

Chronic Diseases of Lifestyle Unit and Burden of Disease Research Unit of the Medical Research Council



Dietary changes and the **health transition** in South Africa: implications for health policy

Nelia P Steyn, Debbie Bradshaw, Rosana Norman, Jané Joubert, Michelle Schneider, Krisela Steyn
Technical support and editing Jean Fourie



Dietary changes and the **health transition** in South Africa: implications for health policy

2006



Chronic Diseases of Lifestyle Unit & Burden of Disease Research Unit of the
South African Medical Research Council

Nelia P Steyn, Debbie Bradshaw, Rosana Norman, Jané Joubert, Michelle Schneider, Krisela Steyn

Technical support and editing
Jean Fourie

We acknowledge the financial assistance and technical support for this country report provided by the Food and Nutrition Division of the Food and Agriculture Organization (FAO) of the United Nations in Rome, Italy under the FAO - Norway Partnership Programme. Special thanks to Gina Kennedy, Guy Nantel and Prakash Shetty of the Nutrition Planning, Assessment & Evaluation Service (ESNA) for their technical assistance in the preparation of this report

Copy available on the internet at:
<http://www.sahealthinfo.org/lifestyle/dietaccess.htm>

Copyright information:
Copyright 2006, South African Medical Research Council. All materials in this report may be reproduced and copied for non-commercial purposes; citation as to source is required.

Suggested citation:
Steyn NP, Bradshaw D, Norman R, Joubert JD, Schneider M, Steyn K. Dietary Changes and the Health Transition in South Africa: Implications for Health Policy. Cape Town: South African Medical Research Council, 2006.

INDEX

EXECUTIVE SUMMARY	5
1. INTRODUCTION.....	6
1.1. BRIEF HISTORICAL BACKGROUND.....	7
1.2. DEMOGRAPHIC AND SOCIO-ECONOMIC INDICATORS.....	8
1.2.1. Selected demographic indicators.....	8
1.2.2. Selected socio-economic indicators.....	10
1.3. Burden of disease	12
2. DIETARY TRENDS AND ASSOCIATED RISK FACTORS.....	13
2.1. Changes in total dietary energy, carbohydrate, protein, and fat intake.....	13
2.2. Differences in nutrient intake between ethnic groups and urban and rural areas.....	14
2.3. Changes in intake of different types of food and food groups over time.....	16
2.4. Current diet.....	17
2.5. Changes in alcohol intake.....	18
3. TRENDS IN NUTRITIONAL STATUS.....	19
3.1. Trends in the prevalence of undernutrition and protein-energy malnutrition (PEM).....	19
3.2. Trends in the prevalence of overweight and obesity.....	20
3.3. Trends in micronutrient status	23
4. OTHER CHRONIC DISEASES AND ASSOCIATED LIFESTYLE RISK FACTORS	24
4.1. Physical inactivity	24
4.2. Tobacco consumption	24
4.3. Hypercholesterolaemia.....	25
4.4. Hypertension	25
4.5. Cardiovascular diseases and diabetes	25
4.6. Cancers	29
5. COMMUNICABLE DISEASE BURDEN	32
5.1. Human immunodeficiency virus/acquired immune deficiency syndrome (HIV/AIDS).....	32
5.2. Tuberculosis	32
5.3. Malaria	33
5.4. Diarrhoeal disease.....	33
6. SUMMARY	34
6.1. Current burden of disease	34
6.2. Current nutritional status of the population	34
6.3. Current dietary intake patterns of the population	34
7. POLICIES AND STRATEGIES FOR ADDRESSING THE BURDEN OF CHRONIC DISEASES.....	36
7.1. Programmes in place to improve PEM and under nutrition	36
7.2. Programmes in place to improve micronutrient status	37
7.3. Programmes in place to prevent and manage nutrition-related chronic diseases.....	37
7.4. The nutrition transition and future strategies required	38
8. CONCLUSIONS	41
9. REFERENCES.....	42
ADDENDUM A.....	47

LIST OF ABBREVIATIONS

DOH:.....Department of Health
BRISK:Coronary Risk Factor Study in blacks
CORIS:Coronary Risk Factor Study in whites
CRISIC:Coronary Risk Factor Study in coloureds
CVA:Cerebrovascular accident
CVD:.....Cardiovascular diseases
FAO:Food and Agricultural Organization
HDI:Human Development Index
HSRC:Human Sciences Research Council
IHD:Ischaemic heart disease
NFCS:National Food Consumption Survey
NCHS:National Centre for Health Statistics
NTCP:National Tuberculosis Control Programme
SADHS:South African Demographic and Health Survey
SANBDS: ..South African National Burden of Disease Study
SAVACG: .South African Vitamin A Consultative Group
UNICEF: ..United Nations Children’s Fund
UNDP:United Nations Development Programme
VIGHOR: .Vanderbijlpark Information Project on Health, Obesity and Risk Factors
WHO:World Health Organization
YRBS:Youth Risk Behaviour Study

EXECUTIVE SUMMARY

Until the 1990s there was a gradual decline in most of the infectious diseases as well as in the infant and child mortality rates in South Africa. However, since that period there has been an explosive increase in communicable diseases, largely because of the increasing burden of the human immunodeficiency virus/acquired immune deficiency syndrome (HIV/AIDS) and tuberculosis (TB). The last three decades have shown that many non-communicable (chronic) diseases are also featuring significantly in terms of overall morbidity and mortality. This is particularly so for ischemic heart disease, hypertensive disease, stroke, diabetes, lung cancer, oesophageal, breast and colorectal cancers. An examination of the main risk behaviours for these diseases show that significant changes have been taking place in the lifestyle of many South Africans which are contributing to their risk for developing chronic diseases. In this report we have examined the major risk behaviours, i.e. a "western" diet, physical inactivity, and tobacco-use of the population to explain some of the disease patterns and their outcomes. This has been a difficult task, as there is a paucity of national representative data prior to 1994. Hence this report comprises information from various small studies that do not necessarily reflect the "typical" South African profile. In many instances there have been no prior studies and we have only been able to present current data on different population groups.

Studies on dietary intake show that the black population is undergoing a transition from a traditional high fibre, high carbohydrate intake to a more typically western diet, which has an increased fat and added sugar intake, a lower unrefined carbohydrate intake and an increased intake of animal protein sources and saturated fat. The other ethnic groups (white, coloured and Indian) already follow this westernised dietary pattern. These eating patterns are reflected by the high prevalence of overweight and obesity in the adult and child population, despite the fact that stunting and chronic energy deficiency still affects a large number of infants and children. The high prevalence of overweight and obesity can also be explained by the finding that more than half of the population are sedentary at work and during their leisure time. This presence of obesity and sedentary lifestyle in turn help to explain the increased prevalence of cardiovascular disease, diabetes, hypertension, dyslipidaemia and certain cancers, as does the high prevalence of tobacco and alcohol-use, particularly in the youth. In order to deal with an escalating problem regarding chronic diseases in the next decade it is recommended that health authorities develop successful intervention programmes aimed at health promotion in children, and which utilise the school environment as a vehicle for change and adoption of a healthy lifestyle. Furthermore, the health service provision in the country should move away from exclusively providing for acute illnesses to include patient-centred chronic disease care.

1. INTRODUCTION

In 2001, non-communicable diseases (NCDs) accounted for 60% of the estimated 56 million deaths globally, and 47% of the global burden of disease. While NCDs were initially mainly limited to higher socio-economic groups in low and middle-income countries, recent evidence shows that the unhealthy behaviours associated with these diseases are becoming increasingly prevalent in poor communities of developing countries, and NCDs are becoming more prominent in these communities (WHO, 2004).

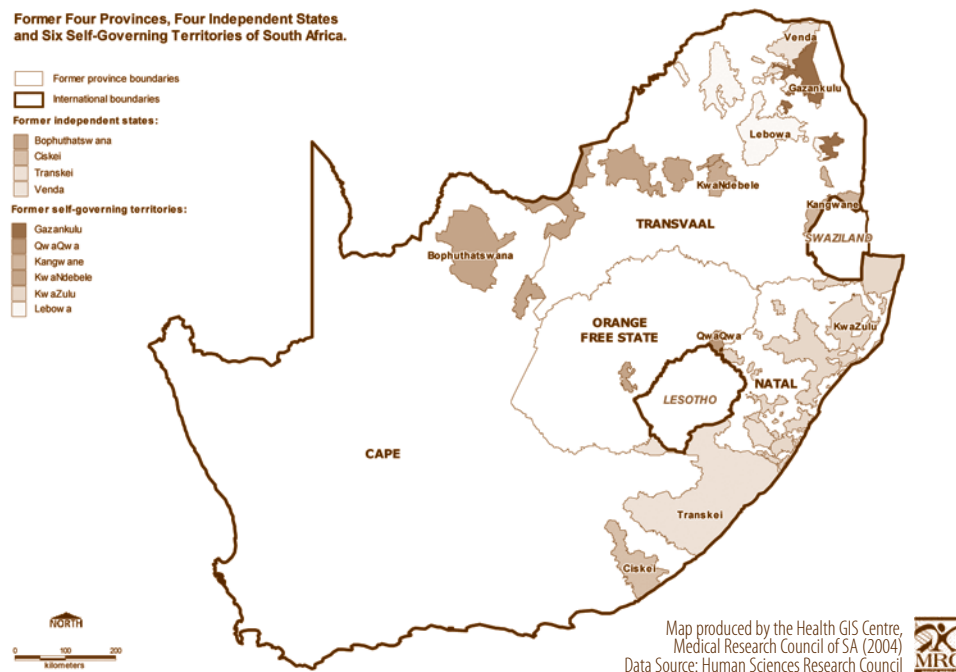
The World Health Report in 2002 highlighted that a few major risk factors accounted for most of the morbidity and mortality associated with the major NCDs, namely cardiovascular disease (CVD), type 2 diabetes and certain types of cancer. The major risk factors identified as leading causes of NCDs were high blood pressure, dyslipidaemia, including high blood serum cholesterol levels, overweight and obesity, physical inactivity, tobacco use, and inadequate intake of fruits and vegetables (WHO, 2003). Globally, the unhealthy lifestyles associated with NCDs were the same, and with respect to diet included a high consumption of energy-dense foods that are low in micronutrients and fibre, and high in total fat, saturated fat, trans fatty acids, free sugars and salt (WHO, 2003).

South Africa is a middle income country with a variety of living conditions spanning wealthy and middle income suburbs, deprived peri-urban areas, rural farms and under-developed rural areas. Changing social, political and economic factors have resulted in increased urbanisation and changes in diet and health behaviours. Estimates for South Africa show that despite the high burden from infectious diseases, NCDs account for a large proportion of the deaths. In the year 2000, HIV/AIDS accounted for 29% of the deaths and together with other infectious diseases accounted for 44% of the deaths (Bradshaw *et al.*, 2003). NCDs accounted for 37% of deaths; cardiovascular disease and diabetes together, accounted for 19% of total deaths and cancers accounted for a further 7.5%. In contrast, nutritional deficiencies related to undernutrition account for 1.2% of the deaths. As a result of the relatively high burden attributable to injuries and HIV/AIDS, the burden of disease in South Africa has been described as a “quadruple burden”. This includes the conditions associated with underdevelopment, the emerging chronic diseases related to unhealthy lifestyles, HIV/AIDS and injuries. This report provides data from published research in respect of diet, dietary trends, nutritional status and diet-related chronic diseases in South Africa over the past few decades. These are assessed in the context of the trends in the communicable disease burden. The prevalence of NCD risk factors, such as obesity, hypertension and diabetes has increased and the disease profile currently reflects a quadruple burden with the combination of conditions related to poverty and under-development, NCDs, injuries and HIV/AIDS. A review of the changes in diet and the health transition experienced in South Africa, could possibly contribute to the development of a national strategy requiring a strong dietary policy component that will be effective in the long term.

1.1. Brief historical background

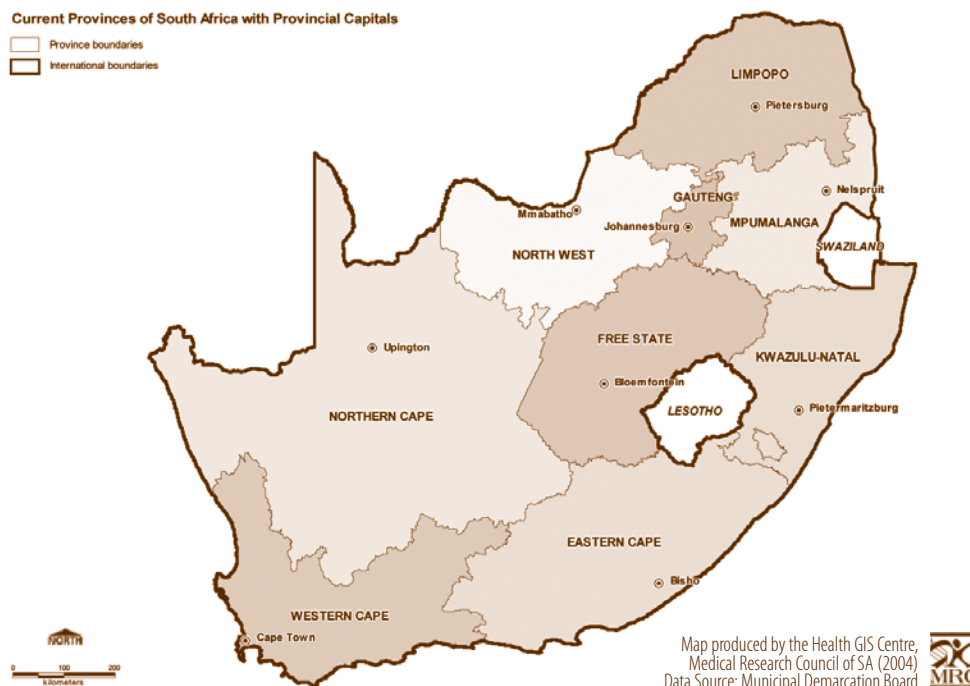
South Africa has a heterogeneous population of diverse origins accommodating approximately 46 million people. Historically, people of Khoi, San, Bantu, European, and Indian descent pioneered the country, but at present over a million persons are from other African countries, Asia, Europe, Australia, New Zealand, and the Americas. The rich heritage of South Africa has resulted in vast cultural and ethnic diversity, with 11 official languages and several other indigenous languages and dialects. The largest organised religion is Christianity, and others include Islam, Hinduism, and Judaism. In addition, many people hold a 'traditionalist' belief system (DOH *et al.*, 2002). The 2001 census (Statistics South Africa, 2003) incorporated the following self-classified and self-reported population groups: black/African (79%), coloured/mixed origin (8.9%), white (9.6%), and Asian/Indian (2.5%).¹

Segregation and discrimination has been part of South Africa's history for hundreds of years. Over the last century, the country's people endured complex systems of neo-colonial and Apartheid repression and oppression. In the eighties, escalating conflict, civil unrest, changes in the ideology of the then-ruling National Party, declining economic growth and international sanctions contributed to alternative political views. Subsequent negotiations resulted in the country's first democratic elections in April 1994 and the development of a new political dispensation (Blaauw & Gilson, 2001). South Africa is currently undergoing a profound social transition from its segregationist past to a democracy supported by a progressive constitution entrenching extensive human rights and fundamental political freedoms. The country's political past was intertwined with its geographic formation and governing system. Hence, 11 geopolitical areas consisting of the former provinces, four independent states and six self-governing areas, have been restructured into nine provinces (Map 1 and 2), and a new governing system has been established at national, provincial and local levels (Blaauw & Gilson, 2001).



Map 1: Former geographic composition of South Africa.
Source: Human Sciences Research Council

¹The population group classification reflects self-reporting according to groups defined by the Population Registration Act of 1950. This classification is used to highlight issues that may reflect effects of historical disparities, and the authors do not subscribe to this classification for any other purpose. The terms black and African are used interchangeably.



Map 2: Current geographic composition of South Africa.
 Source: Human Sciences Research Council

The development challenge faced by South Africa is enormous. While aiming to build a society based on human rights and social justice, South Africa has to grapple with the legacy of an income distribution that is among the most unequal in the world, combined with high levels of poverty and unemployment. Furthermore, the strategies to promote economic growth are likely to reduce the likelihood of eliminating the inequalities in the near future (Terreblanche, 2004).

1.2. Demographic and socio-economic indicators

The dietary and individual risk behaviour of people fundamentally defines their nutritional status, health, growth, and development. These do not occur in a vacuum but within a cultural, economic, social, and political context, which can either aggravate or promote their health (WHO, 2003). As South Africa is undergoing major transformations, it is important to describe some demographic, economic, health, and development trends that may play variable roles in nutrition and health.

1.2.1. Selected demographic indicators

Projections are used to describe the demographic trends in South Africa. Common to the situation in most sub-Saharan countries, South Africa's demographic and epidemiological data systems have limitations. Determined efforts over the past decade have improved processes and products of vital registration systems, but sources of complete and reliable vital statistics remain a challenge (Bradshaw *et al.*, 2003). The country's rapidly growing AIDS epidemic has affected many demographic and epidemiological trends in atypical ways that would challenge data systems even under optimal circumstances. The internationally acknowledged model of the Actuarial Society of South Africa

(ASSA) has the best potential for our purpose, and we have used the ASSA2002 suite of models when empirical data are not available or reliable. Inclusive details of the models, and their assumptions, are available on the Internet at <http://www.assa.org.za>.

Life expectancy and adult, child and infant mortality rates

The average life expectancy at birth increased steadily during the eighties (Figure 1.2.1.1). However, the mortality impact of the country's severe AIDS epidemic is evident in the considerable drop in life expectancy, from 61.6 in 1992 to a projected low of 49.7 in 2006. The harshness of the impact on women is evident in the unusually rapid narrowing of the difference between female and male life expectancy, from 8 years in the early 1990s to less than 4 years in 2010. The AIDS epidemic is having an impact of vast dimensions. The vastness is illustrated in Figures 5.1.2 to 5.1.3 in section 5.1, showing the projected number of HIV-infected and AIDS-sick persons, and the huge mortality force from AIDS alone, versus that from all other disease, disability and injury collectively. Both the fall in life expectancy and the change in the sex differential are mirrored in the steeply upward trend of the 45q15, or the probability that a person aged 15 years old will not live another 45 years to reach age 60 (Figure 1.2.1.2).

The adult mortality rate in South Africa has been particularly high for men (Bradshaw *et al.*, 1992). In the mid-1980s the estimates of the index 45q15 were just under 40% for men and just over 20% for women. These levels persisted until the late 1990s when the impact of AIDS increased these rates. By the year 2000, the mortality of women had increased more than two-fold in the age group 25-29 years and the mortality of men had increased one and a half times in the age range 30-39 years (Dorrington *et al.*, 2004).

