between weekday cigarette smoking and a day during the weekend.

During the week there were about equal numbers of men doing light, medium and heavy smoking but during the weekend there were about 10% fewer men doing light smoking and about 10% more doing heavy smoking. Between the ages of 15 to 24 years 48,6% of men were light smokers, while only 24,3% were heavy smokers during the week. Above 44 years of age this situation was almost

Table 4 Comparison of cigarette consumption during the week and weekend in coloured men

	SMOKING ON A WEEKDAY				SMOKING ON A WEEKEND DAY			
Age groups in years	Total no of cig smokers	Light 1-9 cig/day %	Medium 10-19 cig/day %	Heavy ≥20 cig/day %	Total no of cig smokers	Light 1-9 cig/day %	Medium 10-19 cig/day %	Heavy ≥20 cig/day %
15-24	37	48,6	27,0	24,3	38	39,5	28,9	31,6
25-34	66	37,9	27,3	34,8	69	27,5	27,5	44,9
35-44	66	30,3	36,4	33,3	68	19,1	36,8	44,1
45-54	53	32,1	26,4	41,5	56	17,9	39,3	42,9
55-64	54	20,4	42,6	37,0	55	18,2	38,2	43,6
15-64	276	33,0	32,2	34,8	28,6	23,4	34,3	42,3

Table 5 Comparison of cigarette consumption during the week and weekend in coloured women

Age groups in years	SMOKING ON A WEEKDAY				SMOKING ON A WEEKEND DAY			
	Total no of cig smokers	Light 1-9 cig/day %	Medium 10-19 cig/day %	Heavy ≥ 20 cig/day %	Total No of cig smokers	Light 1-9 cig/day %	Medium 10-19 cig/day %	Heavy ≥ 20 cig/day %
15-24	35	51,4	34,3	14,3	35	31,4	34,3	34,3
25-34	44	36,4	38,6	25	46	37,0	34,8	28,3
35-44	51	31,4	29,4	39,2	51	23,5	33,3	43,1
45-54	36	30,6	27,8	41,7	37	24,3	24,3	51,4
55-64	34	44,1	26,5	29,4	34	32,4	32,4	36,3
15-64	200	38	31,5	30,5	203	29,6	32,0	38,4

reversed during the week. For smoking women 38% were light smokers during the week, while 30,5% were heavy smokers during the week. The situation almost exactly reversed itself during the weekend. The most marked difference in week and weekend smoking was seen in the youngest group of women, 15 to 24 years, where 51,4% smoked lightly and 14,3% smoked heavily during the week. During the weekend 31,4% smoked lightly and 34,3% smoked heavily. The shift between weekday and weekend smoking was just slightly larger for men than for women.

C Age of onset and duration of smoking and smoking index

The total exposure to cigarette smoke was estimated by calculating a smoking index, defined as the product of the number of cigarettes smoked per day and the duration of the habit in years.

Table 6 shows the mean age of onset of smoking, and the mean duration of smoking. The mean age of onset of smoking, for both men and women was lowest for the youngest age group and increased with each age group to show the oldest age groups of both men and women starting smoking at the latest age. It follows that most of the smokers of the youngest age group started smoking before they turned twenty, while the smokers of the oldest group started smoking after they turned twenty, and particularly the older women started at a much later age.

The calculated smoking index had a very wide variation in each age group with a skewed distribution with the mean value in each age group well above the median for the distribution. The range between the 25th and 75th percentile is reported in Table 7. As expected, for each age group the men had a higher smoking index than women as men of each age group had smoked for more years and had smoked more cigarettes per day than women of the same age.

Table 6 Age of onset and duration of smoking of the study population

	MEN		WOMEN	
Age groups in years	mean age of onset of smoking +SD	mean duration of smoking in years +SD	mean age of onset of smoking +SD	mean duration of smoking in years +SD
15-24	16,1 ±2,5	4 ±2,7	16,4 ±2,8	4,1 ±3
25-34	17,3 ±3,7	12,3 ±4,5	19,4 ±5,9	11,1 ±6,1
35-44	19,0 ±5,0	19,8 ±5,9	20,7 ±7,7	18,1 ±7,5
45-54	21,2 ±7,5	28,1 ±7,6	26,4 ±9,0	22,7 ±8,3
55-64	23,1 ±8,3	35,5 ±8,5	29,4 ±13,4	29,9 ±13,4
15-64	19,6 ±6,4	21,2 ±12,1	22,2 ±9	17,0 ±11,7

Table 7 The smoking index of the study population

	MEN			WOMEN		
Age groups in years	25th percentile	50th percentile	75th percentile	25th percentile	50th percentile	75th percentile
15-24	12	33	80	10	31	53
25-34	67	134	248	48	126	213
35-44	125	223	400	152	200	400
45-54	179	333	594	142	309	525
55-64	200	400	742	160	286	576
15-64	86	210	410	59	178	214

Table 8 Types of tobacco smoked by smokers

		MEN SMOKERS					WOMEN SMOKERS		
Age groups in years		Filter cigarettes	Non-filter cigarettes	Own rolled cigarettes	Pipe	Other	Filter cigarettes	Non-filter cigarettes	Own rolled cigarettes
15-24	N	38	1	1	0	0	35	0	1
	%	100	2,6	2,6	0	0	100	0	2,9
25-34	N	68	6	4	4	2	47	0	0
	%	98,6	8,7	5,8	5,8	2,9	100	0	0
35-44	N	64	2	7	3	0	51	1	1
	%	92,8	2,9	10,1	4,3	0	100	2	1,9
45-54	N	51	4	8	3	1	37	0	2
	%	89,5	7,0	14,0	5,3	1,8	100	0	5,2
55-64	N	47	4	4	7	1	34	0	0
	%	78,3	6,7	6,7	11,7	1,7	100	0	0
15-64	N	268	17	24	17	4	205	1	4
	%	91,5	5,8	8,2	5,8	1,4	100	0,5	1,9

D Types of tobacco used by the smokers

From Table 8 it is seen that by far the most smokers used filter cigarettes, in fact women almost exclusively so. As can be seen from the table some participants smoked more than one type of cigarette. For the men the younger age group smoked almost exclusively filter cigarettes while the pipe and non-filter cigarette smokers were older men.

7 ATTEMPTS AT AND ATTITUDES TO COMBATTING SMOKING

When asked if the smokers had attempted to stop or to smoke less in the last year 44,4% of smoking men and 49,5% of smoking women replied in the affirmative. The age distribution of these smokers is shown in Table 9. The outstanding features seen in this table are the large proportion of men aged 15-24 years (57,9%) who already had attempted to decrease their smoking habit in the previous year and of these 59,6% did it for health reasons.

More younger men than older men, while more older women than younger women, attempted to smoke less. The oldest age group of smoking women (55 to 64 years) reported the highest number of people attempting to stop and they are also the only group where more of them did so for reasons other than health reasons.

Associations that were looked for in people reporting an attempt to smoke less or stop, when compared to those who did not, were: number of cigarettes smoked, the years of the smoking habit, and the smoking index. The only significant association ($p<0,05$) was found between the male smokers below the

Table 9 Attempts and reasons to decrease smoking

	% MEN SMOKERS			% WOMEN SMOKERS		
Age groups in years	Attempted to stop	Attempted for health reasons	Attempted for other reasons	Attempted to stop	Attempted for health reasons	Attempted for other reasons
15-24	57,9	59,6	40,4	42,9	60	40
25-34	49,3	48,6	51,4	48,9	52,2	47,8
35-44	36,2	52,2	47,8	44,2	52,2	47,8
45-54	33,3	74	26	52,6	70	30
55-64	50	79,2	20,8	61,8	47,6	52,4
15-64	44,4	63,2	36,8	49,5	55,9	45,1

age of 45 years, where significantly more men with low smoking indexes reported an attempt to decrease smoking than those with a high smoking index. The same associations were looked for with people who attempted to decrease smoking for health reasons when compared to those who did so for other reasons. Again only one group showed a significant association ($p<0,05$). These were the women older than 44 years, among whom a low smoking index was associated with more women attempting to decrease smoking for health reasons than was a high smoking index.

Attitudes to combatting the smoking habit were evaluated by including ten questions in the risk factor questionnaire (Appendix 8A). Of these, five were found to be associated with each other in concordance analyses and were

included in the attitudinal field. These were: (Positive attitude in brackets)

a Are men who smoke more masculine than those who do not smoke? (NO)

b Would most smokers like to stop smoking? (YES)

c Should one be allowed to smoke anywhere one likes? (NO)

d Should each packet of cigarettes carry a warning that smoking is unhealthy? (YES)

e Should smoking be prohibited in public areas such as bioscopes? (YES)

The questions that did not qualify were:

a Is it smart for ladies to smoke?

b Do people who stop smoking become fat?

c Does smoking calm one's nerves?

d Should people who take part in sport smoke?

e Do people who do not smoke usually live longer than those who do?

A participant's attitude to combatting the smoking habit is defined as positive when he responds positively to all five of the questions included. If positive responses were given to three or four questions the participant's attitude is defined as neutral, and it is negative when fewer than three positive responses were recorded. Table 10 shows the attitudes toward combatting the smoking habit of the study population. In all age groups men were more positive than women. Very few participants were negative to combatting smoking.

Table 10 Attitudes to combatting smoking

	ATTITUDES					
	% MEN			% WOMEN		
Age groups in years	Positive attitude	Neutral attitude	Negative attitude	Positive attitude	Neutral attitude	Negative attitude
15-24	41	55	4	35	53	14
24-34	46	41	14	39	49	12
35-44	43	46	5	30	56	13
45-54	41	54	5	37	53	10
55-64	42	45	13	33	61	5
15-64	43	48	8	35	54	11

To evaluate the effect of educational level on attitude to combatting smoking the participants were looked at in two groups with a standard eight level of education being the cut-off point. Figure 1 shows this effect. More participants with the higher level of education were positive to combatting smoking than those with lower level of education. The effect of the smoking pattern on the attitudes of the participants is shown in Table 11. More present smokers (13,5%) were negative to combatting smoking than the other two groups, but 36,5% had a positive attitude to decreasing the habit. As could be expected the greatest percentage of persons with a positive attitude (50%) was found in the group of previous smokers.

Table 11 The influence of the smoking pattern on the attitude to combatting smoking

	Smoke at present			Smoked previously			Never smoked		
Age group	Postitive%	Neutral%	Negative%	Positive%	Neutral%	Negative%	Positive%	Neutral%	Negative%
15-24	39,5	50,0	10,5	16,7	66,7	16,7	41,7	53,6	5,4
25-34	37,7	45,9	16,4	58,3	41,7	8,3	53,8	42,3	3,8
35-44	37,5	64,6	14,6	46,2	38,2	15,4	44,8	48,3	6,9
45-54	35,3	51,0	13,7	54,5	45,5	0	40,5	59,5	2,7
55-64	37,3	51,0	5,9	53	46,7	0	35,3	58,8	5,9
15-64	36,5	50,0	13,5	50,0	41,7	8,3	41,7	52,8	5,6

Figure 1 The effects of level of education on attitude to combatting smoking

Age groups in Years	Level of Education	Attitude: Positive %	Attitude: Neutral %	Attitude: Negative %
15-24	≤Std 7	33%	55%	12%
	≥Std 8	45%	50%	5%
25-34	<Std 7	35%	48%	17%
	≥Std 8	58%	39%	3%
35-44	≤Std 7	34%	54%	12%
	≥Std 8	42%	43%	15%
45-54	≤Std 7	38%	56%	7%
	≥Std 8	45%	45%	10%
55-64	≤Std 7	35%	55%	10%
	≥Std 8	54%	39%	7%
15-64	≤Std 7	35%	54%	11%
	≥Std 8	48%	44%	8%

8 CHD-RELATED MEDICAL HISTORY OF THE SMOKERS

Table 12 shows the CHD-associated medical histories of smokers, ex-smokers and non-smokers. There is a significant difference between ex-smokers and

Table 12 Comparison of CHD-associated history between smokers and non-smokers

	% Non-smokers A	% Ex-smokers B	% Smokers 1-19 cig/day C	% Smokers >20 cig/day D	Significant differences between: (p<0,01)
	N = 364	N = 113	N = 331	N = 154	
Reported CHD	4,1	11,5	4,5	5,2	A:B B:C
CHD by Questionnaire	12,4	20,4	16,6	22,7	A:B A:D
Stroke	1,1	3,54	0,6	0,7	Number too few for statistics
Hypertension	23,9	29,2	13,6	17,3	A:C B:C B:D
Obesity	20,3	22,1	10,9	12,3	A:C A:D B:C B:D
Family History	78,9	84,1	72,8	70,13	Not significantly different
Use of medical facilities in the last year	72,5	66,4	79,2	79,9	Not significantly different

non-smokers, and between ex-smokers and less than 20 cigarettes-a-day smokers when asked about angina or myocardial infarcts, but when CHD was determined by the London School of Hygiene questionnaire for chest pain, significantly more heavy smokers and ex-smokers ($\geq$20 cigarettes/day) were diagnosed as suffering from CHD when compared to non-smokers. This significant difference was also found in the following sub-groups of smokers: all female smokers, and females below 45 years of age. It was not found in any of the male groups or the older female group.

Non- and ex-smokers significantly more often than smokers, reported suffering from hypertension. This is an unexpected finding. Non- and ex-smokers reported being obese significantly more frequently than smokers. This was also found in the sub-groups of men and women smokers above 44 years of age.

9 FACTORS RELATED TO SMOKING

When comparing smokers to non-smokers with respect to a variety of factors related to CHD the results in Table 13 were found. Smokers consistently weighed significantly less than non-smokers as can be seen from the BMI differences. This significant difference was also seen in the group of men older than 45 years. Smokers had significantly lower HDL-cholesterol values than non-smokers. The effect of smoking on HDL-cholesterol seems to be dose-dependant as a low but significant negative correlation was shown between the number of cigarettes smoked, the smoking index of smokers, and HDL-cholesterol.

Table 13 Comparing a variety of CHD factors between smokers and non-smokers

Variable measured	Smokers' mean values	Non-smokers' mean values	t-test p-value
Body mass index	24,5	26,1	0,001
HDL-cholesterol in mmol/litre	1,45	1,53	0,005
Total serum cholesterol in mg/dl	218,8	223,8	Not significant
HDL/TC ratio	27	28	Not significant
			Mann-Whitney U test p-value
Occupancy rate	1,83	1,72	Not significant
CASS occupational category*	3,45	2,97	0,001
CASS prestige scale*	47,1	54,8	0,001

*Social class categories as defined in section 7 of Chapter III.

The measures of socio-economic class used (see section 7 of Chapter III) all showed smokers to be of lower socio-economic standing than non-smokers. Although not statistically significant, the occupancy rate of smokers was higher than that of non-smokers. CASS* Occupational Categories and CASS* Prestige Scale of Occupations as well as level of education (not shown in table) were found to be significantly different in smokers and non-smokers.

Alcohol consumption was significantly more often found in smokers than in non-smokers. Heavy smoking and amount of alcohol used seem to be associated as a low but significant correlation was found between the number of cigarettes smoked, the smoking index, and the amount of alcohol used.

There was no significant difference in energy expenditure at work or at leisure when comparing smokers and non-smokers. A weak significant association was found between number of cigarettes smoked and energy expenditure at work. An inversely low but significant relationship exists between the number of cigarettes smoked, the smoking index and energy expenditure on leisure activities. Both of these could be a reflection of the association of low social class and smoking.

Finally a low but significant association was seen between the number of cigarettes smoked, the smoking index and the serum triglyceride and uric acid levels.

The financial burden of this habit on the economically active coloureds (15 to 64 years) of the Cape Peninsula is enormous. In 1982 the cost of a South African produced packet of cigarettes in a café was 57 cents plus 5% tax. It can be calculated that the coloured population aged 15 to 64 of the Cape Peninsula spent roughly R36 164 000 on cigarettes in 1982. Most of the smokers are of the lower socio-economic classes. This money is spent to enable this population to develop the diseases associated with smoking that will cost industry dearly in loss of productivity and probably cost state funded and other medical services even more.

10 A SUMMARY OF THE FINDINGS IN THIS CHAPTER

A Of the men 61,3% were current smokers, only 26,2% had never smoked and 12,5% had stopped smoking.

B Of the women 41,4% were current smokers, 48% had never smoked and 10,6% had stopped smoking.

C In the younger age group the prevalence of smoking of women approached that of men. This was different in the older groups.

D Of the smokers 66,6% of men and 60,4% of women smoked more than ten cigarettes per day.

E All groups of smokers smoked more heavily during the weekends than during the week.

F The younger smokers started smoking earlier than the older smokers had done.

G The coloured smokers almost exclusively smoked filter cigarettes.

H In the previous year 44,4% of male and 49,5% of female smokers had attempted to decrease their use of tobacco, mostly for reasons of health.

I Most study participants had a positive attitude to combatting the smoking habit, but men more so than women, higher educated persons more so than lower educated persons.

J Smokers reported significantly more CHD as determined by the London School of Hygiene's questionnaire than non-smokers. This finding was not substantiated by direct questioning.

K Non-smokers were significantly more obese than smokers.

L Smokers had significantly lower HDL-cholesterol values than non-smokers. This was a dose-dependent response.

M Smokers were consistantly of lower socio-economic status than non-smokers.

N Smoking and alcohol consumption were found to be associated.

O A weak positive association was also found between cigarette smoking and serum non-fasting triglyceride and uric acid levels.

P The financial burden of smoking on this population, on industry and on medical services is enormous.

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CHAPTER VI

SERUM CHOLESTEROL IN THE COLOURED POPULATION OF THE CAPE PENINSULA

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CHAPTER VI

SERUM CHOLESTEROL IN THE COLOURED POPULATION OF THE CAPE PENINSULA

1 INTRODUCTION

The association between CHD and serum total cholesterol and LDL-cholesterol levels has been established and supported by many studies across the world such as the Pooling Project[1] and the Seven Country Study[2]. Despite the fact that this association has been found to be consistent, strong, graded and independent and that it has temporal relationship in that serum cholesterol is an excellent predictor of later CHD, it is one of the most hotly debated associations in medical science in the second half of this century.

It took the extensive Lipid Research Clinics Coronary Primary Prevention Trial[3] (LRC-CPP-trial) to finally prove that in men the reduction of serum cholesterol levels actually led to the reduction of CHD. After these results were published the National Institutes of Health in the USA called for an NIH Consensus Development Conference held in December 1984 to generate recommendations aimed at reducing the American populations' serum cholesterol levels to prevent heart disease[4]. Although the results of the LRC-CPP-trial are consistant with those of the Oslo heart study[5], the World Health Organisation Clofibrate Trial[6], the Los Angeles Veterans Administration Dietary Trial[7], the Leiden Intervention Trial[8] and the Ireland-Boston Diet-Heart Study[9] and other studies, there are still scientists who question

the need for reducing serum cholesterol levels to prevent heart disease in populations with high blood cholesterol[10-12]. Their arguments to circumvent the diet-heart hypothesis hinge around insufficient proof that lowering blood cholesterol will reduce heart disease in all groups of people and insufficient knowledge of the level of blood cholesterol that produces risk for CHD. With the vast body of knowledge supporting the diet-heart hypothesis and the general consensus that it is indeed valid, the argument is no longer whether, but when and how to reduce blood cholesterol. The loud protestations of those with contrary views are an impediment to the implementation of an effective prevention strategy for CHD.

From the results of the LRC-CPP-trial[3] it was estimated that as a general rule, each percent of cholesterol lowering results in a two-percent reduction in coronary risk.

In contrast some prospective studies[12-15], but not all[16,17], showed an inverse relationship between cancer mortality and plasma cholesterol, demonstrable at cholesterol levels below 180 mg/dl (4,65 mmol/litre). In some of the studies the statistical significance of this relationship decreases and disappears when deaths in the first six years of follow-up are excluded, leading to uncertainty as to which variable is the primary one[18,19]. There is also some evidence that low levels of serum cholesterol is associated with an increased risk of stroke[20].

Lowering serum cholesterol not only helps to reduce the risk of myocardial infarction (MI), but it can significantly affect the five-year prognosis of a male patient after the first MI[21] as well as the duration of patency of a coronary vein graft in surgery on a hyperlipidemic patient[22].

Overall the association between CHD and hypercholesterolaemia is clear, as is the need to reduce cholesterol levels in individuals and populations to levels that will remove the risk of CHD imparted by raised blood cholesterol.

2 DEFINITION OF HYPERCHOLESTEROLAEMIA

It has been clearly argued[17,23] that cut-off points traditionally used in most laboratories to diagnose hypercholesterolaemia can not be seen as representing those levels at which risk for CHD, ascribable to the level of serum cholesterol, is found. In fact in the Pooling Project[1] it was found that men with "mild" or "moderate" hypercholesterolaemia often labelled as within the "normal" range account for most of the populations' excess attributable risk for CHD ascribed to blood cholesterol levels.

The phenomenon of tracking with age[24] of blood cholesterol, now generally accepted, has brought the principle of age-specific cut-off points to the fore. This will diagnose those groups of younger persons who have the risk of developing CHD due to the level of their blood cholesterol. Previously they would have been labelled as having normal blood cholesterol levels.

To define the risk for CHD ascribable to hypercholesterolaemia in a population, one needs to look at more levels than the usual level of 6,5 mmol/litre of total serum cholesterol. CHD risk associated with mild hypercholesterolaemia, as suggested by the Pooling Project[1], was found at serum cholesterol levels above 5,7 mmol/litre. The best assessment of hypercholesterolaemia in a population would be achieved when age- and

sex-specific cut-off points for total serum cholesterol are used, as was suggested at two consensus workshops[17,24,25] in the USA and by Rossouw[23] for the South African situation.

3 PREVALENCES OF HYPERCHOLESTEROLAEMIA

The mean cholesterol levels in populations vary markedly across the globe[1,2]. Even within the same country different population groups have different mean cholesterol levels. It would appear that this is mostly lifestyle induced in populations. Blood cholesterol levels of migrating populations change as they change their lifestyles in general, and their diet in particular. In South Africa genetic factors seem to play a greater role than elsewhere in the world.

A Hypercholesterolaemia in southern African populations

Thirty years ago, in 1955, Brönte-Stewart showed in Cape Town in a small study[26] that the mean serum cholesterol of 6,05 mmol/litre in white males aged 40 to 58 years was higher than that of Cape coloureds (5,27 mmol/litre), or of blacks (4,29 mmol/litre). The situation has certainly not improved in the last thirty years, and Rossouw[23] has shown that in males and females of the CORIS white population study only 30% had total cholesterol levels freeing them of risk for CHD. In addition it was found in this white population that the 80th percentile of serum cholesterol distribution corresponded to that of the 95th percentile of the American values[24,27].

Initially it was thought that familial hypercholesterolaemia (FH) had an unusually high prevalence only in white South Africans in the Witwatersrand area[28,29] and that this could possibly be explained by a genetic isolate phenomenon as FH was mostly found in a single Afrikaans speaking religious denomination[30]. The study of Jooste[31] has raised the suspicion that the FH prevalence in more white South African populations could be as high as one in 60 of the population. Clearly then the high prevalence rate of FH contributes significantly, with lifestyle, to the high prevalence of hypercholesterolaemia in white South Africans who probably has the highest level in the world.

In the CORIS study 45,3% of males and 46,7% of females between the ages of 15 to 64 years[32] had cholesterol levels above 5,7 mmol/litre. On the Witwatersrand a group of 3 930 white miners aged 45 to 62 years showed a high prevalence of CHD risk factors, with 77% having at least one of the three major risk factors[33]. Of these men 32,3% had total cholesterol levels above 6,5 mmol/litre and 81,1% had levels of cholesterol suggestive of FH (≥7,75 mmol/litre). The mean total cholesterol for this group was 5,95 mmol/litre.

In black African communities who have a traditional diet the rise of serum cholesterol with age is much less marked than in westernised populations. For example in a study of 214 black male dockworkers in Cape Town (Dr P Jooste, Research Institute for Nutritional Diseases, Medical Research Council, Cape Town, unpublished data) following a traditional low fat diet the mean total cholesterol level was 4,35 mmol/litre and only the group of males above 60 years had mean cholesterol values above 5,7 mmol/litre. In a group of 2 503

black men doing either clerical or manual work the mean serum cholesterol was 4,35 mmol/litre for manual workers and 4,40 mmol/litre for clerical workers[34]. Seftel[35] reports similar low serum cholesterol values for blacks in Johannesburg. In a study in Zimbabwe[36] the mean serum cholesterol of a sample of 283 black men was 4,82 mmol/litre. The group was stratified by occupational status and in the more highly qualified occupations a higher total serum cholesterol level was found. This higher blood cholesterol level never approached that of 5,45 mmol/litre which was the level found for a group of 109 white men in the same study. Truswell[37] found a group of Kalahari Bushmen to have a mean cholesterol value of 2,84 mmol/litre.

In Durban, in an inter-racial study of angiographically proven CHD[38], it was found that hypercholesterolaemia was the only risk factor common to white, black and Indian patients with CHD. For the CHD patients participating in the study the mean serum cholesterol for the whites was 7,64 mmol/litre, for Indians 7,16 mmol/litre and for blacks, 5,85 mmol/litre.

Preliminary results in an CHD risk factor study in the Indian community in Durban (Dr S Khan, Dept of Medicine, University of Natal, unpublished data) found 27,4% of men and 23,1% of women aged 15 to 64 years to have cholesterol levels above 6,5 mmol/litre.

B Hypercholesterolaemia in other populations

The results of the Cooperative Lipoprotein Phenotyping Study[39], which included data of six epidemiological studies of participants aged 40 to 70 years in different populations, were published in 1977. Participants included

both men and women who were white, black and Japanese. Average cholesterol levels ranged from 5,17 mmol/litre in Puerto Rican men, to over 6,20 mmol/litre in Framingham women. Women at these ages had higher levels than men of the same populations. The Pooling Project[1] showed that men above 40 years of age, for all age groups had serum cholesterol values between 6,04 and 6,15 mmol/litre. From the large database of more than 3 million cholesterol determinations of the Melpath Clinical Laboratory[40] in the USA it was found that 41,6% of women and 34,2% of males of all ages tested had cholesterol levels above 6,5 mmol/litre. The weighted mean for men in this report was 6,25 mmol/litre and for women 6,51 mmol/litre. This report[40] indicated that physicians in the USA were seeing more patients with hyperlipidemia than with any other metabolic disorder.

Within the same geographic area people of different origins can have different levels of serum cholesterol. In Jerusalem[41] it was found that for a group of men aged 35 to 59 years the mean serum cholesterol levels for those born in Israel were 5,3 mmol/litre, for those born in Europe 5,2 mmol/litre, for those born in Asia 5,0 mmol/litre, and for those born in North Africa 4,95 mmol/litre. For the same age group of women in Jerusalem, those born in Israel and Europe also had higher serum cholesterol levels than those born in Asia and North Africa.

Some societies have remarkably low total serum cholesterol levels and also very low CHD prevalence; classically the Tarahumara Indians of Mexico[42] are quoted with their males having a mean level of 3,5 mmol/litre. In a Polynesian population in Rarotanga[43] only 5,8% had cholesterol levels above 6,5 mmol/litre.

One of the most significant studies showing the effect of lifestyle on serum cholesterol is the different serum cholesterol values of Japanese men, of the same origin, living in Japan, Hawaii and California. The Ni-Hon-San study[44] indicates the role of lifestyle in determining total serum cholesterol. In Japan the mean total cholesterol value was 4,65 mmol/litre. In Hawaii the value was 5,63 mmol/litre and in California it was 5,89 mmol/litre. Clearly the lifestyle in Japan had also changed between 1960 and 1980[45] as the levels of total cholesterol in 1980 were higher than those in 1960 by 0,26 mmol/litre to 0,39 mmol/litre in all age groups tested in 10 977 participants studied in many parts of Japan. In this study in 1980 the urban Japanese participants who now ate more fat annually, had higher total cholesterol levels than their rural counterparts eating a more traditional diet. The authors speculated that this could be explained by the westernisation of dietary patterns in the urban areas.

In population studies the association between high blood cholesterol and high prevalence of CHD has clearly been shown and a WHO report[46] and the previously mentioned Consensus Congress[17] considered population means of between 5 mmol/litre and 4,7 mmol/litre, as desirable and to be aimed at in population intervention programmes.

4 FACTORS ASSOCIATED WITH HYPERCHOLESTEROLAEMIA

Of all the factors associated with high total serum cholesterol the association with diet has resulted in more scientific research and more heated arguments than any other diet association in this century. Although the diet

heart hypothesis is now substantially proven, the influence of a number of dietary components on serum cholesterol levels still need clarification.

A Dietary factors and the diet heart hypothesis

From the quoted population surveys the process of westernisation of a population's diet is clearly associated with a rise in total serum cholesterol. The elements in the westernised diet that are associated with hypercholesterolaemia have been identified, initially, mostly by the work of Keys[47]. He formulated the Keys equation. The Keys score, derived from the Keys equation, reflects the overall hypercholesterolaemic effect of the diet. The score was generated from the ratio of the percentage calories (energy) from polyunsaturated and saturated fats, and the cholesterol intake of the diet. The Keys equation[48] was formulated to predict the size of diet induced change in serum cholesterol.

A special report of the American Heart Association (AHA)[25] in 1984 formulated the multifactorial dietary intervention necessary for reducing serum cholesterol levels in the American public as a whole. The dietary goals for the USA supported by the American Dietetic Association[49,50] correspond to these suggestions. The AHA recommendations also propose a lipid lowering diet for specific hypercholesterolaemic patients. The diet recommendations[51] involve an adjusted energy intake to achieve and maintain ideal body weight. In addition total fat, saturated fatty acids and cholesterol intake should be reduced in the following stepwise eating plan to achieve goal blood cholesterol levels.

Phase I: 30% of energy as fat, equal amounts of saturated, monosaturated, and polyunsaturated fatty acids, less than 300 mg cholesterol per day.

Phase II: 25% of energy as fat, equal distribution of types of fatty acids, between 200 to 250 mg cholesterol per day.

Phase III: 20% of energy as fat, equal distribution of types of fatty acids, between 100 to 150 mg cholesterol per day.

A number of other nutrients have also been found to affect the serum cholesterol level.

Barry Lewis[52] showed convincingly that soluble dietary fibre has an additive effect to the above fat-modified diet in lowering total serum cholesterol. Non-soluble dietary fibre like bran does not lower total serum cholesterol[53]. As a part of a heart disease prevention diet[54] the Canterbury Report advised the increased intake of fibre.

The enigma of the Eskimoes, with their high fat diet (fish and seal meat) and their low serum cholesterol and very low CHD prevalence is at present explained by the high intake of polyunsaturated fatty acids, especially eicosapentanoic acid (EPA). This fatty acid reduces serum cholesterol levels and depresses platelet aggregation[55] and thus also CHD. A South African study[55] and a Dutch study[56] leave no doubt about the desirability of eating more fish. The Dutch study[56] concluded that as little as one or two fish dishes per week may be of preventive value in relation to CHD.

Vegetable protein, when compared to animal protein, has a significant lowering effect on serum cholesterol levels in man[57]. Even when a low fat and low cholesterol diet is followed, the replacement of animal protein with soy-protein in this low fat diet leads to an additional lowering of total serum cholesterol[58]. The lysine/arginine ratio of the diet seems to be the determining factor[59].

With the exception of EPA, the previously described dietary factors that would lower serum cholesterol would combine effectively in a typical vegan diet and it is anticipated that vegans would have lower total serum cholesterol levels than non-vegans. A study by Kritchevsky[60] showed that strict vegans had the lowest total serum cholesterol when compared to lacto-ovo vegetarians and the omnivores studied. The latter had the highest total serum cholesterol. Similar findings for vegans were reported by Roshanai et al.[61].

Two large natural experiments also pointed to the association with the mentioned nutrients and CHD. Between 1950 and 1975 the traditional Japanese diet changed dramatically[62] with a 15-fold increase in consumption of milk, 7,5-fold increase of meat, poultry and eggs consumption, and 6-fold increase in fat usage. During this period the use of barley, potatoes and rice decreased. At the same time longevity decreased, total serum cholesterol increased and CHD mortality increased.

During periods of food deprivation following World Wars I and II[63] in West Germany myocardial infarctions were seldom seen and autopsy reports showing advanced atherosclerosis in arteries, were rare between 1945 and 1948 compared with 1939 to 1945. The average cholesterol levels of the starving peoples of

western and northern Europe was extremely low, with an average of 3,88 mmol/litre. The probable causes for this low serum cholesterol level were the low total energy consumption; the unavailability of fat, limiting intake to under 10g of oil or fat per day; the low consumption of animal protein (15-20g/day) and the abundance of high fibre vegetables. After 1948 when the diet changed the low cholesterol levels climbed rapidly and reached mean values comparable with those seen today[63].

Two other nutrients have been suggested to be associated with blood cholesterol. The Tromso Heart Study[64] found some indication that high caffeine intake raised serum cholesterol. There was some indication that high doses of vitamin C may reduce cholesterol[65]. Neither of these two findings have been substantiated.

In an editorial in Arteriosclerosis[66] Zilversmit stated that the argument about the diet-heart hypothesis has left the scientific community exhausted and the public confused. Two questions were asked[66]: (1) What level of evidence should one require in support of the presumed relation between diet and heart disease before the public is advised by the government or various medical groups that changes in diet may have beneficial results? (2) Why do only the "prudent diet" protagonists have to carry the full burden of proof?

With the available knowledge it seems prudent to advise populations to first adapt their diets to the suggested one, while final proof for the diet heart hypothesis, if not yet available, is awaited.

B Other factors associated with hypercholesterolaemia

Age and sex are both linked to total serum cholesterol levels, as has been seen in both cross-sectional and longitudinal studies. Total cholesterol levels increase with age. In the Framingham study[67] mean LDL-cholesterol increased from 2,6 to 3,88 mmol/litre (57%) in women, and from 2,89 to 3,72 mmol/litre (29%) in men between the ages of 20 to 64 years. In the Lipid Research Clinic's Program Prevalence study[68] the corresponding increases were approximately 40% in men and 45% in women. Similar increases have been demonstrated in many other populations. In old age LDL-cholesterol levels tend to decline again, this transition generally starting earlier in males than females. During puberty a slight decline is also found in total serum cholesterol in both sexes[69].

In pre-menopausal women the lower level of total cholesterol compared to men is ascribed to the protective effects of ovarian hormones. As would be anticipated these differences between men and women disappear after the menopause[70] as does the difference in risk for CHD.

The Tecumseh cross-sectional study[71] showed that total serum cholesterol and triglycerides are more dependent on the degree of adiposity of men and women, than on consumption of fat, sugar, starch, or alcohol. The Zutphen study[72] in the Netherlands showed the same association between weight and total serum cholesterol.

After controlling for smoking, BMI, and alcohol intake an independent association existed in participants studied in the Framingham study[73],

between LDL-cholesterol levels and serum calcium, hematocrit, lactate dehydrogenase, and the leucocyte count.

In a number of genetic hyperlipidaemias the total serum cholesterol may be raised[74,75]. The most common in South African whites is FH (Frederickson Type IIA) in which the cholesterol level can be above 20 mmol/litre in homozygotes. Total serum cholesterol can also be raised in polygenic hypercholesterolaemia and familial combined hyperlipidaemia. In several diseases such as Frederickson type III (broad beta disease), Type V, and familial lipoprotein lipase deficiencies (Type I) the total cholesterol can be raised, although only slightly in the latter disease.

Many drugs can affect the total serum cholesterol. The most common case is found in post-menopausal women on estrogen replacement therapy, which decreases their total serum cholesterol[76]. Other steroid compounds also affect the total serum cholesterol[76]. Many drugs used for hypertension affect the total serum cholesterol adversely. In the excellent review by Spence[77] the problem of this effect and its implication for CHD risk is highlighted.

Drugs in common clinical use for lowering total serum cholesterol include the bile acid sequestrants, the derivatives of fibric acid, nicotinic acid and its derivatives and probucol[78]. The development of the inhibitors of HMGCA reductase synthesis promises to be a positive development in treatment of severe hypercholesterolaemia[78,79].

Many clinical conditions can precede the development of hypercholesterolaemia. During pregnancy total cholesterol increases in the mother. The most common pathological condition leading to secondary hypercholesterolaemia is diabetes, also common is hypothyroidism. When hypercholesterolaemia is diagnosed the many causes that can lead to hypercholesterolaemia must be excluded or treated before an attempt is made to lower the patient's cholesterol by means other than a diet.

5 A SUMMARY OF ASPECTS OF HYPERCHOLESTEROLAEMIA EVALUATED IN THIS STUDY

A The validity of the total and LDL-cholesterol measurements.

B Levels of total and LDL-cholesterol in the study population.

C Prevalence of hypercholesterolaemia defined in four ways.

D Comparison of hypercholesterolaemia prevalence with that in other populations.

E Hypercholesterolaemia-associated medical history of the study population.

F The population's efforts to control its blood cholesterol levels and its knowledge of, and attitudes to hypercholesterolaemic control.

G Dietary factors associated with hypercholesterolaemia in the study population.

H Other factors associated with hypercholesterolaemia in the study population.

6 VALIDITY OF THE SERUM CHOLESTEROL MEASUREMENTS

The procedure followed in this study to validate the serum cholesterol readings is discussed in Chapter II:4. The within batch variation was standardised against the two control samples included for analysis in each batch.

The variability of total serum cholesterol determinations at two visits at least seven days apart, was reflected in Pearsons' correlation coefficient of 0,88 for the first and second reading in a random sub-sample of one hundred participants.

7 CHOLESTEROL LEVELS IN THE STUDY POPULATION

From the earlier small study[26] in 1953 in this population group a cholesterol level lower than that of the whites would have been expected.

A Mean total and LDL-cholesterol levels in the study population

Table 1 shows the mean total and LDL-cholesterol levels. The LDL-cholesterol levels were calculated using the Friedewald equation[80], which takes into account the triglyceride levels. Triglyceride levels above 400 mg/dl (4,56 mmol/litre) were not used for this calculation since LDL-cholesterol levels cannot be calculated accurately above this triglyceride level.

Table 1 The total and LDL-cholesterol levels in the study populations

	MEN				WOMEN			
Age group in years	Number in the group	mean total choles-terol mmol/ℓ + SD	Number in the group	mean LDL-choles-terol mmol/ℓ +SD	Number in the group	mean total choles-terol mmol/ℓ +SD	Number in the group	mean LDL-choles-terol mmol/ℓ +SD
15-24	94	4,65 ±0,72	93	2,66 ±0,62	103	4,82 ±0,72	103	2,71 ±0,67
25-34	96	5,18 ±1,09	91	3,31 ±0,96	94	5,27 ±1,01	94	3,10 ±0,90
35-44	103	5,94 ±1,27	94	3,51 ±1,06	112	5,78 ±1,08	110	3,49 ±0,96
45-54	95	6,10 ±1,42	84	3,51 ±1,09	94	6,30 ±1,27	90	3,82 ±1,17
55-64	90	6,18 ±1,19	83	3,64 ±1,11	95	6,69 ±1,19	88	4,00 ±1,34

For both men and women the total and LDL-cholesterol increased with age. For men from 25 to 44 years both their total and LDL-cholesterol was higher than that of women of the same age. For all the other age groups the levels of total and LDL-cholesterol were higher in women than in men. The standard deviations in the older age groups were larger than those of the younger age groups.

In 1955 the mean cholesterol level of a group of coloured men aged 40 to 58 years was 5,27 mmol/litre[26]. In 1982 in a sub-group of men aged 40 to 58 years of this study population the mean cholesterol level was 6,13 mmol/litre. Although a part of the difference may be explained by

different techniques of cholesterol determination, it is more likely that the rise in mean cholesterol level in this group of men over a 27-year period reflects a population that had, in 1982 a higher cholesterol level than that of the same population in 1955.

B Prevalence of hypercholesterolaemia in the study population

For the purpose of this study hypercholesterolaemia is defined in four ways. Firstly the usual 6,5 mmol/litre (250 mg/dl) (Level A) cut-off point was considered. Secondly a lower level, 5,7 mmol/litre (220 mg/dl) (Level B) above which risk for CHD is present[1], is also considered. Thirdly, age specific cut-off points (Level C) as suggested by Rossouw et al.[23] were used to indicate all persons at risk for developing CHD ascribable to the level of their total serum cholesterol. Finally the prevalence of participants with total cholesterol levels above the 80th percentile reported by Rossouw[23] for the sex and age category of the CORIS population, is given. This group of participants warrants further investigation for genetic FH. Table 2 and Figure 1 show the prevalence of hypercholesterolaemia in the coloured population as defined by the above four criteria. The populations against which age adjustements were made, are described in Chapter IV Section 7:B.

With the usual cut-off point A ($\geq$6,5 mmol/litre) the prevalence of hypercholesterolaemia for men increases for each successive age category up to 44 years and thereafter a levelling out of the prevalence rates is seen. The age corrected rate shows that 17,3% of the coloured males of the Cape Peninsula are hypercholesterolaemic (A). Using the same cut-off point for women the prevalence rate increased with each successive age category, with

Figure 1 Prevalence of hypercholesterolemia in coloureds

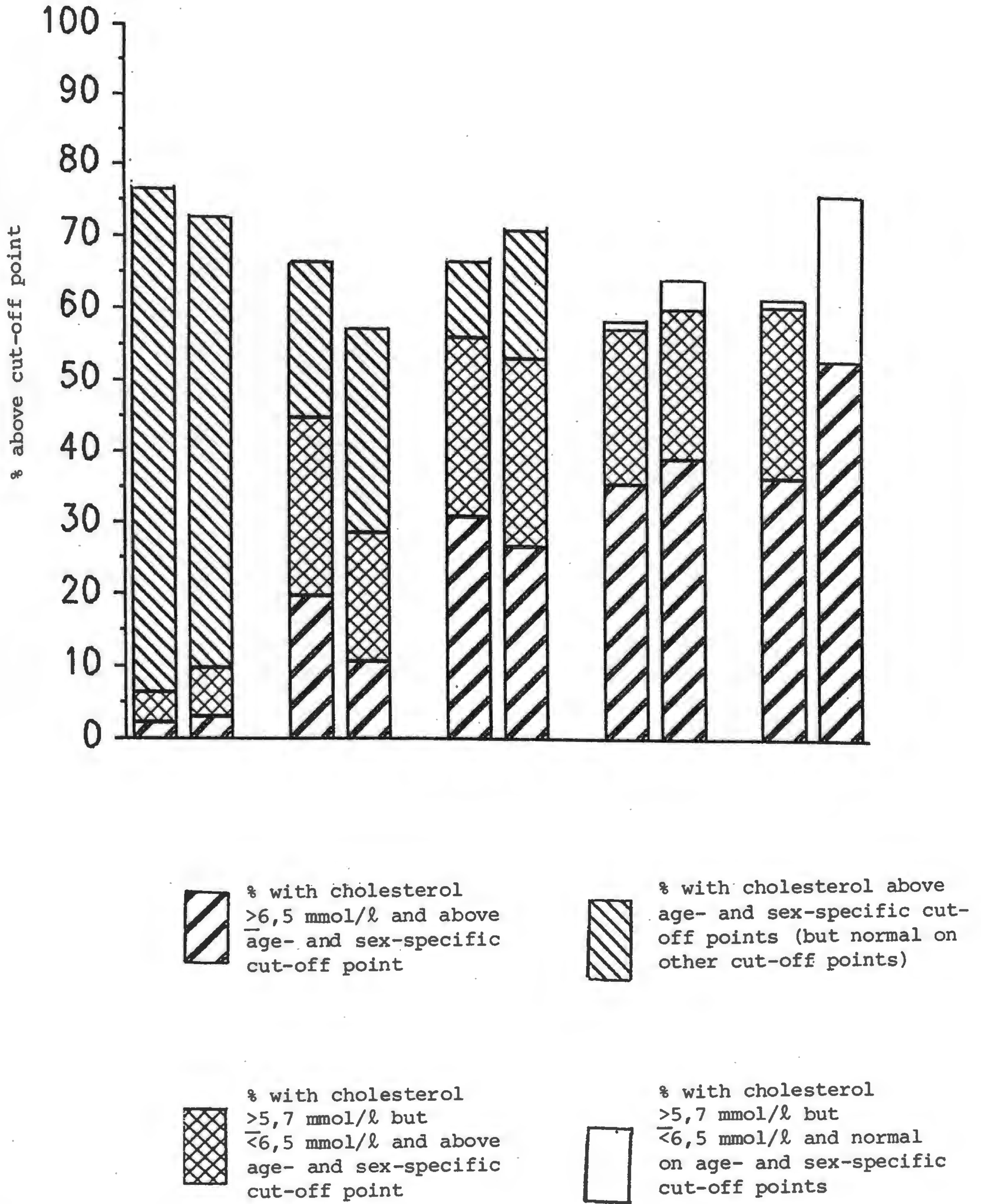


Table 2 Prevalence of hypercholesterolaemia in the study population

	% MEN				% WOMEN			
Age group in years	Level A cholesterol ≥6,5mmol/ℓ	Level B cholesterol ≥5,7mmol/ℓ	Level C age-specific cut-off points	More than Coris 80th percentile	Level A cholesterol ≥6,5mmolℓ	Level B cholesterol ≥5,7mmol/ℓ	Level C age-specific cut-off points	More than Coris 80th percentile
15-24	1,1	6,4	76,6	24,5	1,9	9,7	72,8	12,6
25-34	19,8	44,8	66,7	13,5	10,6	28,7	57,4	12,8
35-44	31,1	56,3	67,0	17,5	26,8	53,6	71,4	17,9
45-54	35,8	58,9	57,9	16,8	39,4	64,9	60,6	12,7
55-64	36,7	62,2	61,1	16,7	53,7	76,8	53,7	10,5
15-64 Crude rate	25,1	45,8	65,9	17,8	26,1	46,4	63,7	13,5
Cape Peninsula coloured rate	17,3	34,3	69,3	19,2	16,1	32,8	66,0	13,4
SA coloured rate	17,4	34,5	69,2	19,1	16,2	32,9	65,9	13,4
Standard million rate	22,3	42,0	67,1	18,2	22,7	41,7	64,1	13,4

53,7% of women from 55 to 64 years being hypercholesterolaemic and overall the age corrected hypercholesterolaemic (A) rate for women was 16,1%.

When using cut-off point B ($\geq$5,7 mmol/litre) a similar prevalence increase with age was seen for both men and women. The age-corrected prevalence rate of hypercholesterolaemia (B) for men was 34,3% and for women 32,8%.

The age- and sex-specific cut-off points used, defined a hypercholesterolaemia problem of a totally different magnitude in the coloured population of the Cape Peninsula. Serum total cholesterol tracks with age[81,82], thus persons with high blood cholesterol when young are likely to have high blood cholesterol for the rest of their lives and are therefore at risk for developing CHD. The age-specific cut-off points suggested by Rossouw _et al._[23] aim to identify individuals of all ages who are at risk for developing CHD.

When attempting to look at hypercholesterolaemia in this manner the burden of CHD risk due to hypercholesterolaemia in the coloured population is enormous. The age corrected rate shows that 69,3% of men and 66,0% of women in this population were hypercholesterolaemic and thus at risk for developing CHD. Of the three major risk factors for CHD, hypercholesterolaemia was found in a larger proportion of the study population than either smoking or hypertension and may thus even be the largest contributing factor to CHD mortality in this population. The highest prevalence of age-specific hypercholesterolaemia was diagnosed for men and women from 15 to 24 years. This could be due to inappropriate cut-off points, or it could reflect a population in which the young people have more hypercholesterolaemia than their elders.

The age-corrected rate of persons above the CORIS 80th percentile who warrant further investigation for genetic FH, was 19,2% for men and 13,4% for women.

8 A COMPARISON OF HYPERCHOLESTEROLAEMIA PREVALENCE WITH THAT IN OTHER POPULATIONS

When the mean cholesterol levels of urban coloureds measured in 1982 are compared to those of a white rural population (the CORIS study[23]), for the age groups studied no significant differences are observed. This can be seen in Figure 2.

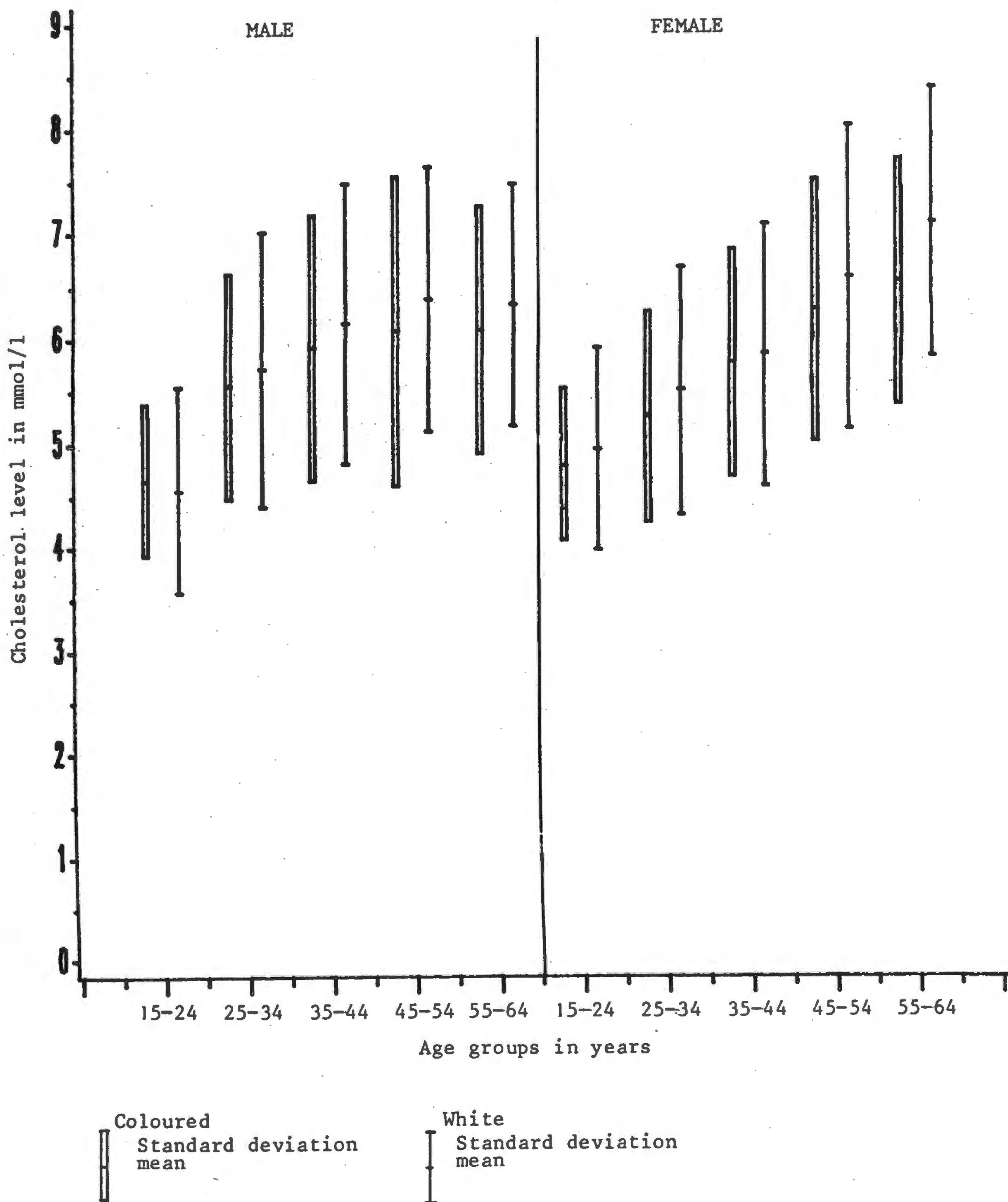
Of the coloured males aged 45 to 64 years 36% had cholesterol levels above 6,5 mmol/litre. This is a higher prevalence than that reported for white miners[33] aged 45 to 62 years of 32,3%.

The serum values reported for blacks in South Africa[34-36] are all well below those of the coloureds' mean total serum cholesterol in this study.

The prevalence of hypercholesterolaemia above 6,5 mmol/litre in a preliminary study in Durban Indians was similar to that found in the coloureds of the Cape Peninsula.

From the foregoing it would seem that the total serum cholesterol levels of coloureds, whites and Indians in this country are very similar. Rossouw *et al.*[23] showed that the levels in South African whites (CORIS study) were higher than those of the Americans reported in the Lipid Research Clinics and Bogalusa studies. Therefore the coloureds of the Cape Peninsula will also

Figure 2 Comparison of mean cholesterol values in coloureds and whites in the Cape



have higher total serum cholesterol levels than Americans and must compete with the South African whites for the position of population group with the highest total serum cholesterol level known.

9 HYPERCHOLESTEROLAEMIA-ASSOCIATED MEDICAL HISTORY OF THE STUDY POPULATION

To look for associations between hypercholesterolaemia and CHD-related medical history each of three prescribed cut-off points were used to classify a participant as hypercholesterolaemic or not. Then a comparison was made between hyper- and normocholesterolaemic participants with respect to their CHD-related medical histories. The use of cut-off points A and B does not take age into consideration and thus associations found to be significant using these cut-off points may be spurious if not also found when using cut-off point C which is age specific. Significant differences were found between the two groups, for the items indicated in Table 3.

A participant's self-reported CHD was significantly more often found in the hypercholesterolaemic groups of men than in normocholesterolaemic men, whichever of the three cut-off points were used to define hypercholesterolaemia. When the whole group and women were compared only cut-off points A and B distinguished between hyper- and normocholesterolaemic participants with CHD and others.

Only cut-off point A (6,5 mmol/litre) distinguished between participants who reported suffering from hypercholesterolaemia and other participants. This is not surprising as most laboratories use this cut-off point for the diagnosis of hypercholesterolaemia.

Table 3 Comparison of CHD-associated medical history of hyper- and normocholesterolaemic participants

	Group	Hypercholesterolaemia cut-off points A $\geq$ 6,5mmol/ℓ	B $\geq$ 5,7mmol/ℓ	C Age-specific
		p-value	p-value	p-value
Reported history of CHD	All	0,0001	0,0001	NS
	Men	0,0001	0,0001	0,375
	Women	0,369	0,0001	NS
Reported hypercholes-terolaemia	All	0,0383*	NS*	NS*
	Men	NS*	NS*	NS*
	Women	NS*	NS*	NS*
Family history of CHD	All	0,0006	0,0007	0,0102
	Men	0,0704 NS	0,0021	0,0092
	Women	0,0029	0,0828 NS	NS
Hypertension	All	0,0001	0,0001	NS
	Men	0,0001	0,0002	NS
	Women	0,0001	0,0001	NS
Diabetes	All	0,0001	0,0026	NS
	Men	0,0016	0,0266	NS
	Women	0,0069	0,0411	NS
Stroke All three groups		NS*	NS*	NS*

All values CHI-square test except for * where Fisher's exact test was used.

All three of the cut-off points distinguished between hypercholesterolaemics and normocholesterolaemic participants with respect to a family history of CHD. The former had more positive CHD family histories than the latter. Of all the features of CHD-related medical history reported on in this study, only CHD family history does not increase with age. It is thus of interest to note that cut-off point C, which is age-specific, in the whole group and in men, distinguishes statistically significantly between hypercholesterolaemics with more family history of CHD, and normocholesterolaemics, with less family history of CHD.

Hypercholesterolaemic groups defined by both cut-off points A and B had significantly more hypertension and diabetes than normocholesterolaemic groups of participants. This once again points to a possible clustering of CHD risk factors in certain individuals. These differences were not found when using the age-specific cut-off point C. One could assume that the spurious association found with cut-off points A and B was due to the effect of age and not a true association. A history of stroke is not associated with hypercholesterolaemia in this study.

10 STUDY POPULATION'S ATTEMPTS AT, ATTITUDES TO, AND KNOWLEDGE OF DIET MODIFICATION TO CHANGE SERUM CHOLESTEROL

When asked if the participants had modified their diet in the past 12 months to prevent heart disease, 16,5% of men and 21,7% of women answered in the affirmative. Both men and women in the older age categories of between 45 and 64 years, answered in the affirmative more often than did younger participants.

When asked what they had eaten to prevent heart disease, the answers given in Table 4 were recorded. In each case it was older participants who reported dietary adaptations more frequently than did the younger ones.

The persons who reported having tried to adapt their diet significantly more often attended medical services, than people who did not try.

Table 4 Attempts to modify diet to prevent heart disease

	MALES		FEMALES 498	
	Number	%	Number	%
Persons who reported modifying their diet	79	16,5	108	21,7
Persons who ate less fat	67	14,0	95	19,1
Persons who ate soft margarine	15	3,1	27	5,4
Persons who ate less cholesterol	22	4,6	21	4,2
Persons who lost weight	29	6,1	46	9,2

Eleven questions were asked about the elements of a healthy diet to protect against heart disease. (See the risk factor questionnaire). The total count of each correct item for each participant will be referred to as the knowledge index of that participant and the values found are shown in Table 5.

Table 5 Knowledge index of participants

	MEN	WOMEN
Age group in years	Median value	Median value
15-24	6	7
25-34	7	7
35-44	7	7
45-54	6	8
55-64	7	6
15-64	7	7

After expressing the participants' knowledge index as a percentage, the following three categories were chosen.

Little knowledge	0-55%
Average knowledge	56-75%
Very knowledgeable	75-100%

The categories were then grouped according to educational levels of above and below standard seven. Table 6 shows these categories and indicates that the higher level of education was found to be associated with a higher knowledge index.

Table 6 The association between level of education and knowledge index of participants

		% MEN					% WOMEN				
Level of education	Knowledge index	15-24 years	25-34 years	35-44 years	45-54 years	55-64 years	15-24 years	25-34 years	35-44 years	45-54 years	55-64 years
Std 7 and lower	Low	23	31	29	36	33	33	28	25	32	42
	Average	18	20	20	26	28	19	32	33	28	37
	High	13	13	16	9	17	10	10	20	27	13
Std 8 and higher	Low	16	6	5	9	4	10	3	7	1	0
	Average	21	19	15	14	12	20	14	10	9	5
	High	7	11	15	5	6	8	14	6	4	3
TOTAL		100	100	100	99	100	101	100	100	101	100

The attitudes to changing dietary habits were evaluated by including ten questions in the risk factor questionnaire (Appendix II:8:A). Of these five were found to be associated with each other in concordance analysis and were included in the attitudinal field. These were: (positive attitude in brackets)

1 Should only people who are overweight or who suffer from heart disease eat in a healthy way? (No)

2 Can one eat whatever one wants as long as one eats enough? (No)

3 Is expensive food healthier than cheaper food? (No)

4 Is too much fuss made nowadays about what one should eat? (No)

5 Are people taught enough about how to eat in a healthy way? (Yes)

The questions that did not qualify were:

1 Is too much fuss being made about the dangers of fatty foods for heart diseases?

2 Are most people fat by nature?

3 Is it as good to take slimming tablets as it is to change one's diet when one is overweight?

4 Is it necessary for children who do not like vegetables to eat them?

Table 7 The association between level of education and attitude to a healthy eating pattern in the study participants

Level of education	Knowledge index	% MEN					% WOMEN				
		15-24 years	25-34 years	35-44 years	45-54 years	55-64 years	15-24 years	25-34 years	35-44 years	45-54 years	55-64 years
Std 7 and lower	Positive	13	17	21	26	31	23	30	22	28	34
	Neutral	18	26	23	18	21	17	19	30	26	24
	Negative	23	21	21	27	25	22	20	25	33	34
Std 8 and higher	Positive	13	22	17	9	6	17	15	10	5	2
	Neutral	19	7	11	7	6	15	12	8	7	5
	Negative	14	7	6	12	11	7	4	4	1	1
TOTAL		100	100	99	99	100	101	100	101	100	100

5 Do fat people have the same chance as other people of living a long life?

A person's attitude to changing dietary habits is defined as positive when he responds positively to four or five items included in the attitudinal field; defined as neutral when he responds positively to three items and negative if he responds positively to nil, one or two items in the attitudinal field.