The infant and child mortality rates do not reflect the country's middle-income economic status, particularly not so in the wake of the AIDS epidemic. However, assuming efforts to prevent vertical HIV-transmission, a recovery to and improvement of pre-AIDS trends in infant and child mortality are projected by the model (Figure 1.2.1.3). Solarsh and Goga (2004) highlight the large variations in child mortality rates between population groups.

Total population and fertility rates

South Africa's total fertility rate (TFR) has been in decline for several decades (Figure 1.2.1.4), and is currently estimated at 2.6 children born alive per women during her reproductive lifetime, indicating that the population is well advanced in its fertility transition (Moultrie & Timæus, 2003). The currently-reported low fertility levels and impact of HIV/AIDS suggest that the absolute number of births per year is also now declining (Moultrie & Timæus, 2003). Figure 1.2.1.5 projects that, over the next two decades, between 50 000 and 60 000 children per year will be infected with HIV. This, in turn, will impact on the nutritional needs of these children, many of whom already live in a vulnerable psycho-social, financial and infrastructural environment.

Increased mortality rates in tandem with decreased fertility and birth rates will result in a rapid decline in the average annual growth rate of the total population. However, population momentum will ensure that the total population will continue increasing at least until the end of the projection period (Figure 1.2.1.6).

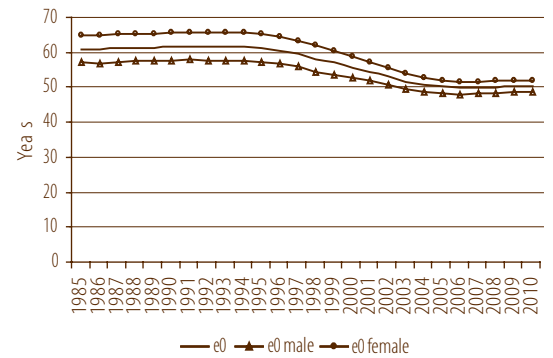


Figure 1.2.1.1: Average life expectancy at birth, 1985-2010
Source: ASSA2002; <http://www.assa.org.za>

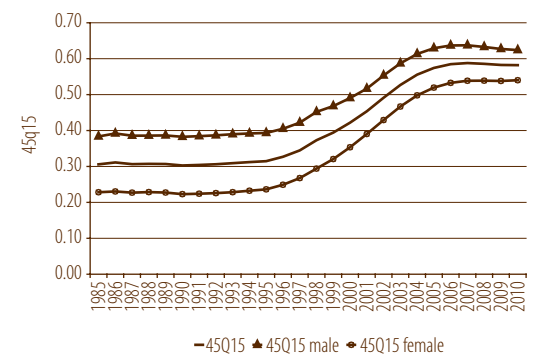


Figure 1.2.1.2: Adult mortality² in South Africa, 1985-2010
Source: ASSA2002; <http://www.assa.org.za>

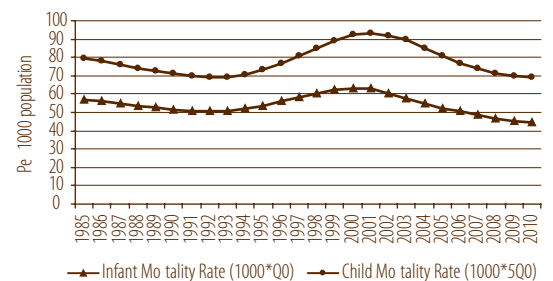


Figure 1.2.1.3: Infant and child mortality rates, 1985 - 2010
Source: ASSA2002; <http://www.assa.org.za>

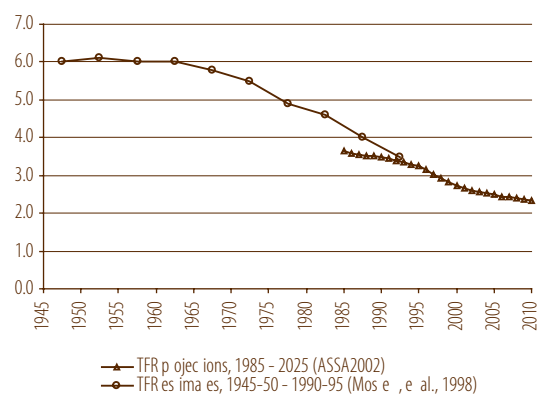


Figure 1.2.1.4: Total fertility rate (TFR), 1985 - 2010 and 1945-50 - 1990-95
Source: ASSA2002; <http://www.assa.org.za>

² Fig. 1.2.1.2 represents the proportion of persons in a particular cohort alive at the beginning of an indicated age interval (x), who will die before reaching the end of that age interval (x + n). In other words, the fig. 1.2.1.2 values stand for the probability that a person at his/her xth birthday will die before reaching his x + nth birthday. So, 45q15 represents the probability that persons aged 15 years will die before they reach the age of 60 (or 15 + 45). One can also call it "premature adult mortality". The 45q15 is widely used as a demographic indicator of adult mortality.

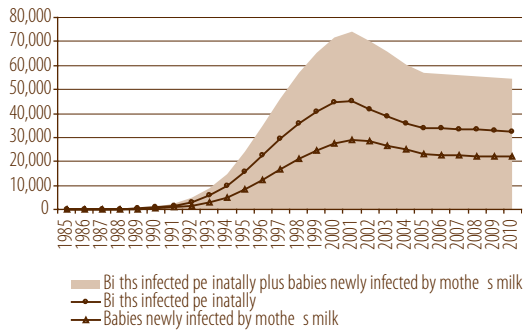


Figure 1.2.1.5: Number of births infected with HIV, 1985-2010
Source: ASSA2002; <http://www.assa.org.za>

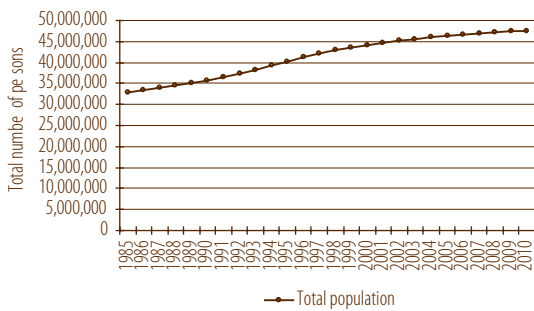


Figure 1.2.1.6: Total population of South Africa, 1985-2010
Source: ASSA2002; <http://www.assa.org.za>

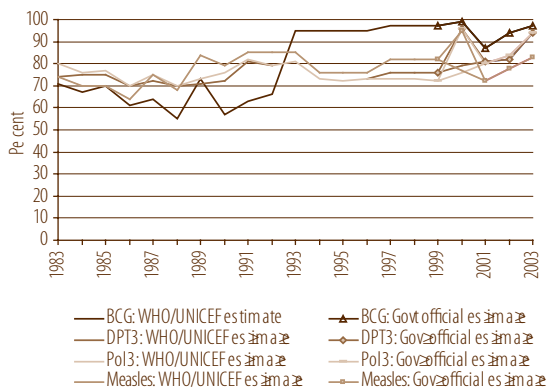
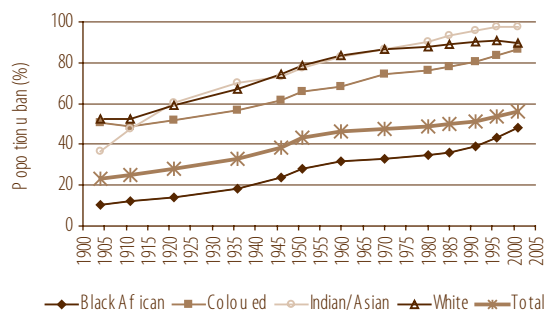


Figure 1.2.1.7: BCG, DTP3, polio3 and measles immunisation trends, 1983-2003
Source: WHO/UNICEF, 2004



Note: * data points for 1980, 1985, and 1991 interpolated; data point for 2001 estimated.

Figure 1.2.1.8: Urbanisation trends, 1904-2001
Sources: Kok, 2004; Statistics South Africa, 2004

Immunisation coverage

In Figure 1.2.1.7, WHO/UNICEF (2004) estimates of child immunisation coverage for each year from 1983 to 2003 are shown. These are derived from WHO and UNICEF databases, drawn from survey information, local expert consultation, and country reports based on administrative records.

During the 1980s, the level of BCG vaccination fluctuated around 60% and 70%. This increased gradually during the early 1990s, and thereafter increased and remained at very high levels. DTP3 vaccinations remained steady around the 70% to 75% level, except for slightly increased levels during the early 1990s and 2000s. The coverage of Polio3 vaccinations followed a very similar course to that of DTP3, while vaccination levels against measles fluctuated somewhat more over the 20-year period. These estimates are supported by findings from surveys, such as the 1998 South African Demographic and Health Survey (SADHS) (DOH *et al.*, 2002), and the 1994-study of the South African Vitamin A Consultative Group (SAVACG, 1995).

Urbanisation trends

Urbanisation and other migration patterns are perceived as very important issues in nutrition and health. However, in South Africa, relationships and patterns of migration are complex, and suitable sources of data very scarce. Although the 1996 population census offers data on internal migration for the entire population, the absence of suitable data prior to this has constrained the analysis of migration data over time (Kok *et al.*, 2003).

The country's ideological history has influenced the natural course of migration through segregationist policies. Urbanisation, in particular, has different histories for the four main population groups in the country, with the urbanisation levels of black Africans diverging most prominently from that of the other groups (Fig. 1.2.1.8). Until July 1986, when it was abolished, 'influx control' legislation prevented the black African population from settling permanently outside the independent and self-governing states. Initially, only African men who had jobs were given permission to live in urban areas and this was extended to their family. The 'group areas' legislation, repealed in June 1990, enforced the resettlement of millions of South Africans, mostly black African people (Gelderblom & Kok, 1994; Kok *et al.*, 2003). These and other political control and legislation were not only directed towards restricting black migration, but were instruments towards controlling black labour (Terreblanche & Nattrass, 1990). The country's 20th century urbanisation profile as illustrated in Figure 1.2.1.8 bears the footprints of these restrictions.

1.2.2. Selected socio-economic indicators

Gross domestic product (GDP)

Sufficient, safe, and varied food supply can prevent under- and over-nutrition and reduce the risk of chronic disease. There is, however, also evidence that poverty and inequity are part of the root causes of malnutrition (WHO, 2003). South Africa's per capita Gross Domestic Product (GDP) corrected for purchasing power parity (PPP) at US\$11 240 per year in 2001, placed it as one of the 50 wealthiest nations in the world (May, 2004).

However, in 1993 the World Bank described the country as one of the world's most unequal economies with a Gini-coefficient for income as high as 0.58 (World Bank, cited in May, 2004), an indicator which has deteriorated to 0.69 in 2000, placing South Africa as the third most unequal society in the world (UNDP, 2001). This also suggests that income inequality has worsened nationally, despite official efforts to increase wages at the lower end of the income scale, such as those of domestic and farm workers (cf. Department of Labour, 2002).

In Figure 1.2.2.1 the country's per capita GDP, corrected for PPP, is shown and has

increased steadily since the 1980s. However, such macro-economic indicators conceal important concerns that may affect community or individual nutritional status and well-being. For example, in 1993, 19 million persons, accounting for almost half of the country's population, were categorised as poor (Klasen, 1997 cited in May, 1998), and 11.5% of the population lived on less than PPP\$1 per day, while 35.8% lived on less than PPP\$2 per day (World Bank, 2000 cited in May, 2004). In a rigorous analysis of poverty and related data, Woolard and Leibbrandt (2001 cited in May, 2004) indicated with 1995-data that the situation continues to be bleak, with 40-50% of South Africans being categorised as poor, and among them 25% as ultra-poor. Although definitions of poverty have been adapted over the years and changes in the incidence and severity of poverty are debated, various studies suggest that poverty levels and the number of people living in poverty have increased over recent years (cf. Budlender, 2000; Statistics South Africa, 2002; Van der Ruit & May, 2003; Meth & Dias, 2004—all cited in May, 2004).

Unemployment

Differing conceptual, methodological, theoretical, and ideological positions can influence measuring 'unemployment', and this seems particularly true in South Africa (Archer *et al.*, 1990). However, there is rather wide consensus that the unemployment rate has increased considerably over the past three decades (Fig. 1.2.2.2). Since the mid-1970s, there were fewer wage jobs available annually than the number of persons entering the labour market (Archer *et al.*, 1990). Towards the turn of the century, this observation was highlighted by May (1998), who said the South African economy is creating employment too slowly to make a meaningful impression on unemployment levels. Despite employment creation efforts by the new Government at the end of the first ten years of democracy, it was still clear that the rate of unemployment had risen significantly—whether defined broadly or narrowly (HSRC, 2003).

Housing and sanitation

The environment that people live in has been highlighted as possibly aggravating or promoting one's health. Despite improvements over the past decade, almost a third of South Africa's households live in informal and traditional dwellings, about a third have piped water inside their homes, little over half are using a flush or chemical toilet, while 14% have no toilet as indicated in Figures 1.2.2.3 - 1.2.2.5. The proportions of households deprived of quality basic services during 1996 and 2001 are shown in Figure 1.2.2.6. The seven basic services included in the calculation are housing, energy for cooking, heating, and for lighting, water, toilet facilities, and refuse removal. There has been a decline in the proportion of households deprived of a higher number of basic services, and an increase in the proportion of households deprived of a smaller number of basic services. This reflects a net effect of modest progress in households' access to basic services.

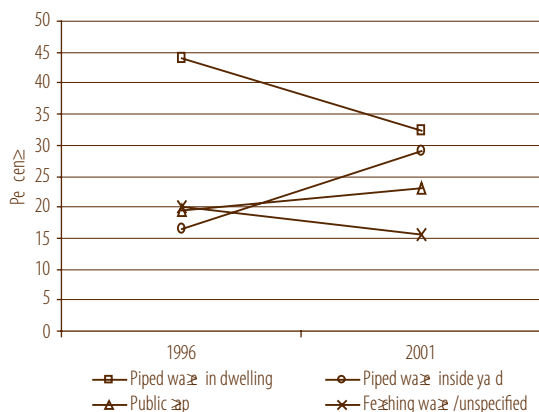
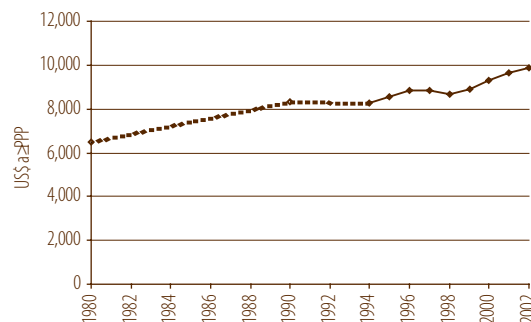


Figure 1.2.2.4: Distribution of households by main source of water supply, 1996 and 2001

Source: Statistics South Africa, 1998 & 2003



Note: Data points for 1981-1989 and 1991-1993 are interpolated
Figure 1.2.2.1: GDP per capita: 1980, 1990 and annual values for the period 1994 - 2002

Source: Quatec Dataset; UNDP, 2003

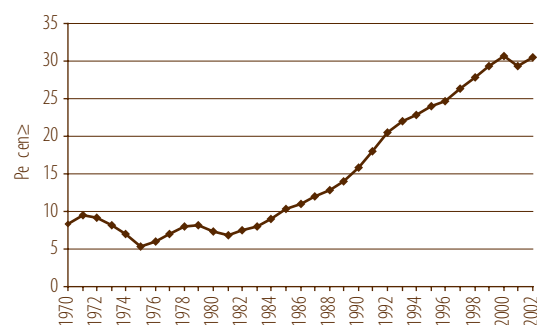


Figure 1.2.2.2: Unemployment rate, 1970-2002
Sources: SA Reserve Bank Quarterly Bulletin 2003, q1; EIU Country Data; World Bank Global Development Indicators; and IMF Financial Statistics; UNDP, 2003

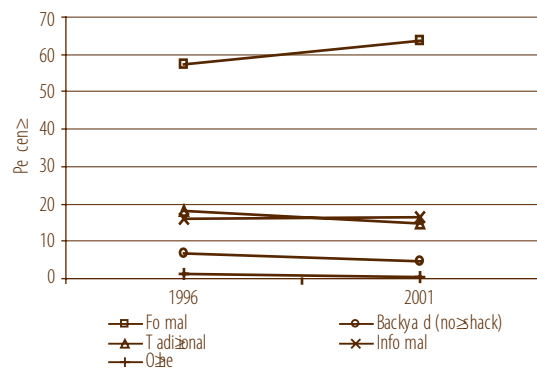


Figure 1.2.2.3: Distribution of households by type of dwelling, 1996 and 2001

Source: Statistics South Africa, 1998 & 2003

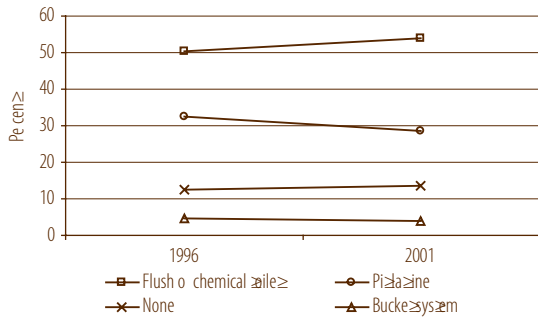


Figure 1.2.2.5: Distribution of households by main toilet facility, 1996 and 2001

Source: Statistics South Africa, 1998 & 2003

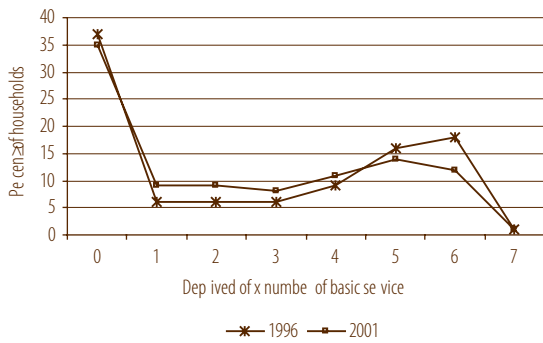


Figure 1.2.2.6: Distribution of households deprived of quality basic services, 1996 and 2001

Source: UNDP, 2003

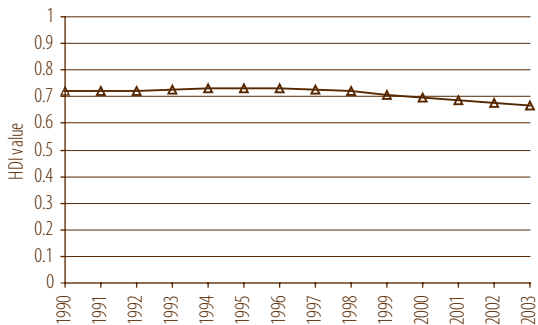


Figure 1.2.2.7: Human development index, 1990-2003

Source: UNDP, 2003

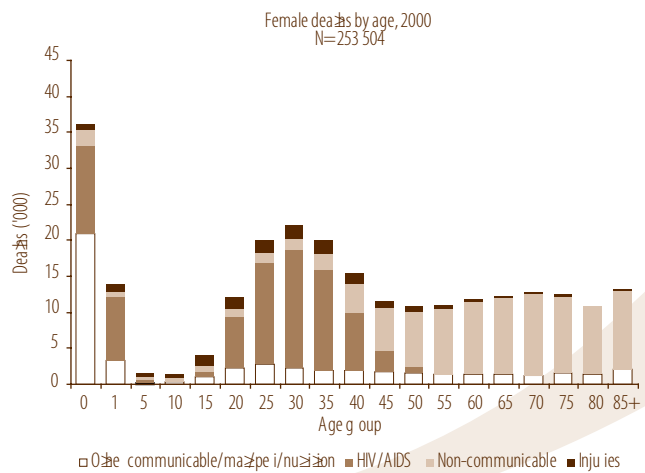
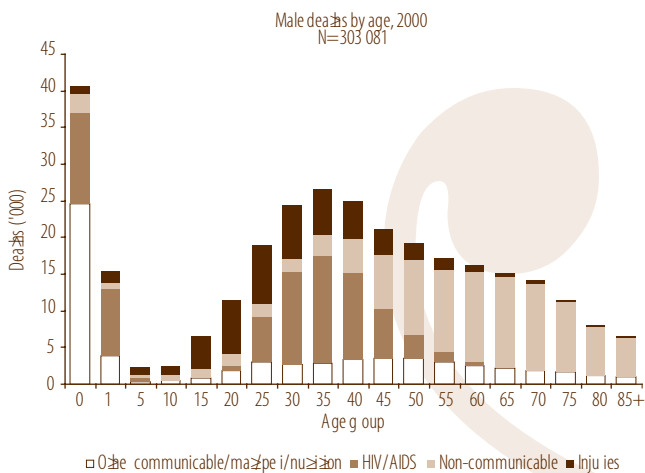


Figure 1.3.1: Male and female deaths by age and cause

Source: 2000 SANBDS Bradshaw *et al.*, 2003

Figures 1.2.2.3 - 1.2.2.6 illustrate a congruent message that a considerable number of households continue to be deprived of basic services, meaning that much is still to be done to enhance the country's inherited skewed system of access to these services.