Table 7 shows that participants with an educational level above standard seven generally had a more positive attitude to a healthy diet than did those participants with a lower level of education.

A discriminant analysis was done in an attempt to discriminate between the three attitudinal categories and four variables, i.e. total cholesterol, systolic and diastolic blood pressure and BMI. Not one of these independent variables could be shown to play a major part with respect to the attitude to a healthy eating pattern in this study.

11 FACTORS RELATED TO TOTAL SERUM CHOLESTEROL

Dietary factors seem to play a determining role in the total serum cholesterol level of the participants.

A Dietary factors related to total serum cholesterol

The three methods of defining hypercholesterolaemia were also employed when looking for dietary factors that were associated with hypercholesterolaemia.

One should again keep in mind that spurious associations, due to age, might be identified by the use of cut-off points A and B if not substantiated by cut-off point C which is age-specific. The dietary intake of nutrients relating to hypercholesterolaemia of the three groups of hypercholesterolaemic participants was compared to those of the three groups of normocholesterolaemic patients.

1 Nutrients and hypercholesterolaemia: cut-off point 6,5 mmol/litre (250 mg/dl)

Table 8 shows the significant differences when using cut-off point A (6,5 mmol/litre) to distinguish between normo- and hypercholesterolaemic participants. When looking at the group as a whole and at all the males, significantly higher intakes of total protein, animal protein and saturated fat expressed per 1 000 kcal intake, were found in hypercholesterolaemics compared to normocholesterolaemics. In the group as a whole normocholesterolaemic participants consumed more unsaturated fat per day than did hypercholesterolaemic participants. The Keys score of hypercholesterolaemic patients' diets was higher, and the P/S ratios of their diets was lower than for normocholesterolaemic participants' diets. In the case of females these differences were also present, but did not reach statistical significance. Normocholesterolaemic females consumed significantly more cholesterol per day than did their hypercholesterolaemic counterparts. Many of these significant associations between hypercholesterolaemic and nutrient intakes became more prominent when looking

Table 8 Comparison of nutrient intake of normo- and hypercholesterolaemic participants. Cut-off point 6,5 mmol/litre

	ALL PARTICIPANTS			MALES			FEMALES		
	Normo-choles-terol-aemic N=725	Hyper-choles-terol aemic N-251	t-test p-value	Normo-choles-terol-aemic N=358	Hyper-choles-terol-aemic N=121	t-test p-value	Normo-choles-terol-aemic N-367	Hyper-choles-terol-aemic N-131	t-test p-value
g protein intake/day	72,6	72,1	0,86	84,1	86,3	0,58	61,3	59,2	0,45
g protein intake/1000kcal	37,0	39,2	0,0069*	36,7	39,6	0,0156*	37,3	38,9	0,15
g animal protein/day	50,1	51,3	0,574	57,7	61,8	0,2395	42,7	41,7	0,72
g animal protein/1000kcal	25,6	28	0,085*	25,3	28,4	0,0187*	26,0	27,7	0,167
g saturated fat/day	25,9	26,3	0,7098	29,5	31,2	0,2963	22,3	21,7	0,685
g saturated fat/1000kcal	12,7	13,5	0,005*	12,5	13,7	0,007*	12,8	13,3	0,214
g unsaturated fat/day	20,5	18,2	0,0162*	23,4	21,2	0,1319	17,7	15,5	0,058
g unsaturated fat/1000kcal	9,94	9,35	0,0526	9,73	9,23	0,2746	10,1	9,4	0,0969
P/S ratio of diet	0,86	0,77	0,0064*	0,86	0,76	0,0359*	0,87	0,79	0,77
mg cholesterol intake/day	313,8	311	0,8812	351	401	0,101	277,6	228,8	0,0317
mg cholesterol intake/1000kcal	159,8	161,9	0,8128	156	178	0,115	163,2	147,1	0,178
Keys score	35,1	38	0,0041*	34,75	39,4	0,002*	35,3	36,8	0,343

*Statistically significant differences

Table 9 Comparison of nutrient intake of normo- and hypercholesterolaemic participants. Cut-off point 5,7 mmol/litre

	ALL PARTICIPANTS			MALES			FEMALES		
	Normo-cholesterol-aemic N=526	Hyper-cholesterol aemic N-450	t-test p-value	Normo-cholesterol-aemic N=296	Hyper-cholesterol-aemic N=236	t-test p-value	Normo-cholesterol-aemic N-230	Hyper-cholesterol-aemic N-214	t-test p-value
Total calorie intake/day	2039	1895	0,0116*	2356	2236	0,145	1732	1572	0,019*
g protein intake/day	73,0	71,9	0,63	83,6	85,9	0,52	62,6	58,6	0,124
g protein intake/1000kcal	36,5	38,8	0,0013*	36	39,2	0,0016*	37	38,5	0,1502
g animal protein/day	50	50,9	0,65	56,7	61,1	0,151	43,4	41,2	0,308
g animal protein/1000kcal	25,1	27,6	0,0024*	24,5	27,9	0,0024*	25,8	27,2	0,1981
g plant protein/day	22,9	20,9	0,0129*	26,7	24,6	0,095	19,2	17,4	0,0409*
g plant protein/1000kcal	11,3	11,2	0,74	11,4	11,2	0,63	11,22	11,22	0,987
g saturated fat/day	26,3	25,6	0,43*	29,9	30,0	0,935	22,9	21,3	0,214
g saturated fat/1000kcal	12,6	13,2	0,0365*	12,4	13,2	0,039*	12,8	13,1	0,389
g unsaturated fat/day	21,2	18,5	0,0015*	23,9	21,7	0,090	18,5	15,5	0,0029
g unsaturated fat/1000kcal	10,1	9,5	0,032*	9,74	9,46	0,456	10,4	9,5	0,0229*
P/S ratio	0,87	0,80	0,0103	0,86	0,80	0,1498	0,89	0,80	0,029*
mg cholesterol/day	326	298	0,098	361	367	0,815	292,2	233	0,0031*
mg cholesterol/1000kcal	165	156	0,260	160	164	0,779	168,6	147,8	0,0479
Keys score	35,07	36,79	0,0512	34,7	37,4	0,037*	35,5	36,2	0,5225

*Statistical significant differences

at the groups of males and females above 45 years of age, and insignificant in the males and females below this age.

Other nutrient intakes that did not show significant differences when comparing the two groups were: total calorie intake, plant protein intake, total fat intake and fibre intake.

2 <u>Nutrients and hypercholesterolaemia: cut-off point 5,7 mmol/litre (220 mg/dl)</u>

Table 9 shows the significant differences when using cut-off point B (5,7 mmol/litre) to distinguish between normo- and hypercholesterolaemic participants.

When looking at the group as a whole the normocholesterolaemic participants consumed significantly more total kilocalories per day, more plant protein per day, more unsaturated fat per day, and had a higher P/S ratio diet than did their hypercholesterolaemic counterparts. The latter consumed significantly more total and animal protein and saturated fat per 1 000 kcal than did normocholesterolaemic participants. In the case of male participants, hypercholesterolaemics had a significantly higher intake of total protein, animal protein and saturated fat/1 000 kcal, as well as a higher dietary Keys score than did normocholesterolaemics. Normocholesterolaemic females consumed more total calories, plant protein, unsaturated fat, and cholesterol per day and had a diet with a higher P/S ratio than did the hypercholesterolaemic females. There were no significant differences between the two groups of participants in their intake of total fat and total fibre. As reported

Table 10 Comparison of nutrient intake of normo- and hypercholesterolaemic participants. Cut-off point age- and sex-specific

	ALL PARTICIPANTS			MALES			FEMALES		
	Normo-choles-terol-aemic N=344	Hyper-choles-terol aemic N-632	t-test p-value	Normo-choles-terol-aemic N=163	Hyper-choles-terol-aemic N=315	t-test p-value	Normo-choles-terol-aemic N-181	Hyper-choles-terol-aemic N-317	t-test p-value
g total fat intake/day	79,7	84,9	0,086	92,8	98	0,248	67,8	71,8	0,286
g total fat intake/1000kcal	40,5	41,3	0,2126	39,7	41,7	0,035*	41,3	41,0	0,707
g saturated fat intake/day	24	27	0,0036*	28,1	30,9	0,060	20,4	23,2	0,0337*
g saturated fat intake/1000kcal	12,3	13,2	0,0006*	12,14	13,12	0,0152*	12,36	13,26	0,0151*
P/S ratio of the diet	0,87	0,87	0,065	0,82	0,84	0,605	0,93	0,80	0,0022*
Keys score	34,2	36,7	0,0067*	34,3	36,8	0,073	34,2	36,7	0,0417*

*Statistical significant differences

before, these significant differences became more pronounced in both males and females over the age of 45 years, and less so in the younger age groups.

3 Nutrients and hypercholesterolaemia: age- and sex-specific cut-off points

Table 10 shows the significant differences when using cut-off point C, age- and sex-specific cut-off points, to distinguish between normo- and hypercholesterolaemic participants.

For the group as a whole the hypercholesterolaemic participants consumed significantly more saturated fat per day and per 1 000 kcal as well as the Keys score of their diet was higher than that of their normocholesterolaemic counterparts. The intake of total fat of the hypercholesterolaemic males was significantly higher than that of the normocholesterolaemic males. In the case of hypercholesterolaemic females their intake of saturated fat per day and per 1 000 kcal as well as the Keys score of their diet was significantly higher and the P/S ratio of their diet was significantly lower than that of normocholesterolaemic females. When using cut-off point C the following nutrients were not significantly different when comparing the two groups of participants: total calorie intake, total animal and plant protein, unsaturated fat intake, total cholesterol intake and fibre intake.

Again the significant differences between the two groups became more pronounced when comparing men and women above 45 years and less pronounced or absent in the groups below 45 years. These findings seem to suggest that in this study the influence of diet on the total serum cholesterol level was more pronounced in the persons above 45 years and less in younger persons.

4 Hypercholesterolaemia and the prudent diet

The Keys score of the prudent diet is calculated to be below 28. To evaluate the benefit of complying with a prudent diet in this study, an association between not following a prudent diet and hypercholesterolaemia was looked for. Table 11 shows the significant associations between hypercholesterolaemia and a non-prudent diet.

Table 11 Probability of hypercholesterolaemia being associated with a Keys score ≥ 28 (CHI - square test)

	Hypercholesterolaemia cut-off points		
Groups compared	A $\geq$6,5mmol/ℓ p-value	B $\geq$5,7mmol/ℓ p-value	C Age- and sex-specific p-value
All participants	0,0112	0,0467	-0,0491*
All males	0,0085	0,0232	NS
Males < 45 years	0,0129	0,0238	NS
Males $\geq$ 45 years	NS	NS	NS
All females	NS	NS	NS
Females < 45 years	NS	NS	NS
Females $\geq$ 45 years	NS	NS	NS

*Significantly associated with normocholesterolaemia

The probability of being hypercholesterolaemic if the participant followed a diet with a Keys score above 28 was significantly higher in the group as a whole than in all the males and the males younger than 45 years when using cut-off points A and B. In the case of cut-off point C just the opposite was

Table 12 Comparison of habitual food intake of normo- and hypercholesterolaemic participants: age- and sex-specific cut-off points

	ALL PARTICIPANTS			MALES			FEMALES		
	Normo-choles-terol-aemic N=344	Hyper-choles-terol aemic N-632	t-test p-value	Normo-choles-terol-aemic N=163	Hyper-choles-terol-aemic N=315	t-test p-value	Normo-choles-terol-aemic N-181	Hyper-choles-terol-aemic N-317	t-test p-value
Daily food cholesterol index	223,6	237,8	0,059	253,2	254,6	0,904	196,9	221,2	0,0064*
P/S ratio index	0,2	0,185	0,007*	0,196	0,185	0,062	0,205	0,185	0,0043*
Total fat index	60,3	61,1	0,612	67,9	67,5	0,857	53,4	54,9	0,452

*Statistical significant differences

found and the association of a prudent diet and normocholesterolaemia could not be substantiated.

5 Habitual nutrient intake associated with hypercholesterolaemia

The habitual nutrient intake usually associated with hypercholesterolaemia was evaluated by generating arbitrary habitual food intake indices from questions asked on habitual intake (see questionnaire Chapter II). Only when the age- and sex-specific cut-off points C were used, were the significant differences as shown in Table 12, found.

The habitual P/S ratio index of the hypercholesterolaemic participants was lower than those of the normocholesterolaemic participants in the group as a whole and in the females. The hypercholesterolaemic females also had a significantly higher daily food cholesterol index than did the normocholesterolaemic females.

6 Nutrient intake calculated from 24-hour dietary recall interviews and total serum cholesterol

When comparing the nutrient intake calculated from the 24-hour dietary recall with the total serum and LDL-cholesterol levels of the participants, very low but significant, associations were found. These are shown in Table 13.

Table 13 Association between nutrients and total serum cholesterol levels

	Total serum cholesterol		LDL-cholesterol	
Nutrient	Pearson's correlation coefficient	p-value	Pearson's correlation coefficient	p-value
Total daily calories	-0,1132	0,0004	-0,0867	0,0081
% Energy from protein	0,1250	0,0001	0,0921	0,0049
Total protein/1000kcal	0,1250	0,0001	0,0921	0,0049
% Energy from animal protein	0,1285	0,0001	0,0930	0,0045
Animal protein/1000kcal	0,1285	0,0001	0,0930	0,0045
Daily plant protein	-0,1225	0,0001	-0,0863	0,0085
Daily total fat	-0,0836	0,0090	-0,069	0,0354
% Energy from saturated fat	0,0922	0,0039	0,0843	0,0101
Saturated fat/1000kcal	0,0922	0,0039	0,0843	0,0101
Daily polyunsaturated	-0,1264	0,0001	-0,11256	0,0006
% Energy from unsaturated fat	-0,0697	0,0294	-0,0693	0,0345
Unsaturated fat/1000kcal	-0,0697	0,0294	-0,0693	0,0345
P/S ratio	-0,0910	0,0045	-0,1016	0,0020
Keys score	0,1132	0,0004	0,1183	0,0003

The nutrients that did not show an association with total or LDL-cholesterol levels were dietary cholesterol and fibre intake. All the others were very low associations and conform to those that would be expected from the literature, except the very low negative association between total daily fat intake and serum cholesterol. A possible explanation for this finding is the very high polyunsaturated intake of the study population which constitutes a significant part of the total fat intake in this population group.

In summary the dietary factors found to be associated with the total serum cholesterol levels and hypercholesterolaemia in this study population are those previously reported in the literature and these nutrients contribute significantly to the high total serum cholesterol levels in this population group.

B Other factors related to total serum cholesterol

In the previous two chapters a degree of clustering of risk factors has been noted. Table 14 shows the significant association between total and LDL-cholesterol levels and other risk factors. Some of these associations may be due to the effects of age on both risk factors. The contribution of age to the association will be considered in Chapter VIII.

The serum non-fasting triglyceride showed the strongest association with total and LDL-cholesterol levels followed by body mass index, the diastolic and systolic blood pressure and uric acid. The other factors showed very low associations with total serum cholesterol levels.

Associations between hypercholesterolaemia and social class parameters were looked for. Table 15 shows these associations.

Table 14 Association between total serum cholesterol and other risk factors

	Total serum cholesterol		LDL-cholesterol	
	Pearson's correlation coefficient	p-value	Pearson's correlation coefficient	p-value
Systolic blood pressure	0,2947	0,0001	0,2086	0,0001
Diastolic blood pressure	0,3212	0,0001	0,2279	0,0001
Uric acid	0,2089	0,0001	0,1747	0,0001
Triglyceride	0,5410	0,0001	0,3603	0,0001
Body mass index	0,4006	0,0001	0,3557	0,0001
Gram ethanol drank	-0,0126	0,6965	-0,1150	0,0005
Calories expended at work	0,0901	0,005	0,0803	0,0146
Calories expended at leisure	-0,0956	0,0029	-0,0875	0,0078

Table 15 Comparison of social class parameters in normo- and hypercholesterolaemic participants (cut-off point B, 5,7mmol/litre)

	Normocholes-terolaemics N=526	Hypercholes-terolaemics N=450	Mann-Whitney u-test p-value
Educational category	4,44	4,28	0,0693
Occupancy rate	1,87	1,66	0,0001
Schlemmers' occupational category	3,38	3,08	0,0094

The normocholesterolaemic participants showed a significantly higher occupancy rate and occupational category than the hypercholesterolaemic participants. Both these measures reflect the lower socio-economic standing of the normocholesterolaemic participants compared to those of the hypercholesterolaemic participants.

12 A SUMMARY OF FINDINGS IN THIS CHAPTER

A The level of total serum cholesterol increases with age for both men and women.

B In comparison to a small study in this population group in 1953, the mean cholesterol level in men aged 40 to 58 years has increased since then.

C Hypercholesterolaemia, defined in three ways, is very common in this population group with 22,3% of males and 22,7% of females having a cholesterol level above 6,5 mmol/litre, 42% of males and 41,7% of females a cholesterol level above 5,7 mmol/litre, and 67,1% of males and 64,1% of females a cholesterol level above an age- and sex-specific cut-off points that reflects CHD risk attributable to total serum cholesterol levels.

D The prevalence of hypercholesterolaemia in the coloured population of the Cape Peninsula is comparable to that found in the rural whites, and urban Indians in South Africa.

E Hypercholesterolaemic participants significantly more often report suffering from CHD or having a family history of CHD than do normocholesterolaemic participants.

F An educational level of above standard seven was associated with better knowledge of a diet protecting against heart disease and a more positive attitude to a healthy diet.

G Dietary factors associated with hypercholesterolaemia in some participant groups included a high total and animal protein intake, as well as a high total fat and saturated fat intake. Also a diet with a low P/S ratio, low polyunsaturated fat intake, low plant protein intake and a high Keys score was associated with hypercholesterolaemia.

H Other factors associated with hypercholesterolaemia were serum triglyceride and systolic blood pressure.

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CHAPTER VII

HIGH-DENSITY LIPOPROTEIN (HDL) CHOLESTEROL IN THE COLOURED POPULATION

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CHAPTER VII

HIGH-DENSITY LIPOPROTEIN (HDL) CHOLESTEROL IN THE COLOURED POPULATION

1 HDL-CHOLESTEROL AS A CORONARY RISK FACTOR

The inverse relationship between HDL-cholesterol levels and CHD was first described by Barr *et al.*[1] in 1951. Since that time within population studies have mostly supported this finding. In the excellent review of Heiss *et al.*[2] it is pointed out that up to 1980, 13 case control studies showed that the HDL-cholesterol level was lower in survivors of CHD than in a variety of control groups. In prospective studies such as the Tromso Heart Study[3], the Framingham Study[4] and the Israeli Ischaemic Heart Disease Study[5] HDL-cholesterol levels were found to be negatively associated with the development of CHD in persons free of the disease at intake with follow up periods of two to ten years.

The recently published results of the British Regional Heart Study which examined 7 735 men aged 40 to 59 years found HDL-cholesterol not to be predictive of developing CHD in 4,2 years[6].

Comparisons between populations showed no relationship between the different populations' HDL-cholesterol levels and the different populations' CHD prevalence rates[2,7]. Kannel[8] suggested that the risk for CHD associated with HDL-cholesterol level in any given population is determined by the total cholesterol level associated with the HDL-cholesterol level in that population group.

The ratio of HDL-cholesterol to total serum cholesterol (HDL/TC) has proved to be an efficient measure of CHD risk[9-11]. In the Framingham Study[11] protection against CHD was seen when this ratio was found to be 20% for men and 25% for women in persons 45 to 54 years of age. Before the age of 14 years there is little difference between this ratio in males and females. After this age there is a growing divergence in the value of the ratio between the sexes. Only at the age of 55 to 63 years does the HDL/TC in females approximate male levels of 25 to 34 years[12]. This could be part of the reason why the prevalence of CHD in females approaches that of males at a late stage in life.

In families suffering from hyperalphalipoproteinaemia where the HDL-cholesterol levels and HDL/TC are markedly raised, longevity and absence of CHD is a feature[13]. In contrast atherosclerosis is increased in families with hypoalphalipoproteinaemia[14] in the presence of a very low HDL/TC.

The inverse relationship between the direct measurement by angiography of atherosclerosis and HDL-levels has repeatedly been reported in a variety of studies[15-18]. The severity of clinical features of CHD in hypercholesterolaemic patients was also inversely related to HDL-cholesterol levels irrespective of the age, level of the blood pressure, level of other lipoproteins or coronary angiographic findings[19].

This association has not been found in all studies when CHD mortality was the measure of the disease. Keys _et al._[20] could not show in a prospective study in Finland that HDL-cholesterol levels were predictive of CHD mortality over a

24-year period, neither could the association be shown in a 25-year follow-up period of Minnesota business and professional men aged 50 to 60 years at entry to the study[21].

In a prospective study of men who had had a myocardial infarction the HDL-cholesterol level was inversely related to the five-year mortality after the infarction[22].

Heiss et al.[2] summarised the epidemiological evidence of the anti-atherogenicity of HDL-cholesterol as follows: the association within populations in a variety of studies has been independent, a strong negative predictor of CHD, consistent, with a temporal relationship. Biological plausability has been suggested. Intervention studies to finally establish the link have not been reported and neither has a dose response gradient been clearly shown in all studies.

2 HDL-CHOLESTEROL LEVELS IN POPULATIONS

There are marked differences seen when comparing the HDL-cholesterol levels in different populations of all ages[23-25]. These differences are probably determined by environmental as well as genetic factors. The mean serum HDL-cholesterol concentrations showed a distribution similar to that of mean total cholesterol: relatively low levels in the less developed countries and relatively high levels in the more developed westernised countries.

In American population studies it was shown that juvenile black males and females as well as adult black males have higher levels of HDL-cholesterol

than do whites. Given the excess of certain CHD risk factors amongst blacks these differences from whites potentially protect blacks against increased CHD morbidity and mortality. The loss of the protective HDL-cholesterol difference in adult black females appears most likely to be due to their pandemic obesity[26,27].

As the levels of total and HDL-cholesterol seem to move in parallel when comparing different populations it follows that the HDL/TC may be similar in populations with greatly different absolute cholesterol levels. It was thus found that the Masai people of Kenya[28] had very low total and HDL-cholesterol levels compared to a European control group, although the HDL/TC was 23% in both groups.

Despite the above finding marked differences in the HDL/TC between populations have been recorded[13,23]. It would seem that populations with a high HDL/TC in the presence of a high total cholesterol are less at risk for CHD than a similar population with a low ratio.

Little is known about the HDL-cholesterol levels and the HDL/TC in SA population groups. In the CORIS study on whites in the South Western Cape[29] it was found that females (15 to 64 years) had higher HDL-cholesterol levels than males of the same age. Unlike total cholesterol, HDL-cholesterol levels showed no increase with age. The mean level of HDL-cholesterol for the male groups studied ranged from 1,12 mmol/litre to 1,15 mmol/litre and for the female groups studied from 1,32 mmol/litre to 1,46 mmol/litre. For all age groups of the study population the median value of the HDL/TC fell below that level imparting "protection" against CHD[12]. The South African black people

living on a traditional diet seem to have higher HDL-cholesterol levels and HDL/TC than the other populations in South Africa studied to date. Unpublished data of Dr P L Jooste (RIND of the South African Medical Research Council) on a group of 204 African dockworkers aged 25 to 64 years found the mean HDL-cholesterol level to be 1,7 mmol/litre and the HDL/TC to be 34%.

3 DESIRABLE HDL-CHOLESTEROL AND HDL-CHOLESTEROL TO TOTAL CHOLESTEROL RATIO (HDL/TC) LEVELS

There are no clear guidelines about the desirable level of HDL-cholesterol that will impart protection against CHD. The level of total cholesterol in a person or a population seem to play a role in the HDL-cholesterol needed for protection. In the Framingham Study the risk of future CHD was greater than average for levels below 1,15 mmol/litre (45mg/dl) in men and 1,42 mmol/litre (55mg/dl) in women aged 50 to 69 years[30]. Rossouw *et al.*[12] suggested that these levels, which corresponded to the 60th percentile in the CORIS study population be taken as conservative desirable levels in a high risk CHD population.

From the above suggested desirable HDL-cholesterol levels and the protective HDL/TC found in the Framingham study[11,30] Rossouw suggested that the CORIS 70th percentile be used to estimate cut-off points for desirable HDL/TC. This ratio is higher in the younger age group and in women. Therefore age- and sex-specific cut-off points for this ratio are needed, and Table 1 shows the suggested cut-off points used in this study.

Table 1 Cut-off points for HDL-cholesterol and HDL/TC for a high CHD population[30]

Age in years	1-2		3-14		15-34		35-64	
Lower limit of HDL-cholesterol in mmol/litre (mg/dl)								
Male	1,16	(45)	1,42	(55)	1,16	(45)	1,16	(45)
Female	1,16	(45)	1,42	(55)	1,42	(55)	1,42	(55)

Age in years	1-14	15-24	25-44	45-64
Lower limit of % HDL/TC				
Male	35	28	22	21
Female	35	31	29	25

4 FACTORS ASSOCIATED WITH HDL-CHOLESTEROL LEVELS

The HDL-cholesterol level seems mostly genetically determined in normal people. It also shows the phenomenon of tracking with age, as do total plasma cholesterol levels[31]. A number of inherited diseases have altered HDL-cholesterol levels[32,33]. There are also a variety of other diseases in which this level is altered. In diabetics a lower level of HDL-cholesterol has been found than in non-diabetics[34]; also patients with chronic renal failure have low levels[35] and patients with some forms of liver and thyroid diseases have an altered HDL structure[36,37].

A diurnal variation of HDL-cholesterol was reported by Miettinen[38], lowest levels were seen early in the morning followed by an increase before breakfast, with the highest levels during the afternoon. Adult females have higher HDL-cholesterol levels than adult males in most populations studied[39]. In men a positive association between concentrations of serum testosterone and plasma HDL-cholesterol has been reported[40].

A Reversible factors related to HDL-cholesterol

A variety of factors amenable to change have been shown to be associated with HDL-cholesterol levels in man:

Body mass: Obesity and overweight, defined in a variety of ways, have been associated with lower levels of HDL-cholesterol in many studies[2,4,13]. The mechanisms by which the HDL-cholesterol is lowered in obese patients are not clear. Weight reduction has been found to be associated with an elevation of HDL-cholesterol levels[41,42].

Tobacco smoking: Population studies have shown that HDL-cholesterol levels were lower in cigarette smokers than in non-smokers[5,42-44]. Reduction or cessation of cigarette smoking was accompanied by an increase in HDL-cholesterol levels[41,42].

Physical activity: Physically active persons have higher HDL-cholesterol than sedentary persons[2,45,46]. Experimental evidence is available showing that regular prolonged exercise in males is accompanied by a decrease in total plasma triglyceride levels and a delayed increase in HDL-cholesterol[47,48].

This association is further corroborated by the positive association between HDL-cholesterol concentration and reported or observed physical activity in free-living populations such as the ones studied in the Lipid Research Clinics Program Study[49] and by Walker _et al_.[50].

Effects of drugs: A variety of commonly used drugs affect the HDL-cholesterol levels in patients on these drugs. Women using oestrogens post-menopausally or in some oral contraceptive preparations had higher HDL-cholesterol levels than in non-users[51]. The use of synthetic progestins generally decreased HDL-cholesterol[52] and thus the combination of oestrogens and progestins in oral contraceptives preparations had variable effects on HDL-cholesterol levels. These variations were a function of type and dose of the component steroids[51,53]. Androgen use resulted in lowered HDL-cholesterol levels[54].

The following drugs have been shown to increase HDL-cholesterol levels: anti-epileptic drugs, such as phenytoin and phenobarbitone, are associated with induction of hepatic cytochrome P-450 activity[55]. The agents used to lower total cholesterol such as high doses of nicotinic acid as well as the derivatives of fibric acids, such as Bezafibrate and phenofibrate, also increase HDL-cholesterol[56] as does cimetidine[57].

HDL-cholesterol levels were reduced by the cholesterol lowering drug probucol; by β-blocking agents, except pindolol, used for hypertension and angina[58]; by some oral hyperglycemic agents[59]; by phenothiazines which are major tranquillizers[60]; and by the drug Danazol used for endometriosis[61].

Plasma constituents: An inverse relationship of HDL-cholesterol with triglyceride and VLDL-cholesterol has been reported in studies on men, women and children[62-64].

Social class: In one study[65] the HDL-cholesterol concentration was found to be directly associated with educational achievement among females and young males.

B Dietary factors in relation to HDL-cholesterol

A number of dietary factors have been found to be associated with HDL-cholesterol levels in a variety of studies.

Ethanol consumption: Of the dietary elements studies, most information is available about the strongly positive association between HDL-cholesterol and the use of alcohol[44,45,66]. This association was confirmed by higher HDL-cholesterol levels found in drinkers of alcohol compared to non-drinkers, and by the rise in HDL-cholesterol being directly related to the amount of ethanol consumed[67]. Cessation of alcohol consumption is associated with a decrease in HDL-cholesterol levels[68].

Carbohydrate intake: In the Lipid Research Clinics Study an inverse significant correlation between HDL-cholesterol level and total carbohydrate intake, sucrose intake as well as starch intake could be shown[66]. Substitution of fat with carbohydrate in the diet was associated with a decrease in HDL-cholesterol[69].

Fat intake: HDL-cholesterol levels are depressed by low fat diets in comparison with diets with a higher fat content, whether high or low in polyunsaturates[70]. On an isocaloric diet polyunsaturated fats decrease HDL-cholesterol compared to a typical western diet high in saturated fat[71]. Vegetarians, who normally have a low fat intake, are known to have lower HDL-cholesterol levels than non-vegetarians[72].

Dietary zinc: Zinc administration in healthy men led to a marked decrease in HDL-cholesterol levels and suggests that zinc ingestion may be atherogenic in man[73].

5 A SUMMARY OF ASPECTS OF HDL-CHOLESTEROL EVALUATED IN THIS STUDY

A The validity of HDL-cholesterol determinations.

B The mean HDL-cholesterol levels and HDL/TC in the study population.

C The prevalence of persons with a protective HDL/TC in the study population.

D The association of HDL-cholesterol levels with the CHD-associated medical history of the study population.

E The factors associated with HDL-cholesterol in this study. Univariate analysis as well as multiple regression analysis.

6 HDL-CHOLESTEROL LEVELS IN THE POPULATION

A The validity of HDL-cholesterol measurements

The procedures followed in this study to validate the HDL-cholesterol measurements are discussed in Chapter II:4. The within batch variation was standardised against the two control samples included for analysis in each batch.

The validity of serum HDL-cholesterol determinations at two visits at least 7 days apart was reflected in a Pearson's correlation coefficient of 0,85 for the first and second reading in a random subsample of a hundred participants.

B Mean HDL-cholesterol levels and HDL/TC

Table 2 shows the mean HDL-cholesterol levels and the mean HDL/TC as well as the standard deviations in every age and sex category.

For neither men nor women does the HDL-cholesterol level increase with age, but for all age groups men were found to have a lower HDL-cholesterol than do women.

The HDL/TC decreased with age in both men and women up to the age of 44 years, thereafter this level remained fairly constant up to the age of 64 years. In the groups of women below the age of 44 years the HDL/TC was found to be

Table 2 The HDL-cholesterol levels and HDL/TC in the study populations

	MEN		WOMEN	
Age group in years	mean HDL-cholesterol in mmol/ℓ +SD	mean HDL/TC as a %	mean HDL-cholesterol in mmol/ℓ +SD	mean HDL/TC as a %
15-24	1,42 ±0,32	30,9 6,8	1,60 ±0,38	33,8 ±8,6
25-34	1,41 ±0,35	26,2 ±8,1	1,52 ±0,41	29,6 ±8,4
35-44	1,44 ±0,59	25,1 ±10,4	1,59 ±0,45	28,4 ±9,2
45-54	1,42 ±0,44	24,7 ±9,6	1,52 ±0,46	24,9 ±9,0
55-64	1,43 ±0,47	24,2 ±10,75	1,55 ±0,47	24,2 ±8,3
15-64	1,43 ±0,42	26,3 ±9,5	1,57 ±0,41	28,3 ±9,3

higher than that of men of the same age group. Above 44 years of age the HDL/TC was similar for men and women. These differences between men and women can be explained by the difference in total cholesterol levels in the different age and sex categories studied, as the HDL-cholesterol level was constant with increasing age. This similarity of HDL-cholesterol levels in men and women above 44 years of age is probably explained by the almost pandemic degree of obesity found in the older groups of women.

C Prevalence of protective HDL/TC in the study population

For the purposes of this study a protective HDL/TC was considered to be present in an individual when the ratio was equal to or greater than the values set out in Table 1 in section 3 of this chapter.

Table 3 shows the prevalence of persons in the study population who have HDL-cholesterol levels that fall above the levels that are suggested to impart protection against CHD, or who have HDL/TC also suggesting protection against CHD.

The cut-off points used to define protective HDL-cholesterol levels and ratios are chosen on the basis of the findings in epidemiological studies and suggest that the lowest level of risk for women is associated with higher HDL-cholesterol levels than for men although the overall risk for women is lower.

Mechanistically it would be difficult to explain why women would need a higher HDL-cholesterol level or HDL/TC than men to gain protection against CHD. The findings in Table 3 illustrate the problem arising when such cut-off points are used. Fewer women (60,9% age-corrected) than men (75% age-corrected) were found to have protective HDL-cholesterol levels or ratios when using these epidemiological cut-off points despite women having higher levels and ratios of HDL-cholesterol than men. For both men and women the youngest age group of 15 to 24 years had higher protective HDL-cholesterol levels than did any of the older age groups.

Table 3 Prevalence of protective HDL-cholesterol levels in the study population

	MEN				WOMEN			
Age groups in years	Cut-off point for % HDL/TC to define protection	% men > the HDL/TC cut-off point	% men > the HDL-cholesterol level of 1,16mmol/ℓ		Cut-off point for % HDL/TC to define protection	% Women > the HDL/TC cut-off point	% Women > the HDL-cholesterol level of 1,42 mmol/ℓ	
15-24	28	60,6	81,9	95,7	31	65,0	65,0	96,9
25-34	22	69,8	74	74	29	48,8	59,6	88,
35-44	22	53,4	64	59,2	29	40,2	58	82,
45-54	21	58,9	73,7	64,2	25	40,4	56,4	68,1
55-64	21	55,6	67,8	60	25	35,8	56,8	69,5
15-64 Crude rate		59,7	72,3			46,0	59,1	80,7
Cape Peninsula rate		61,3	75,0	80,0		52	60,9	87
SA coloured rate		61,2	75,0	80,0		51,9	60,9	87
Standard million rate		60,3	73,2	73,1		48,0	59,8	83,2

7 COMPARISON OF PROTECTIVE HDL-CHOLESTEROL LEVELS AND RATIOS WITH OTHER POPULATIONS

When the mean HDL-cholesterol levels and mean HDL/TC of the urban coloureds were compared to those of the white rural population of the CORIS study[29] the coloured males were found to have about 0,18 mmol/litre higher HDL-cholesterol levels and about 5% higher HDL/TC than the white males studied. Table 4 shows the significant differences ($p<0,0005$ in all cases) between these two groups of men. These were found despite the fact that more coloured men smoke than do white men[29].

Table 4 Comparison of the HDL-cholesterol level and HDL/TC in the coloured and white men

	COLOURED MEN		WHITE MEN	
Age group in years	mean HDL-cholesterol in mmol/ℓ ±SD	mean HDL/TC as % ±SD	mean HDL-cholesterol in mmol/ℓ ±SD	mean HDL/TC as % ±SD
15-24	1,42 ±0,32	30,9 ±6,8	1,25 ±0,25	26,5 ±7,0
25-34	1,41 ±0,35	26,2 ±8,1	1,23 ±0,29	21,1 ±6,5
35-44	1,44 ±0,59	25,1 ±10,4	1,27 ±0,30	19,5 ±6,1
45-54	1,42 ±0,44	24,7 ±9,6	1,24 ±0,33	19,0 ±6,2
55-64	1,43 ±0,47	24,2 ±10,75	1,25 ±0,34	19,18 ±6,1
15-64	1,43 ±0,42	26,3 ±9,5	1,23 ±0,31	21,07 ±6,4

The lower CHD mortality in coloureds than whites could possibly be ascribed to the higher level of HDL-cholesterol in the coloureds.

Table 5 compares the HDL-cholesterol levels and HDL/TC of coloured and white women. Except for the youngest age group of 15 to 24 years where a significant difference (p<0,0005) was observed, there is no significant difference between the HDL-cholesterol levels of coloured and white women. Coloured women smoked much more than the CORIS white women did and obesity was also more common in coloured women than in white women[29]. The genetic benefit of higher HDL-cholesterol that coloured women compared to white women could be anticipated to have, seems to be obliterated by their CHD risk profile which resulted in their reduced HDL-cholesterol levels.

The HDL/TC of the coloured women was significantly higher than those of the white women (p<0,003) except in the age group of 45 to 54 years where no significant differences were noted. Although the differences between the two groups of women were significant, they were smaller than the differences between the two groups of men. This suggests that the genetic benefit that the coloured women should be enjoying above the white women is lost to them due to the high levels of CHD risk factors that affect HDL-cholesterol levels and to which they are exposed.

Table 5 Comparison of the HDL-cholesterol level and HDL/TC in the coloured and white women

	COLOURED WOMEN		WHITE WOMEN	
Age group in years	mean HDL-cholesterol in mmol/ℓ +SD	mean HDL/TC as % + SD	mean HDL-cholesterol in mmol/ℓ +SD	mean HDL/TC as % + SD
15-24	1,60 ±0,38	33,8 ±8,6	1,46 ±0,29	28,43 ±6,62
25-34	1,52 ±0,41	29,6 ±8,4	1,53 ±0,32	27,0 ±7,1
35-44	1,59 ±0,45	28,4 ±9,2	1,53 ±0,39	25,3 ±7,6
45-54	1,52 ±0,46	24,9 ±9,0	1,58 ±0,16	23,40 ±7,5
55-64	1,55 ±0,47	24,2 ±8,3	1,54 ±0,16	20,9 ±6,7
15-64	1,57 ±0,41	28,3 ±9,3	1,53 ±0,38	25,01 ±7,0

The black people of South Africa have higher HDL-cholesterol levels than do the coloureds studied. The mean HDL-cholesterol of a group of black dockworkers aged 25 to 64 years (unpublished data, Dr P L Jooste NRIND of the SAMRC) was 1,6 mmol/litre, while that of the male coloured study population was 1,43 mmol/litre. The black dockworkers' HDL/TC was 34% while that of the coloured men was 26,3%.

Castelli *et al.*[11] showed the HDL-cholesterol levels in white and Japanese men from Framingham, Albany, Honolulu, San Francisco, Evans County and Puerto

Rico to be similar to those of South African whites studied in the CORIS study[29] and thus lower than those of the coloureds participating in this study.

South African coloured men and women have lower HDL-cholesterol levels than the American Negroes studied in the Evans County study[26]; the latter's levels were similar to that reported for the black dockworkers.

The CHD mortality of the coloured people is lower than that of the whites in South Africa. This is despite the higher level of risk the coloured population carries due to the high prevalence of smoking, hypertension and hypercholesterolaemia compared to the rural whites of the CORIS study.

8 HDL-CHOLESTEROL LEVELS AND CHD-ASSOCIATED MEDICAL HISTORY OF THE STUDY POPULATION

To look at the association between protective levels of HDL-cholesterol and CHD related medical history the cut-off points of HDL-cholesterol of less than 1,42 mmol/litre for women and 1,16 mmol/litre for men were used to group participants with and without protective HDL-cholesterol levels. The comparison of the CHD-associated medical history of these two groups is shown in Table 6. Significantly fewer participants with protective HDL-cholesterol levels than those without, suffered from CHD as determined by the questionnaire or by self-reporting. Hypertension and diabetes were reported less frequently by participants with protective HDL-cholesterol levels than by those without such levels.

Table 6 Comparison of CHD-associated medical history of persons with and without protective HDL-cholesterol levels

		% of Group with protective HDL-cholesterol	% of Group without protective HDL-cholesterol	p-value CHI-square test
History of CHD by questionnaire	All	13,3	22,1	0,0005
	Male	13,4	20,1	0,0568
	Female	13,1	23,0	0,0039
Reported history of CHD	All	3,6	8,8	0,0005
	Male	3,5	13,4	0,0001
	Female	3,7	5,5	NS
Hypertension reported	All	17,8	24,8	0,0105
	Male	11,8	16,0	NS
	Female	24,8	30,5	NS
Diabetes reported	All	3,3	7,0	0,0085
	Male	3,2	6,9	0,0715
	Female	3,4	7,0	0,0627

643 in group with protective HDL-cholesterol

331 in group without protective HDL-cholesterol

347 in group of women with protective HDL-cholesterol

131 in group of women without protective HDL-cholesterol

298 in group of men with protective HDL-cholesterol

200 in group of men without protective HDL-cholesterol

The association between the HDL/TC and CHD-associated medical history was determined by comparing the group of participants with protective ratios with the group without such a ratio. Table 7 shows this comparison.

Table 7 Comparison of CHD-associated medical history of persons with and without protective HDL/TC

		% of Group with protective ratio males ≥20% females ≥25%	% of Group without protective ratio males <20% females <25%	p-value CHI-square test
Family history of CHD	All	25,8	32,7	0,0243
	Male	23,4	35,5	0,0069
	Female	28,7	30,7	NS
Hypertension associated family history	All	54,9	63,0	0,0144
	Male	51,9	61,7	0,0502
	Female	58,6	63,9	NS
History of CHD by questionnaire	All	2,7	22,8	0,0001
	Male	12,2	23,4	0,0020
	Female	13,3	22,4	0,0077
Reported history of CHD	All	2,2	11,0	0,0001
	Male	2,7	14,9	0,0001
	Female	1,7	8,3	0,0004
Hypertension	All	12,9	33,5	0,0001
	Male	9,5	21,3	0,0005
	Female	16,7	42,0	0,0001
Diabetes	All	2,2	8,7	0,0001 #
	Male	2,4	8,5	0,0022
	Female	2,1	8,8	0,0006
Stroke	All	0,5	2,3	0,0207 #
	Male	0,3	4,3	0,0032 #
	Female	0,7	1,0	NS

630 in group with and 346 in group without protective HDL/TC

293 women in group with and 205 women in group without protective HDL/TC

337 men in group with and 141 men in group without HDL/TC

#Fischer's exact test used

A family history of CHD and hypertension-associated disease is significantly less frequently reported in some of the groups of participants with protective HDL/TC studied than in the groups without such a ratio. Similarly CHD history, reported or determined by questionnaire, was significantly less frequently found in the groups with protective HDL/TC than in the group without such a ratio. This association could be spurious as it could be confounded by age.

A history of hypertension, diabetes and stroke were all reported significantly less frequently in the groups of participants with a protective HDL/TC than in groups without such a ratio.

9 FACTORS ASSOCIATED WITH HDL-CHOLESTEROL LEVELS IN THE STUDY POPULATION

In an effort to identify factors associated with HDL-cholesterol in the study population the Pearson's correlation coefficients were calculated for the correlation of HDL-cholesterol, nutrient and other variables.

These and other variables were then used in multiple regression analysis in an effort to find the extent to which these variables contribute to the variation of HDL-cholesterol observed in the study population.

Table 8 shows the Pearson's correlation coefficients where a significant correlation was found between HDL-cholesterol and other variables in either men, women or both groups. In men the strongest inverse correlation of HDL-cholesterol was found with non-fasting serum triglyceride levels, body mass index and LDL-cholesterol levels. The strongest direct correlation was

found with gram alcohol bought per day. In women the strongest inverse correlation of HDL-cholesterol was found with non-fasting serum triglyceride levels, the number of cigarettes smoked daily, body mass index and LDL-cholesterol levels.

Table 8 Association between variables and HDL-cholesterol levels

	MEN		WOMEN	
Factor	Pearson's correlation coefficient	p-value	Pearson's correlation coefficient	p-value
Daily cigarette consumption	-0,1321	NS	-0,2791	0,0001
Systolic blood pressure	0,0178	NS	-0,162	0,0003
Diastolic blood pressure	0,0583	NS	-0,1192	0,0079
Uric acid	-0,1485	0,0012	-0,1636	0,0003
Triglyceride (non-fasting)	-0,3811	0,0001	-0,4404	0,0001
LDL-cholesterol (Friedewald)	-0,2458	0,0001	0,1975	0,0001
Body mass index	-0,3226	0,0001	-0,2746	0,0001
Physical activity at work	0,0273	NS	-0,0993	0,0273
Gram alcohol bought	0,2718	0,0001	0,0389	NS
Daily calories from carbohydrates	-0,1152	0,0126	-0,0060	NS
% calories from carbohydrates	-0,1726	0,0002	0,0038	NS
% calories from saturated fat	-0,0511	NS	0,1320	0,0035

The following variables were included in the multiple regression analysis of HDL-cholesterol: serum levels of non-fasting triglycerides, uric acid and LDL-cholesterol, systolic and diastolic blood pressure, body mass index, number of cigarettes smoked per day, age, gram alcohol bought per day and thirteen nutrient variables determined by the 24-hour dietary recall.

Analyses were carried out separately for men and women. A multiple regression analysis was carried out with all variables included in order to identify outlying HDL-cholesterol observations. These observations were deleted from subsequent analyses. The subset of variables that contributed significantly to the regression of HDL-cholesterol before deleting are shown in Table 9.

All the outlying observations deleted from the analysis were characterised by high HDL-cholesterol values. The analyses were repeated with all HDL-cholesterol levels greater than 2,58 mmol/litre deleted to check on their influence on the regression. This influence was only apparent in the female data set where deletion of 12 such HDL-cholesterol observations resulted in a change in the regression such that dietary iron, thiamine, zinc and cholesterol no longer made a significant contribution to the regression. The results of the analysis omitting the observations with HDL-cholesterol $\geq$2,58 mmol/litre are shown in Table 10.

In coloured men 29,7% of the variation of HDL-cholesterol can be explained by the following variables (some of them also reported in the literature): non-fasting serum triglyceride levels[62-64], amount of dietary carbohydrate consumed per day[66], gram alcohol bought [44,45,66] per week. These three variables contribute most to the variation of HDL-cholesterol. Total dietary

Table 9 Variables that contribute significantly to the regression of HDL-cholesterol

Variable	Coefficient	Standard error of the mean	Standardised coefficient	Partial correlation	Probability p	Adjusted R^2
MEN						
Non-fasting triglyceride	-0,05338	0,00944	-0,2747	-0,2638	<0,0001	0,1043
g dietary carbohydrate/day	0,05214	0,01081	-0,3879	-0,2272	<0,0001	0,1287
g alchol bought/day	0,01445	0,00302	0,2122	0,2255	<0,0001	0,1910
Total kJ/day	0,00594	0,00139	0,3399	0,2019	<0,0001	0,2141
BMI	0,8207	0,2034	-0,2032	-0,1916	<0,0001	0,2290
Diastolic blood pressure	0,2115	0,0547	0,1756	0,1838	<0,0001	0,2632
Number of cigarettes smoked	-0,2392	0,0675	-0,1524	-0,1690	0,0004	0,2819
Age	0,1416	0,0522	0,1317	0,1302	0,0069	0,2887
LDL-cholesterol	-0,0434	0,0176	-0,1113	-0,1186	0,0140	0,2970
WOMEN						
Non-fasting triglycerides	-0,07004	0,00936	-0,3485	-0,3276	<0,0001	0,1472
Age	0,2994	0,0532	0,2729	0,2521	<0,0001	0,1636
Number of cigarettes smoked/day	-0,3952	0,0750	-0,2136	-0,2370	<0,0001	0,1923
g alcohol bought/week	0,0292	0,00775	0,1505	0,1724	<0,0002	0,2128
BMI	-0,3579	0,1035	-0,1562	-0,1582	0,0006	0,2366
mg dietary iron/day	0,9152	0,2655	0,2401	0,1577	0,0006	0,2350
mg dietary thiamine/day	-11,5845	3,5373	-0,1339	-0,1500	0,0011	0,2471
mg dietary zinc/day	-0,5718	0,1871	-0,1973	-0,1401	0,0024	0,2554
LDL-cholesterol	-0,04803	0,01684	-0,1281	-0,1310	0,0046	0,2635
mg dietary cholesterol/day	-0,00959	0,00343	-0,1381	-0,1284	0,0054	0,2710
% energy from saturated fat	0,4801	0,1871	0,1098	0,1181	0,0106	0,2796

Table 10 Variables that contribute significantly to the regression of HDL-cholesterol in women after deleting outliers

Variable	Coefficient	Standard error of the mean	Standardised coefficient	Partial correlation	Probability p	Adjusted R^2
Non-fasting triglycerides	-0,06643	0,00871	-0,3625	-0,3341	<0,0001	0,1591
Number of cigarettes smoked	-0,3723	0,0698	-0,2202	-0,2407	<0,0001	0,1946
Age	0,2318	0,0497	0,2305	0,2117	<0,0001	0,2064
BMI	-0,3385	0,0967	-0,1618	-0,1605	0,0005	0,2256
% Energy from saturated fat	0,4479	0,1652	0,1098	0,1250	0,0070	0,2333
g alcohol bought/week	0,01793	0,00746	0,0978	0,1111	0,0166	0,2416
LDL-cholesterol	-0,03271	0,01588	-0,0950	-0,0953	0,0400	0,2468

kJ intake per day, BMI[2,4,13], diastolic blood pressure, the number of cigarettes smoked per day[42-44], age and LDL-cholesterol levels also contribute. The partial correlation coefficients are similar to those reported in the literature[13,42-44,62,66]. The very low association of HDL-cholesterol and diastolic blood pressure has not previously been reported. Neither has the inverse relationship with LDL-cholesterol levels.

From Table 9 it is seen that in coloured women 27,96% of the variation of HDL-cholesterol can be explained by the following variables reported in the order of magnitude of their contribution: non-fasting triglyceride levels[62-64], age, number of cigarettes smoked[42-44], gram alcohol bought per week[44-46], BMI[2,4,13], mg dietary iron per day, mg dietary thiamine per day, mg dietary zinc per day[73], serum LDL-cholesterol, mg dietary cholesterol per day and percentage energy from saturated fat.

When the outlying observations were deleted 24,68% of the variation of HDL-cholesterol in coloured women could be explained, in order of importance, by the following variables: non-fasting triglycerides, number of cigarettes smoked per day, age, BMI, percentage energy from saturated fat, gram alcohol bought per week and LDL-cholesterol levels. The very low association of HDL-cholesterol levels and percentage energy of the diet from saturated fats, and the inverse relationship with serum LDL-cholesterol has not previously been described.

Overall only a small amount of the variation of HDL-cholesterol could be explained by the variables studied, and as in similar studies[33,62,66] in the literature, it must be assumed that the HDL-cholesterol level in a population is mostly determined by genetic factors or factors not yet identified.

10 SUMMARY OF FINDINGS IN THIS CHAPTER

A The level of HDL-cholesterol does not increase with age in either men or women, therefore the HDL/TC decreases with age in both men and women.

B The prevalence of persons with protective HDL-cholesterol levels and protective HDL/TC is high in the coloured population of the Cape Peninsula.

C The HDL-cholesterol levels and HDL/TC of the coloureds of the Cape Peninsula was higher than that of the rural white population of the CORIS study and white populations elsewhere.

D The black people of South Africa and elsewhere have higher HDL-cholesterol levels than do the coloureds studied.

E Participants with protective HDL-cholesterol levels and protective HDL/TC did not give family histories or personal histories of CHD, diabetes or hypertension as frequently as participants without protective levels.

F Factors inversely related to HDL-cholesterol levels in multiple regression analysis were for men, non-fasting triglyceride levels, gram dietary carbohydrate eaten per day, BMI, number of cigarettes smoked per day and LDL-cholesterol levels.

For women the variables were non-fasting triglycerides, the number of cigarettes smoked per day, BMI and serum LDL-cholesterol levels.

G Factors directly related to HDL-cholesterol levels in multiple regression analysis were for men, gram alcohol bought per day, total energy intake per day, diastolic blood pressure and age.

For women the variables were age, percentage energy from saturated fat and gram alcohol bought per week.

H The high HDL-cholesterol levels found in the coloureds studied in the Cape Peninsula probably accounts for the lower mortality of the coloured population compared to that of the whites[74]. This occurs despite the higher level of risk the coloured population carries due to the high prevalence of smoking, hypertension and hypercholesterolaemia compared to the rural whites of the CORIS study.

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CHAPTER VIII

INTERRELATIONSHIP OF RISK FACTORS IN THE COLOURED POPULATION OF THE CAPE PENINSULA

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CHAPTER VIII

INTERRELATIONSHIP OF RISK FACTORS IN THE COLOURED POPULATION OF THE CAPE PENINSULA

1 INTRODUCTION

In studying the interrelationship of independent risk factors of CHD it became clear that besides being associated with CHD they are often also associated with each other. In addition these risk factors can be considered synergistic in that their simultaneous contributions to the consequent development of CHD are more than additive[1-4]. The implication is that people with relatively slight elevations in several risk factors could have a risk of the same magnitude as persons with a marked raised level of risk in one, but normal levels of risk in other factors. Since the first category represents the majority of people in most westernised societies, the bulk of disease of the community occurs in this group[3,5].

Criqui *et al*[1] illustrated another aspect of the clustering of risk factors in the results of the Collaborative Lipid Research Program. They showed that clustering was stronger in subjects at the highest level of risk than in subjects with moderate levels of risk. They studied the three major risk factors as well as serum triglyceride levels and obesity. This implies, in practical terms, that persons belonging to a subgroup within the population of extremely high CHD risk can be identified if health personnel, when identifying persons with a high level of risk in one risk factor, also screen

for the other important risk factors. This would contribute towards identifying that group of people with extreme risk in the population who need special individual attention to prevent CHD.

In section four of this chapter the clustering of the three major risk factors for CHD in the coloured population is reported on.

In Chapters IV and VI the factors related to the continuous variables, diastolic and systolic blood pressure as well as total serum cholesterol levels, were reported on. For the study of the association between these variables, significant simple correlations and differences in group comparisons were looked for. In an effort to identify those factors which independently contributed to the variation found in these factors multiple regression analysis was carried out.

2 FACTORS RELATED TO BLOOD PRESSURE AS DETERMINED BY MULTIPLE REGRESSION

Multiple regression analysis of systolic and diastolic blood pressure was carried out for men and women separately. The following set of variables was entered into the regression.

Age

Body mass index

Number of cigarettes smoked per day

Total serum cholesterol level

LDL-cholesterol level

HDL-cholesterol level

Serum uric acid level

Non-fasting triglyceride level

Energy expenditure during leisure activity

Energy expenditure at work

Occupancy rate

Level of education

Social class index

Gram alcohol used per day

Nutrient intake: calories per day

mg cholesterol per day

g carbohydrate per day

mg calcium per day

mg iron per day

mg potassium per day

mg sodium per day

mg zinc per day

mg copper per day

mg vitamin B6 per day

% energy from plant protein

% energy from animal protein

% energy from saturated fat

% energy from polyunsaturated fat

% energy from carbohydrate

mg cholesterol per 1 000 calories

g fibre per 1 000 calories

mg thiamine per 1 000 calories

mg magnesium per 1 000 calories

mg nicotinic acid per 1 000 calories

Ratio of polyunsaturated to saturated fatty acids

A multiple regression analysis was carried out with all variables included in order to identify outlying observations. These observations were deleted from subsequent analyses and were characterised by high values of systolic and diastolic blood pressure. Stepwise regression analysis produced a subset of the variables which contributed significantly to the regression of systolic blood pressure and diastolic blood pressure.

Tables 1, 2, 3 and 4 show these variables and the corresponding statistics that explain the variation of systolic and diastolic blood pressure in coloured men and women.

Table 1 Multiple regression analysis of systolic blood pressure of coloured men

Variable	Coefficient	Standard error	Standardised Coefficient	Partial Correlation	Probability	Adjusted R^2
Age	0,373	0,0581	0,292	0,2860	<0,0001	0,1378
BMI	1,115	0,214	0,240	0,2352	<0,0001	0,1699
HDL-cholesterol	0,171	0,0457	0,162	0,1712	0,0002	0,1897
Number of cig/day	0,161	0,0761	0,088	0,0977	0,0352	0,1949
mg sodium per day	0,002	0,0008	0,115	0,1171	0,0115	0,1990
mg potassium per day	-0,003	0,0011	-0,171	-0,1224	0,0082	0,2014
mg vit B6 per day	3,386	1,549	0,134	0,1010	0,0294	0,2078

Table 2 Multiple regression analysis of diastolic blood pressure in coloured men

Variable	Coefficient	Standard error	Standardised Coefficient	Partial Correlation	Probability	Adjusted R^2
Age	0,277	0,039	0,3086	0,3135	<0,0001	0,1605
BMI	0,793	0,144	0,2443	0,2451	<0,0001	0,1877
HDL-cholesterol	0,129	0,032	0,1751	0,1842	<0,0001	0,2224
g alcohol per day	0,0055	0,0021	0,1103	0,1214	0,0081	0,2322

The variables entered explained only 20,8% of the variation of systolic blood pressure and 23,2% of the variation of diastolic blood pressure in coloured males studied. For both systolic and diastolic blood pressure the variables, age, BMI and HDL-cholesterol levels contributed significantly to the regression. For coloured men the number of cigarettes smoked per day, the sodium and vitamin B6 intake directly and the potassium intake inversely contributed in a small way to the systolic blood pressure regression. For the diastolic blood pressure regression, the amount of alcohol used per day also significantly contributed to the regression.