Human development

The human development index (HDI) is a summary measure that extends beyond economic growth. In addition, it incorporates human capital through a measure of education and life expectancy. The trend in the HDI after gradually improving since 1990, has worsened over recent years from 0.7326 in 1995 to 0.6675 in 2003 (see Fig. 1.2.2.7). The HDI-values represent a composite index of three equally-weighted indices, i.e. the life expectancy index, the educational attainments index and the gross domestic product index. While the latter two indices have shown positive trends since 1990, the life expectancy index—largely attributable to HIV/AIDS—has shown powerful negative trends for the largest part of the period, to the extent where the decline in life expectancy has been greater than the combined increasing effects of the remaining two indices (UNDP, 2003).

1.3. Burden of disease

The initial burden of disease study of 2000 (Bradshaw *et al.*, 2003) is the first set of estimates of the causes of mortality experienced in South Africa. This study made use of several sources of cause of death data together with the ASSA model to overcome the under-registration of deaths and the misclassification of causes. Figure 1.3.1 shows the age distribution of the estimated number of deaths in 2000 by broad cause group. The distinct age pattern of AIDS deaths among children and young adults is clearly apparent. Communicable diseases occur across all ages, while injuries particularly affect young adult men. NCDs occur in the adult ages. More such deaths occur under the age of 60, reflecting the age structure of the population. The SANBDS estimates that in 2000, NCDs accounted for 37% of the deaths, followed by HIV/AIDS, which accounts for 30%. NCDs accounted for 40% of female deaths and 36% of male deaths. Stroke is the most common fatal NCD among women and ischaemic heart disease is the most common among men. Hypertensive heart disease, diabetes mellitus and chronic obstructive pulmonary disease were also among the leading causes of fatal NCDs in the year 2000. These conditions co-exist with low birth weight, protein energy malnutrition and other infectious diseases as leading causes of death.

2 DIETARY TRENDS AND ASSOCIATED RISK FACTORS

2.1. Changes in total dietary energy, carbohydrate, protein, and fat intake

Food balance sheets for 1962, 1972, 1982, 1992 and 2001 are presented in Addendum A and have been used to describe trends in per capita consumption (FAO, 2004). The contributions of different macronutrients to energy intake are shown in Fig. 2.1.1. These ratios have not changed much even though the available per capita energy supply has increased by more than 300 kilocalories. It is important to be reminded of the fact that food balance sheets present total amounts of food available (not consumed) and there is no accounting for how commodities are distributed within regions, SES, gender or any other demographic factor. These data are regarded as very crude estimates of dietary intake and have only been included because national data on dietary intake surveys are not available prior to 1999.

However, certain trends have been noticed over the 40-year period (Addendum A). The per capita available energy supplies increased from 2603 kilocalories per day in 1962 to 2921 kilocalories in 2001 (Fig. 2.1.1), available protein supplies increased from 68.4 g to 75.1 g, fat increased from 61.2 g to 79 g, while the available carbohydrate supplies increased from 445 g to 478 g (Figs. 2.1.2 - 2.1.4). The implication therefore being that at national level more food is available to the consumers. However, the increase in fat availability per capita may be detrimental to health from a chronic diseases perspective.

The first nationally representative dietary study in South Africa was undertaken in 1999 (National Food Consumption Survey) (NFCS) (Labadarios *et al.*, 2000). This was a cross-sectional survey in 1-9-year-old children, with provincial representation drawing on the 1996 census data. The aim of the survey was to collect baseline data for formulating appropriate policy guidelines for food fortification, as well as for developing appropriate nutrition education material for South African children. The final sample comprised 2894 children, with a response rate of 93%. Sociodemographic, dietary, and anthropometric data were collected for each participant.

Since the NFCS was the first national dietary study in South Africa, it is not possible to compare macronutrients in a reliable manner over time. However, by examining two studies, one in adults and one in schoolchildren, one can deduce some changes over time. Bourne (1996) examined the macronutrient intake of black adults residing in Cape Town (Fig. 2.1.5). Certain trends are noticeable, such as the intake of carbohydrate (percentage energy (% E)) that decreased from 61.4% to 52.8% with increased time living in the city.³ In contrast, fat intake increased from 23.8% to 31.8% (% E intake) over time spent in the city. Protein intake remained more or less the same over time, although the contribution of animal protein increased, whereas the amount of plant protein decreased. Fibre intake (not shown), also decreased significantly from 20.7 g to 16.7 g with increased time living in the city.

³ A person living in the city all their life has spent 100% in an urban area. Alternatively, people living in a rural area for most of their life (50 years) and 5 years in the city have only spent 10% of their life in an urban area.

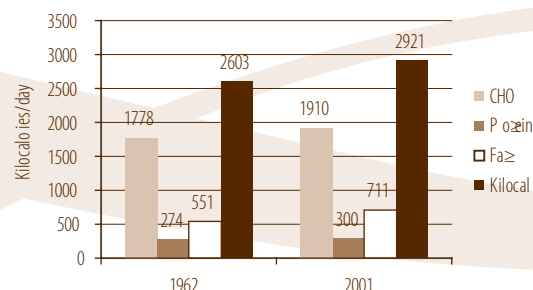


Figure 2.1.1: Trends in dietary energy supplies from fat, protein and carbohydrate (CHO)

Source: FAO Stat, 2004

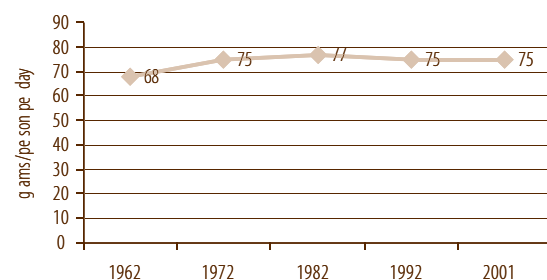


Figure 2.1.2: Per capita available dietary protein supplies in RSA, 1962-2001

Source: FAO, 2004

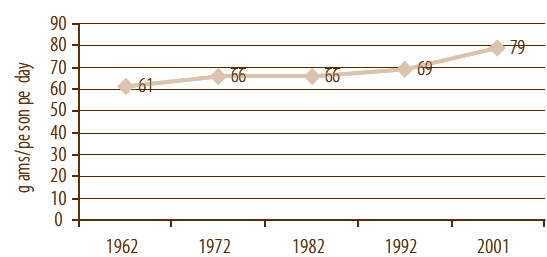


Figure 2.1.3: Per capita available dietary fat supplies in RSA, 1962-2001

Source: FAO, 2004

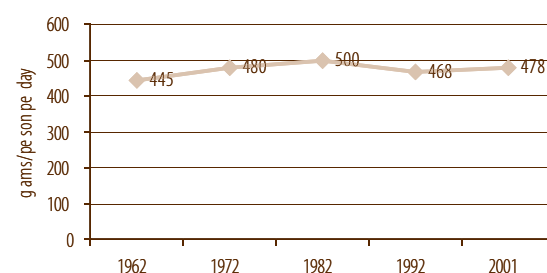


Figure 2.1.4: Per capita available dietary carbohydrate supplies in RSA, 1962-2001

Source: FAO, 2004

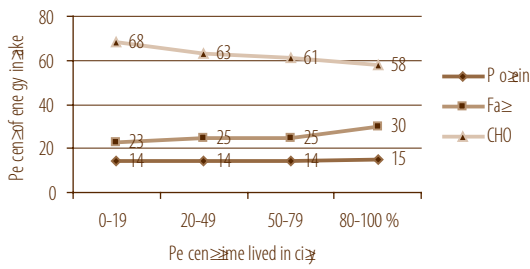


Figure 2.1.5: Changes in contribution of macronutrients as a percentage of energy intake by 19-44-year-old black adults (n=649) according to the percentage of time living in the city of Cape Town

Source: BRISK; Bourne, 1996

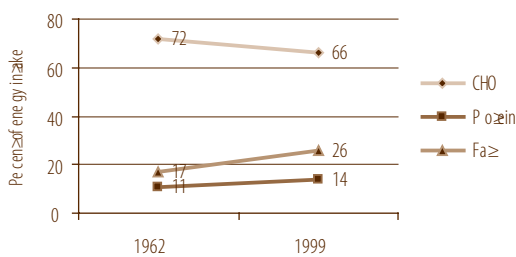


Figure 2.1.6: Macronutrient distribution as a percentage of total energy consumed by black school-going children in urban areas of Gauteng in 1962 (n=552; 6-9 years) and in 1999 (n=427; 1-9 years)

Sources: 1962: Lubbe, 1973; 1999: NFCS, 1999; Labadarios *et al.*, 200

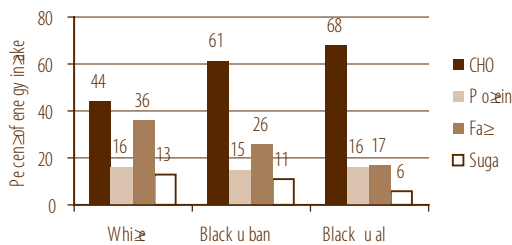


Figure 2.2.1: Macronutrient distribution as a percentage of total energy consumed/day by adult males white urban (n=454; 15-64 years), black urban (n=285; 19-44 years), and black rural (n=74; 20-65 years)

Sources: white: Wolmarans *et al.*, 1989; black urban: Bourne *et al.*, 1993; black rural: Steyn *et al.*, 2001

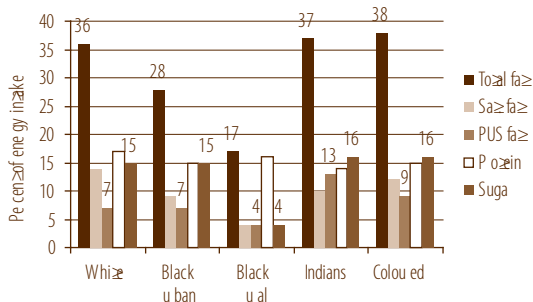


Figure 2.2.2: A comparison of fat, protein and sugar intake as a percentage of energy intake by the main ethnic groups (adult males) in South Africa.

Sources: see Table 2.2.1

These changes are all consistent with a population undergoing the nutrition transition, i.e. changes in diet from a traditional high carbohydrate, high fibre, low fat diet to one with a higher fat and sugar intake and a lower carbohydrate and fibre intake (Popkin, 2001).

In urban areas of Gauteng, mean fat intake increased from 17% in 1962 to 25.8% in 1999, and carbohydrate intake decreased from 72% to 60.3% as shown in Fig. 2.1.6 (Lubbe, 1973; Labadarios *et al.*, 2000). Some differences between the two studies however, need to be kept in mind. In the 1962-study results are reported for 6-9-year-olds using a modified diet history; while the results for 1999 are for 1-9-year-olds using a 24-hour recall dietary method. Despite these differences schoolchildren showed similar patterns of macronutrient intakes to those of adults in the Cape Town study by Bourne (1996). These two studies support the trends that energy and fat intake have increased since 1962 as shown by the food balance sheets.

2.2. Differences in nutrient intake between ethnic groups and urban and rural areas

It is important to note there is a diversity of ethnic and cultural groups in South Africa with different traditional eating patterns. The white population consumes a typical western diet, which has a high fat (> 30% E) intake, low carbohydrate intake (< 55% E), low fibre and high free sugar intake (> 10% E) (Wolmarans *et al.*, 1989). The Indian and coloured (mixed ancestry) populations have a very similar pattern to the white population, albeit each group more commonly consumes certain foods (Langenhoven *et al.*, 1988). The black African population has two distinct types of eating patterns. The rural population still follows a very traditional diet, which is high in carbohydrates (> 65% E), low in fat (< 25% E), low in sugar (< 10% E), and moderately high in fibre (Steyn *et al.*, 2001). On the other hand, the black African urban population demonstrates an adoption of the western diet of the other groups. Their carbohydrate (< 65% E) and fibre intakes are lower, and fat intake is higher (> 25% E) (Bourne *et al.*, 1993).

In Figure 2.2.1, macronutrient distributions show marked differences between white and urban and rural blacks. White males (35-44 years) have the highest intake of fat, protein and added sugar and the lowest intake of carbohydrates (Wolmarans *et al.*, 1988). Rural black adults of the same age have the highest intake of carbohydrates and the lowest intake of protein, fat and added sugar (Steyn *et al.*, 2001). Black urban males (35-44 years) lie between the two extremes (Bourne *et al.*, 1993). This figure suggests the transition in diet of blacks from a traditional rural one to an urban diet that is approaching the completely westernised one of the white population. However, one needs to keep in mind that the studies were not undertaken at the same point in time, which may have influenced the results.

Further, illustrations in Figures 2.2.2 and Table 2.2.1 show the differences between the dietary intakes of all the main ethnic groups (males) in South Africa with urban and rural subgroups for blacks (Bourne *et al.*, 1993; Langenhoven *et al.*, 1988; Steyn *et al.*, 2001; Vorster *et al.*, 1995; Wolmarans *et al.*, 1988, 1999). These studies were geographically and ethnically representative of the areas where they were undertaken, and can be regarded as a good reflection of the typical diet of each specific group. The white, Indian and coloured groups have the highest intake of fats, protein and free sugar, which are not in line with the WHO/FAO (2003) recommendations. Black males in rural areas have the lowest intakes of all types of fat and protein. Urban males once again illustrate the nutrition transition that has taken place. Table 2.2.2 shows various transitions, which have taken place in the black population (MacIntyre *et al.*, 2002).

The urban upper-income group have the highest fat and protein intakes as a percentage of energy intake. They also have the highest cholesterol intake, which is higher than the WHO/FAO (2003) recommendation (< 300 mg/day). At the other end of the scale are the rural residents and rural farm workers who have a strict prudent diet that is low in fat and high in carbohydrate.

Table 2.2.1: Comparison of macronutrient mean ranges in six dietary studies in adults in South Africa

Dietary factor	CORIS ¹ white rural n=1113 15-64 yrs	DIKGALE ² black rural n=210 20-65 yrs	VIGHOR ³ white urban n=317 15-64 yrs	BRISK ⁴ black urban n=983 19-44 years	Indians ⁵ urban n=370 15-69 yrs	CRISIC ⁶ coloured urban n=276 20-34 yrs	WHO ⁷ goals % energy
Energy MJ	6.3 - 12.7	6.0 - 6.7	5.9 - 12.5	5.8 - 8.5	5 - 8.5	7.1 - 10.3	
Energy (kilocalories)	1500 - 3024	1434 - 1590	1405 - 2976	1386 - 2035	1190 - 2024	1690 - 2452	
Total fat % E	34.6 - 36.5	15.7 - 17.1	33.3 - 38.6	23.8 - 28.3	32.8 - 36.9	37.3 - 38	15 - 30%
SFA % E	12.6 - 13.6	3.7 - 4.4	12.2 - 14.6	8.5 - 9.2	7.0 - 9.8	11.8 - 11.9	< 10%
PUFAs % E	5.9 - 7.0	3.7 - 3.9	5.6 - 7.8	4.5 - 7.2	9.5 - 12.5	9.1 - 9.2	6 - 10%
CHO % E	44.1 - 51.5	62.4 - 70.8	46.9 - 53.3	59.2 - 64.3	45.5 - 53.0	45 - 46.5	55 - 75%
Free sugar % E	10.8 - 15.4	5.2 - 4.2	13.0 - 18.6	10.7 - 14.6	10.8 - 15.8	15 - 16	< 10%
Protein % E	13.8 - 16.6	14.2 - 15.6	13.6 - 16.3	13.1 - 15.3	11.9 - 13.8	14.9 - 15	10 - 15%
Cholesterol (mg)	243 - 509	144.9 - 116.6	140 - 176 mg /4.2MJ	-	76 - 117 mg /4.2MJ	290 - 440	≤ 300 mg/day

Sources: 1. CORIS: Wolmarans *et al.*, 1988; 2. DIKGALE: Steyn *et al.*, 2001; 3. VIGHOR: Vorster *et al.*, 1995; 4. BRISK: Bourne *et al.*, 1993; 5. Indian Study: Wolmarans *et al.*, 1999; 6. CRISIC: Langenhoven *et al.*, 1988; 7. WHO/FAO, 2003

Table 2.2.2: The distribution of macronutrients in the diet of black South African males according to area and income