Table 3 Multiple regression analysis of systolic blood pressure of coloured women

Variable	Coefficient	Standard error	Standardised Coefficient	Partial Correlation	Probability	Adjusted R^2
Age	0,737	0,064	0,451	0,4598	<0,0001	0,3632
BMI	0,767	0,133	0,224	0,2519	<0,0001	0,4124
Serum uric acid levels	1,436	0,483	0,115	0,1330	0,0031	0,4226
% Energy from saturated fat	-0,559	0,223	-0,086	-0,1127	0,0124	0,4307
mg Cholesterol per day	-0,015	0,0068	-0,076	-0,1005	0,0257	0,4353

Table 4 Multiple regression analysis of diastolic blood pressure of coloured women

Variable	Coefficient	Standard error	Standardised Coefficient	Partial Correlation	Probability	Adjusted R^2
Age	0,379	0,039	0,394	0,4007	<0,0001	0,3195
BMI	0,459	0,083	0,220	0,2426	<0,0001	0,3715
Serum uric acid levels	1,017	0,293	0,138	0,1555	0,0006	0,3904
mg iron intake per day	-0,374	0,119	-0,111	-0,1401	0,0019	0,3994
g alcohol per day	0,0175	0,0057	0,108	0,1387	0,0021	0,4098

The variables entered explained much more of the blood pressure variation in women than in the case of men, with 43,5% of the systolic variation and 41,0% of the diastolic variation being explained. In the case of men, most of the variation is explained by age, followed by BMI for both systolic and diastolic blood pressure. Here the similarities stop. For women the additional variation in systolic blood pressure is explained to a small but significant degree by the serum uric acid level, the percentage energy intake from saturated fat and the cholesterol intake/1 000 kcal. For diastolic pressure the additional variation is also explained by the serum uric acid levels as well as by the milligram iron intake per day and the gram alcohol used per day.

A crossover of variables contributing significantly in the multiple regression calculations between men and women as well as diastolic and systolic blood pressure was done. It was found for women's diastolic blood pressure that the variable, percentage energy from saturated fat, could replace the two variables, milligram iron intake per day and gram alcohol intake per day in a regression explaining 41,2% of the variation. This was better than the regression calculation shown in Table 4, where only 41% of the variation was explained. This finding could be seen as an example of some of the weaknesses of multiple regression analysis. These results are shown in Table 5.

The association between age, BMI and serum uric acid levels and hypertension in men and women has often been described (see Chapter IV). What could not be traced in the literature is the finding of the association in men of HDL-cholesterol with both diastolic and systolic blood pressure. The association of blood pressure with the intake of sodium, potassium and alcohol has previously been described (Chapter IV) but not that with vitamin B6 or cholesterol intake.

Table 5 Improved multiple regression analysis of diastolic blood pressure in coloured women

Variable	Coefficient	Standard error	Standardised Coefficient	Partial Correlation	Probability	Adjusted R^2
Age	0,385	0,038	0,404	0,4133	<0,0001	0,3276
BMI	0,468	0,083	0,225	0,2483	<0,0001	0,3813
Serum uric acid levels	1,092	0,288	0,149	0,1692	0,0002	0,3993
% Energy from saturated fat	-0,455	0,132	-0,120	-0,1537	0,0006	0,4123

In the Karelia study[5] the high saturated fat intake of women was also found to be associated with raised blood pressure. Even the association between blood pressure and iron has been described by Saltman[6].

In summary one can deduct from all the associations reported in this section and Chapter IV that compliance to the dietary guidelines suggested by the prudent diet would improve the coloured population's blood pressure levels.

3 FACTORS RELATED TO TOTAL SERUM AND LDL-CHOLESTEROL AS DETERMINED BY MULTIPLE REGRESSION

Multiple regression analysis of total serum cholesterol and LDL-cholesterol was carried out for men and women separately. The following set of variables was entered into the regression:

Age

BMI

Number of cigarettes smoked per day

Diastolic and systolic blood pressure

Serum uric acid levels

Serum triglyceride levels

Energy expenditure during leisure activity

Occupancy rate

Dietary variables: Keys score (Defined in Chapter VI)

Ratio of polyunsaturated to saturated fatty acids (P/S ratio)

The rest of the nutrients were entered in one of three sets, firstly as mass of intake per day, secondly as percentage energy of the daily energy intake, and thirdly as mass of intake per 1 000 kcal energy intake.

The nutrients were:

- Plant protein
- Animal protein
- Saturated fat
- Polyunsaturated fat
- Cholesterol

For each sex a multiple regression analysis was carried out with all variables included in order to identify outlying observations. These observations were deleted from subsequent analyses. Stepwise regression analysis produced a subset of the variables which contributed significantly to the regression of total and LDL-cholesterol levels.

Table 6 Multiple regression analysis of total cholesterol of coloured men

Variable	Coeffi-cient	Standard error	Standardised Coefficient	Partial Correlation	Proba-bility	Adjusted R^2
Non-fasting triglyceride	0,142	0,011	0,485	0,5137	<0,0001	0,3683
Age	0,760	0,129	0,222	0,2630	<0,0001	0,4326
BMI	1,915	0,479	0,154	0,1818	<0,0001	0,4505
g polyunsa-turated fat/day	-0,660	0,257	-0,190	-0,1179	0,0106	0,4513
mg cholesterol/day	0,0135	0,006	0,079	0,0966	0,0366	0,4587
g saturated fat/day	0,405	0,210	0,130	0,0888	0,0545	0,4591
Non-fasting triglyceride	0,141	0,011	0,481	0,5079	<0,0001	0,3683
Age	0,776	0,124	0,227	0,2780	<0,0001	0,4326
BMI	1,827	0,479	0,147	0,1733	<0,0002	0,4505
Keys score	0,311	0,119	0,090	0,1201	0,0090	0,4572

Table 7 Multiple regression analysis of total cholesterol of coloured women

Variable	Coeffi-cient	Standard error	Standardised Coefficient	Partial Correlation	Proba-bility	Adjusted R^2
Age	1,267	0,128	0,387	0,4081	<0,0001	0,2811
Non-fasting triglyceride	0,171	0,020	0,343	0,3689	<0,0001	0,3750
P/S ratio	-11,866	3,666	-0,114	-0,1447	0,0013	0,3868

Tables 6, 7, 8 and 9 show the variables for and the corresponding statistics that explain the variation of total and LDL-serum cholesterol in the coloured population.

Table 8 Multiple regression analysis of LDL-cholesterol level in coloured men using the different subsets of variables

Variable	Coefficient	Standard error	Standardised Coefficient	Partial Correlation	Probability	Adjusted R^2
First subset						
BMI	2,258	0,529	0,220	0,2000	<0,0001	0,1243
Age	0,470	0,131	0,172	0,1686	<0,0004	0,1623
mg Cholesterol intake/day	0,017	0,0060	0,123	0,1304	0,0062	0,1707
Non-fasting triglyceride levels	0,067	0,0252	0,136	0,1265	0,0079	0,1816
g polyunsaturated fat intake/day	-0,258	0,129	-0,092	-0,0948	0,0469	0,1871
Second subset						
Age	0,563	0,126	0,207	0,2090	<0,0001	0,0915
BMI	2,054	0,526	0,201	0,1835	<0,0002	0,1623
g alcohol used per day	-0,020	0,0065	-0,132	-0,1456	0,0022	0,1794
Non-fasting triglyceride levels	0,064	0,0249	0,130	0,1215	0,0108	0,1896
Keys score	0,304	0,119	0,109	0,1205	0,0114	0,1996

The variables entered explained 45,9% of the variation of total serum cholesterol for men and 38,7% for women of the coloured population. For men the non-fasting triglyceride level followed by age and BMI explained most of the variation. The three nutrient variables of polyunsaturated fat, cholesterol and saturated fat intake per day explained the rest of the variation in men and can virtually equally be replaced by the Keys score as shown in the lower part of Table 6. For women age was the greatest contributor to the variation of total cholesterol, followed by non-fasting triglyceride levels and the P/S ratio of the diet.

For coloured men the first set of variables explained 18,7% and the second set of variables 20% of the variation of LDL-cholesterol - considerably less than the explained variation for total serum cholesterol. BMI and Age explained most of the variation in both sets of variables. The non-fasting serum triglyceride levels also contributed to variance in both the analyses. In the analyses with the first set of variables the intake of cholesterol per day and the inverse of the polyunsaturated fat intake per day also contributed to the variation of LDL-cholesterol. In the analysis with the second set of variables additional variation was also explained by the Keys score of the diet and inversely by the gram alcohol used per day. Possible explanations for this could be that the use of alcohol raised the HDL-cholesterol which in turn could contribute to a lowered LDL-cholesterol level, or that the diet of people consuming higher amounts of alcohol is such that a lower LDL-cholesterol level results.

Table 9 Multiple regression analysis of LDL-cholesterol levels in coloured women using the different subsets of variables

Variable	Coeffi-cient	Standard error	Standardised Coefficient	Partial Correlation	Proba-bility	Adjusted R^2
First Subset						
Age	1,027	0,124	0,363	0,3559	<0,0001	0,2007
Triglyceride level	0,123	0,023	0,215	0,2205	<0,0001	0,2378
P/S ratio	-8,607	3,532	-0,097	-0,1110	0,0152	0,2456
Second subset						
Age	1,053	0,122	0,377	0,3682	<0,0001	0,2048
Serum trigly-ceride level	0,106	0,023	0,206	0,2118	<0,0001	0,2380
% Energy from saturated fat	1,163	0,436	0,106	0,1212	0,0079	0,2476
Third subset						
Age	1,072	0,123	0,385	0,3726	<0,0001	0,2040
Serum trigly-ceride level	0,107	0,022	0,207	0,2133	<0,0001	0,2384
P/S ratio	-18,288	5,684	-0,209	-0,1462	0,0014	0,2445
g polyunsaturated fat per 1 000 kcal	-1,461	0,619	-0,153	-0,1078	0,0186	0,2517

For coloured women the analysis for each of the three sets of variables yielded slightly different independent contributors to the explanation of the variance of LDL-cholesterol, of which 24,6% in the first case, 24,8% in the second case and 25,2% in the third case was explained as shown in Table 9. Age explained by far the most variance of LDL-cholesterol levels, followed by

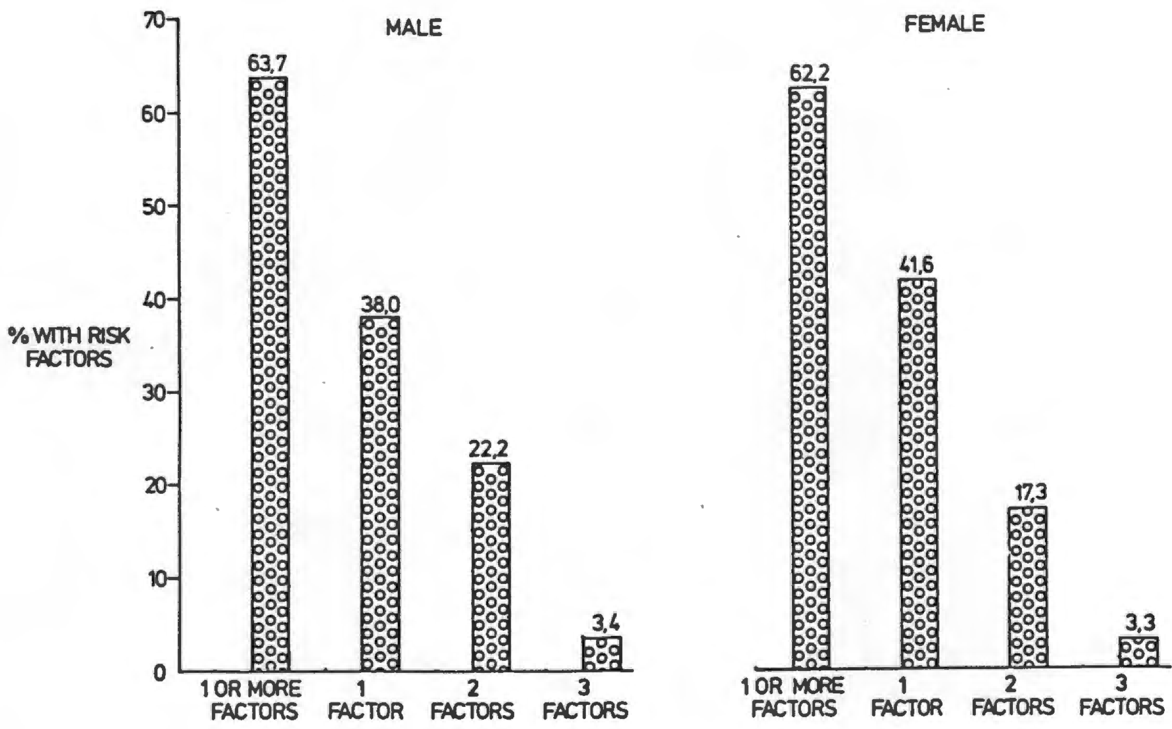
non-fasting serum triglyceride levels in each of the three sets of variables. A very small but significant additional explanation of variance of LDL-cholesterol in the first set of data was given by the inverse of the P/S ratio of the diet. In the second set of variables such additional variation was explained by the percentage energy intake from saturated fat. In the third set of variables a small but significant additional variation of LDL-cholesterol was explained by the inverse of the P/S ratio as well as the gram polyunsaturated fat intake/1 000 kcal consumed.

Finally one can again deduct from the associations reported in this section and Chapter VI that compliance to the dietary guidelines of the prudent diet as subscribed to by American and other Heart Foundations, would improve the coloured population's serum total and LDL-cholesterol levels and consequently their risk for CHD.

4 THE CLUSTERING OF HYPERTENSION, SMOKING AND HYPERCHOLESTEROLAEMIA IN THE STUDY POPULATION

The clustering of the major risk factors for CHD imparts a synergistic contribution to CHD risk. Figure 1 shows the composite risk profile of the major risk factors in the coloured population of the Cape Peninsula. Of the men 63,7% and of the women 62,2% had one or more risk factors at a high level of risk (Blood pressure $\geq$160/95mm Hg, smoking $\geq$10 cigarettes per day and serum cholesterol level $\geq$6,5 mmol/litre). Of the men 38% had only one of the three risk factors, 22,2% had two and 3,4% had all three risk factors at this high level. The women's situation was no better, with 41,6% having one factor, 17,3% having two factors and 3,3% having all three major risk factors at a high level of risk.

Figure 1 The composite risk profile of major risk factors of the coloured population



When comparing the coloured population of the Cape Peninsula with the white population studied in the South Western Cape[7] (Figure 2) it becomes clear that the coloured population of the Cape Peninsula carries an overall higher composite risk profile for CHD than does the whites in the South Western Cape, where 63% of coloured males compared to 54,6% of whites have at least one major risk factor.

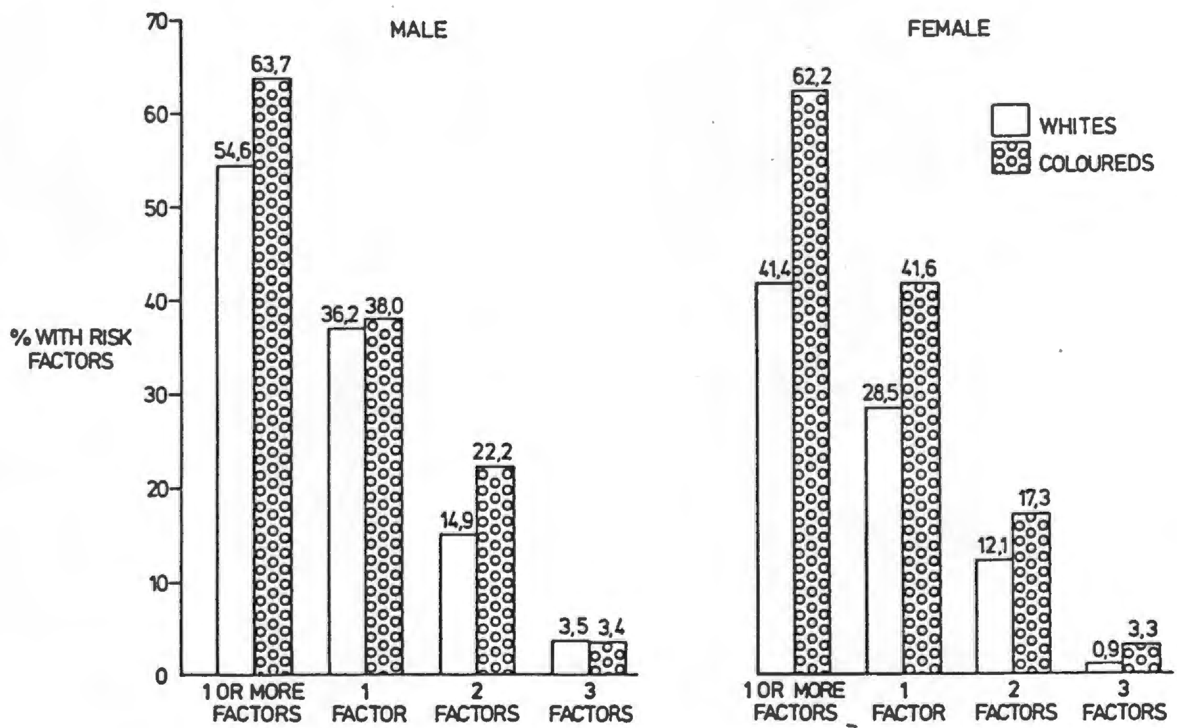
It is particularly the coloured women compared to the white women who have an unfavourable CHD risk profile, with 62,2% of coloured women compared to 41,4% of the white women having at least one major risk factor for CHD.

A single high level cut-off point was used for the age-dependent risk factors of hypertension and hypercholesterolaemia in the preparation of Figure 2. Thus many young people are classified as normal despite being in the uppermost decile of distribution for that risk factor at that age. It can therefore be assumed that many young people who in reality carry a risk for later CHD are now classified as risk free. Consequently the true prevalence of risk in this population could be even worse than reflected in the already alarming figures, if accurate age-specific cut-off values had been used.

A <u>Clustering of major risk factors at a high level of risk</u>

Figure 3 shows the percentage block charts that represent the clustering of the three major risk factors for CHD in coloured men at a high level of risk. (Blood pressure of $\geq$160/95mm Hg and/or taking anti-hypertensive medication, a total serum cholesterol of $\geq$6,5mmol/litre and the smoking of at least 10 cigarettes per day.)

Figure 2 The comparison of the CHD risk profiles of whites[7] and coloureds in the Cape



At this high level of risk only 37% of men are risk free, these men are mostly of a young age. In men of the age group 55 to 64 years only 20% were risk free.

Smoking was by far the most commonly found risk factor and already present at a young age in coloured men. As was seen in Chapter IV hypertension is common and mostly undiagnosed in young coloured males. In the young men aged 35 to 44 years, the concurrent presence of hypertension and smoking was found in 14,7% of men. This is much more common than the concurrent presence of the other combinations of risk factors in this age group of men and it may therefore be wise to look for hypertension particularly in smoking young coloured men. In men above the age of 45 years hypercholesterolaemia and hypertension were often concurrently present, suggesting the need for considering both risk factors when handling this age group of coloured men. Relatively few men, mostly of the older age groups, had all three risk factors present at a high level of risk. This group of men had the highest risk for developing CHD and must be identified in a successful intervention programme.

Figure 4 shows the percentage block charts that represent the clustering of the three major risk factors for CHD in coloured women at the same high level of risk.

At this level of risk only 40,4% of women are risk free, and these are mostly younger than 45 years. In the oldest age group of women between 55 and 64 years only 3,2% were free of risk.

Figure 3 **Clustering of major risk factors at a high level of risk in coloured men (%)**

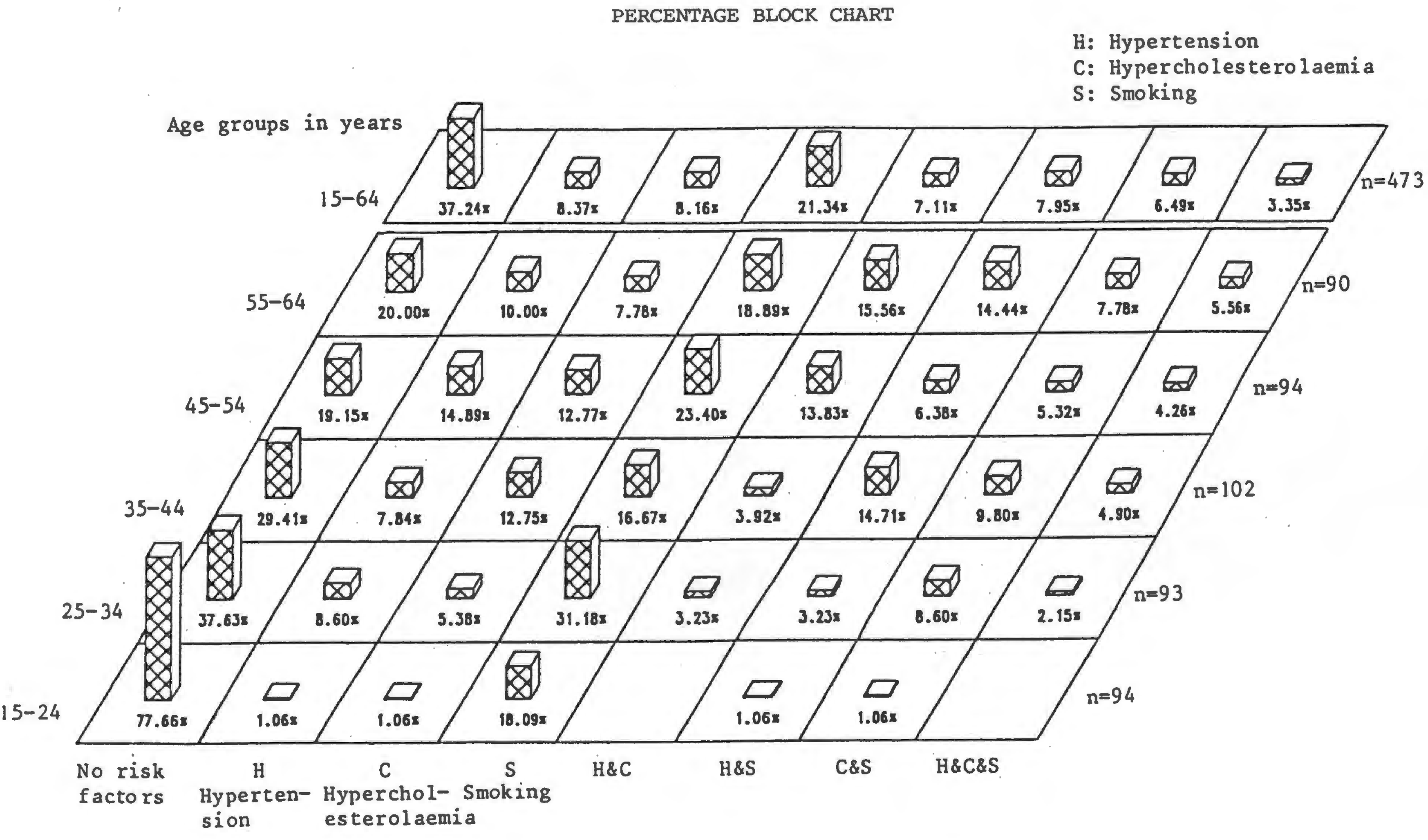
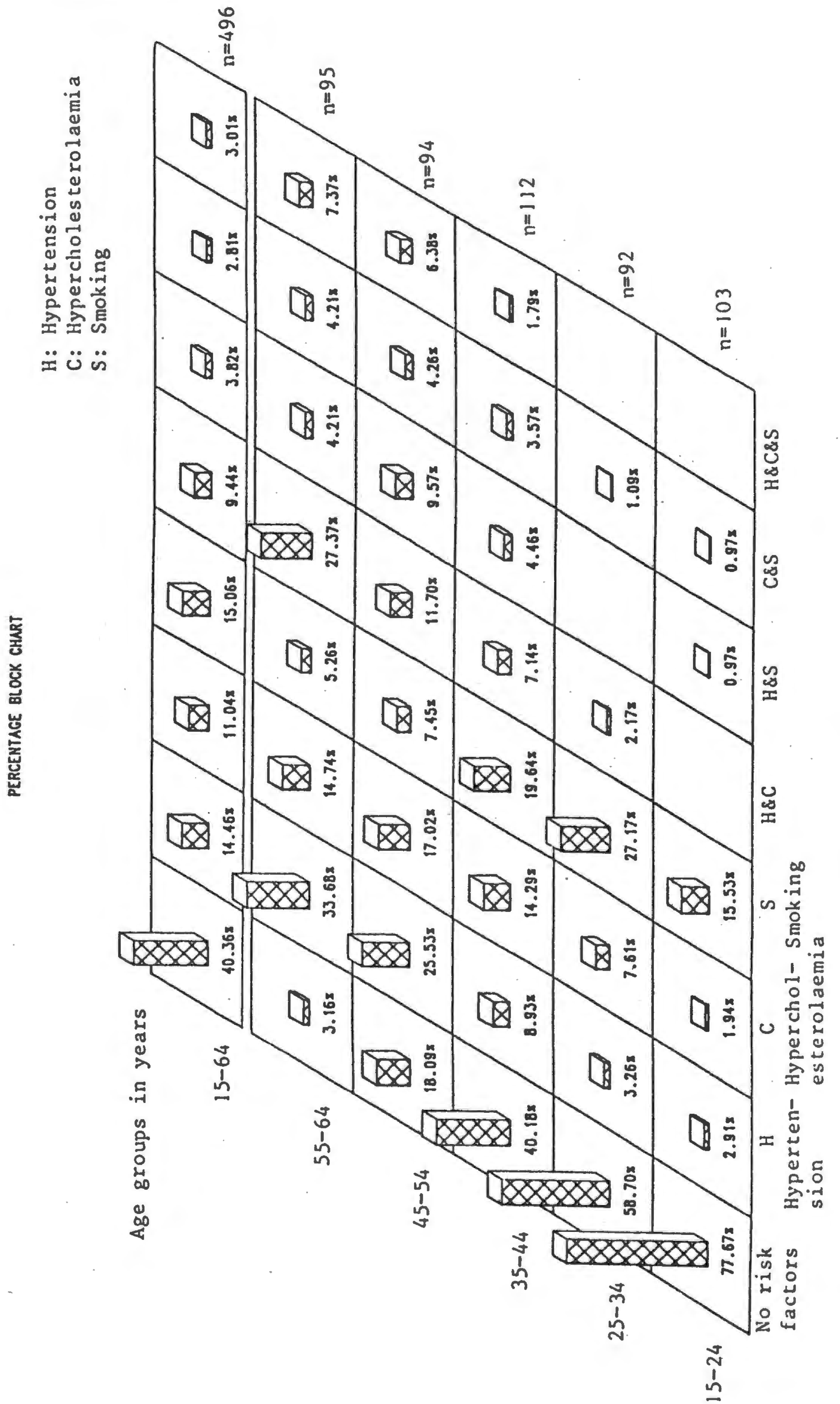


Figure 4 Clustering of major risk factors at a high level of risk in coloured women (%)



In the younger groups of women smoking was the most common risk factor, while hypertension was the most common among the older women. In the women aged 55 to 64 years 27,4% had both hypertension and hypercholesterolaemia. This indicates the need for looking for both these risk factors in older coloured women. Women did not show the clustering of hypertension and smoking as often as did coloured men. Few coloured women had all three risk factors present at the high level of risk.

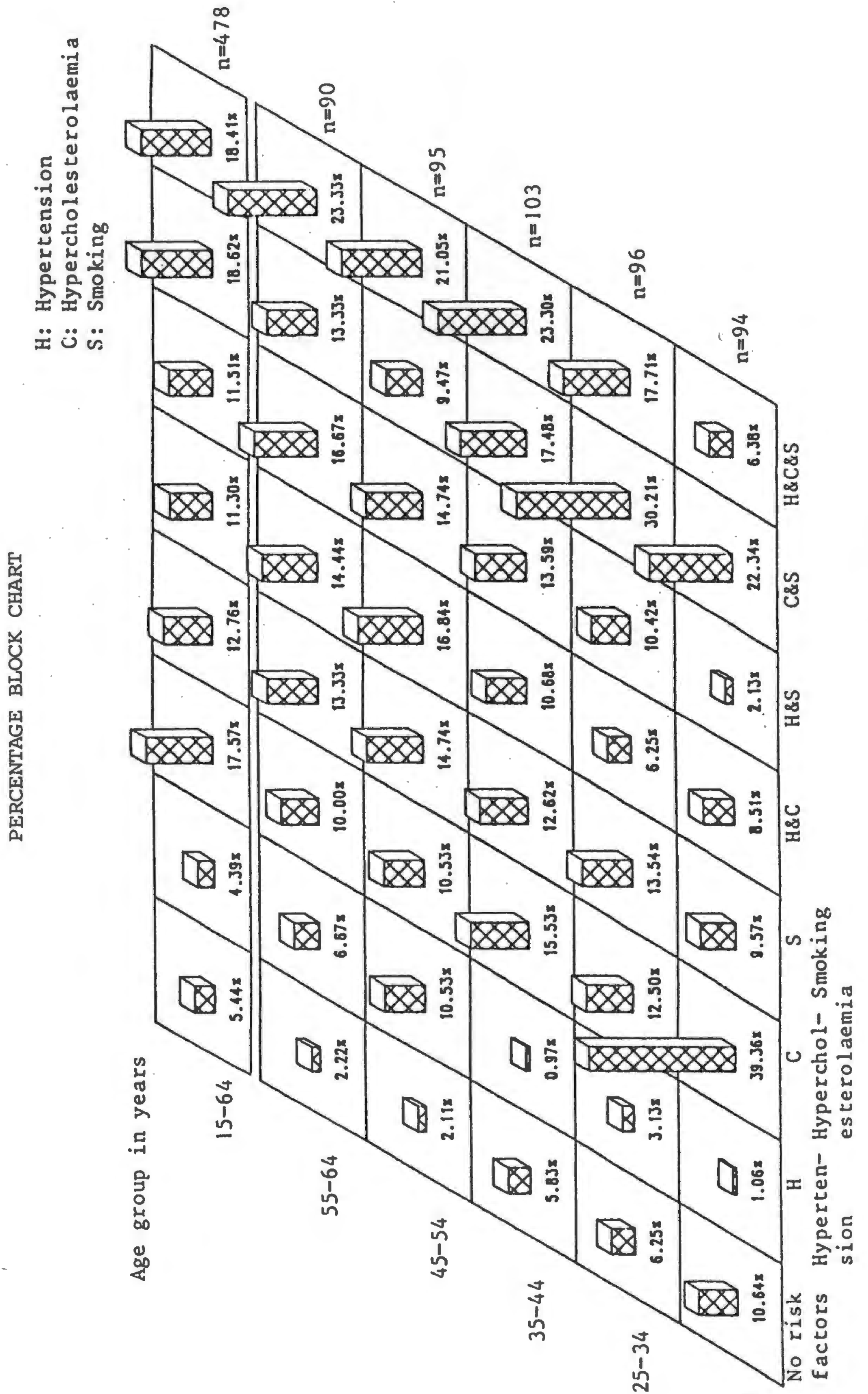
B Clustering of risk factors at a lower real level of risk

As has previously been indicated, it is necessary to use appropriate cut-off points to identify all persons in a population who have increased risk for developing CHD by virtue of the presence of the major risk factors. To identify all the persons truly at risk for developing CHD in the coloured population the following criteria were used: a blood pressure of ≥140/90 mm Hg, a total serum cholesterol above appropriate age- and sex-specific cut-off points[8], and the smoking of cigarettes.