Dietary factor	Rural low income n=194	Farm (rural) workers low income n=109	Urban low income (informal settlement) n=128	Urban middle income n=229	Urban high income n=83	WHO ⁷ goals % of energy
Energy (kJ)	9.6	8.9	9.3	9.9	9.8	
Energy (calories)	2285	2122	2222	2356	2338	
Total fat % E	22.9	22.8	24.3	26.0	30.6	15 - 30%
CHO % E	67.4	67.2	65.5	64	57.3	55 - 75%
Protein % E	11.6	12.1	12	11.8	13.2	10 - 15%
Cholesterol (mg)	315.6	283	332	377	420	≤ 300 mg /day
Fibre (g)	19.2	15.6	17.4	18.8	19.7	

Source: MacIntyre *et al.*, 2002; WHO goals: WHO/FAO, 2003

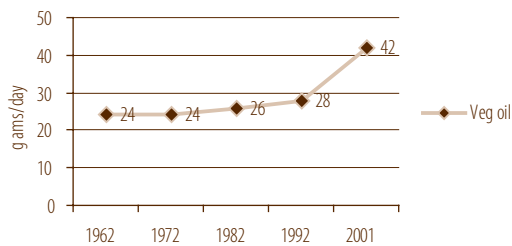


Figure 2.3.1: Per capita daily intake of oils between 1962 and 2001
Source: FAO, 2004

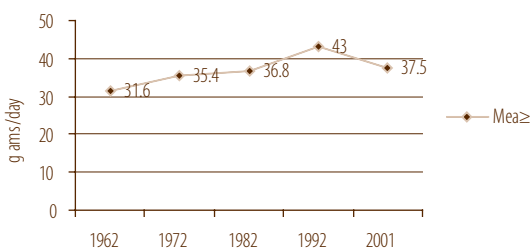


Figure 2.3.2: Per capita daily intake of meat in RSA, 1962-2001
Source: FAO, 2004

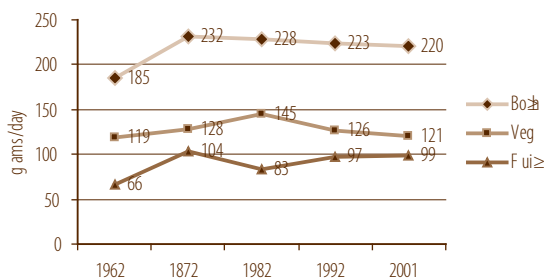


Figure 2.3.3: Per capita intake of fruits and vegetables in RSA, 1962-2001
Source: FAO, 2004

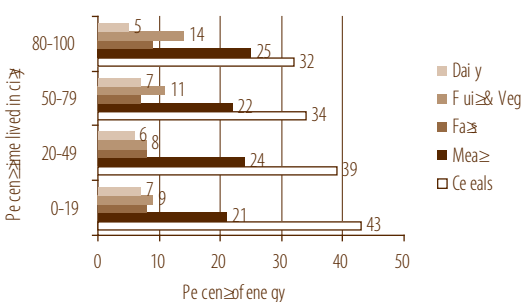


Figure 2.3.4: Percentage contribution to energy from different food groups according to time spent in the city of Cape Town by black adults (n=649; 19-44 years)
Source: Bourne, 1996

2.3. Changes in intake of different types of food and food groups over time

According to FAO data (Addendum A), cereal availability increased from 169.3 kg per capita per annum in 1962 to 187.8 kg in 2001; as did starchy roots (13 to 29.7 kg), vegetable oils (5.7 to 14.5 kg), fruits (24.1 to 36.0 kg), alcohol (43.8 to 56.8 L), meat (31.6 to 37.5 kg), eggs (2.5 to 6.1 kg), and fish (5.5 to 7.9 kg). Foods per capita which decreased, are: sugar and sweeteners (39.4 to 32.8 kg), ofal (4.5 to 3.8 kg), animal fats (including butter) (3.0 to 0.7 kg), and milk (78.0 to 54.1 kg).

These data represent the following scenarios: Availability of staple cereals gradually increased, as did the other items mentioned above. These account for the overall increase in energy intake. Vegetable oil and meat per capita also increased significantly, which account for the large increase in fat and saturated fat intake (Figs. 2.3.1 - 2.3.2). Of concern is the fact that vegetable availability remained constant (43.5 to 44.2 kg per annum). Overall fruit and vegetable availability was 205 g/day (excluding starchy roots; see Fig. 2.3.3), and thus theoretically could not begin to meet the recommended intake of 400 g/day (WHO/FAO, 2003). This has serious implications for chronic diseases since low fruit and vegetable intake is a risk factor for many NCDs.

The amounts consumed from different food groups changed with increasing time spent in Cape Town by black adults as shown in Figure 2.3.4. There was a higher consumption from the following groups: meat, fruit and vegetables, fats and non-basic foods (such as drinks and sweets), while there was a decreased consumption from the dairy and cereal groups. Similar findings are presented for young females in Figure 2.3.5. The larger consumption of sugar-containing food items in urban versus rural areas is shown in Figure 2.3.6.

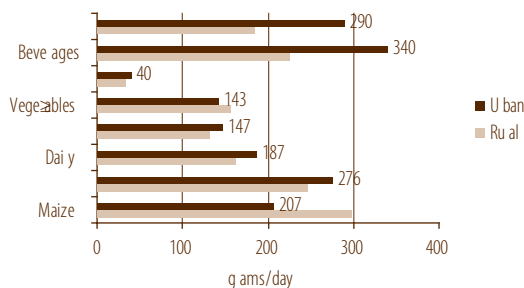
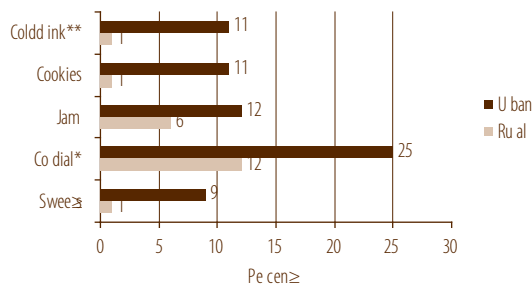


Figure 2.3.5: Food consumption by black female university students (n=115) from urban and rural areas evaluated on entering university in Limpopo province
Source: Steyn *et al.*, 2000



* Cordial: drink made from sweet sucrose concentrate; ** Cold drink = soft drink
Figure 2.3.6: Percentage consumption of sugar containing items by 6-9-year-olds (n=439) in the National Food Consumption Survey 1999
Source: Adapted from Labadarios *et al.*, 2000

2.4. Current diet

The results from the NFCS have provided the first nationally representative dietary data for South Africa. Table 2.4.1 indicates the mean nutrient intakes of the children and whether these are less than the recommended nutrient intakes (RNI) (FAO & WHO, 2002). Overall, energy intakes of both rural groups were less than the RNI values. This was also the case for vitamin A, vitamin C, niacin, vitamin B6 and zinc. For folate and calcium, urban and rural intakes were less than the RNIs. An important aspect about the study was the disparities that were found in intakes between urban and rural areas. For most nutrients, the mean values in urban areas were significantly higher compared to those in rural areas.

To understand the dynamics of dietary changes, the main food groups consumed by South African adults and children in urban and rural areas were examined (Table 2.4.2). The data are summarised from combined databases using secondary data analyses (in lieu of no national data on adults) to show the dietary intake of adults (Steyn *et al.*, 2001; Nel & Steyn, 2002) and children (1-5 years) (Labadarios *et al.*, 2000). Although rural dwellers have a higher cereal and vegetable intake, the urban adults and children far exceed the consumption for most other food groups. This is particularly true for sugar, meat, vegetable oil, dairy, fruit, roots, tubers, and alcohol consumption.

Table 2.4.1: Mean nutrient intake of children in the National Food Consumption Survey in 1999

Nutrients	Children 1-3 years (n=1308)			Children 4-6 years (n=1083)		
	Urban	Rural	RSA	Urban	Rural	RSA
Energy# (KJ)	4403 (2043)	3992* (1790)	4200 (1933)	5614 (2375)	4963*(2283)	5271* (2349)
Energy (calories)	1048 (486)	950* (426)	1000 (460)	1337 (565)	1182* (544)	1255* (559)
CHO (g)	154 (72)	151 (71)	152 (72)	192 (80)	193 (91)	193 (86)
Added sugar# (g)	26 (23)	18 (17)	22 (21)	36 (30)	24 (34)	29 (33)
Protein# (g)	33 (18)	29 (17)	31 (18)	43 (21)	36 (19)	39 (21)
Fat (g)	29 (21)	22 (16)	25 (19)	38 (25)	42 (21)	31 (24)
Fibre (g)	9 (6)	10 (7)	9 (6)	13 (7)	13 (8)	13 (8)
Vitamin A# (RE)	463 (943)	252* (349)	359* (723)	544 (1313)	319* (1007)	425* (1167)
Vitamin C# (mg)	41 (96)	20* (36)	31* (73)	36* (65)	29* (78)	33* (72)
Thiamin (mg)	0.6 (0.3)	0.6 (0.3)	0.6 (0.3)	0.7 (0.4)	0.7 (0.4)	0.7 (0.4)
Riboflavin# (mg)	0.8 (0.8)	0.6 (0.6)	0.7 (0.7)	1.0 (1.0)	0.7 (1.0)	0.8 (0.9)
Niacin# (mg)	6.4 (4.7)	4.8* (3.8)	5.6 (4.3)	9 (6.2)	6.3* (4.4)	7.6* (5.5)
Vitamin B6# (mg)	0.6 (0.4)	0.4* (0.3)	0.5 (0.4)	0.8 (0.6)	0.5* (0.4)	0.6 (0.5)
Vitamin B12#(ug)	2.7 (8.4)	1.4 (4.4)	2.1 (6.8)	3.7 (12.1)	2 (10.2)	2.8 (11.2)
Folate# (mg)	102* (81)	86* (84)	94* (83)	161* (119)	127* (111)	143* (116)
Calcium# (mg)	345* (326)	302* (326)	324* (327)	342* (282)	270* (254)	304* (269)
Iron# (mg)	4.9* (3.6)	4.7* (3.8)	4.8* (3.7)	6.7 (4.2)	6.1 (4.6)	6.4 (4.5)
Zinc# (mg)	4.5 (2.7)	3.9* (2.5)	4.2 (2.6)	5.9 (3.3)	4.8* (3.1)	5.3 (3.2)

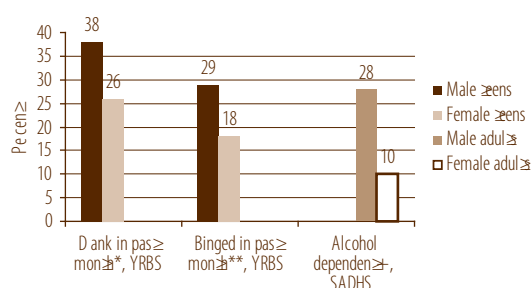
* Mean intake is less than the FAO/WHO (2002) RNIs; # significant urban/rural differences ($p < 0.01$)

Source: Steyn *et al.* in Labadarios *et al.*, 2000

Table 2.4.2: Food groups as consumed by South African adults and children in urban and rural areas

Food groups	Adults and children 10+years (n=817)			Children 1-5 years (n=2048)		
	RSA g/day	Urban g/day	Rural g/day	RSA g/day	Urban g/day	Rural g/day
Cereals	870	736	1023	489	433	546
Sugar	76	120	27	65	93	39
Stimulants: tea, coffee	382	390	371	147	143	151
Vegetables	93	85	101	52	45	58
Meat and offal	86	102	67	45	56	34
Vegetable oils	8	11	5	5	6	3
Dairy	73	109	31	124	147	102
Fruit	61	83	36	48	70	27
Eggs	15	16	14	10	12	8
Legumes	35	34	36	17	15	18
Fish	12	14	10	7	8	5.8
Roots & tubers	40	59	19	29	32	27
Nuts & oilseeds	2	2	2	1	2	1
Alcohol	54	67	38	-	-	-
Soups	2.6	4.3	0.6	6	3	9
Condiments	0.5	0.7	0.3	0.2	0.2	0.1
Animal Fat	1.0	1.6	0.4	0.1	0.1	0.2

Source: Nel & Steyn, 2002



* Had a drink of alcohol on one or more days of previous month; ** Had 5 or more drinks on one or more days of the preceding month; + According to the CAGE questionnaire

Figure 2.5.1: Prevalence of reported drinking of alcohol or bingeing in the past month among teenagers (13-19 years) who attend school; and prevalence among adults found to be alcohol-dependent

Sources: YRBS: Reddy *et al.*, 2003; SADHS: DOH, 2002

2.5. Changes in alcohol intake

According to the food balance sheets per capita alcohol consumption in South Africa increased from 1962 to 2001, implying that alcohol consumption had increased in the population (Addendum A). Certain trends are noticeable from two surveys in the 90s, i.e. the SADHS in adults (DOH, 2002) and the Youth Risk Behaviour Study (YRBS) (Reddy *et al.*, 2003) in teenagers (Fig. 2.5.1). Reddy *et al.* (2003) ascertained that more than 30% of the teenagers drank and/or binged on alcohol in the preceding 30 days. In adults, nearly 30% of males reported to use alcohol excessively, based on the CAGE test (Ewing, 1984) compared with 10% of females (DOH, 2002). Hence, high alcohol consumption, a risk factor for chronic diseases such as stroke, diabetes and cancer of the oesophagus, liver, and breast, is an underlying determinant that needs to be addressed in the prevention of NCDs (WHO/FAO, 2003).

3. TRENDS IN NUTRITIONAL STATUS

3.1. Trends in the prevalence of undernutrition and protein-energy malnutrition (PEM)

Nationally representative and comparable anthropometric data over time are only available for 1994 and 1999 in children and in 1998 for adults and hence do not show long-term trends. In order to obtain longer time trends smaller localised studies have been used as comparisons with the 1994 and 1999 data of children. Data on the two national and on one localised study undertaken in South Africa between 1986 and 1999 are shown in Table 3.1.1 and Figure 3.1.1. Given some differences in the children's ages, and the limitations mentioned above, conclusions on trends should be interpreted cautiously. The study in 1986 sampled black preschool children on farms in areas which excluded the "homelands" where the greater part of the black population lived. Consequently, the data are not a true reflection of the actual prevalence of malnutrition, which would have been higher if these areas had been included. Before democratisation in South Africa health-care services provided to the population in these areas were totally insufficient. In 1994, the South African Vitamin A Consultative Group (SAVACG, 1995) study was undertaken on preschool children nationally, and in 1999, the NFCS included school-going children (Labadarios *et al.*, 2000). These studies showed similar results, with underweight ranging from 6.9% to 10.7%, stunting from 16.1% to 27% and wasting from 1.8% to 3.7%. Malnutrition prevalence was always higher in the rural areas compared with the urban areas. There appears to be a small improvement in the prevalence of stunting between 1994 and 1999 in these two nationally representative surveys.

Two earlier studies (1969 and 1975) were undertaken as representative studies of the Transvaal, now partly Gauteng (Fig. 3.1.2). These studies used the Harvard-3rd percentile as an indicator of underweight, while the later studies used the National Centre for Health Statistics (NCHS) percentiles; therefore, there are some discrepancies despite the two standards being very similar. There is a large decrease in the prevalence of underweight in urban and rural areas until 1994. The small increase after 1994 in urban Gauteng is probably because of the large migration into this region after the lifting of migration restrictions.

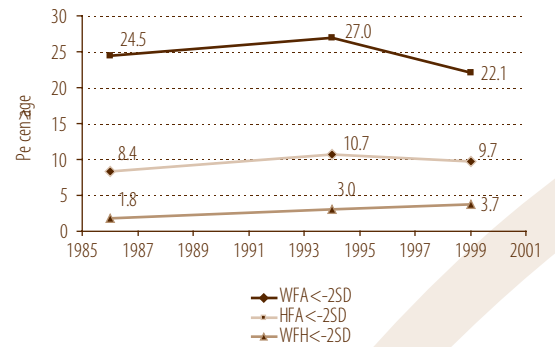


Figure 3.1.1: A comparison of prevalence of underweight and stunting in rural children (< 72 months) in 1986 (n=1 745), 1994(n= 4757) and 1999 (n= 2 200)

Sources: see Table 3.1.1

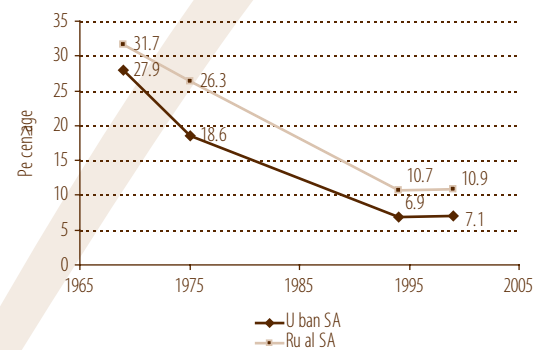


Figure 3.1.2: Prevalence of underweight in black preschool children (< 72 months) as reported by 4 studies 1969 (n=2 073), 1975 (n= 3 655), 1994 (n= 11 238) and 1999 (n=2 200)

Sources: 1969, 1975: Richardson, 1977; 1994: SAVACG, 1995; 1999 NFCS: Labadarios *et al.*, 2000; Steyn *et al.*, 2005

Table 3.1.1: Prevalence of low weight-for-height, low height-for-age and low weight-for-age in South African children measured in three national surveys (1986, 1994 and 1999)

	1986 rural 0-59** months	1994 urban 6-71 months	1994 rural 6-71 months	1994 RSA 6-71 months	1999 RSA 12-72** month
	n=1 745	n=4 757	n=6 062	n=10 819	n=2 200
Weight-for-age < -2SD NCHS	8.4	6.9	10.7	9.3	8.8 (9.7)*
95% Confidence Intervals	6.8; 9.9	6.0; 7.9	9.6; 11.9	8.5; 10.1	7.6; 10.1
Height-for-age < -2SD	24.5	16.1	27.0	22.9	19.3 (22.1)*
95 %Confidence Intervals	19.2; 29.7	14.4; 17.8	24.8; 29.3	21.4; 24.5	17.5; 21.2
Weight-for-height < -2SD	1.8	2.1	2.8	2.6	3.7 (3.7)*
95% Confidence Intervals	1.3; 2.3	1.5; 2.7	2.3; 3.4	2.2; 2.9	3.0; 4.4

* 12-96 months; ** 6-71-month category not available

Sources: 1986: Kustner, 1987; 1994 SAVACG Study: SAVACG, 1995; 1999 NFCS: Labadarios *et al.*, 2000; Steyn *et al.*, 2005

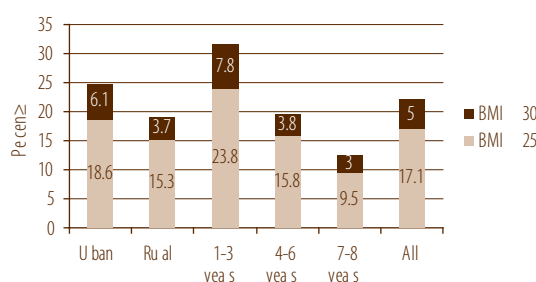


Figure 3.2.1: The prevalence of overweight and obesity in children (n=2200) in South Africa in 1999

Sources: NFCS: Steyn *et al.*, 2005

3.2. Trends in the prevalence of overweight and obesity

The prevalence of children who were overweight and obese at the time of the NFCS in 1999 is shown in Figure 3.2.1 and Table 3.2.1. There were significant differences between urban and rural areas, between location domains and among age groups. Overweight was highest in formal urban areas and in 1-3-year-old children. The finding that overweight/obesity was higher in urban areas is an indication that the nutrition transition is underway, and that undernutrition and associated infectious diseases should not be the only concern for health among policy makers. The data show that the prevalence of combined overweight and obesity (17.1%) is nearly the same as that for stunting (21.6%) (Steyn *et al.*, 2005). Furthermore, stunting was associated with an increased risk (OR=1.80, CI=1.48-2.20) of being overweight (BMI ≥ 25) (Steyn *et al.*, 2005). This finding suggests that stunting in childhood predisposes children to become overweight or obese when sufficient food comes available. This in its own right poses a threat for the emergence of chronic disease risk factors when these stunted children become obese adults.