Figure 6 shows the percentage block charts that represent the clustering of major risk factors at a level representing the real CHD risk in coloured men of the Cape Peninsula.

Astoundingly only 5,4% of coloured men studied had no major risk factors and even in the youngest age group of men, 15 to 24 years, only 10,8% were totally risk free. Hypercholesterolaemia defined by age-specific cut-off points was the most common single major risk factor found, particularly in young men aged 15 to 24 years.

Figure 5 **Clustering of major risk factors at true levels or risk in coloured men (%)**



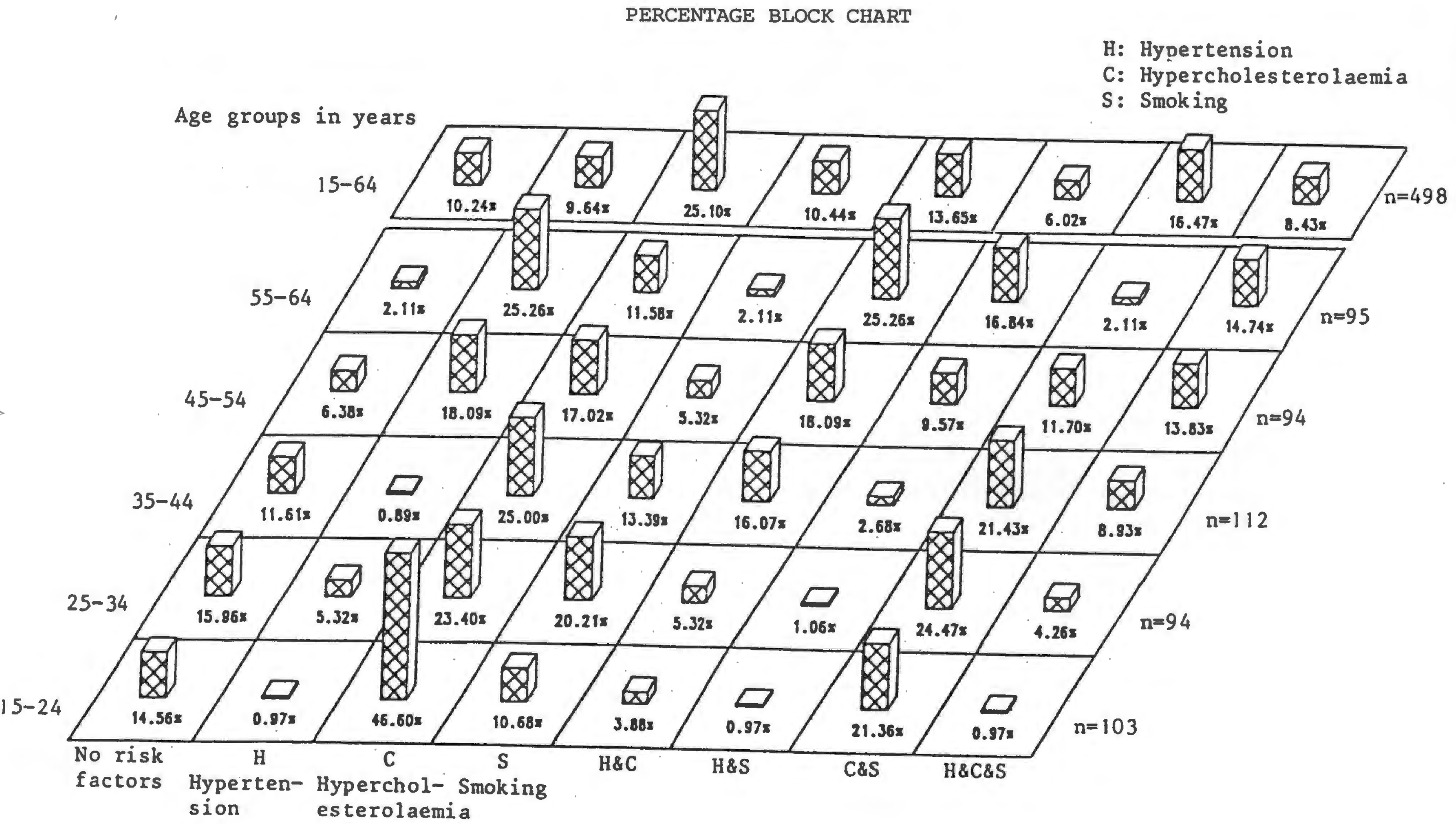
The risk factors occurring concurrently most often in coloured men were hypercholesterolaemia and smoking. This was so particularly in coloured men younger than 35 years. The most alarming finding is that above the age of 34 years at least 21% of coloured men had all three major risk factors present, exerting their synergistic effect on CHD risk. It follows that an effective intervention programme for the males of this population group will need to recognise and to identify this target group with very high risk and treat them effectively.

Figure 6 shows the percentage block charts that represent the clustering of major risk factors at a level representing the real CHD risk in coloured women of the Cape Peninsula.

Only 10,2% of women were totally risk free and even in the age group below 35 years only 15,2% were risk free. Again, as in the case of men the most common single risk factor was hypercholesterolaemia, particularly in the younger age groups, hypertension was very common in women 45 years or older.

The risk factors occurring concurrently most often in younger coloured women are again hypercholesterolaemia and smoking. In older women it is hypercholesterolaemia and hypertension that occurs concurrently most often. In the age group of 55 to 64 years 18,8% were both hypertensive and smoked. Overall 8,4% of women had all three major risk factors and above the age of 45 years at least 13,8% had all three risk factors.

Figure 6 Clustering of major risk factors at a true level of risk in coloured women (%)



Overall the coloured men had a much worse risk profile than the coloured women, particularly because more men than women had clustering of either two or all three major risk factors. Add to this the fact that men do not enjoy the protection women receive from their sex hormones, and one is confronted with a coloured male population greatly at risk for CHD.

5 SUMMARY OF FINDINGS IN THIS CHAPTER

1. Multiple regression analysis identified the following variables as contributing independently to the variation in systolic blood pressure in coloured men: age, BMI, HDL-cholesterol, number of cigarettes smoked per day, sodium, potassium and vitamin B6 intake per day.

2. The same analysis identified the following variables contributing to the variation of diastolic blood pressure in men: age, BMI, HDL-cholesterol and gram alcohol used per day.

3. In coloured women the following variables contributed to the variation in systolic blood pressure: age, BMI, serum uric acid, percentage energy from saturated fat intake and gram cholesterol intake per day.

4. The variables explaining the diástolic blood pressure variation in coloured women were age, BMI, serum uric acid, milligram iron and gram alcohol intake per day as well as percentage energy from saturated fat intake per day.

5. The variation in total serum cholesterol in men could be explained by the following variables: non-fasting triglycerides, age, BMI, gram polyunsaturated and saturated fat, and milligram cholesterol intake per day as well as by the Keys score of the diet.

6. In women the variation in total serum cholesterol could be explained by age, non-fasting triglycerides and the P/S ratio of the diet.

7 The LDL-cholesterol variation in men could be explained by BMI, age, non-fasting triglyceride levels, milligram cholesterol and gram polyunsaturated intake per day, gram alcohol intake per day as well as the Keys score of the diet.

8 The LDL-cholesterol variation in women could be explained by age, non-fasting triglyceride levels, P/S ratio, percentage energy from saturated fat as well as the gram polyunsaturated fat intake per 1 000 kcal.

9 Qf the men 63,7% and 62,2% of the women had one or more major risk factors at a high level of risk.

10 The coloured population carry overall a higher level of CHD risk than do the white population studied in the South Western Cape.

11 Very few coloureds were completely free of CHD risk.

12 The clustering of risk factors is very common in the coloured population.

13 Overall the coloured men had a much worse CHD risk profile than the coloured women.

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CHAPTER IX

CHD-RELATED MEDICAL HISTORY OF AND HEALTH-RELATED BEHAVIOUR AND FACILITIES FOR THE COLOURED POPULATION OF THE CAPE PENINSULA

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CHAPTER IX

CHD-RELATED MEDICAL HISTORY OF AND HEALTH-RELATED BEHAVIOUR AND FACILITIES FOR THE COLOURED POPULATION OF THE CAPE PENINSULA

1 INTRODUCTION

Within the coloured population, the target populations who specifically need intervention have been identified in the previous chapter. In order to suggest a feasible intervention programme the health-related behaviour of the study population, their actual and suggested sources of health information and their CHD-related medical histories need to be identified. The health care facilities and other possible useful facilities available to the population also need to be known.

Although some of this information has been given in earlier chapters in different context it bears repeating in this chapter to complete the overview necessary for suggesting guidelines for an intervention programme.

2 CHD-RELATED MEDICAL HISTORY

The CHD medical history of each participant was determined in two ways: firstly by means of the London School of Hygiene (Rose) questionnaire for chest pain[1]; secondly, the patients were directly questioned to elicit a history of either angina or of having had a myocardial infarction. Some other diseases related to CHD were also asked about.

Table 1 Percentage of participants having or having had either angina, a myocardial infarction or both, as determined by direct questioning

	% MEN			% WOMEN		
Age group in years	Angina	MI	CHD	Angina	MI	CHD
15-24	0	0	0	0	0	0
25-34	0	0	0	0	0	0
35-44	1,9	0	1,9	0	0	0
45-54	9,6	4,2	11,6	4,3	1,1	5,3
55-64	16,7	11,1	18,9	14,7	6,3	17,9
15-64 Crude rate	5,4	2,9	6,3	3,6	1,4	4,4
Coloured population Cape Peninsula	2,6	1,2	3,0	1,5	1,0	1,8
Coloured population South Africa	2,6	1,2	3,0	1,5	1,0	1,8
Standard million	2,6	1,3	3,0	1,5	1,0	1,9

A Participants' own CHD-related medical history

In Table 1 the percentage of participants giving a history of CHD on direct questioning is shown. In Table 2 the percentage of participants with a history of CHD elicited by use of the Rose questionnaire is shown.

The first table shows the positive self-reported history of CHD in men and women older than 44 years and particularly in the group of 55 years or older. More men than women reported having had CHD.

Table 2 Percentage of participants having or having had either angina, a myocardial infarction or both, as determined by questionnaire

	% MEN			% WOMEN		
Age group in years	Angina	MI	CHD	Angina	MI	CHD
15-24	12,8	0	12,8	13,6	2,9	15,5
25-34	7,3	3,1	8,3	13,8	4,3	14,9
35-44	10,7	3,9	13,6	11,6	4,5	15,2
45-54	12,6	7,4	17,9	19,2	2,1	19,2
55-64	23,3	8,9	25,6	17,9	6,3	21,1
15-64 Crude rate	13,2	4,6	15,5	15,1	4,0	17,1
Coloured population Cape Peninsula	11,8	2,9	13,7	14,3	3,7	16,1
Coloured population South Africa	11,8	2,9	13,3	14,3	3,7	16,1
Standard million	12,7	4,0	14,7	14,8	3,9	16,8

When comparing the history of CHD determined by the Rose questionnaire (Table 2) to that which was self-reported (Table 1) a marked discrepancy was found, particularly in the younger age groups. Clearly the questionnaire falsely identified young participants 'suffering' from CHD when in reality they did not. CHD in young people is very rare and only found in patients with genetic hyperlipidemias.

This illustrates the problems arising when questionnaires developed for use in a specific population are used in another. The results of the Rose questionnaire in our hands have not proved useful for the coloured population

of the Cape Peninsula. Although angina was shown to have a marked variability when determined by the questionnaire in the hands of Rose and his co-workers[2], its results did correlate well with ischaemic changes seen on electrocardiographic tracings of patients. Validation of the questionnaire to determine CHD in general and angina in particular seems to be acceptable[3]. But interpopulation differences with this questionnaire such as those we found, have also been experienced in other studies[4,5]. In conclusion it would seem unwise to use this questionnaire for the coloured population or any other population in South Africa before it has been validated locally.

Tables 3 and 4 show the other diseases suffered by the study population and elicited in this survey. Table 5 shows the treatment status of the patients with these conditions.

The prevalence of reported hypertension was described in Chapter IV. When the actual hypertension prevalence determined by blood pressure measurements and reported on in Chapter IV is compared to the self-reported medical history of hypertension, it is clear that women between 25 and 44 years report suffering from hypertension more often than is actually the case as found by direct measurement. Another indication that hypertension is self-reported by persons not actually suffering from the disease, is the finding that only 42,6% of male and 69,9% of female true hypertensives actually reported having the disease. This could be a sign that the participants were not fully knowledgeable about the medical conditions from which they suffered. This highlights the need to actually determine the blood pressure of a person to identify hypertension, as the giving of a hypertensive history is so unreliable for identifying hypertensive cases.

Table 3 Reported medical history of males in the study population (percentage)

Age group	Hypertension	Diabetes	Constipation	Stroke	Hypercholes-terolaemia
15-24	2,1	0	3,2	0	0
25-34	4,2	0	11,5	0	0
35-44	10,7	2,9	13,6	0	0
45-54	18,9	9,5	11,6	1	5,3
55-64	30	8,9	13,3	6,7	3,3
15-64 Crude rate	13,2	4,3	10,6	1,5	1,7
Coloured population Cape Peninsula	7,9	2,2	8,7	0,6	0,9
Coloured population South Africa	7,9	2,2	8,7	0,6	0,9
Standard million	11,2	3,5	10,0	1,2	1,4

Table 4 Reported medical history of the female participants in the study population (percentage)

Age group in years	Hypertension	Diabetes	Constipation	Stroke	Hypercholes-terolaemia
15-24	1,9	0	20,4	0	0
25-34	12,8	5,3	29,8	0	0
35-44	24,1	1,8	28,6	0	0
45-54	44,7	6,4	34,0	1,0	1,0
55-64	54,7	11,6	28,4	3,2	2,1
15-64 Crude rate	27,6	5,0	28,2	1,0	0,6
Coloured population Cape Peninsula	17,0	3,2	26,3	0,3	0,3
Coloured population South Africa	17,0	3,2	26,3	0,3	0,3
Standard million	23,7	4,4	27,6	0,6	0,5

Table 5 Treatment status of reported disease in the study population (percentage)

	MEN. TOTAL = 478		WOMEN. TOTAL = 498	
Disease and treatment reported	Total number with the disease	% taking drugs or on a diet	Total number with the disease	% taking drugs or on a diet
Hypertensives:				
Taking drugs daily	30	23,44	62	40,52
Taking drugs occasionally	8	6,25	16	10,46
Following a diet	5	3,91	12	7,84
Diabetes:	20		24	
Taking drugs daily		50		45,8
Following a diet		40		33,3
Obesity:	34		92	
Following a diet		22,7		17,1
Angina:	26		18	
Taking drugs daily		26,9		27,8
Taking drugs occasionally		42,3		50,0
Constipation:	51		140	
Taking drugs daily		3,9		5,7
Taking drugs occasionally		50,9		65,7
Following a diet		3,9		6,4

Diabetes was more often reported in the older than younger age groups. Overall 2,2% of men and 3,2% of women suffered from diabetes. Very little morbidity data on diabetes in this population group is available. Nash[6] reported that in a representative sample of persons over 65 years of age 13% had glycosuria. In the Cape morbidity survey by general practitioners[7] diabetes accounted for 16% of the recorded diseases in coloureds. Self-reported diabetics were receiving more treatment or followed a diet more often than were the hypertensive participants. Fifty percent of male

diabetics and 45,8% of the female diabetics were taking medication daily, while 40% of male diabetics and 33,3% of female diabetics reported following a diet for their diabetes.

This still indicates that more than half of the diabetics in the study population do not take medication or follow a diet to control their condition. Diabetes, particularly poorly controlled diabetes, is also a significant independent risk factor for CHD[8,9] and must be diagnosed and adequately treated in an optimal CHD prevention programme.

Table 6 Obesity in the study population

	% MEN		% WOMEN	
Age group in years	Self-reported obesity	BMI ≥ 25	Self-reported obesity	BMI ≥ 24
15-24	4,3	7,4	6,8	30,1
25-34	3,1	20,8	18,1	58,4
35-44	7,8	35,0	20,5	67,0
45-54	15,8	42,1	29,8	83,0
55-64	15,6	42,2	37,9	80,0
15-64 Crude rate	9,3	29,4	22,6	63,3
Coloured population Cape Peninsula	6,7	21,5	16,8	53,4
Coloured population South Africa	6,7	21,6	16,8	53,4
Standard million	8,3	27,0	20,3	59,7

Of the men 8,7% and of the women 26,3% complained of being constipated. An amazing 54,8% of men and 71,4% of women used medication for constipation at least occasionally. This confirmed a clinical observation of the author and reflects the inadequacy of the vegetable fibre intake among the participants.

Very few participants reported having suffered a stroke. This is difficult to explain in terms of the very high cerebrovascular accident mortality found in this population group[10] as well as the high prevalence of hypertension (Chapter IV). One can speculate that a high case fatality rate of cerebrovascular disease could explain this finding.

Only few participants reported having hypercholesterolaemia. In Chapter VI it was seen what a significant contribution hypercholesterolaemia makes to the CHD risk profile of the participants. It would seem unlikely that a population, not knowing that their cholesterol is raised, would in any way attempt to adapt their diet to improve their serum cholesterol level.

Obesity contributes mostly indirectly to increased risk for CHD[11-13] and little doubt exists that in obese persons CHD risk can be reduced by weight reduction[14]. Being overweight is a common problem in the study population, as can be seen from Table 6. Of the men 21,5% and of the women 53,4% were overweight or obese as defined by a BMI of $\geq$25 for men and BMI of $\geq$24 for women. Being overweight was thus found much more often than the participants reported it themselves. Only 6,7% of men and 16,8% of women saw themselves as overweight. Clearly a weight reduction programme in this population group will need to deal with this self-image of not being overweight. Of the persons who reported themselves as being overweight, only 22,7% of men and

17,1% of women followed a diet to lose weight (Table 5). Not only do very few overweight persons see themselves as such, but a very small percentage follow a weight reducing diet.

B CHD-related family history

For this study a positive family history for CHD is defined as having either a mother, a father or a sibling who had suffered angina and/or a myocardial infarction. A double family history is defined as having at least two of these first degree relatives with such a medical history. Table 7 shows the participants with a single and double CHD family history. A high number of participants, in fact 27% of men and 29,5% of women reported a single, and 11,1% of men and 12,6% of women reported a double CHD family history. From earlier comparisons of self-reporting by the participants with direct measurements on the participants it was suggested that self-reporting in this study group is not a source of very accurate information. Despite this the results do suggest that a CHD family history is very common in the study population and that familial hypercholesterolaemia is a disease that must be looked for in the coloured population if CHD mortality is to be maximally reduced.

3 HEALTH ACTIONS TAKEN BY PARTICIPANTS

An effective intervention programme must consider the health actions taken by the population towards which it is directed. In the following sections the reported health actions of the participants will be described.

Table 7 Participants with a CHD family history

	% MEN WITH		% WOMEN WITH	
Age group in years	Single CHD family history	Double CHD family history	Single CHD family history	Double CHD family history
15-24	11,7	5,3	16,5	5,8
25-34	31,3	8,3	34,0	13,8
35-44	26,2	7,8	32,1	9,8
45-54	30,5	9,5	33,0	12,8
55-64	35,6	25,6	32,6	22,1
15-64 Crude rate	27,0	11,1	29,5	12,6
Coloured population Cape Peninsula	19,9	7,2	20,9	7,3
Coloured population South Africa	19,9	7,2	20,8	7,3
Standard million	25,1	9,3	26,3	9,9

A Use of medical facilities in the Cape Peninsula

Table 8 shows which medical facilities in the Cape Peninsula the study population attended. In this section only the crude prevalence rates for the whole population, without age standardisation, are given.

Table 8 Use of medical facilities by the study population

% of each age group

Age in years	15 - 24	25 - 34	35 - 44	45 - 54	55 - 64	15 - 64
Men						
Day hospitals	19,2	15,6	15,5	17,9	24,4	18,4
Preventive clinics and others	3,2	6,3	5,8	5,3	3,3	4,8
Provincial hospitals	19,2	22,9	22,3	23,2	42,2	25,7
Private medical services	41,5	65,6	65,0	55,8	54,4	56,7
Women						
Day hospitals	17,5	19,1	25,0	23,4	46,3	26,1
Preventive clinics and others	14,6	30,9	17,0	8,5	9,5	10,3
Provincial hospitals	17,5	23,4	16,1	27,7	34,7	23,5
Private medical services	42,7	60,6	57,1	58,5	43,2	52,4

The day hospitals are frequented by only 18,4% of men and 26,1% of women. The women between ages 55 and 64 years have the highest percentage (46,3%) attending the day hospitals. The large number of women between the ages of 15 and 44 years attending preventative clinics probably represents the attendance of family planning clinics. As can be anticipated the oldest age group of both men and women are those who most often use the sophisticated services of the provincial hospitals. By far the most popular of medical services were those provided by private practitioners.

Relatively little detailed information is available on the actual number of coloured patients who attend the various medical facilities in the Cape Peninsula. It is pointed out in the Saldru Working Paper no 55[15] that by far the majority of private medical practitioners, the favoured medical facility used by the study sample, live outside the coloured areas. Thus, problems of access arise for the population, particularly after hours.

Table 9 indicates which proportion of the population uses only private or only public medical facilities, or both.

Table 9 Preferred use of medical facilities by the study population

	% Men	% Women
Attending only public medical facilities	49,9	38,2
Attending only private medical facilities	31,3	39,2
Attending both types of medical facilities	18,8	22,6

Noticeably more men than women attend only general practitioners, in fact in the males of age group 25 to 44 years 58,75% attended only general practioners and only in the oldest group of men studied, 55 to 64 years, did more men attend only day hospitals (43,2%) than those who consulted only general practitioners (35,8%). For females this tendency was less pronounced and in the oldest age group of women only 18,3% attended general practitioners and 52,4% attended day hospitals only. In an effective CHD risk factor intervention programme the general practitioners serving the community, being the most frequently utilised medical facility, will have to be important contributors to the programme. This is a role that is not always clearly perceived or practised by general practitioners and will need to be developed.

B Blood pressure measurements

Table 10 shows how often participants had their blood pressure measured in the year before the survey. Many more women than men had had their blood pressure measured in the last year. This difference is particularly marked during the childbearing years of the women, since they then come in contact with medical services more often than men. The high frequency of blood pressure measurements in the study population suggests that the population has a reasonable access to blood pressure measurements. One would assume that this access should contribute considerably to hypertension control. That this does not seem to be the case was reflected in the poor hypertension control found among the hypertensives in this study. Thus part of an efficient hypertension control programme would need to be directed at the personnel of medical services who take the blood pressure readings. Such personnel would have to act more effectively than at present to improve hypertension control among the coloureds of the Cape Peninsula.

C Reported efforts at weight loss

From Table 6 it can be seen that being overweight was a very common problem in the study populations and that few participants reported themselves as being overweight. From Table 11 it can be seen that many more women than men attempted to lose weight, while more men than women thought they did not need to lose weight. Of the women who attempted to lose weight 76,9% followed a reducing diet, only 24,9% increased their physical activity, while 18,7% used appetite suppressants and 13,8% used expensive slimming preparations (Table 12). Neither of the last two have been shown to be effective in achieving a permanent weight loss.

Table 10 Persons whose blood pressure had been measured in the last year

Age group in years	% MEN	% WOMEN
15-24	26,6	37,9
25-34	47,9	70,2
35-44	56,3	63,4
45-54	57,9	73,4
55-64	72,2	75,8
15-64 Crude rate	52,09	63,7

Table 11 Percentage of participants who attempted to lose weight

	% MEN		% WOMEN	
Age group in years	Not neces-sary*	Attempted	Not neces-sary*	Attempted
15-24	44,7	8,5	33,0	35,0
25-34	33,3	20,8	17,0	40,4
35-44	28,2	19,4	16,1	51,8
45-54	29,5	23,2	11,7	51,1
55-64	28,9	26,7	15,8	47,4
15-64	32,9	16,7	18,9	45,2

*Participants who did not think they needed to lose weight

Table 12 Methods used by women to lose weight

Age groups in years	Number who attempted weight loss (% of total)	% who used dieting	% who used exercise	% who used appetite suppressants	% who used slimming preparations
15-24	36 (35,0)	69,4	36,1	27,8	8,3
25-34	38 (40,4)	60,5	44,7	23,7	21,1
35-44	58 (51,8)	81,0	24,1	25,9	13,8
45-54	48 (51,1)	87,5	14,6	12,5	12,5
55-64	45 (47,4)	80,0	11,1	4,4	13,3
15-64	225 (45,2)	76,9	24,9	18,7	13,8

Table 13 Methods used by men to lose weight

Age groups in years	Number who attempted weight loss (% of total)	% who used dieting	% who used exercise	% who used appetite suppressants	% who used slimming preparations
15-24	8 (8,5)	50,0	87,5	12,5	12,5
25-34	20 (20,8)	80,0	60,0	0,0	0
35-44	20 (19,4)	75,0	55,5	0,0	0
45-54	22 (23,2)	68,2	36,4	22,7	4,5
55-64	24 (26,7)	87,5	8,3	12,5	8,3
15-64	94 (19,7)	75,5	42,6	9,6	4,3

Of the men who attempted to lose weight (Table 13), 75,5% followed a reducing diet, 42,6% increased their physical activity, while 9,6% used appetite suppressants and 4,3% used slimming preparations. In comparing men and women it is seen that the men used exercise, known to contribute to successful weight loss, more often than women. Less effective weight loss techniques like the use of appetite suppressants and the use of slimming preparations were used more by women than by men.

For this grossly overweight population to effectively lose weight a programme including the following aspects needs to be established:

a The population must be made aware of obesity as a problem, as many participants do not seem to perceive themselves as overweight when in fact they are overweight.

b Besides following an effective kilojoule-restricted diet, the overweight persons, particularly the women, will need to be motivated to exercise more and to avoid the use of ineffective appetite suppressants and expensive slimming preparations.

D <u>Reported efforts to alter diet to protect the heart</u>

Table 14 shows that only 16,5% of men and 21,7% of women reported that they had attempted to alter their diet in the last year to guard against heart disease. Clearly this is inadequate in a population where hypercholesterolaemia is so common (Chapter VI).

Table 14 Percentage of participants who changed their diet to guard against CHD

Age group in years	% MEN	% WOMEN
15-24	8,5	11,7
25-34	10,4	13,8
35-44	12,6	23,2
45-54	21,1	34,0
55-64	31,1	26,3
15-64	16,5	21,7

Tables 15 and 16 show the dietary changes that were attempted by the male and female participants in the study. Fourteen percent of the men and 19,1% of the women ate less fat, and 3,1% of men and 5,4% of women used margarine and/or cooking oil rather than butter.

Table 15 Diet changes used by men to guard against CHD

Age group in years	% who ate less fat	% who used more margarine and cooking oil	% who ate less liver, eggs and offal	% who tried to lose weight	% who ate less salt	% who ate less sugar	% who ate more fibre rich food
15-24	7,5	1,1	2,1	3,2	26,6	34,0	62,8
25-34	7,3	2,1	4,2	2,1	36,5	34,4	65,6
35-44	10,7	4,9	2,9	7,8	41,8	46,6	68,9
45-54	17,9	2,1	4,2	10,5	29,5	36,8	61,1
55-64	27,8	5,6	10,0	6,7	50,0	52,2	70,0
15-64	14,0	3,1	4,6	6,1	36,9	40,8	65,7

Table 16 Diet changes used by women to protect against CHD

Age group in years	% who ate less fat	% who used more margarine and cooking oil	% who ate less liver, eggs and offal	% who tried to lose weight	% who ate less salt	% who ate less sugar	% who ate more fibre rich food
15-24	9,7	2,9	1,9	2,9	35,0	45,6	65,1
25-34	10,6	4,3	2,1	6,4	45,7	51,1	69,2
35-44	17,0	4,5	4,5	10,7	50,9	15,0	75,0
45-54	34,0	9,6	7,5	11,7	54,3	68,1	71,3
55-64	25,3	6,3	5,3	14,7	70,5	69,5	77,9
15-64	19,1	5,4	4,2	9,2	51	58,2	71,7

Only 4,6% of men and 4,2% of women avoided food high in cholesterol like eggs, liver and offal. Of the men 6,1% and of the women 9,2% reported attempts to lose weight to protect their heart.