Table 3.2.1: Percentage South African children with BMI values ≥ 25 and ≥ 30 using the International Obesity Task Force BMI cut-off points**

BMI cut-off points	Domain analysis by area of residence*				Domain analysis by urban / rural*		Domain analysis by age group*			All
	Farms	Formal urban	Informal urban	Tribal	Rural	Urban	1-3 years	4-6 years	7-8 years	
	n=108	n=946	n=272	n=874	n=982	n=128	n=795	n=861	n=544	n=2200
% ≥ 30 BMI	3.54	6.18	5.89	3.74	3.71	6.11	7.78	3.81	2.98	5.04
Lower 95% CI	0.77	4.40	3.15	2.55	2.64	4.55	6.07	2.50	1.13	4.07
Upper 95% CI	6.30	7.96	8.63	4.93	4.79	7.67	9.49	5.12	4.83	6.02
% ≥ 25 BMI	10.76	20.10	13.41	15.83	15.27	18.61	23.75	15.79	9.53	17.12
Lower 95% CI	6.03	16.01	10.02	13.52	13.15	15.15	20.87	12.84	6.37	15.00
Upper 95% CI	15.50	24.19	16.80	18.14	17.40	22.06	26.62	18.75	12.69	19.23
Chi-square*	P=0.0066			0.0257		<0.0001				

* Chi-square p-value for testing for associations, using weighted values, between BMI groupings, area of residence, urban/rural and age groups; CI= confidence interval; SD= standard deviation;

** Cole et al., 2000

Source: 1999 NFCS: Steyn et al., 2005

In adults, the South African Demographic and Health Survey (SADHS) in 1998 was the first nationally representative health survey in adults, aged 15 years and older (DOH, 2002). To examine trends from previous years and compare with these data, it was necessary to evaluate earlier studies that were representative of the specific ethnic groups. Interpretation of these data should keep these limitations in mind. These earlier studies include: a baseline study in 1979 on coronary heart disease risk factors in white adults in three towns of the Western Cape Province (CORIS) (Jooste *et al.*, 1988); in 1982 in the coloured population (CRISIC) (Steyn *et al.*, 1985); in the black population in Cape Town (BRISK) (Steyn *et al.*, 1991), and in the Indian population of Durban (Seedat *et al.*, 1990).

Figures 3.2.2 and 3.2.3 show the extent of the problem of obesity in men and women in South Africa. In women, the prevalence of obesity has remained high since 1979, particularly in black women, who show the highest prevalence. In men there appears to be a large increase in obesity in whites if one compares the 1979 study with that of 1998.

The most recent data on overweight and obesity in adults from the SADHS in 1998 indicates that obesity increases with age until about 35 years in both men and women and declines from about 55 years (Fig. 3.2.4). More than 40% of women are obese from about 35-years-old, while more than 20% of all women are overweight. For the ethnic groups, obesity is highest in black women and in white men. The prevalence of underweight (BMI < 18.5) in adults is far lower than the prevalence of overweight and obesity in males and females, being 12.9% and 5.6%, respectively for men and women (DOH, 2002).

The rising prevalence of obesity in South Africa gives cause for serious concern because of the increased risk of diabetes and cardiovascular disease (CVD) (WHO/FAO, 2003). There are the direct costs, which may be as high as 6.8% of health-care costs, as well as the indirect costs, such as workdays lost, doctors visits, impaired quality of life and premature mortality (WHO/FAO, 2003).

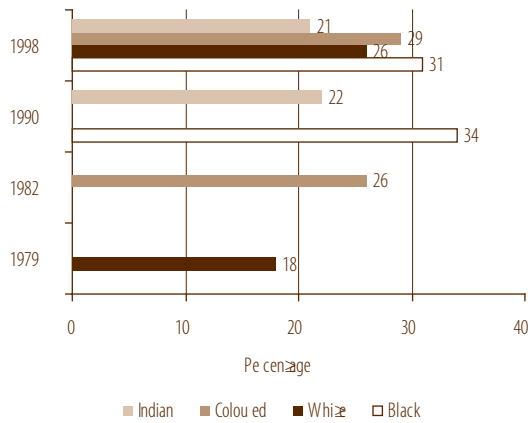


Figure 3.2.2: The prevalence of obesity (BMI ≥ 30) in women in South African studies between 1979 and 1998

Sources: 1979: Jooste *et al.*, 1988 (n=3 831); 1982: Steyn *et al.*, 1985 (n=498); 1990: Seedat *et al.*, 1990; Steyn *et al.*, 1991(n=544); 1998: DOH, 2002 (n=7 970)

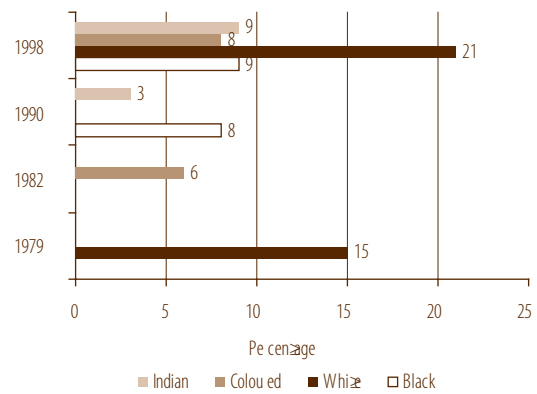


Figure 3.2.3: The prevalence of obesity (BMI ≥ 30) in South African adult males in studies between 1979 and 1998

Sources: 1979: Jooste *et al.*, 1988 (n=3 357); 1982: Steyn *et al.*, 1985 (n=478); 1990: Seedat *et al.*, 1990; Steyn *et al.*, 1991(n=442); 1998: DOH, 2002 (n=5 558)

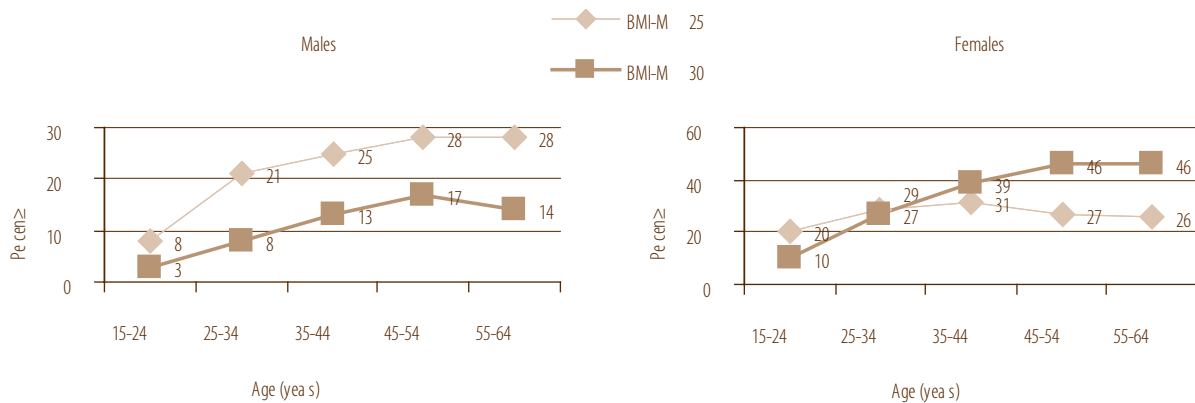


Figure 3.2.4: The prevalence of obesity (BMI ≥ 30) and overweight (BMI ≥ 25) in South African adults (n=13 528) for different age categories in 1998
Source: DOH, 2002

The data presented in Section 3 of this report illustrates that both over- and undernutrition are found in South Africa, with the black population showing the extremes most strongly.

3.3. Trends in micronutrient status

The nationally representative SAVACG survey in 1994, examined among other factors the vitamin A and iron status of children aged 0-5 years (SAVACG, 1995). This was the first study that examined micronutrients in children at a national level. Micronutrient intakes of children will be measured again in 2005.

About 3% (Fig. 3.3.1) of the sampled children showed a serum vitamin A deficiency (serum retinol < 10 ug/dL), while 39% were marginally deficient (serum retinol < 20 ug/dL) (SAVACG, 1995). Children in the age group 36-47 months were the most affected. Eleven percent of children had a haemoglobin concentration of less than 11 g/dL and 25% had low iron stores (ferritin < 12 ug/dL) (Fig. 3.3.2). The mandatory fortification of maize and wheat with vitamin A, iron, and other micronutrients since 2003 is expected to decrease these micronutrient deficiencies in South African children in future.

Results from an iodine-deficiency survey in 1998 in primary schoolchildren have shown that within provinces there was a range of between 0% and 42% of schools with children who were iodine-deficient (Immelman *et al.*, 2000) (Fig. 3.3.3). Schools in rural areas of Mpumalanga and Limpopo provinces were most affected. The survey also found that mandatory salt iodation since 1995 considerably improved the iodine status of children. However, minor weaknesses still exist in the national salt iodation programme, such as the domestic use of non-iodated salt in 6.5% of households and the under- or non-iodation of a substantial percentage of household salt.

Micronutrient deficiencies continue to contribute to the burden of mortality in South Africa. Preliminary results of a study to assess the attributable burden due to selected nutritional deficiencies estimates that nearly three thousand deaths in children 0-4 years because of diarrhoea were attributed to a vitamin-A deficiency in South Africa in 2000. Furthermore, 519 maternal deaths were attributed to vitamin A deficiency in pregnant women, while more than 3000 perinatal deaths were attributed to iron deficiency anaemia in 2000 (0.6% of total deaths) (Nojilana *et al.*, unpublished). Unfortunately, no national data on biochemical deficiencies are available for adults. However, numerous localised studies have shown high prevalences of iron deficiency in women (Kruger *et al.*, 1994; Dannhauser *et al.*, 1999) and vitamin A deficiency, particularly in HIV-infected adults (Kennedy-Oji *et al.*, 2001; Visser *et al.*, 2003).

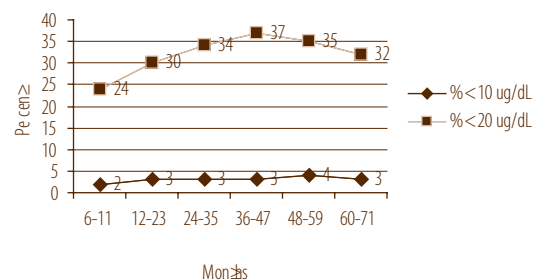


Figure 3.3.1: Vitamin A status of children in 1994, 6-71-months-old (n=4 283) with vitamin A less than 10 ug/dL serum retinol indicating deficiency and < 20 ug/dL indicating marginal vitamin A deficiency

Source: 1994 SAVACG study: SAVACG, 1995

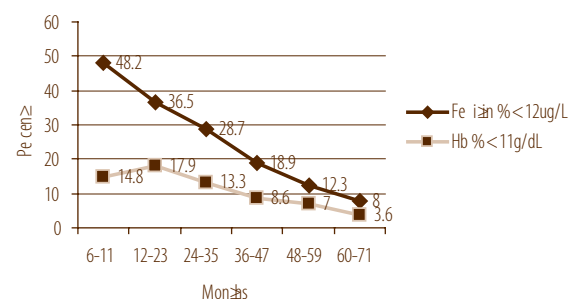


Figure 3.3.2: Iron status of children aged 6-71 months (n=4 494) in 1994

Source: 1994 SAVACG study: SAVACG, 1995

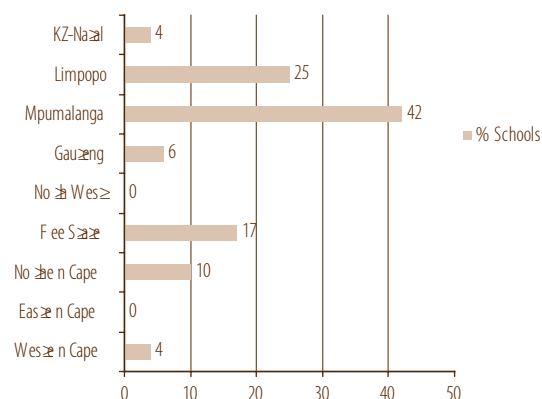


Figure 3.3.3: Percentage of schools in the 9 provinces (n=179 schools) which have a median urinary iodine < 100 ug/L suggesting insufficient iodine intake

Source: IDD Survey: Immelman *et al.*, 2000

4. OTHER CHRONIC DISEASES AND ASSOCIATED LIFESTYLE RISK FACTORS

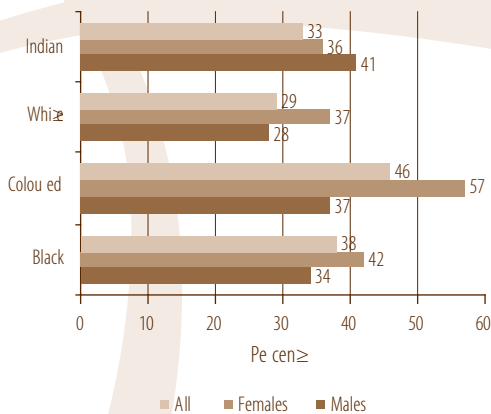


Figure 4.1.1: Percentage 13-19-year-olds who reported having insufficient or no physical activity at work⁴ (n=10 100)
Sources: YRBS, 2002; Reddy *et al.*, 2003

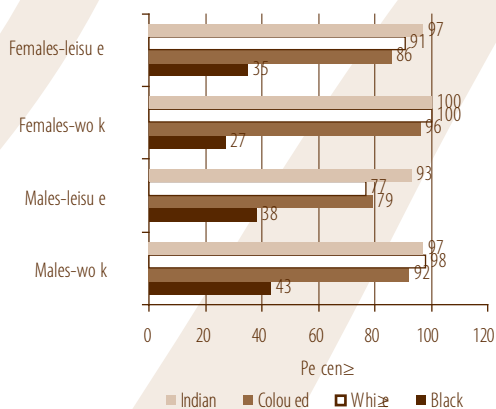


Figure 4.1.2: Percentage 15-64-year-olds in four different studies reporting insufficient or no physical activity at work (< 32 300kJ/wk) and during leisure times (< 8 400kJ/wk)
Sources: White (CORIS): Rossouw *et al.*, 1983 (n=7 188); Coloured (CRISIC): Steyn *et al.*, 1985 (n=976); Black (BRISK): Steyn *et al.*, 1991 (n=986); Indian: Seedat *et al.*, 1990 (n=778)

4.1. Physical inactivity

There is a paucity of data on physical activity levels of South Africans, making it difficult to show trends over time. Figure 4.1.1 shows current levels of inactivity in South African teenagers from a national survey undertaken in 2002 (Reddy *et al.*, 2003). Overall, coloured girls have the highest levels of inactivity, with nearly 60% doing little or none. The high levels of inactivity go a long way to explaining the high levels of overweight, obesity and hypertension in the population, and particularly in women. Figure 4.1.2 reports data on inactivity in adults. With the exception of the black population, the prevalence of inactivity was very high (> 90%), at work and during leisure times.

All the above studies identified physical activity patterns by means of questionnaires. The measurement of physical activity by questionnaires has remained a challenge in large epidemiological studies. Consequently, the patterns shown here must be interpreted with caution, however, the overall trends suggest the Indian and white population are the most inactive at work and at leisure times, while the black population are the least inactive.

4.2. Tobacco consumption

The tobacco consumption patterns in South Africa between 1990 and 2004 illustrate the impact of an aggressive tobacco control policy that was phased in during this period. The policy had two distinct aspects: 1) tobacco control legislation and 2) rapidly increasing excise taxes. Major legislative milestones include the Tobacco Products Control Act which was passed in 1993, introducing health warnings on cigarette packets and advertisements to South Africans. The Act was amended in 1999 resulting in the banning of all advertisements, prohibition of smoking in all indoor public areas and the sale of tobacco products to minors. In 1994 the government announced the phasing in of an increase of excise tax on the retail price of 50%. This resulted in a real increase in the excise tax per pack of cigarettes by 256% between 1994 and 2004 and the real price of cigarettes increased by 127% over the same period. The Tobacco Framework Convention of the WHO has been ratified by South Africa and sufficient number of member states to require all countries to comply with these laws. South Africa is currently expanding its tobacco control legislation to ensure compliance (Van Walbeek, 2005).

Martin *et al.* (1992) reported that 31.5% of South Africans 18 years and older smoked. The prevalence rate peaked at 34% in 1995, as recorded by Reddy *et al.* (1998) and declined steadily thereafter reaching 24% in 2003. The average number of smokers decreased from 229 packs in 1993 to 163 packs in 2003. Africans, males, young adults and poorer people experienced the most rapid decreases in smoking prevalence, while the decrease was less pronounced among white, females, and older and more affluent people.

⁴ Insufficient or no physical activity means the person did not participate in vigorous or moderate activity that would have been sufficient for a health benefit over the previous 7 days

Despite the positive trends described above the prevalence of tobacco smoking is still high, particularly in the youth. A recent survey found that the prevalence of smoking cigarettes (daily and occasionally) is higher in 14-year-old adolescent males than in females (21.5% vs. 15.7%) (Reddy *et al.*, 2003). By age 16 years, 30.4% of males were already smoking cigarettes, rising to 38% in 18-year-old males.

The SADHS found that in 1998, more than 39% of African, white, coloured and Indian adult males (15 years and older) smoked daily or occasionally, with the lowest prevalence in rural black males (37%). In rural areas, only 4% black females smoke daily compared with 6% of urban females. The overall prevalence of daily smoking for females was lowest in black females (5%) and highest among white females (27%) (DOH, 2002). Since tobacco use is a risk factor for heart disease and lung cancer, which are serious contributors to both morbidity and mortality in South Africa, tobacco use is a risk factor that calls for prevention, particularly in the youth. The finding that nearly one third of 16-year-old males are current smokers is a serious concern. In adult males, the prevalence of smoking is shown in 1984 and in 1998 (Fig. 4.2.1). The highest prevalences were found in whites and Indians. Despite the finding that smoking prevalence peaked in 1995 (Reddy *et al.*, 1998) the prevalence is still considerably higher than it was in 1984.

4.3. Hypercholesterolaemia

No national surveys have been conducted on serum cholesterol levels. Figure 4.3.1 presents the results from four studies undertaken in different ethnic groups in localised settings. White men had the highest mean total cholesterol values, while black men had the lowest. Indian and coloured men had similar mean values to white men, albeit slightly lower. With the exception of black men, all were found to have mean values above the recommended limit of 5.2 mmol/L. Hence, high serum cholesterol is a strong risk factor for coronary heart disease (CHD) in South African men who are not black. Since these studies were conducted in the late seventies and early eighties, it is not possible to say what trends and changes have taken place in cholesterol values of black males to date.

4.4. Hypertension

The SADHS was the first national survey to measure blood pressure of adults and these findings are presented in Figure 4.4.1 (DOH, 2002). The lowest prevalence of hypertension (BP > 140/90 mmHg) was found in black men (20.2%) and the highest in white males (38%). Coloured women, white women and Indian men also had a very high prevalence of close to 30%. Of great concern, however, are the levels of hypertension control, namely control of those who have hypertension (BP > 140/90 mmHg). The highest levels of control were found in white women and Indians, while the lowest levels of control were in black men and coloured women. Less than 10% of the latter were found to be controlled. The high levels of hypertension illustrated in Figure 4.4.1, together with the high prevalence of obesity, tobacco use (showed earlier) and hypercholesterolaemia help to explain the high prevalence of CVD in many adults.

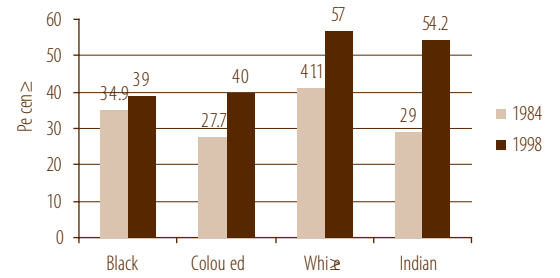


Figure 4.2.1: The prevalence of smoking in adult males by population group in 1984 and 1998

Sources: 1984: Yach & Townsend, 1988; 1998 SADHS: DOH, 2002

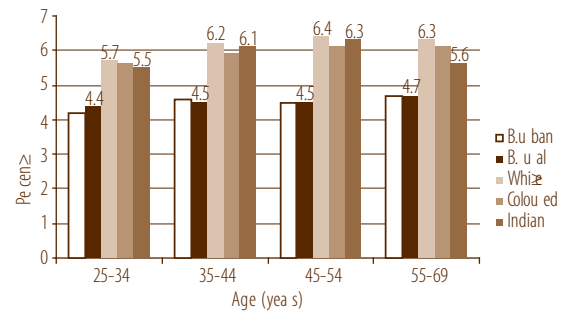


Figure 4.3.1: Mean total serum cholesterol values (mmol/L) of male adults of different ages in different ethnic groups in South Africa

Sources: Black: Norman *et al.*, (unpublished data 2005); White: CORIS: Rossouw *et al.*, 1983; Coloured: CRISIC: Steyn *et al.*, 1985; Indian: Seedat *et al.*, 1990

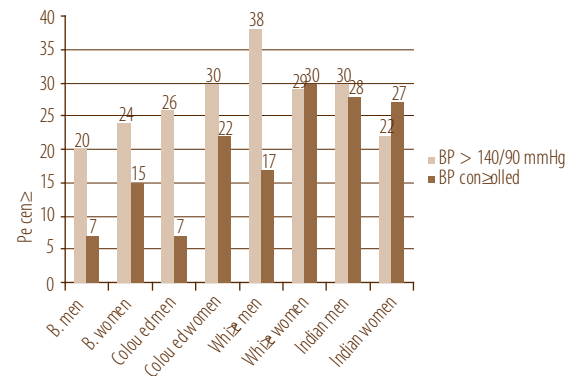


Figure 4.4.1: Prevalence of hypertension (BP > 140/90 mmHg) in adults (n=2 049) (BP controlled = hypertensives with BP < 140/90 mmHg)

Source: SADHS: DOH, 2002

4.5. Cardiovascular diseases and diabetes

Cause-specific death rates from CVD and diabetes from the SANBD show differences between the population groups in 2000 (Table 4.5.1). The death rates from IHD among whites, coloureds and Indians were more than double the rate for blacks, while stroke death rates among blacks and coloureds were double the rates among whites. The stroke rates for Indians were exceedingly high (almost 400/100 000) which may be an artefact of small numbers. Hypertensive heart disease death rates among blacks were about 3 times higher than those for coloureds and Indians and nearly 10 times higher than the rate for whites. The death rate from diabetes was highest among Indians with double the rates for coloureds and blacks and about 5-times the rate for whites.

Table 4.5.1: Age-standardised mortality rates per 100 000 population, South Africa 2000 (World Standard Population)

	Ischaemic heart disease	Stroke	Hypertensive heart disease	Diabetes
Black	70	143	88	56
White	230	72	10	22
Coloured	171	139	37	59
Indian	392	392	29	103
South Africa	123	124	68	54

Source: SANBDS: Bradshaw (unpublished data, 2005)

The poor quality of historical cause of death data makes it very difficult to assess trends in mortality. Bradshaw *et al.*, (1995) calculated age-standardised death rates by population group for 1985, based on the deaths reported for the years 1984-1986 relative to and population estimates for 1985. Rates for blacks were calculated for urban areas only as a result of the high level of under-registration of deaths in the rural areas for blacks. None-the-less, these are compared with death rates estimated for 2000 (Bradshaw *et al.*, 2004). Figure 4.5.1 shows age-standardised mortality rates for IHD, stroke, hypertensive heart disease and diabetes in 1984/86 compared with 2000 by population group. These comparisons must be interpreted carefully as the estimates for 2000 have been adjusted for misclassification and under-registration of deaths but no such adjustment has been made to the 1984/86 estimates. The increase in IHD across all groups is likely to be a result of the adjustment for the misclassification of ill-defined cardiac causes in 2000. From Figure 4.5.1, it appears that hypertensive disease increased dramatically in the black population, as well as stroke. Diabetes mortality also increased in all ethnic groups, and mostly in the black population. The increase in rates for the black population may be an artefact of the adjustment for under-registration of deaths in the 2000 estimate.

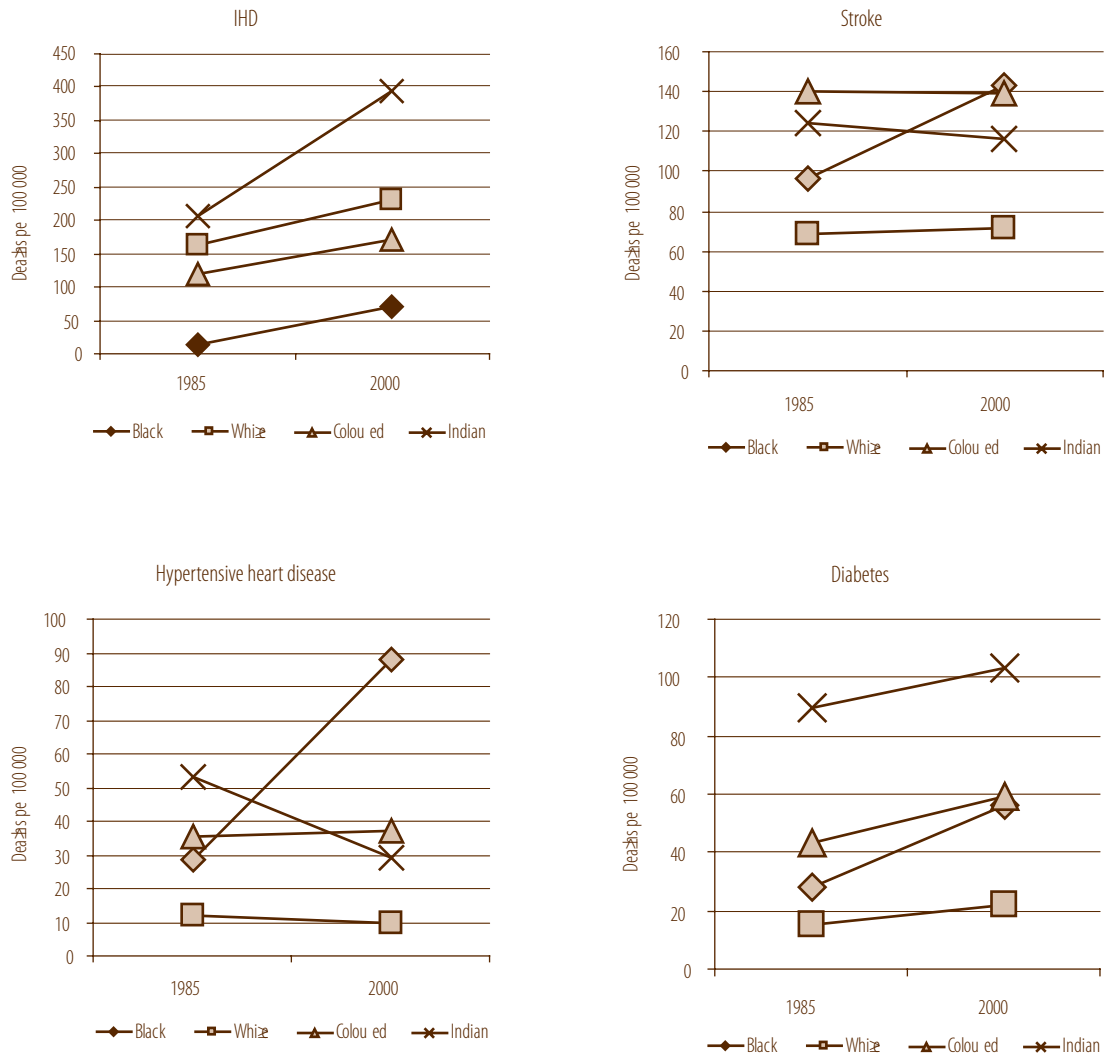


Figure 4.5.1: Age-standardised mortality rates from hypertensive heart disease, stroke, IHD and diabetes per 100 000 per population per annum (World Standard Population)

Note: 2000 figures are adjusted for misclassification and under-registration of deaths but not 1985 figures; 1985 figures for blacks are for urban blacks only

Source: 1985: Bradshaw *et al.*, 1995; 2000: Bradshaw *et al.*, 2003.

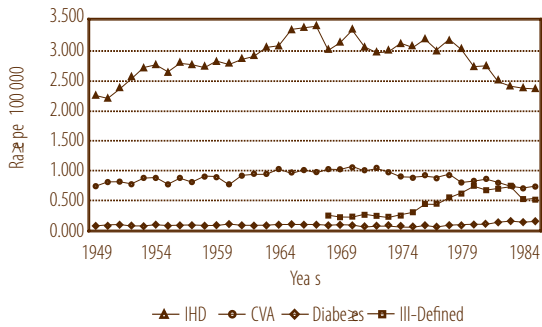


Figure 4.5.2: Age-standardised mortality rates for the community syndrome of hypertension, atherosclerosis and diabetes in white males in 1949-1984

Source: Bradshaw *et al.*, 1995.

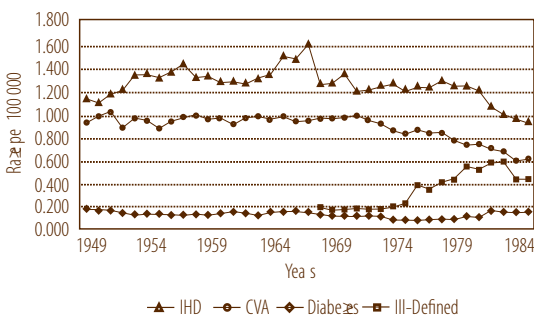


Figure 4.5.3: Age-standardised mortality rates for the community syndrome of hypertension, atherosclerosis and diabetes in white females in 1949-1984

Source: Bradshaw *et al.*, 1995.

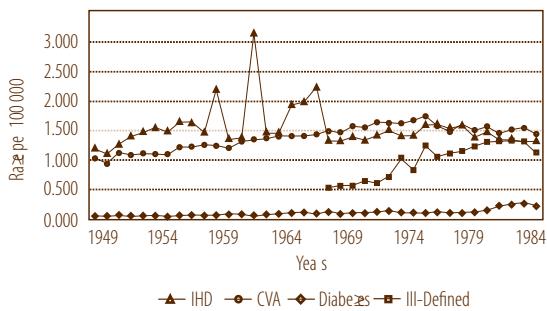


Figure 4.5.4: Age-standardised mortality rates for the community syndrome of hypertension, atherosclerosis and diabetes in coloured males in 1949-1984/6

Source: Bradshaw *et al.*, 1995

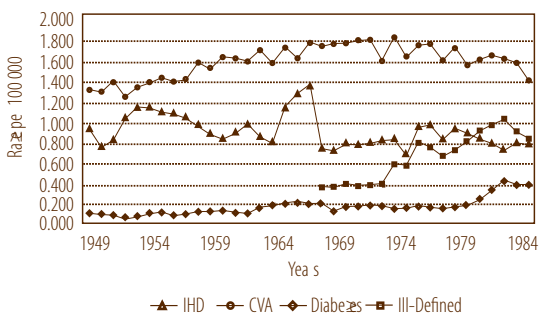


Figure 4.5.5: Age-standardised mortality rates for the community syndrome of hypertension, atherosclerosis and diabetes in coloured females in 1949-1984/6

Source: Bradshaw *et al.*, 1995

Mortality trends in cardiovascular diseases and diabetes in selected population groups for 1949 to 1984 and are presented in Figures 4.5.2 to 4.5.7 (Bradshaw *et al.*, 1995). These data show that ischaemic heart disease (IHD) was the main cause of mortality in cardiovascular diseases and diabetes in white males between 1949 and 1985 (Fig.5.2). Mortality increased from 260 per 100 000 in 1949 to more than 300 per 100 000 between 1964 and 1979. This subsequently decreased from 312 per 100 000 in 1978 to 139 in 1989 (Walker *et al.*, 1993). IHD was also the main cause of cardiovascular disease mortality in white females (Figure 4.5.3), although the rates were about half those of the males.

IHD was the main cause of mortality in cardiovascular diseases and diabetes in coloured males until 1969, after which it was replaced by stroke (Figure 4.5.4). There was a very large increase in mortality from IHD between 1958 and 1969. However, this remained stable until 1985 at about 150 per 100 000. Stroke was the major cause of mortality in coloured females (Figure 4.5.5). Mortality from diabetes increased four times from 10 in 1949 to 40 in 1984.

IHD was the major cause of mortality in Indian males (Figure 4.5.6) from cardiovascular diseases and diabetes between 1949 and 1985, followed by stroke and lastly diabetes. During this period the mortality rates remained fairly constant, except that there was an increase in IHD to above 250 per 100 000 and in diabetes to above 70 per 100 000 in 1985. Stroke was the major cause of mortality in Indian females (Figure 4.5.7). There was also a doubling in the mortality rate from diabetes, from about 20 per 100 000 in 1949 to 70 per 100 000. These data seem to suggest that both IHD and stroke have high mortality rates and that hypertensive heart disease and diabetes may have been growing. IHD is particularly high for white and Indians, while hypertensive heart disease and stroke are highest among the black population group.

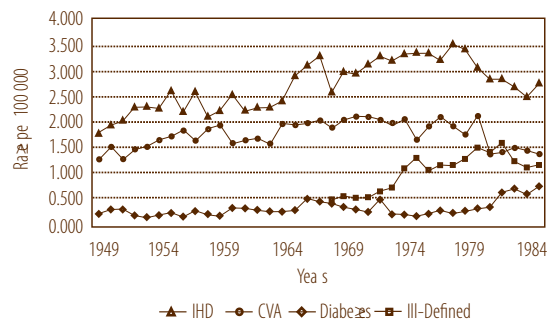


Figure 4.5.6: Age-standardised mortality rates for the community syndrome of hypertension, atherosclerosis and diabetes in Indian males in 1949-1984/6

Source: Bradshaw *et al.*, 1995

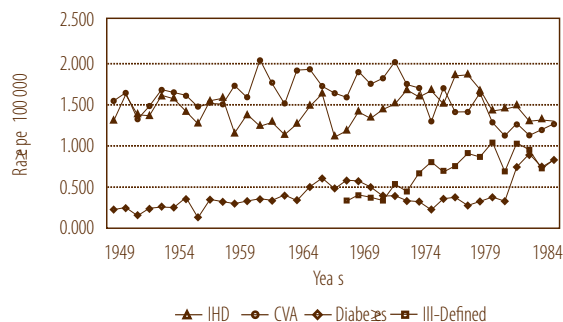


Figure 4.5.7: Age-standardised mortality rates for the community syndrome of hypertension, atherosclerosis and diabetes in Indian females in 1949-1984/6

Source: Bradshaw *et al.*, 1995

4.6. Cancers

The South African National Burden of Disease Study (SANBDS) found that in the year 2000, cancers as a group (the malignant neoplasms category) accounted for 41 691 (deaths) (7.5% of all deaths) and was ranked as the fourth leading cause of death for all persons and the second leading cause of death among older (60+ years) persons (Bradshaw *et al.*, 2003). In males, trachea/bronchi/lung (also referred to as lung) cancer accounted for 22.5% of all cancer deaths followed by oesophageal cancer (17.2% of cancer deaths). Cancer of the cervix (17.9%), breast (15.7%) and lung (10.9%) were among the top causes of cancer deaths in females.

Lung cancer

The age-standardised mortality from lung cancer in South Africa between 1949 and 1984 is shown in Figures 4.6.1 and 4.6.2. There have been marked increases in mortality rates for lung cancer among males of all population groups, with the rates among whites increasing almost three-fold between 1949 and 1979, and in coloured males, this has been even more dramatic. Smaller increases are seen among females. In 1984, 34.5% of all white deaths could be attributed to smoking-related deaths compared to those for Indians (24.5%), for coloureds (14.5%), and 3.9% for blacks (Yach & Townshend, 1988).

From 1984-1986 the age-standardised mortality for lung cancer was the highest in coloured urban males (88.4/100 000), followed by white urban males (48.7/100 000), black urban males (27.9/100 000) and Indian urban males (21.8/100 000) (Bradshaw *et al.*, 1995) (Fig. 4.6.3). National age-standardized death rates for 2000 (not available by urban/rural residence) for males by population group are presented in Figure 4.6.3. Again, the coloured males had the highest rates (82.1/100 000), followed by white males (54.3/100 000). The age-standardised death rate was 33.4 per 100 000 and 6.0 per 100 000 in black males and females, respectively, in 2000 (Bradshaw *et al.*, 2003).