The data in the first four columns of Tables 15 and 16 was elicited by first asking participants whether they had changed their diet to protect their heart in the past year. If they answered in the affirmative then it was enquired how they had achieved this. If one of the answers shown in the first four columns of Tables 15 and 16 was given, it was marked in the questionnaire by the interviewers, who thus used indirect questioning techniques. In contrast direct questions were asked to elicit the data shown in the last three columns in the two tables. Participants only needed to answer 'yes' or 'no'. As can be seen when comparing the number of affirmative answers in the last three

columns with those in the first four columns of Tables 15 and 16, many more participants gave positive answers when directly questioned than when more indirect questioning techniques were used. This again highlights the need to avoid such questioning techniques whenever possible and cautions against the validity of the results of direct questioning.

The direct questioning techniques used showed that 36,9% of men and 51% of women reported eating less salt. Of the men 40,8% and of the women 58,2% ate less sugar and 65,7% of men and 71,7% of women confirmed that they ate more fibre rich foods.

The data in this section clearly shows that this hypercholesterolaemic population is not adapting their diet to reduce hypercholesterolaemia. The data from the 24-hour dietary recall part of this study (unpublished data Mrs M L Langenhoven, RIND, P O Box 70, Tygerberg 7505, RSA) showed that the study population followed a westernised diet with high animal protein content, and 37% of total energy intake provided by fat. The polyunsaturated:saturated fat ratio was between 0,78 and 1,0 and thus less atherogenic than most typical westernised diets. Clearly a dietary education programme for this population group is badly needed.

E Reported efforts to stop smoking

Participants' reported efforts to stop smoking are described in Chapter V.

F Reported efforts to relieve tension

Table 17 shows that 28% of men and 38,8% of women had attempted to relieve their stress in the last year. Only 14,6% of the men and 12,5% of the women

Table 17 . Percentage of participants who tried to relieve stress

	MEN		WOMEN	
Age group in years	% who tried to relieve stress	% who had no stress	% who tried to relieve stress	% who had no stress
15-24	22,3	20,2	16,5	23,3
25-34	18,8	19,8	35,1	10,6
35-44	34,9	12,6	45,5	8,0
45-54	30,5	13,7	47,9	6,4
55-64	33,3	6,7	49,5	13,7
15-64	28,0	14,6	38,8	12,5

reported that they did not suffer any stress. Tables 18 and 19 show the actions taken, as determined by indirect questioning, by all the participants to relieve stress. Of the men 9,8% and of the women 8,4% had decreased their responsibilities, 13,2% of men and 15,9% of women had fewer worries and 8,6% of men and 9,8% of women had solved their problems. Of the men 5,7% and of the women 13,1% had used anxiolytic medication, 4,4% of men and 3,4% of women had used exercise to relieve stress and only 3,1% of men and 4,8% of women had consulted a psychologist or a similar professional person for the stress they had suffered.

Table 18 Changes used by men to relieve stress

Age groups in years	% who decreased their responsibilities	% who had fewer worries	% who had solved their problems	% who used anxiolytic medication	% who used exercise to relieve stress	% who consulted a psychologist
15-24	3,2	12,8	9,6	4,3	8,5	2,1
25-34	6,3	10,4	6,3	3,1	3,1	2,1
35-44	11,7	14,6	13,6	6,8	5,8	1,9
45-54	10,5	12,6	7,4	6,3	3,2	1,1
55-64	17,8	15,6	5,6	7,8	1,1	8,9
15-64	9,8	13,2	8,6	5,7	4,4	3,1

Table 19 Changes used by women to relieve stress

Age groups in years	% who decreased their responsibilities	% who had fewer worries	% who had solved their problems	% who used anxiolytic medication	% who used exercise to relieve stress	% who consulted a psychologist
15-24	1,0	9,7	5,8	1,9	2,9	1
25-34	5,3	17,0	12,8	10,6	7,5	6,4
35-44	11,6	18,8	10,7	17,0	1,8	3,6
45-54	16,0	18,1	13,8	17,0	3,2	6,4
55-64	8,4	15,8	6,3	19,0	2,1	7,4
15-64	8,4	15,9	9,8	13,1	3,4	4,8

The determination of Type A coronary-prone behaviour[16-18] was achieved in this study by the use of the Bortner scale[19] and the results of this aspect

of the study have been published elsewhere[20]. The prevalence of type A behaviour was fairly equal distributed between high and low type A behaviour scores that occurred among both sexes, aged 16 to 54, whereas proportionally fewer high than low scores occurred with people between 55 and 64 years. Both male and female respondents with high type A scores recorded higher average systolic blood pressure readings. Type A men also smoked more than others.

Stress does seem to play an important role in this population group and type A coronary prone behaviour is a feature of the coronary risk profile of the coloured population of the Cape Peninsula. The problem of the relief of stress and the diagnosis and treatment of type A coronary prone behaviour should also be addressed in an effective CHD intervention programme.

G Reported physical activity patterns

The protective role of vigorous physical activity over a long period against CHD has clearly been demonstrated in many studies[21-24]. Paffenbarger *et al.*[22,23] showed that a protective exercise threshold could be identified. Expenditure of 32 300 kJ/week or more above basal levels during the workday and at least 8 400 kJ/week of vigorous leisure time exercise led to a reduced incidence of CHD and sudden death. These protective levels of work and leisure time activity were used to identify those participants in the study population who expended insufficient energy at work or during leisure time to protect against CHD. Tables 20 and 21 show the percentage of men and women who fell in these categories. Of the men 92,1% and of the women 96,2% did not expend sufficient energy at work to protect against CHD. Insufficient leisure time activity for protection was spent by 79,1% of men and 84,9% of women.

Although only a few participants spent sufficient energy during the workday to protect against CHD, this nevertheless was much more than was spent by a rural white population, where less than 2% of men and 0,5% of women expended more than 32 300 kJ/week at work[25].

During leisure time activity 79,1% of men and 84,9% of women spent less than 4 800 kJ/week. The coloured women of the Cape Peninsula in this study were as inactive during leisure time as the white women of the South Western Cape, with less than 16% in both groups doing inadequate leisure time exercise to protect against CHD. The coloured men did less protective leisure time activity than did white men[25], with 19,1% of coloured and 32,6% of white men doing sufficient leisure time activity for CHD protection.

Table 20 Percentage of men who undertake no or inadequate physical activity

Age group in years	% who do sedentary work	% who spend less than 32 300 kJ/week at work[16]	% who do no exercise after work	% who spend less than 4 800 kJ/week on leisure activity[17]
15-24	22,3	98,9	39,4	62,8
25-34	16,7	82,3	45,8	67,7
35-44	16,5	93,2	59,2	86,4
45-54	23,2	94,7	61,1	88,4
55-64	31,1	91,1	76,7	90,0
15-64	21,8	92,1	56,3	79,1

Table 21 Percentage of women who undertake no or inadequate physical activity

Age group in years	% who do sedentary work	% who spend less than 32 300 kJ/week at work[16]	% who do no exercise after work	% who spend less than 4 800 kJ/week on leisure activity[17]
15-24	23,3	99	46,6	77,7
25-34	14,9	94,7	63,8	83,0
35-44	11,6	94,4	58,9	81,3
45-54	10,6	90,4	68,1	88,3
55-64	13,7	99,9	76,8	95,8
15-64	14,9	96,2	62,4	84,9

Of the men 21,8% did sedentary work while only 14,9% of women did such work. Of the men 56,3% and of the women 62,4% spent no energy above basal levels during leisure time activities. Young participants were more physically active than older ones.

The benefit of vigorous exercise is understood by few of the coloured population, and a CHD intervention programme will also need to address this problem.

4 SOURCES OF HEALTH INFORMATION

When an intervention programme for CHD, which will attempt to change the population's knowledge and behaviour, is formulated the current sources of their knowledge and the sources suggested by them must be taken into consideration.

Table 22 Sources of health information of study participants

Source of information	Participants	% of participants in each age group					
		15-24	25-34	35-44	45-54	55-64	15-64
Learnt from television	Male	68,1	70,8	75,7	66,3	68,9	70,1
	Female	68,9	60,6	68,8	75,5	67,4	68,3
Learnt from written material: magazines, pamphlets, books, newspapers	Male	62,8	57,3	54,4	52,6	41,1	53,8
	Female	59,2	56,4	56,4	51,1	35,8	52,0
Learnt from radio	Male	37,2	42,7	45,6	41,1	42,2	41,8
	Female	34,0	42,6	42,9	48,9	41,1	41,8
Learnt from posters in public places	Male	50,0	37,5	51,5	31,6	30,0	40,4
	Female	38,8	37,2	33,0	37,2	28,4	34,9
Learnt from doctors or nurses	Male	14,9	21,9	29,1	26,3	37,8	25,9
	Female	22,3	22,3	20,5	34,0	36,8	26,9
Learnt from friends	Male	23,4	25,0	11,7	17,9	25,6	20,5
	Female	25,2	22,3	22,3	16,0	20,0	21,3
Learnt at day hospitals or clinics	Male	14,9	10,4	9,7	16,9	22,2	14,6
	Female	16,5	17,0	17,9	17,0	31,6	19,9
Learnt from teachers at school	Male	41,5	14,6	16,5	9,5	3,3	17,2
	Female	37,9	10,6	8,0	8,5	2,1	13,7
Learnt at work	Male	16,0	18,8	20,4	11,6	5,6	14,6
	Female	12,6	10,6	10,7	12,8	4,2	10,2
Learnt from children at school	Male	10,6	5,2	7,8	3,2	6,7	6,7
	Female	7,8	5,3	5,4	6,4	5,3	6,0

A Sources of information used by participants

Participants were asked how they had learnt how to keep their hearts healthy. Table 22 shows the sources they identified.

The most frequently mentioned source was the television, with 70,1% of men and 68,3% of women referring to it. A similar number of persons of each age and sex category mentioned television. Written material like magazines, newspapers, pamphlets and books was in the second position in the table. The younger age groups of both sexes mentioned this more often than did the older participants.

Third on the table is the radio, followed by posters in public places. The youngest age group, 15 to 24 years, learnt less frequently from the radio than did the older groups of participants. In fifth place on the table is information from doctors and nurses; this was reported more often by older participants than younger ones. This is followed by information from participants' friends. Only 14,6% of men and 19,9% of women learnt at day hospitals or clinics about preventing heart disease. Apart from the youngest age group of 15 to 24 years very few participants, 17,2% of men and 13,7% of women, had learnt at school from their teachers how to prevent heart disease. At work only 14,6% of men and 10,2% of women had received such information. The least effective source of information was schoolchildren carrying over information to their parents.

Table 23 Percentage of participants who reported not learning about methods to keep their heart healthy

Age group in years	% MEN	% WOMEN
15-24	10,6	16,5
25-34	17,7	21,3
35-44	13,6	15,2
45-54	13,7	8,5
55-64	12,2	15,8
15-64	13,6	15,5

Table 23 shows that 13,6% of men and 15,5% of women had not learnt from any of the sources mentioned about methods to keep their hearts healthy.

In summary most persons gained information from public media followed by information from medical personnel and facilities, and least information was gained in schools or at the work-place.

Table 24 Percentage of participants who suggested television as a medium for teaching

	% MALES				% FEMALES			
Age group in years	First choice	Second choice	Third choice	Total	First choice	Second choice	Third choice	Total
15-24	26,6	18,1	28,7	73,4	21,4	37,9	16,5	75,8
25-34	25,0	28,1	28,1	81,2	25,5	33,0	20,2	78,7
35-44	33,0	29,1	20,4	82,5	25,9	33,9	22,3	82,1
45-54	26,3	37,9	10,5	74,8	30,9	33,0	18,1	82,0
55-64	17,8	35,6	26,7	70,1	29,5	37,9	15,8	82,2
15-64	25,9	29,7	22,8	78,4	26,5	35,1	18,7	80,3

B Sources of information suggested by participants

Participants were asked to select the most important three sources, from a list, that they thought would be effective in teaching the people of their

Table 25 Percentage of participants who suggested school as a medium for teaching

	% MALES				% FEMALES			
Age group in years	First choice	Second choice	Third choice	Total	First choice	Second choice	Third choice	Total
15-24	17,0	31,9	12,8	61,7	26,2	23,3	2,9	52,4
25-34	18,8	26,0	9,4	54,2	19,2	20,2	8,5	47,9
35-44	16,5	15,5	10,7	42,7	19,6	17,9	16,1	53,6
45-54	24,2	20,0	9,5	53,7	21,3	23,4	10,6	56,3
55-64	28,9	12,2	11,1	52,2	22,1	9,5	9,5	41,1
15-64	20,9	21,1	10,7	52,7	21,7	18,9	9,6	50,2

community to live in a fashion that will protect against heart disease. Table 24 shows that overall 78,4% of men and 80,3% of women suggested television as one of the three most effective sources to teach the population. Thus television was the most favoured first choice medium of the study population. Similar numbers in each age and sex category suggested television. This would suggest that television could be used effectively more often for health education, than is presently the case.

The personnel responsible for health education in the day hospital organisation report that video material is the method received with most enthusiasm by the patients at the hospitals.

The next most popular source cited by the participants was being taught at school as shown in Table 25; 52,7% of men and 50,2% of women chose this facility and more give it as their first choice rather than their third choice. From Table 22 it can be seen that only 17,2% of men and 13,7% of females reported receiving CHD prevention education at school. Thus the study population seems to suggest that it would be effective to teach CHD prevention at school to young people and that it should be done much more than at present. Again this suggestion was made equally often by all age and sex groups.

Table 26 Percentage of participants who suggested newspapers as a medium for teaching

	% MALES				% FEMALES			
Age group in years	First choice	Second choice	Third choice	Total	First choice	Second choice	Third choice	Total
15-24	4,3	10,6	16,0	30,9	4,9	8,7	23,3	36,9
25-34	1,0	6,3	17,7	25,0	2,1	12,8	20,2	35,1
35-44	1,9	10,7	18,5	31,1	1,8	8,9	25,9	36,6
45-54	1,1	7,4	29,5	38,0	2,1	6,4	30,9	39,4
55-64	3,3	8,9	33,3	45,5	0	6,3	26,3	32,6
15-64	2,3	8,8	22,8	33,9	2,2	8,6	25,3	36,1

Overall the next most popular medium was newspapers. From Table 26 it can be seen that they ranked much higher as a third choice and very low as a first

choice in all age groups. Older persons, particularly men, suggested newspapers more often than did younger persons. Interestingly, newspapers ranked very much higher than magazines and pamphlets. From Table 22 it can be seen that written material ranked just below television as a source of information. One can thus assume that newspapers as an educational tool would be the preferred form of written information rather than magazines and pamphlets and should be used as an adjunct to other facilities.

Table 27 Percentage of participants who suggested lectures as a medium for teaching

	% MALES				% FEMALES			
Age group in years	First choice	Second choice	Third choice	Total	First choice	Second choice	Third choice	Total
15-24	23,4	5,3	4,3	33,0	19,4	4,9	8,7	33,0
25-34	20,8	5,2	0	25,0	19,2	4,3	3,2	27,7
35-44	19,4	9,7	3,9	33,0	17,9	8,0	2,7	28,6
45-54	19,0	3,2	5,3	27,5	19,2	2,1	2,1	23,4
55-64	15,6	6,7	4,4	26,7	13,7	4,2	3,2	21,1
15-64	19,7	6,1	3,6	29,4	17,9	4,8	4,0	26,7

Lectures as educational tools were the next most commonly chosen facility and markedly more often as a first choice (Table 27). There was a slight tendency for young persons to choose lectures more often than older people. Lectures are very often used by the health educators of both the Cape Town City Council and the Cape Divisional Council at clinics and many other places.

Less frequently posters in public places were chosen. Table 28 shows that overall 22,4% of men and 20,7% of women chose posters, and they were listed as a first choice more often than as a second or third choice.

Table 28 Percentage of participants who suggested posters as a medium for teaching

	% MALES				% FEMALES			
Age group in years	First choice	Second choice	Third choice	Total	First choice	Second choice	Third choice	Total
15-24	11,7	4,3	5,3	21,3	13,6	2,9	7,8	24,3
25-34	14,6	4,2	3,1	21,9	18,0	2,1	5,3	23,4
35-44	8,7	6,8	8,7	24,2	12,5	4,5	2,7	19,7
45-54	13,7	6,3	4,2	24,2	7,5	4,3	3,2	15,0
55-64	14,4	1,1	4,4	19,9	10,5	7,4	3,2	21,1
15-64	12,6	4,6	5,2	22,4	12,1	4,2	4,4	20,7

The radio was hardly ever chosen as a first choice for education, as can be seen from Table 29. Only older women aged 55 to 64 listed it often as a choice.

Table 30 shows that day hospitals and clinics were only chosen by 19,9% of men as an effective source of CHD prevention education. In contrast 28,6% of women chose these medical facilities for this purpose. Clearly women during their pregnancies and with their children use these facilities more often than

men. Both men and women of the older age group (55 to 64 years) attended these facilities more often than younger ones.

In CHD prevention information received at work is ranked very low by women as can be seen from Table 32. Only 11,0% of women suggested this, while many more men, 21,3%, thought the work-place would be an effective source of the necessary information. Clearly the potential of health education at the work-place is not being optimally utilized (Table 22) and the population also does not perceive this as a very useful source. Apart from unemployed women and other such persons the work-place could be a source that contributes greatly to health education and preventive medical practice but is obviously being used minimally for this purpose.

Table 29 Percentage of participants who suggested radio as a medium for teaching

	% MALES				% FEMALES			
Age group in years	First choice	Second choice	Third choice	Total	First choice	Second choice	Third choice	Total
15-24	0	8,5	7,5	16,0	0	8,7	6,8	15,5
25-34	1,0	9,4	9,4	19,8	0	7,5	11,7	19,2
35-44	1,0	8,7	7,8	17,5	1	8,9	7,1	16,1
45-54	0	10,5	11,6	22,1	1	14,9	5,3	21,2
55-64	2	13,3	1,1	16,4	2	12,6	20,0	34,6
15-64	1	10,0	7,5	18,5	1	10,4	10,0	21,4

Table 30 Percentage of participants who suggested day hospitals as a medium for teaching

	% MALES				% FEMALES			
Age group in years	First choice	Second choice	Third choice	Total	First choice	Second choice	Third choice	Total
15-24	2,1	9,6	6,4	18,1	5,8	8,7	9,7	24,2
25-34	4,2	5,2	9,4	18,8	11,7	7,5	5,3	24,5
35-44	5,8	8,7	4,9	19,4	11,6	8,0	8,0	27,6
45-54	4,2	3,2	9,5	16,9	8,5	11,7	8,5	28,7
55-64	7,8	14,4	4,4	26,6	16,8	16,8	5,3	38,9
15-64	4,8	8,2	6,9	19,9	10,8	10,4	7,4	28,6

Table 31 Percentage of participants who suggested work as a medium for teaching

	% MALES				% FEMALES			
Age group in years	First choice	Second choice	Third choice	Total	First choice	Second choice	Third choice	Total
15-24	11,7	6,4	4,3	22,4	2,9	2,9	4,9	10,7
25-34	9,4	10,4	4,2	24,0	4,3	6,4	3,2	13,9
35-44	8,7	6,8	1,9	17,4	4,5	5,4	4,5	14,4
45-54	10,5	8,4	6,3	25,2	5,3	2,1	1,1	8,5
55-64	10,0	6,7	1,1	17,8	1,1	3,2	3,2	7,5
15-64	10,0	7,7	3,6	21,3	3,6	4,0	3,4	11,0

The two facilities least often suggested by the participants were magazines and pamphlets. Only 11,5% of men and 15,7% of women suggested magazines and mostly as their third choice. Pamphlets ranked the lowest for women, with only 8,2% suggesting them, while 12,1% of men did so and again only as a third choice.

The health education staff at the day hospital organisation reported that pamphlets as educational tools are referred to as 'handouts and throw outs' because even the best prepared handouts are picked up in the streets outside the day hospitals after being handed out at clinics. The Cape Town City Council and the Cape Divisional Council health educators find that pamphlets and handbills are only successful if they are simple in design and used at the end of a lecture or filmshow as an additional reminder of data presented. They are never used on their own.

5 THE HEALTH FACILITIES FOR COLOUREDS IN THE CAPE PENINSULA

A measure of the quality of an environmental, promotive and preventive health service is best reflected in the infant mortality rate found in a given area. In Cape Town (01 metropolitan region) the improvement in this rate from 1975 to 1985 for the coloured population[26], as shown in Table 32, reflects the dramatic improvement in health facilities in this decade for particularly the coloured population of the Cape Peninsula.

Table 32 Infant mortality rate/1 000 births in Cape Town for 1975 and 1985[26]

Population group	1975	1985
White	12,2	12,4
Coloured	32,2	17,6
Black	59	37,8
Total (all races)	34,0	21,2

WHO criteria indicate an infant mortality rate range between 10 and 20 deaths per 1 000 live births up to the age of one year, as being the acceptable limit for a city of the developed western world.

This dramatic improvement in health in particularly the coloured population but also the black population can be ascribed to the interaction between the preventative and curative services rendered in the area. Prevention is practised by the health departments of the local authorities at the clinics of the Cape Town City Council and Cape Divisional Councils. Curative services provided by the public sector are practised at the extensive day hospital organisation of the Cape Provincial Administration located within the poorer socio-economic areas and the Cape Provincial hospitals. The contribution to the improved infant mortality rate in Cape Town[26] made by the excellent paediatric and maternity services of the University of Cape Town Medical School deserves particular mention. The University of Stellenbosch Medical School also contributes. Student health clinics run by voluntary students

at both of the Universities of Cape Town (Shawco) and Stellenbosch (Uskor) also contribute to health care in areas of need in the Cape Peninsula. The private sector contributes to health care by means of general practitioners in private practice, private hospitals and welfare organisations.

In the rest of this section no effort is made to describe the health service in this area in any detail, only some aspects that may have a bearing on a CHD intervention programme will be highlighted.

Private Sector

Myrdal[15] and Thomson indicated that most general practitioners in the Cape Peninsula are concentrated in the areas occupied by the white population. Thus the coloured population experience problems of access to general practitioners as well as the additional financial burden of transport costs added to the consultation fees.

Table 9 showed that 31,3% of men and 39,2% of women of the study population attended only private medical facilities and 18,8% of men and 22,6% of women attended both private and public facilities. From Table 22 it is seen that neither doctors nor nurses contributed much towards the participants' knowledge of protection against heart disease. Despite being mindful of the limited time that busy general practitioners have for patient education it is felt that the contribution made by general practitioners to a successful CHD prevention programme will need to be much improved. Strategies to assist general practitioners to improve their own knowledge and to render a patient's visit to their consulting rooms more educational need to be devised.

Private hospitals cater for patients of all races who either belong to medical aid schemes or who have sufficient financial means to afford this type of medical care. Education to prevent heart disease is not a part of the service rendered at these hospitals, where the private practitioners who work at these hospitals usually determine the treatment and education received by their patients. The main private welfare organisation that contributes to CHD prevention is the Heart Foundation of Southern Africa. The Cancer Association and the Council on Smoking and Health of South Africa focus on anti-smoking campaigns. The Heart Foundation plans to markedly increase its educational role in the future. It also offers a rehabilitation service for all patients in the Cape Peninsula who have suffered a myocardial infarction.

Public sector

The Cape Provincial hospitals of Groote Schuur and Tygerberg which are associated with the Medical Faculties of universities, have specialised coronary intensive care units and also excellent rehabilitation and educational programmes for patients recovering from myocardial infarction. At the other provincial hospitals only informal advice is provided for post-infarct patients. None of the provincial hospitals have formal programmes for CHD risk factor screening or educational programmes to prevent CHD. This will need to be instituted as part of an effective CHD prevention programme.

Day Hospital Organisation[27]

The day hospitals were started in 1969 to bring primary health care to people in the community and to relieve the outpatient load of the provincial

hospitals. During 1985 medical services were rendered at 28 day hospitals and four district rooms. These hospitals are generally situated in poorer socio-economic areas and areas with few general practitioners. There can be little doubt that these mainly curative organisations contribute significantly to the improved health profile of the coloured population of the Cape Peninsula[28]. The hospitals are accessible, most patients walk to hospital, and the fees are very reasonable, particularly for patients with low incomes. Problems that are experienced at the hospitals are the long waiting times and the limited hours of service at some day hospitals. The acceptability of this service is reflected by the positive attitudes of the patients at the hospitals[29].

From Table 8 it can be seen that 18,4% of men and 26,1% of women among the study participants attended the day hospitals, and from Table 9 it is seen that 68,7% of men and 60,8% of women attended one or other of all the public medical facilities. Of the participants 14,6% of men and 19,9% of women learnt about CHD prevention at the day hospitals or clinics (Table 22).

This lack of CHD prevention teaching is also described by some of the staff of the day hospitals, where health education has become a focus of attention. However CHD prevention is limited to the following activities. Firstly, hypertension screening is hoped to be achieved for all patients above a chosen age once enough primary health care sisters are trained; at present this does not happen. The aim of the scheme of primary health care sister training is to have three such sisters working under one doctor's supervision. The identified hypertensives are mostly treated in special clinics where a reasonable control is achieved, and patients form a mutually supportive

environment and receive lectures on hypertension management. The staff of one such clinic felt that women who had completed their families and no longer attended the maternity services were lost to hypertension screening until they are much older, on steroid contraceptives or obese. Younger men are not screened. An anti-smoking clinic was attempted by a doctor at one day hospital with little success. Some anti-smoking posters are on display, a smoke-free day is held annually, and occasionally the Department of Health shows anti-smoking films at the day hospitals attended mostly by coloured persons. Screening for hypercholesterolaemia is not done and nutrition education is directed towards a balanced diet for the children and not specifically directed towards prudent diet guidelines. Some successful diet clubs for obese patients are run at some of the day hospitals. No other risk factors for CHD receive attention at the day hospitals, whose role is essentially a curative and not a preventative one.

Preventative services

A certain degree of efficiency is lost and some duplication of services is inevitable when a somewhat artificial separation of curative and preventative medical services is practised, as is the case in the Cape Peninsula. This situation seems to be aggravated by the tri-cameral health services of the South African State Health Departments. To improve this situation a National Health Facilities Plan has been formulated and a greater degree of co-operation between the City Council, the State Health Department, the Provincial Hospital Administration, the Day Hospital Organisation, Shawco and others has recently been achieved[26]. The preventative health services are provided in the 01 area by the Cape Town City Council and the Cape Divisional

Council's clinics, which patients visit free of charge. These clinics are widely distributed throughout the area making them geographically accessible. The Divisional Council clinics operate in the more rural areas outside the City Council's boundaries. The City Council operates 25 polyclinics and 26 satellite clinics throughout the city. The services provided include the guidance of mothers, baby and child care including immunisation, family planning, child assessment, developmental screening and specialised malnutrition clinics and they provide the base of an intensive home visiting programme. Treatment services for pulmonary tuberculosis and sexually transmitted diseases are also offered at the clinics.

Health education for the public is receiving more attention at present than in the past and is catered for by the City Council by means of four full time health educators giving lectures, filmshows, using posters, handbills and pamphlets. Such sessions are held at the clinics, in schools, hospitals, hostels, and for staff of factories and for a variety of food-handlers. A wide variety of topics are covered but no specific programmes for the prevention of CHD are used at present. Smoking is not focussed on sufficiently in the clinics frequented by coloured patients, but children at schools did receive some anti-smoking advice. Hypertension screening for the population as a whole is not part of the polyclinics' daily programme except in the case of women attending family planning clinics and patients at TB clinics. Nutrition education for mothers of babies and children is stressed at the City Council clinics and by the community health nurses who visit people in their homes. The prudent diet principles are not specifically stressed in the nutrition education programme.

The Divisional Council clinics render services[30] similar to those of the City Council clinics, but in areas outside those of the City Council. Often these are rendered by fewer staff and with less expenditure. Health education is also an important activity of this Council. Fifteen health educators supported by technical staff prepare health education material[30].

In summary it can be said that the Cape Peninsula has a successfully functioning health service for the population, as can be seen from the decrease in infant mortality (Table 32) and other measures of public health[26,31]. The white population seem to be catered for more successfully than the coloureds and Asians and the blacks are the least healthy population. The fragmentation of the State Health Department into own affairs and general affairs as well as the separation of curative and preventative services seems to lead to costly duplication of the health administration much more than to duplication of actual health services to the public. Requests to the Government by the State Health Services, the Provincial Health Services, the Local Health Services, the Private Health services and the Medical Schools have been made for a unified health service for the whole country. Government planning in this respect was announced in August 1986 but details are still to be worked out.

In all the local services health education for the public, by means of having full-time health educators and teaching all staff rendering health services to the public, the techniques of health education, has received much attention in the last few years. The Western Province Health Education Co-ordinating Committee is a body on which many organisations have representation. Its functioning seems to contribute to the fact that health education in the

western Cape is less affected by the previously described fragmentation of health services than are promotive, preventive and curative health services. Health education services seem to cross the barriers, in both directions, between the public and private sectors of the community. Health education is a late addition to health care services in the western Cape and it needs to be greatly expanded before adequate health education will reach the population as a whole.

The extent of CHD prevention for the coloured population in the present health service is very limited. The prevention of CHD and the reduction of its risk factors are also not specifically focussed on in the health education programmes for the coloured population. The reason for this is probably because the level of risk factors for CHD in this population have previously not been identified unlike many other third world health problems. The infrastructure for CHD risk factor screening does exist in the health facilities for the coloured population. Health education programmes have been started and need to be expanded greatly. Only if CHD risk factors in the coloured population are focussed on as a real health hazard can CHD prevention be effected.

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CHAPTER X

FACTORS RELATED TO AND GUIDELINES FOR A CHD RISK FACTOR INTERVENTION PROGRAMME FOR THE COLOURED POPULATION

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CHAPTER X

FACTORS RELATED TO AND GUIDELINES FOR A CHD RISK FACTOR INTERVENTION PROGRAMME FOR THE COLOURED POPULATION

1 INTRODUCTION

In the previous chapters the magnitude of the CHD risk factors in the coloured population was described as well as their interrelationships. Target groups with high levels of risk were identified as well as the medical facilities available to and used by the coloured population. Suggestions by the population itself for intervention approaches were also identified.