The differences in smoking rates among the population groups at different stages of the tobacco epidemic, as well as the gender differences, are reflected in the age-specific death rates for lung cancer presented in Figure 4.6.4. (Although, it is important to note that these death rates reflect exposure to tobacco in the past). Black men had lower rates than coloured and white men for the older age groups, but the lung cancer death rates in black males in the 35-44- and 45-54-year-age groups were higher than in the white population. This, however, is not seen in black women, where lung cancer death rates are lower at all ages (Fig. 4.6.4).

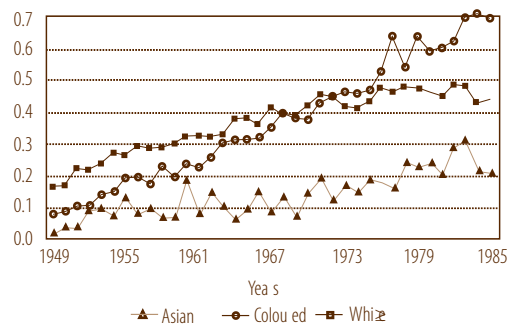


Figure 4.6.1: Age-standardised mortality rates for lung cancer in males, 1949-1985

Source: Bradshaw *et al.*, 1995

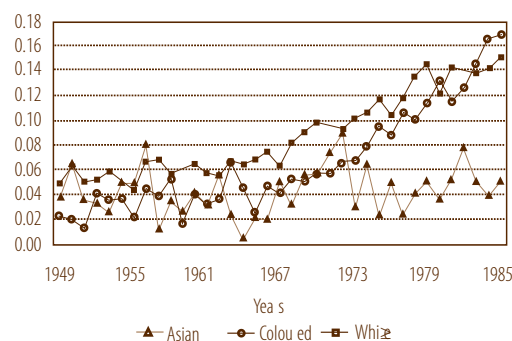


Figure 4.6.2: Age-standardised mortality rates for lung cancer in females, 1949-1985

Source: Bradshaw *et al.*, 1995

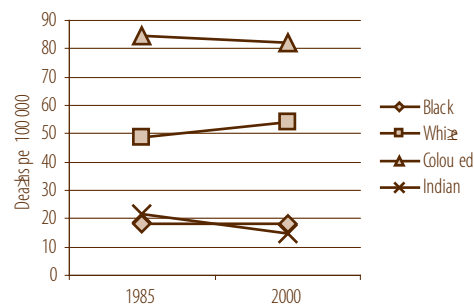


Figure 4.6.3: Age-standardised mortality rates from lung cancer in urban males, 1985 to 2000

Note: 2000 figures are adjusted for misclassification and under-registration of deaths but not 1985 figures; 1985 figures for blacks are for urban blacks only

Source: 1985: Bradshaw *et al.*, 1995; 2000: Bradshaw *et al.*, 2003.

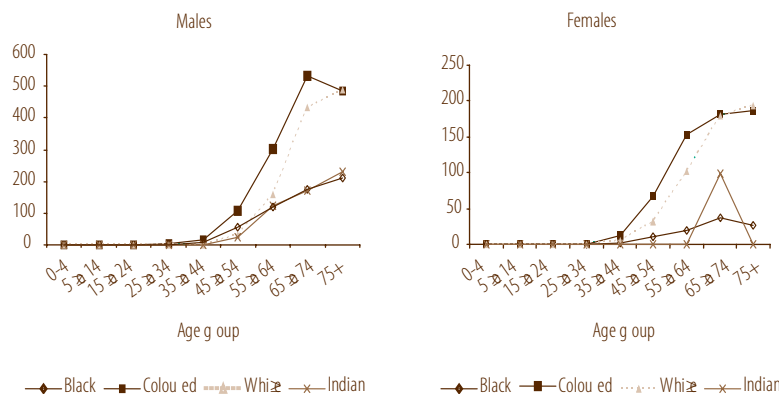


Figure 4.6.4 Age-specific death rates per 100 000 for lung cancer, by sex and population group, South Africa 2000

Source: Bradshaw *et al.*, 2003.

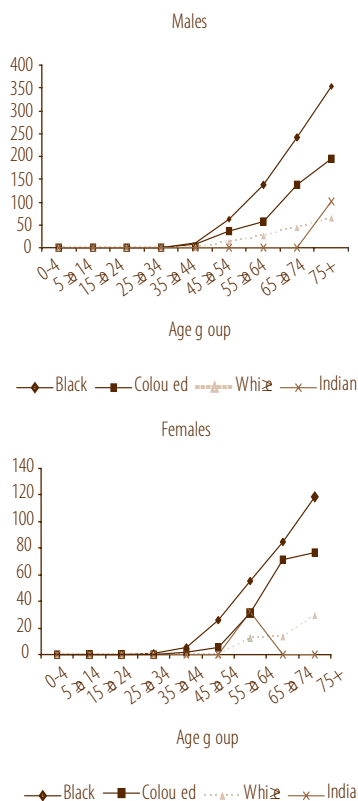


Figure 4.6.5: Age-specific death rates per 100 000 for oesophageal cancer, by sex and population group South Africa 2000
Source: 2000 SANBDS: Bradshaw *et al.*, 2003

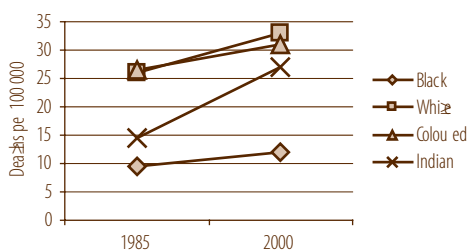


Figure 4.6.6: Age-standardised mortality rates for females from breast cancer, 1985 and 2000
Note: 2000 figures are adjusted for misclassification and under-registration of deaths but not 1985 figures; 1985 figures for blacks are for urban blacks only
Source: 1985: Bradshaw *et al.*, 1995; 2000: Bradshaw *et al.*, 2003.

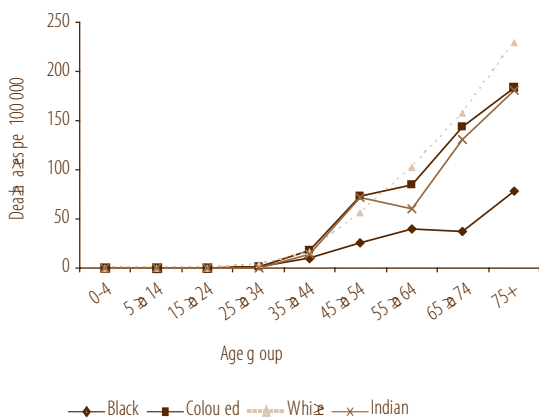


Figure 4.6.7: Age-specific death rates per 100 000 for female breast cancer by population group, South Africa 2000
Source: 2000 SANBDS: Bradshaw *et al.*, 2003

Oesophageal cancer

The incidence of oesophageal cancer has been increasing in South Africa since the 1950s, with the risk being much higher than the national average for those living in the Eastern Cape, particularly in the rural areas of the former Transkei ‘homeland’. Since the mid-1980s, the incidence of oesophageal cancer decreased, as shown in the declining proportion of oesophageal cancers over time in the National Cancer Registry. The reasons for these secular trends remain uncertain.

Marked population group differences exist with the highest incidence rates observed in the African population. A shift from oesophageal cancer as the leading cancer in African males in 1995 to prostate cancer in 1996-1999 were recorded in the national cancer registry. Oesophageal cancer was then the second leading cancer in African males (age-standardised incidence rate (ASR) 14.1/ 100 000) with a lifetime risk of 1 in 59.0 in 1999. Among African females (ASR 7.0/ 100 000), oesophageal cancer was the third leading cancer (after cervix and breast cancer) and the lifetime risk of developing oesophageal cancer was 1 in 113 in 1999 (Mqoqi *et al.*, 2004).

The poor prognosis of oesophageal cancer contributes significantly to cancer mortality. In South Africa, oesophageal cancer was the second leading cause of cancer deaths in males (17.2% of all male cancer deaths) and the fourth leading cause of cancer deaths in females (10%). Oesophageal cancer was the leading cause of male cancer deaths in the African population (age-standardised mortality rate 43.5/100 000) and the second leading cause of cancer deaths after cervical cancer in African females (16.5/100 000) with relatively young age groups affected and rates increasing steadily from age 35-44 years (Figure 4.6.5) (Bradshaw *et al.*, 2003).

The main risk factors for oesophageal cancer are tobacco use and alcohol consumption and their joint effect is multiplicative (Tuyns *et al.*, 1979; Day 1984; International Agency for Research on Cancer, 1988). Other possible risk factors include poor socio-economic conditions, poor nutritional intake, and a diet lacking in vitamins A and C, riboflavin, nicotinic acid, magnesium and zinc (Cook-Mozaffari *et al.*, 1979; Van Rensburg 1981). Contamination of maize with *Fusarium verticillioides* (previously known as *Fusarium moniliforme*) and the consequent ingestion of mycotoxins (possibly fumonisins) produced by this fungus may also play a role.

Breast cancer

In South Africa, breast cancer age-standardised mortality rates were highest in the coloured urban females (26.4/100 000) from 1984-1986 (Fig. 4.6.6). They were followed closely by whites (26.0/100 000), and then urban Indians (14.6/ 100 000), while black urban females had the lowest rates (9.6/100 000) (Bradshaw *et al.*, 1995). In 2000, the age-standardised mortality rates appeared to have increased since 1984/86, although the 2000 national rates were not available by urban/rural residence, and the rate in urban females is probably higher than the national average. As previously, the age-standardised death rates for white females were almost three-fold higher than in blacks in 2000: whites had the highest rates (33.0/100 000), followed closely by coloureds (31.0/100 000) and Indians (27.4/100 000), and black females had the lowest rates (12.1/100 000) (Bradshaw *et al.*, 2003).

However, the age-specific death rates (Fig. 4.6.7) indicate that black females in the 35-44-year age group have very similar rates to those in the white, coloured and Indian population groups, and it is only in the older age groups that black females have much lower rates (Fig. 4.6.8). This pattern is also evident in terms of incidence.

Black females consistently also had the lowest breast cancer incidence rates. In 1999, the national age-standardised incidence rate in blacks was 18.4 per 100,000 compared with 76.5 per 100 000 for coloured and white females (Mqoqi *et al.*, 2004). The differences in rates are more pronounced in the older age groups, but in the younger age groups the incidence rate in black females is closer to that of white and coloured females (Fig. 4.6.8).

The risk of breast cancer is clearly associated with high socio-economic status, and women with higher education or income being at higher risk (Parkin *et al.*, 2003). These differences may be because of differences in the distribution of risk factors between the social classes, such as reproductive factors, and other known risk factors for breast cancer, which include alcohol, diet, smoking, body weight, physical activity and genetic factors. Increased body weight has been found to increase the risk of breast cancer, whereas physical activity has been found to be beneficial at all ages in reducing the breast cancer risk.

Colorectal cancer

Cancers of the colon and the rectum are the second most common malignancy in affluent societies but are rarer in developing countries. In South Africa, colorectal cancer was the sixth leading cancer among males (5.3%) (Fig. 4.6.9) and the fifth leading cancer among females (6.6%) (Fig. 4.6.10) in terms of deaths (Bradshaw *et al.*, 2003). In 1999, colorectal cancer comprised 3.7% of all cancer incident cases in males and 3.4% of all incident cases in females and ranked 3rd and 5th in females and males, respectively. The age-standardised incidence rate for colorectal cancer in females was 6.6 per 100,000, while males had a higher rate of 9.7 per 100 000 (Mqoqi *et al.*, 2004).

Colorectal cancer was the second leading cause of cancer deaths in the South African white population. The age-standardised death rate was more than 5 times greater in this population (21.1/100 000) compared with the black population (4.1/100 000).

Colorectal cancer incidence rates were also highest among white males and females. In 1999, colorectal cancer was the second leading cancer in white males and females in terms of incidence. Coloured males and females had the second highest rates followed by Indian males and females with the lowest rates reported in black males and females. The rates in the white population (ASR=25.4/100 000 in males and 17.5/100 000 in females) are more than eight times the rates found in black males (3.0/100 000) and about seven times the rates in black females (2.3/100 000) (Mqoqi *et al.*, 2004).

Age-specific incidence rates by population group (Figs. 4.6.9 and 4.6.10) suggest an increased risk in younger black South Africans probably because of a changing lifestyle and diet, resulting in the reduction in the incidence gap observed in elderly South Africans. Although there is an almost 10-fold difference in incidence in the older age groups (75+ years), at young ages the incidence rates between the black, white and coloured population groups are almost the same.

A diet high in energy (calories), rich in animal fat and poor in vegetables, fruit and fibre is associated with increased risk. Smoking, meat and alcohol consumption are known risk factors while consumption of fruit and vegetables and physical activity are known to be protective. Hence, the importance of a healthy lifestyle cannot be overemphasised in the prevention of the aforementioned cancers.

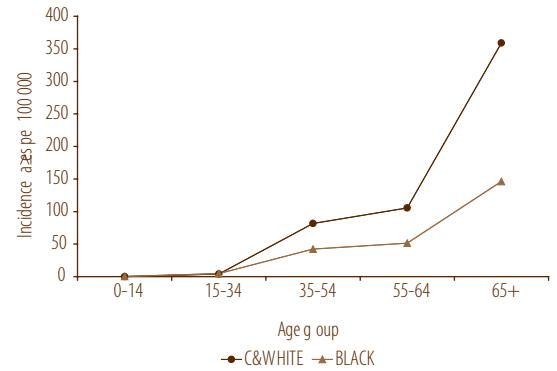


Figure 4.6.8: Age-specific incidence rates for female breast cancer by population group, South Africa 1997

Source: Mqoqi *et al.*, 2004

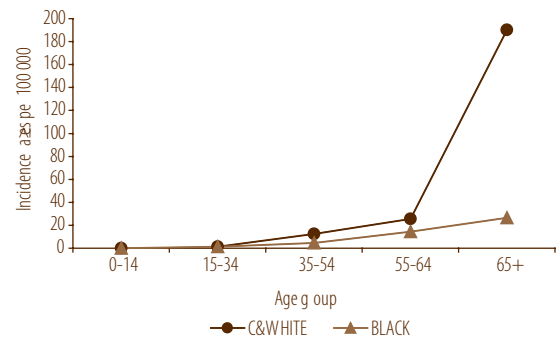


Figure 4.6.9: Age-specific incidence rates for colorectal cancer in males, South Africa 1997

Source: Mqoqi *et al.*, 2004

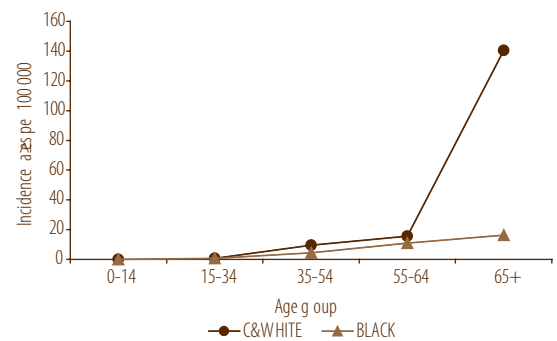


Figure 4.6.10: Age-specific incidence rates for colorectal cancer in females, South Africa 1999

Source: Mqoqi *et al.*, 2004

5. COMMUNICABLE DISEASE BURDEN

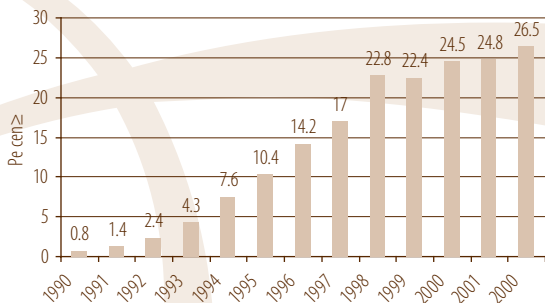


Figure 5.1.1: The prevalence of HIV as determined by antenatal surveys between 1990 and 2002
Source: Department of Health, In: Health Systems Trust, 2004

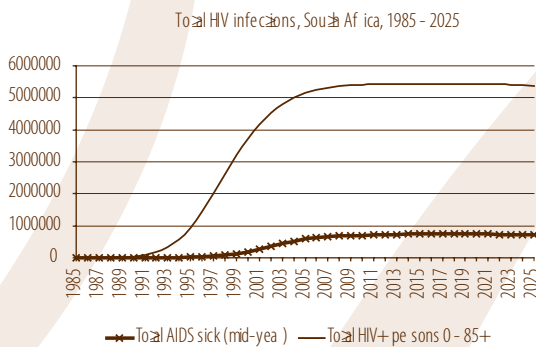


Figure 5.1.2: Projected number of HIV-positive and AIDS-sick persons, 1985 - 2025
Source: ASSA2002

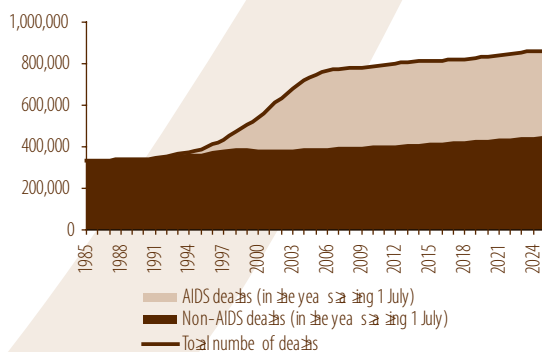


Figure 5.1.3: Projected annual number of AIDS and non-AIDS deaths, 1985 - 2025
Source: ASSA2002

5.1. Human immunodeficiency virus/ acquired immune deficiency syndrome (HIV/AIDS)

The prevalence of HIV among pregnant women attending public sector clinics has been surveyed annually to monitor trends. The surveys show that the prevalence has increased from 0.8% in 1990 to 27.9% in 2003, reflecting a remarkable spread of the epidemic within a decade (Fig. 5.1.1). It is estimated that in 2004, about 12% of the total population was infected with the virus (Dorrington *et al.*, 2004) and that by the year 2000, HIV/AIDS had become the biggest single cause of death in South Africa (Dorrington *et al.*, 2004).

Prior to 2004, AIDS treatment was only available in the private sector restricting its use to people with medical insurance or sufficient money to pay for costly medications. However, in 2004, the government adopted a treatment 5-year plan to roll-out antiretroviral therapy in the public sector with the aim of meeting at least 80% of the need. The ASSA2002 model shows that in 2004 approximately 5 million are HIV positive and 500 000 are AIDS sick (Figure 5.1.2). Allowing for the impact of the treatment intervention, the number of infected persons is projected to peak in 2013 and then decrease slowly, while the number of AIDS sick persons increases slowly. It is further predicted that in 2015 the number of AIDS sick persons will be about three quarters of a million, with a projected 5.4 million plus HIV positive persons. Currently, about 10% of HIV positive persons are AIDS sick and this will rise to just under about 13%.