All these aspects need to be considered when formulating an intervention programme to reduce CHD in the coloured population of the Cape Peninsula. But in addition to these aspects a number of factors not described in the previous chapters are central to the formulation of an efficient CHD risk factor intervention programme. A detailed description and consideration of such factors is outside the scope of this dissertation. A brief mention of some of these factors on the next pages should suggest that only tentative guidelines for an effective CHD risk factor intervention programme in the coloured population can be generated from the data in the previous chapters.

One such aspect is the cost-effectiveness of the different interventions to prevent CHD or its risk factors. Cost-effectiveness can for this purpose be defined as the relationship between resources consumed and health outcomes

achieved, expressed as the nett resource cost per year of life gained, or per quality-adjusted year of life gained[1]. Prevention is not without cost, and evidence for the benefit of some interventions is not unequivocal. The effectiveness of an intervention is evaluated in terms of mortality associated with the prevention or treatment manoeuvre, long-term survival and the quality of life after the intervention. Add to these parameters of effectiveness the cost of the intervention minus the financial gain of the cost of disease treatment saved by preventing the development of such disease, to calculate the cost-effectiveness of such a manoeuvre.

The results of these sophisticated calculations are currently starting to appear in the literature and illustrate the need for such considerations when suggesting intervention for a specific population. An example of the use of a cost-effectiveness calculation is recorded by Weinstein, Stason and Meade. They were unable to prove that the drug treatment of mild hypertension was cost-effective[1,2]. This would suggest that manoeuvres less costly than drugs should be used if mild hypertension is to be cost-effectively controlled. Another attempt at such an evaluation was done by Berwick _et al._[3]. They studied available published data on the relationship between diet, blood cholesterol levels and CHD to estimate the cost-effectiveness of four options for prevention, starting in childhood. The options were (1) to do nothing, (2) to screen all children and treat those with high cholesterol levels, (3) to screen high risk children and treat those with high levels, and (4) to attempt to lower lipid concentrations through population-wide educational intervention without any screening. Their calculations suggested that the last option was most cost-effective.

Weinstein and Stason[4] showed that the most cost-effective way of spending resources in the management of hypertension in a population would be to increase compliance, and not to embark on screening programmes. They also concluded that hypertension detection and treatment would be more cost-effective if delivered at the site of regular medical care rather than at specialised clinics. Hypertension control programmes at the work-place are calculated to be cost-effective for employers when weighing up the benefit of direct medical cost savings and reduced absenteeism against the cost of the programmes[5]. Weinstein and Stason[1] concluded, when assessing the cost-effectiveness of the results of hypertension treatment found in the Framingham Heart Study, the Hypertension Detection and Follow-up Programme and the Australian Therapeutic Trial in Mild Hypertension, that the direct cost savings of hypertension treatment to the health care system of the USA would still fall far short of offsetting the costs of anti-hypertensive treatment. Oster and Epstein[6] based a cost-effectiveness evaluation of the reduction of raised serum cholesterol above 260 mg/dl (6,6 mmol/litre) in adult men on the results found in the Lipid Research Clinic's Coronary Primary Prevention trial. They found that cholesterol lowering interventions are unlikely to result in important direct savings to the health care system in the USA. The indirect benefits of cholesterol lowering were found to be quite high for young and middle-aged adults, as well as for those with severe elevations of cholesterol. Economic benefits increase approximately twofold in the presence of more than one risk factor such as cigarette smoking and hypertension[6]. Pharmacological intervention cannot be recommended as a cost-effective intervention for moderately elevated serum cholesterol levels[1].

The cost-effectiveness of stopping smoking can be shown for individuals, the organisations for which they work, as well as for the economy of a country which has a significant income from a tobacco industry[7-9].

Other aspects that need consideration when formulating a CHD intervention programme, are the other health needs of the population for which an intervention programme is considered. Health priorities need to be considered when allocating health resources if the optimal health care using limited resources is to be achieved in a population.

Recently some publications suggesting methods for the critical appraisal of need, benefit and costs of health interventions have started to appear in the literature[10-12]. If effective intervention is to be distinguished from ineffective intervention in reducing the burden of disease on a population, it is essential that such assessments of effectiveness be made and acted upon.

2 POPULATION APPROACH VERSUS SCREENING APPROACH IN CHD INTERVENTION

An issue that is central to CHD intervention is whether it would be better directed at the whole population by means of mass intervention without screening, with the aim of preventing the onset of the disease by reducing risk factors in the population (primary prevention); or by actively screening the population to identify those individuals with the risk factor or early disease, and treating such individuals (secondary prevention)[13-15].

A proponent of secondary prevention, Oliver[13], holds that primary prevention with mass intervention trials has not proven successful enough to warrant the

recommendation of this approach as a public health measure. He argues that although reductions in risk factors have been achieved in community intervention trials, the expected consequent reduction in CHD has not been proven. Oliver supports stop-smoking campaigns but recommends cholesterol lowering only in identified individuals in the top quartile of serum cholesterol distribution for populations exposed to CHD risk factors. Severe hypertension should be treated with medication[14], but not mild-to-moderate hypertension according to Oliver[13], as the diuretics or β-blockers used in trials like the United Kingdom Medical Research Council Trial[15], cause too many side-effects and have not succeeded in reducing CHD in the study population. Because of the high cost of screening, Oliver[13] recommends that screening should be mainly directed at young and middle-aged men and families at risk. He recommends that males in the third quartiles of the cholesterol and blood pressure distribution not be informed of their increased CHD risk as this would cause too much anxiety in many.

Rose[16] summarised the pros and cons of each of these two approaches. The advantages of identifying high risk individuals are firstly, that they lead to intervention which is appropriate for the diagnosed individuals. Secondly, both the patient and his physician are strongly motivated to rectify the condition, and thirdly, it offers a more favourable ratio of benefits to risk. Rose[16] is of the opinion that the high risk screening approach is more cost-effective than the population primary prevention approach, but it was seen earlier that true cost-effectiveness calculations[1-3,6] do not necessarily support this opinion.

The disadvantages of this approach suggested by Rose[16] recognise firstly the difficulty and cost of screening in populations, and often repeated screening, if risk factors were to be identified early. Screening often does not identify people with minimal levels of risk. Secondly, the high risk strategy is palliative and temporary. Often it does not seek to alter the underlying cause of the disease but only to identify those individuals who are very responsive in developing the risk in the presence of the underlying causes. The result is that screening will need to be an ongoing process as the root of the problem is not addressed. Thirdly, the potential of this approach is limited for the individual patient as the power of risk factors to predict future disease is usually weak, and disease does occur in individuals who have no diagnosable risk. For the population the potential of screening is equally limited because a large number of people at a low level of risk may give rise to more cases of disease than the small number who are at high risk and identified by screening. A further disadvantage is experienced by the diagnosed individuals who should follow a life-style different to that of the population as a whole - not very conducive for compliance to treatment.

Most professionals in the field of CHD prevention prefer the primary preventive approach supported by the World Health Organisation, Heart Associations across the world and many large health-related organisations such as the National Institutes of Health of the USA[17].

The rationale for this approach is found in some of the following arguments. Increased risk for CHD is found not only in those individuals who fall in the top quartiles of risk factor distribution but in any given population most of the CHD events occur in the lower quartiles of risk factor distribution[18].

Consequently if CHD is to be significantly reduced in a population, the risk factor distribution in that population must be shifted to the left for the whole population, thus reducing the risk factors to levels that no longer impart risk to the majority of people in that population. In this process the true underlying causes of the disease are removed.

Rose[19] describes these advantages as powerful and effective, as the population as a whole will have reduced levels of risk. Traditionally this public health control approach involved mass environmental control methods, but for effective CHD risk reduction the alteration of some of the accepted norms of society, such as smoking and dietary patterns, will have to be achieved. Such changes are much more difficult to achieve, but once old norms are relinquished for new society norms it will be unnecessary to continue persuading individuals to change, since society will create the milieu where the desirable behaviour becomes socially acceptable. In one study the effective use of non-drug lifestyle modification hypertension intervention was estimated[15] to reduce the population requiring modification by 50% and reduce cost of hypertension treatment by 30%.

Rose points out that there are also drawbacks to the population approach to change. It only offers a small benefit to each individual despite bringing great benefits to the population as a whole - a prevention paradox often found in public health prevention methods[19]. This results in poor motivation for individual patients particularly in the short term. For individuals, "health in the future" as a motivational goal in health education is inherently weak, as people generally change behaviour for substantial and immediate rewards. Much more powerful as motivators for health education are the social rewards

of enhanced self-esteem and social approval[16]. The population approach often receives little enthusiasm from medical personnel in clinical practice, as they usually do not perceive health as a population issue but as a problem of individuals who need secondary intervention. Practising clinicians have often also experienced the frustration of limited success with preventive medicine where in addition grateful patients are few and success a non-event.

The benefit: risk ratio of intervention can be small and even negative as was seen in the World Health Organisation's clofibrate trial, where a cholesterol-lowering drug seems to have killed more patients than it saved[20]. Two approaches must be distinguished[18]. The first is the restoration of biological normality by the removal of an abnormal exposure, such as stopping smoking, or moderating some dietary deviations, where there can be some presumption of safety. In contrast to this is the preventive approach which leaves intact the underlying causes and seeks to interpose new, supposedly protective interventions such as the use of drugs, jogging or very strict dietary regimes for obesity. Here safety needs to be proven to assure an acceptable benefit:risk ratio before such procedures are accepted and suggested for intervention in populations.

3 PRINCIPLES OF AN EFFECTIVE CHD RISK FACTOR INTERVENTION PROGRAMME

In the previous sections the primary prevention approach for the population as a whole was seen to be more cost-effective than secondary prevention involving screening for and treatment of high risk individuals in the population. The first approach is generally directed at removing underlying causes after which susceptibility of individuals ceases to matter. This is preferable to the

second approach which often is not directed at removing the underlying causes but identifies and treats susceptible individuals. This latter approach has its place only if the underlying causes remain unknown or uncontrollable or as an adjunct to the primary prevention approach[19]. Thus an effective CHD prevention programme must be directed primarily at the population as a whole. It should ideally reach individuals at a young age to ensure the adoption of healthy habits and should reach the population without any conflicting messages which can confuse the population. Recommendations should be easily followed and facilities in society should make this possible. Healthy behaviour should become the norm of society and unhealthy behaviour rejected.

In addition screening procedures for risk factors can easily become part of the usual interaction between patients and medical personnel with very little additional cost for such consultations. If medical personnel use appropriate screening methods and treatment modules, then such case finding approaches will contribute to CHD control alongside the population approach.

In 1970 the American Inter-society Commission for Heart Disease Resources[21] was among the first to suggest a comprehensive approach to the primary prevention of atherosclerotic diseases. In 1984 this approach was updated by the Commission's Atherosclerosis Study Group[17]. Many of these recommendations formed the backbone for intervention programmes initiated throughout the USA and must have contributed to the reduction in CHD in that country. In 1982 the WHO Expert Committee[22] published its guidelines for the prevention of CHD. By then, or soon after, many countries[23,24] and organisations had spent time and effort to formulate applicable CHD prevention

programmes. A second WHO publication[25] suggested that the threat of CHD in developing countries could also be averted by appropriate timely intervention procedures.

The WHO CHD prevention plan[22] focused on three areas: a population strategy for altering life-style and environmental characteristics, and the social and economic determinants of mass CHD and its risk factors; a high risk strategy, for bringing preventive care to the individuals at special risk; and secondary prevention for averting recurrences and the progression of disease in those already afflicted. The report pointed out that an effective population programme can only come about through national policy, planning, development and commitment.

An excellent overview of the elements of a truly national preventive CHD programme is to be found in the Canterbury report[23] on CHD prevention for the United Kingdom. The report calls for a truly national effort, and includes these recommendations. A national health policy should include CHD prevention as a significant part of its strategy for health promotion and prevention of disease. The prevention and control of smoking should receive energetic support by means of legislation. Public and private health services should co-ordinate their preventative efforts. Greater attention should be given to ensuring that all health professionals receive the appropriate training in prevention. A food and agricultural policy should be based on guidelines for healthy nutrition. Subsidies should be shifted away from unhealthy foodstuffs to healthy foodstuffs. Simple and clear labelling of food is needed. Government agencies and the food industry should set up a code of practice to reduce the saturated fat, sugar and salt content of processed food.

The national health services should play a major role at all levels to collect information on risk factors and CHD in the different areas. Prevention programmes for smoking, the promotion of healthy nutrition and sensible exercise as well as the control of hypertension should be practised at all levels of health services.

Primary health care personnel have a major role to play. Health workers such as general practitioners should develop systems for identifying high risk groups and provide treatment. Facilities for community meetings, group counselling and keep-fit classes should be provided at primary health care or community centres.

Urgent attention should be given to establishing health education services in all health services. Medical Education Councils should be formed and must liaise with other relevant organisations. Health education at schools is an under-utilised force for health promotion. This significant avenue must be developed. The staffs of schools should also receive health education to enable them to set examples and promote health wherever possible in the syllabi of schools. All schools should adopt a smoking prevention policy.

Health education and programmes should be available at the work-place to reach particularly the younger employee.

Finally the media can play an important role in supporting public health. Television, radio, newspapers and magazines should also accept the responsibility for contributing to a nation's health. Successful media

techniques such as those used in advertising should be employed to carry the health message to the population.

Clearly then, a successful CHD prevention programme that will reduce CHD in a population needs input on many levels and should take into consideration many of the factors referred to on the previous pages. A CHD intervention programme for the coloured population of the Cape Peninsula can obviously not stand apart from a national CHD intervention programme for all race groups in South Africa. In the following sections guidelines based on the results reported on in the previous chapters, on which a CHD intervention programme can be based, are given.

4 GUIDELINES FOR HYPERTENSION REDUCTION IN THE COLOURED POPULATION OF THE CAPE PENINSULA

Two central problem areas were identified in the pattern of hypertension, a very common condition, in the coloured population of the Cape Peninsula. Firstly, a significant number of hypertensives were undiagnosed, and secondly, the majority of identified hypertensives were not receiving adequate treatment. These two aspects occurred to a different degree in different groups of hypertensives. The male hypertensives between 25 and 44 years contained the largest group of undiagnosed patients in the study population. In addition hypertensive males below 45 years also took appropriate medication less often than other groups of hypertensives and only 8% of this group had controlled hypertension. This group of hypertensives had had their blood pressure measured less frequently in the previous year than did other groups of hypertensives. It would seem that the young males do not avail themselves

of health service facilities as do other groups. If hypertensives in this age group are to be identified, the young men will have to be screened at their place of work.

In Chapter IV hypertension was shown also to occur more frequently in persons of low socio-economic status. Screening for the young male hypertensive should thus be recommended for the unskilled coloured labour force below 45 years of age.

A partial explanation for the high prevalence of hypertension in this group of males could be a high alcohol intake. A high salt intake was reported in the younger participants and more so in young males than females. When such young male hypertensives have been identified, besides medication, attention should be paid to their diet. Moderate alcohol intake, reduced salt intake, increased use of low fat milk products, fresh and dried fruit and vegetables, particularly citrus fruits, bananas, legumes, potatoes, unrefined cereals, green leafy vegetables and tomatoes, need to be recommended in order to increase the calcium, potassium and magnesium intake.

Compliance in the use of medication is worse in men than in women and worse in persons of low socio-economic standing, thus manoeuvres to improve compliance will have to be used, possibly most effectively at the place of work of particularly the unskilled hypertensive male.

The second problem area of inadequate treatment was found mostly in the female hypertensive older than 44 years, where 35,3% of them were using inadequate medication. The older group of women attended medical facilities more often than did any other group in the study population and they also used

anti-hypertensive therapy more often than other hypertensives. Thus although inadequate patient compliance surely does contribute to poor hypertension control, one could deduce that compliance on the part of medical personnel to adequate prescribing and monitoring of blood pressure in this group of hypertensives surely also plays a role. A part of effective hypertension control would therefore also include improved diagnosis, treatment and monitoring by medical personnel who are consulted by these hypertensives.

The older female hypertensive was often found to be obese or overweight. Therefore the appropriate dietary guidance to enable weight loss is essential, as are the dietary guidelines discussed on the previous pages. These dietary guidelines fall in line with the prudent guidelines for the population as a whole. Therefore these guidelines should reach the hypertensives as well as the rest of the community by mass media health education as well as specifically from health educators. The necessary dietary guidelines for hypertensives should not have to be specifically provided by either doctors or dieticians whose professional services could be better utilised elsewhere.

The blood pressure of 52,1% of men and 63,7% of women participants had been measured in the year prior to the survey. This implies that many hypertensives had their blood pressure measured without being diagnosed or treated by medical personnel, thus the medical services failed to control blood pressure in many hypertensives despite having measured it. This failure of doctors and nurses needs to receive attention in a good hypertensive control programme and should include training in the correct procedure and use of the correct blood pressure cuff size for accurate blood pressure readings. The general practitioner was the most common medical facility utilised by the

participants and an improved contribution by general practitioners will enhance blood pressure control in the community. The attachment of a nurse who assists in blood pressure monitoring and health education to a general practitioner's practice would greatly facilitate blood pressure control without taking additional time of the doctor.

Hypertension clinics at day and provincial hospitals that treat and monitor hypertensives specifically should give better hypertension control than patients casually seeing doctors individually. At such clinics the education of hypertensives can be optimised as can the monitoring of blood pressure and the containment of the cost of the treatment of hypertension. Drugs that are effective and inexpensive can often be used in preference to more expensive anti-hypertensive treatment.

Finally, as hypertension is a chronic disease needing lifelong treatment, it seems essential that the hypertensive himself partially take responsibility for the control of his blood pressure. Patients must be informed of their condition, must know at any stage if their blood pressure is controlled or not, know what drugs they are taking and know the consequences of not taking drugs regularly. They must know the dietary and lifestyle modifications that are necessary to improve their blood pressure. Medical personnel cannot control a chronic disease in society without the co-operation of the patient who in turn cannot do so if he/she is not informed. Even patients of limited insight and education can co-operate better if they understand their situation and its needs.

Mass media suited to and directed at the coloured population should encourage them to have their blood pressure measured regularly, to increase their physical activity pattern, to eat correctly and to lose weight. The population approach as an adjunct to the case-finding approach[26] would be an essential part of a successful hypertension control programme for the coloured population of the Cape Peninsula.

5 GUIDELINES FOR THE REDUCTION OF SMOKING IN THE COLOURED POPULATION

Unlike hypertension the problem of smoking in society becomes a medical one only after the damage done becomes obvious and mostly irreversible. To prevent this damage the onset of smoking in individuals should be prevented and those who do smoke should be assisted to stop. Therefore smoking intervention must mostly be based on the whole population approach and mass media methods should be used. The successful mass media methods of advertising are employed to increase the use of tobacco and, as shown in Chapter V, directed at present mostly at the young and underdeveloped populations[27]. The prevalence of the habit has also shifted from the higher socio-economic strata to the lower strata. It is often associated with alcohol use and, as intimated by the advertising, seen as the norm and as acceptable behaviour. It really is only in the higher socio-economic strata that this trend has been reversed.

Central to the control of smoking is a strong anti-smoking campaign by the ruling government[28,29], such as a ban on sales promotion of tobacco, health warnings on all tobacco products, increased tobacco tax, and a ban on sports sponsorship by tobacco companies. The growing of tobacco should in no way be

subsidised and the tobacco industry encouraged to replace its product with less harmful products. Smoking in all public places must be prohibited.

Educational programmes on the risk of smoking should be subsidised and made obligatory in the schools. This should be initiated in the primary school. As was seen in Chapter V, the age of onset of smoking in the coloured population is very low and still decreasing. Anti-smoking education programmes should use successful advertising techniques which suggest that the norm of society is a non-smoking one. The inaccurate association often used in advertisements between smoking and wealth, health and success should be unmasked, particularly for young school children and the true association between disease and smoking highlighted. Anti-smoking education programmes should be directed specifically at coloured females when they are pregnant. Their own smoking can affect their unborn children as well as setting the example for their young children. The study population smoked more over weekends than during the week and therefore the media such as TV, radio and billboards at sportsmeetings should carry anti-smoking advice during weekends. The immediate benefit of stopping for young people should also be highlighted in anti-smoking campaigns, as young people are not strongly motivated by health benefits gleaned over many decades.

Almost half of the current smokers had attempted to stop smoking in the year prior to the survey. Men had a more positive attitude to stopping smoking than women, as had better educated smokers compared to less educated smokers. Facilities to support smokers who are attempting to stop should be of great help, particularly if offered at the place of work. Day hospitals and other hospitals should also offer such support. Organisations such as the Cancer

Association and the Heart Foundation of Southern Africa should co-ordinate such facilities in the community. General practitioners should know where to refer their smoking patients for support in their attempts to stop smoking.

An important aspect of stopping smoking programmes is the encouragement that should be issued to smokers who have attempted to stop, but have failed or who have started smoking again. Many persons who successfully stopped, did not achieve this with their first attempt. Smoking is after all an addiction that has to be broken. Health professionals also become disillusioned with the few successes achieved by stopping smoking programmes and a person who has been prevented from starting smoking is not visible to such workers. They also need encouragement to continue their work.

All these methods of intervention must be mobilised if a successful campaign against smoking in the coloured population or any other population is to be achieved. An illustration of the effectiveness of some of these measures was seen in Hong Kong[28] and Greece[29].

6 GUIDELINES TO IMPROVE THE LIPID PROFILE OF THE COLOURED POPULATION

The magnitude of increased CHD risk attributable to unfavourable lipid profiles is such that the population approach would be essential to improve these profiles of the population as a whole. In Chapter VI (Table 2) it was shown that approximately 50% of the study population had total serum cholesterol levels that needed dietary intervention alone, and an additional 19% of men and 13% of women needed dietary intervention and probably also medication to reduce CHD risk attributable to serum cholesterol levels. Some

indication was given that this unfavourable position in the population had developed in the last two decades.

At present the diet of the coloured population (Mrs M L Langenhoven, RIND of the Medical Research Council - unpublished data) consists of a typical Western diet, high in animal protein, with 37% of total energy derived from the fat in the diet, but having a favourable P/S ratio of between 0,78 and 1,0 in the different groups studied. Hypercholesterolaemia was found to be associated with a higher intake of animal protein and saturated fat and a low intake of plant protein and unsaturated fat as well as a low dietary P/S ratio and high Keys score. The dietary guidelines[21] for a prudent diet, accepted in most countries where CHD is prevalent, are the appropriate guidelines for the coloured population as well as the white and Asian and probably many of the black urban populations of South Africa.

Mass media dietary intervention is the only method that will reach sufficient numbers of the coloured population, and also other populations, to contribute to the shifting of the whole population's cholesterol levels. The results showed that very few participants had attempted to alter their diets to protect their hearts and that older people did so more often than younger people. It is therefore necessary to advocate prudent dietary guidelines as the diet of choice, particularly for the young, in whom a reduced total cholesterol can still prevent the development of atherosclerosis.

From the knowledge questions on an appropriate diet (Chapter VI) it was seen that the coloured population was poorly informed about the principles of a prudent diet. The better educated participants were better informed, had a

more positive attitude to a healthy eating pattern, but also had a higher serum cholesterol level than the less educated participants. This group of higher socio-economic standing should therefore be seen as a susceptible target group for health education on a healthy eating pattern.

An increased BMI was associated with raised total and LDL-cholesterol levels and reduced HDL-cholesterol levels. A high BMI was often found in the older group of women in the study population. Weight reduction programmes should also be part of intervention to improve lipid profiles, as well as blood pressure levels in the coloured population. Fourty-five percent of the women and 17% of the men had attempted to lose weight in the previous year. This indicates a willingness, particularly on the part of women, to attempt to lose weight and intervention programmes given by the mass media or health educators should be well received. Such education should emphasise an appropriate diet and more excercise and should warn against the ineffectiveness of appetite suppressants and expensive special slimming preparations as these agents are often used by the study population.

In this study population, which on the whole has a high HDL-cholesterol, it was shown that lower HDL-cholesterol levels were associated with an increased own and family history of CHD compared to that of participants with protective higher HDL-cholesterol levels. Factors that reduce HDL-cholesterol such as obesity, physical inactivity and smoking were very common in the coloured population and an attempt to reduce these factors in the population using an intervention programme will also improve the lipid profile of the coloured population.

Inadequate leisuretime activity was found in 79% of men and 85% of women. The benefits of exercise are not only restricted to the effects on HDL-cholesterol but contribute on a wide front to the health of a population. A CHD intervention programme for the coloured population should also attempt to get the population exercising.

Screening to find cases with abnormal lipid profiles can certainly contribute to CHD control in a population without excessive additional cost when used judiciously.

Screening can be a control method used in individuals who have a high probability of having abnormal lipid profiles. This would be the case in families with inherited hyperlipidemias or who suffer premature CHD.

At present the results of lipid profiles are often not interpreted correctly by health personnel who attempt to diagnose patients at risk. The appropriate age- and sex-specific cut-off points for lipid parameters are not in general use. As was seen in Chapter VI, this would lead to many participants, particularly young ones, being classified as normal, when in fact they are at risk for CHD due to the levels of the lipids.

As part of any successful CHD control programme the use of appropriate age- and sex-specific cut-off points for total or LDL-cholesterol levels will have to be introduced for general use by doctors.

7 THE IMPLICATIONS OF THE CLUSTERING OF RISK FACTORS FOR THE COLOURED POPULATION

Chapter IX showed that only 5,4% of men and 10% of women were completely risk free. The coloured population of the Cape Peninsula should therefore be seen as a population in which a CHD epidemic greater than the one currently seen in the white population is to be anticipated in the years to come. They do enjoy a degree of protection against CHD by virtue of their high HDL-cholesterol level, but this will probably not protect them against the ravages of the other risk factors. The coloured men were at greater risk than the females. A CHD intervention programme should also be specifically directed at the males, particularly the young ones. This group in any society is less compliant to health recommendations than any other group in society. Intervention programmes should therefore begin at an early age, at schools and should be very strongly directed at creating a healthy lifestyle as the acceptable norm for society.

It was seen that within the coloured population there is a particular group of older people who have a clustering of the major risk factors. Of the men 25,6% and 20,6% of the women had two or more risk factors. This is a significant proportion of the population who carry an enormous risk for developing CHD. These groups are mostly among older people. Health personnel should be educated to identify and treat the other major risk factors of CHD when one is found, particularly in older persons. The higher the level of the risk factor, the more important it will be to identify other risk factors, as there is a greater degree of clustering of risk factors at high levels of risk than at low levels of risk[30].

8 INTERVENTION METHODS FOR CHD REDUCTION IN THE COLOURED POPULATION

In Chapter IX the facilities available, utilised and suggested by the coloured population were described in detail. The following intervention suggestions are based on these findings.

Health education at schools for children should receive urgent attention. It should be expanded and the content should be based on the real health needs of the coloured community, therefore prevention of smoking and promotion of the prudent diet would play an important part in such school health programmes. The use of trained health educators in schools for the health programmes would give better results, as teachers are often as ignorant as the children of health needs. Health education at the work-place is under-utilised and should be greatly expanded. Incentives for employers who promote health education at the work-place would help the development of such programmes. Trained health educators with appropriate aids should be available to visit work-places to give lectures to the workforce. Health posters at the work-place would also contribute.

The role of the appropriately trained health educator emerges as central to a good CHD prevention programme. Other medical facilities in the Cape Peninsula seem fairly adequate. The health educators need to go to schools, work-places, health clinics and all hospitals, they need to be available for general practitioners to refer their patients to, as well as available for the public to consult with their health questions. Health education should become an important aspect of any health service and should be greatly expanded.

Health education should also be made obligatory in many situations to ensure that the public receives the health message from an early age and throughout life. Posters and particularly health pamphlets should be used only as an adjunct to contact with health educators and never on their own. At present CHD prevention does not form any significant part of the health education programmes of the few health educators working in the field. This situation must be corrected.

Added to an extensive health education service, the role of the mass media in health promotion should be greatly expanded, particularly that of television. This, the preferred medium of the coloured population, certainly does not play the role in health promotion that it could and should.

The other mass media recommended by the study population are the newspapers, particularly as an adjunct to information given on television, at schools and at work. The radio was not recommended as a means of health education for the coloured population and neither were magazines and pamphlets. Health education should not be given in a pedantic prescriptive manner, but rather by the means that are commonly employed in the advertising industry.

9 FINAL COMMENTS

In Benatar's[31] report on medicine and health care in South Africa the disease and mortality profile of the coloured population in 1986 is described as comparable to that in developing countries. As seen in Chapter I the trend towards disease of industrialised countries, as is suffered by the whites of South Africa, is beginning to manifest itself in the coloured population.

From the findings reported here it seems inevitable that this trend will be accelerated in the years to come. At present if a priority list of health needs of the urbanised coloured population of the Cape Peninsula is made, it would be unlikely that CHD will feature near the top of such a list, but the results of this study have identified a population at high risk for developing CHD in the years to come. There is some indication that this situation has arisen in the last few decades in the urbanised coloured population. The CHD risk profiles of the rural coloured population are unknown, and should be studied, but are anticipated to be lower than those of the urban coloured population as their CHD mortality is lower than that of urban coloured populations (Mr Pretorius, IB of the MRC, unpublished data).

If the providers of health care for the urbanised coloured population act on the findings reported here, with an appropriate CHD intervention programme, consisting mainly of extensive health education as suggested earlier in this chapter, a major CHD epidemic could still possibly be prevented. It implies that CHD risk intervention, a typical need of westernised industrialised populations, would have to be given a priority, along with the third world health needs that at present are considered when allocating health resources to the coloured population.

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