Figure 5.1.3 shows that the projected total number of deaths increase as a result of the gradual increase in the non-AIDS deaths and the rapid increase during the late 1990s in AIDS deaths. In 2004, the model estimates 389 000 non- AIDS deaths and 311 000 AIDS deaths. The total deaths in 2004 were 701 000, that is about 44% of total deaths were AIDS deaths. The proportion of AIDS deaths to total deaths is fairly constant over the time span depicted in Figure 5.1.3.

5.2. Tuberculosis

Tuberculosis (TB) has been an important disease in South Africa for many years, affecting workers, particularly miners, and poor communities. Despite national treatment programmes, TB has been among the leading cause of death, accounting for more than 5% of all deaths in 2000. This has been exacerbated by the HIV/AIDS epidemic with TB being the common opportunistic infection among HIV-positive people.

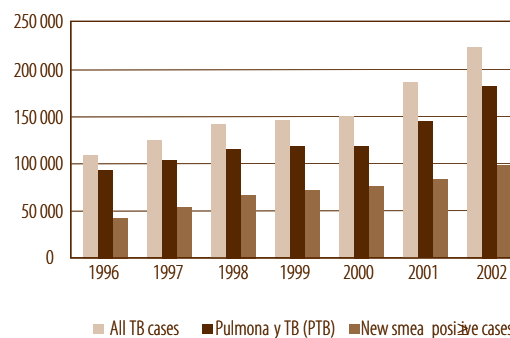


Figure 5.2.1: Number of tuberculosis, pulmonary tuberculosis and new smear cases reported in South Africa, 1996-2002
Source: NTCP in Bamford, Loveday & Verkuil, In: Health Systems Trust, 2003/04

In 2002, it was estimated that there were 243 000 cases of TB in South Africa, globally positioning South Africa as the country with the 7th highest number of TB cases. The number of TB cases, as well as the number of new smear cases has nearly doubled between 1996 and 2002 (Fig. 5.2.1). The rise in the number of reported TB cases since the inception of the National TB Control Programme (NTCP) in 1996 reflects a real increase in the number of cases as well as improved case detection and reporting. The real increase in the number of cases is largely because of the rising prevalence of the human immunodeficiency virus (HIV). HIV infection is now the main single risk factor for TB, and in 2003/2004 more than half the smear-positive TB patients were HIV positive.

5.3. Malaria

Malaria affects only the northern and the north eastern regions of the country. Systematic control efforts introduced in the late 1940s and good access to treatment has generally kept this disease in check. Unlike most other countries in sub-Saharan Africa, malaria is not a major cause of death.

For the period 1976 to 1995 annually reported malaria cases ranged from 2 000 to 13 000 per year. In 1996, there were just over 27 000 cases reported, which rose to more than 60 000 during 2000. The number of notified malaria cases decreased considerably thereafter (Fig. 5.3.1). The malaria vectors' resistance to existing pesticides, as well as anti-malarial drug resistance in part caused the dramatic increase in the number of cases and deaths from malaria. Changes to the drugs and insecticide used contributed to the subsequent significant decrease in malaria morbidity and mortality in South Africa in the subsequent years.

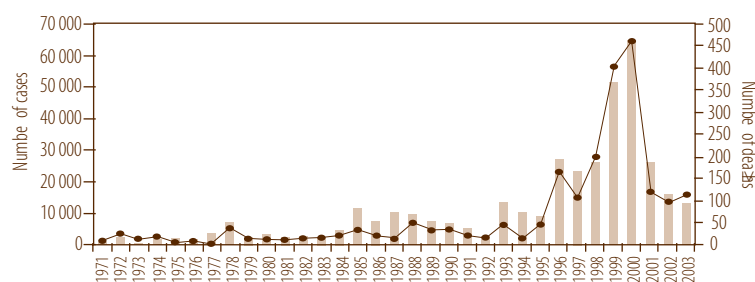


Figure 5.3.1.: Annual notified malaria cases and deaths, South Africa, 1971 - June 2003

Source: Moonasar *et al.*, In Health Systems Trust, 2003/04

5.4. Diarrhoeal disease

The SANBDS found that diarrhoea accounted for nearly 3% of all deaths in South Africa in 2000. However, death rates for diarrhoeal disease vary by province ranging from 12 per 100 000 in the Western Cape to more than 60 in Limpopo Province (Fig. 5.4.1). The average rate for South Africa is about 42 per 100 000 for males and slightly lower for females. Clearly, in some provinces death from diarrhoea still makes a significant contribution, particularly affecting infants and children and the elderly. Serious cholera outbreaks have occurred in the recent years, affecting areas where there are poor water supplies and no sanitation. However, the case fatality rates during these outbreaks have been remarkably low.

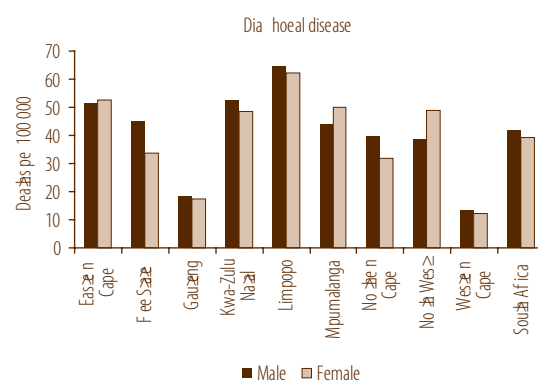


Fig. 5.4.1: Mortality from diarrhoeal diseases in children in South Africa per 100 000 by province and sex

Source: SANBDS 2000; Bradshaw *et al.*, 2004

6. SUMMARY

6.1. Current burden of disease

The data presented show that South Africa has a quadruple burden of disease. These are the infectious diseases associated with under-development, poverty, and undernutrition; the emerging epidemic of chronic diseases linked to overnutrition and a western type of diet and lifestyle; the explosive HIV/AIDS epidemic and the continued burden of injury-related deaths. In the year 2000, NCDs accounted for 37% of deaths and HIV/AIDS and infectious diseases together for 44% (Bradshaw *et al.*, 2003). Cardiovascular disease and diabetes together, accounted for 19% of total deaths and cancers accounted for a further 7.5%. In contrast, nutritional deficiencies related to undernutrition account for 1.2% of the deaths. In terms of mortality from chronic diseases, in South Africa in 2000, ischaemic heart disease and stroke accounted for 123 per 100 000 and 124 per 100 000 deaths respectively, while hypertensive heart disease and diabetes accounted for 68 per 100 000 and 54 per 100 000 deaths respectively (Bradshaw *et al.*, 2003).

6.2. Current nutritional status of the population

Undernutrition and its associated outcomes of stunting and underweight are still prevalent in children. In 1999, it was found that 22% of 1-9-year-old children in South Africa were stunted and 10% were underweight-for-age (Labadarios *et al.*, 2000). However, it should be noted that 17% of these children were overweight and obese (BMI ≥ 25) (Steyn *et al.*, 20005). Furthermore, in adults the prevalence of obesity (BMI ≥ 30) was very high in 1998, particularly in women, where it ranged from 21% to 31% in different population groups (DOH, 2002). In white males, the prevalence of obesity was 21% while it was less than 10% in the other population groups. However the prevalence of overweight (BMI ≥ 25) was 20% in all males. Underweight (BMI < 18.5) was less than 6% in the adult female population and 13% in males (DOH, 2002).

Micronutrient deficiencies are still prevalent in the child population and in 1994, it was found that 39% of 0-5-year-olds were marginally vitamin A deficient and 25% had low iron stores (SAVACG, 1995). Furthermore, iodine deficiency was still found to be prevalent in some provinces in 1998 (Immelman *et al.*, 2000). Unfortunately, no national data on biochemical deficiencies are available for adults. However, numerous localised studies have shown high prevalences of iron deficiency in women (Kruger *et al.*, 1994; Dannhauser *et al.*, 1999) and vitamin A deficiency, particularly in HIV-infected adults (Kennedy-Oji *et al.*, 2001; Visser *et al.*, 2003).

6.3. Current dietary intake patterns of the population

National dietary intake data are only available for 1-9-year-old children in South Africa (Labadarios *et al.*, 2000). The main findings from this survey in 1999 were that many children are deficient in energy and numerous micronutrients (vitamin A, vitamin C, niacin, vitamin B6, calcium, iron, zinc) and the deficiency prevalence's were always higher in the rural areas. A few localised surveys provide some trends on dietary intake in adults. Studies in the white (Wolmarans *et al.*, 1988), coloured (Langenhoven *et al.*, 1988) and Indian (Wolmarans *et al.*, 1999) populations showed that mean carbohydrate intakes were less than 55% E, mean fat intakes greater than 30% E, and added (free) sugar intakes greater than

10% E. Rural blacks (Steyn *et al.*, 2001) had a strict prudent diet with a mean fat intake less than 20% E, carbohydrate intake greater than 60% E and a free sugar intake less than 10% E. Urban blacks, on the other hand, had mean intakes lying between the extremes of the western diet and the rural strict prudent diet (Bourne *et al.*, 1993). In the urban upper income black group (MacIntyre *et al.*, 2002) mean fat intake was greater than 30% E. Studies on dietary trends in urban blacks showed that the mean intake of fat increased from 24% to 32% in 19-44-year-olds with increased time spent in the city, while mean carbohydrate intake decreased from 61% to 53% E (Bourne 1996). The latter trends are typical of the nutritional transition taking place.

7. POLICIES AND STRATEGIES FOR ADDRESSING THE BURDEN OF CHRONIC DISEASES

7.1. Programmes in place to improve PEM and undernutrition

Since the inauguration of the democratic government in 1994, the nutritional status of children has received a great deal of attention from the new government, which made it one of the cornerstones of the Reconstruction and Development Programme. A great deal of focus was placed on the high prevalence of stunting and underweight found in preschool children as reported by the SAVACG (1995) study. The Nutrition Directorate of the Department of Health subsequently developed an Integrated Nutrition Programme for South Africa in an attempt to deal with some of the critical issues related to undernutrition and infectious diseases (DOH, 1998). As part of this strategy certain focus areas were devoted to the improvement of nutritional status of children and to a decrease in the prevalence of PEM nationally (Nutrition Directorate, 2001). The most crucial focus area in this regard included the following:

- i) Contribution to household food security. The objective of this focus area is to alleviate short-term hunger among primary school learners. This has been done by means of school feeding programmes introduced in schools with needy learners in 1994. About 5 million learners benefit annually from this school meal programme. Despite many teething problems a qualitative survey has indicated that the programme makes a major social contribution to schools in terms of difficult to measure qualities such as children being more alert and benefiting intellectually (McCoy, 1997).
- ii) Additionally, there are three more focus areas in the Integrated Nutrition Programme aimed at dealing with the development and consequences of undernutrition. These include disease-specific nutrition support, treatment and counselling; growth monitoring and promotion; and promotion of breastfeeding. These take place at primary health care level where infants and children are brought for routine immunisations and pregnant women come for antenatal and post-natal care. The main objectives of health policy makers are to reduce the prevalence of low birth weight from 8.3% nationally and to reduce the prevalence of stunting and underweight in children from 21.6% and 10.3% in 1999 to 18% and 8% respectively, in 2007 (Nutrition Directorate, 2001).

Another aspect of dealing with undernutrition and dietary deficiencies has been the development and promotion of food-based dietary guidelines in South Africa. The Nutrition Directorate have adopted 11 guidelines developed by a national working group (Love *et al.*, 2001) which promote healthy eating habits in the child and adult population and they are currently testing paediatric guidelines to be introduced in the near future.

- iii) Another focus area which has received much support in terms of nutrition promotion has been that of HIV/AIDS. Recently the ND has implemented an intervention programme aimed at persons having TB and/or HIV/AIDS. The objective of this strategy is to provide an energy-dense meal

and micronutrient supplements to persons who qualify for this scheme. Nutritional guidelines are already available for such patients (Nutrition Directorate, personal communication, 2005).

7.2. Programmes in place to improve micronutrient status

The Department of Health has been successful regarding the implementation of fortification schemes to eliminate micronutrient deficiencies in the South African population. The iodation of salt became compulsory in 1995 and the fortification of maize and wheat flour became compulsory in October 2003. The latter have to be fortified to deliver 33% of the RDA per serving at the point of consumption (National Food Fortification Task Group, 1998 and 2002). The fortificants added are: vitamin A, thiamine, riboflavin, niacin, folic acid, vitamin B6, iron, and zinc. Nutrition support for women and children is further provided by health care workers at primary care facilities. This includes vitamin A and iron supplementation and health promotion aimed at improving diet (The National Nutrition Directorate, 2001). The adoption of the food-based dietary guidelines will also contribute to the elimination of micronutrient deficiencies since one of the guidelines encourages dietary diversity and increased consumption of fruit and vegetables (Love *et al.*, 2001).

7.3. Programmes in place to prevent and manage nutrition-related chronic diseases

The Global Strategy on Diet, Physical Activity and Health, has clearly indicated that each government has a primary steering and stewardship role in initiating and developing its own national strategy for the prevention and management of chronic diseases through a strategy on diet, physical activity and health. National circumstances will determine priorities in the development of such strategies (WHO, 2004).

In 1996 the Directorate: Chronic Diseases, Disabilities and Geriatrics was instituted by the Department of Health and the first director was appointed. This was the beginning of a period of progress in prioritising NCDs in the Department, and in the provincial departments of health. For the first time provinces appointed persons responsible for NCDs. This can be seen as a milestone in the organisation of long-term care delivery in the South African health system (C. Kotzenberg, personal communication, 2005).

In support of this initiative, the Department of Health has embarked on a programme of surveillance, incorporating health indicators, such as BMI, physical inactivity, and blood pressure. The nationally representative survey (SADHS) that was undertaken in 1998 (DOH, 2002) and repeated in 2003-2004, provides a way whereby secular trends for these health indicators can be monitored, in response to the national health strategy.

The Nutrition Directorate has also supported the progress towards the development of strategies for nutrition-related chronic diseases. In the late nineties they initiated a consultative process to develop a series of guidelines for the prevention and management of NCDs (separate guidelines are available for the prevention and management of diabetes, hypertension, hyperlipidaemia, and overweight). In this regard they have set strategic objectives aimed at reducing the prevalence of obesity from 9.3 % in males and 30.1% in females in 2000 to 7% and 25% respectively (Nutrition Directorate, 2001). To date, however, there is no clear indication of how these targets will be achieved in terms of strategies at primary care level.

There are also initiatives within the Ministries of Sport (Sport and Recreation South Africa) and Education, which provide a policy and programme framework,

supporting the strategic priorities for health care. Sport and Recreation South Africa is responsible for devising and implementing the sport and recreation policy in South Africa, specifically targeting increased mass participation, as well as sports development. This mandate is reflected in the theme of the ministerial White Paper on Sport and Recreation in South Africa, which is “getting the nation to play”.

The directorates Health Promotion and Chronic Diseases have also recognised the need to encourage physical activity, in particular, among older adults, and initiated guidelines for promoting “active” ageing (1999). More recently, in November 2004, the Directorate of Health Promotion, within the Department of Health, launched an inter-sectoral strategy aimed at the Promotion of Healthy Lifestyles and Change from Risky Behaviour, particularly among the youth. This forms part of a plan for comprehensive health care in South Africa, and is one of the strategic priorities for the period 2004-2009 (Nutrition Directorate, 2001).

7.4. Future policy needs to address the nutrition transition

The rising prevalence of obesity in South Africa gives cause for grave concern because of the increased risk of diabetes and cardiovascular disease (WHO/FAO, 2003). There are the direct costs which may be as high as 6.8% of health-care costs, as well as the indirect costs, such as work days lost, doctors visits, impaired quality of life and premature mortality (WHO/FAO 2003). The last three decades have shown that many chronic diseases are also featuring significantly in terms of overall morbidity and mortality. This is particularly so for IHD, hypertensive disease, stroke, diabetes, chronic obstructive pulmonary disease, lung cancer, oesophageal, breast and colorectal cancers.

In addition, communicable diseases are still major causes of mortality and morbidity in South Africa, and have to remain as priorities on the health agenda. The death rates from infectious diseases, such as HIV/AIDS, TB, and diarrhoeal disease are still prevalent and in the case of HIV and TB, still increasing. Additionally, sections 3.1 & 3.2 of this report have illustrated the co-existence of both under- and overnutrition. It is therefore important that health-care policy makers do not neglect the one at the expense of the other and that despite immediate pressure for relief against the infectious diseases the government should also be looking for long-term solutions for the chronic diseases. Therefore the first step in this regard will be prevention, and it is most feasible that prevention efforts should be mainly aimed at children.

Children are important targets for health interventions. It is increasingly recognised that the occurrence of adult chronic diseases are influenced by factors operating throughout the life course (Kuh & Schlomo, 2004). Increased risk may start in infancy, or even before birth, and will continue to be influenced by health-related behaviours during childhood. Hence, where feasible, future policies should focus on inculcating healthy behaviours in children. Some recommendations for policies which can be adopted and implemented are presented below.

Fiscal policies and levies

Swinburn *et al.*, (2004) have highlighted the importance of the introduction of fiscal policies that influence the food supply to ensure that the population has access to safe and affordable foods which discourage the intake of high fat/sugar products. Another option in this regard would be for the government to introduce small levies on certain high fat/sugar foods. These could include items such as soft drinks and crisps.

School-based intervention programmes

Schools are an established setting for health promotion activity with the theoretical advantages of influencing health-related beliefs and behaviours early in the 'health career' before they are established as adult patterns. Children in schools also represent a large population who are present and hence accessible over prolonged periods, in a setting which is relatively sheltered and where education and learning is the norm. Influencing children in their formative years is a potential mechanism for influencing the emerging culture and health beliefs of society.

An additional potential benefit of schools-based health promotion is that by improving the health of schoolchildren, educational performance and learning may be enhanced. There is a large body of evidence which indicates that positive educational outcomes are closely linked to good health in school children. These positive outcomes include classroom performance, school attendance, participation in school activities, and in student attitudes (Symons *et al.*, 1997). The importance of school health promotion programmes for the prevention of chronic diseases was underlined in a recent scientific statement by the American Heart Association (Hayman *et al.*, 2004). Recommendations were as follows for health education and health behaviours: "All schools should implement: evidence-based, comprehensive, age-appropriate curricula about cardiovascular health, methods for improving health behaviours, and the reduction of CVD risk; and age-appropriate and culturally sensitive curricula on changing students' patterns of dietary intake, physical activity, and smoking behaviours." An intervention programme to prevent smoking in adolescents is currently being tested at some schools in South Africa (P, Reddy, personal communication, 2005). Hopefully, this may lead to the introduction of similar strategies aimed at diet and physical activity.

Food labeling and claims

Food labeling is currently under revision by the Department of Health and the new regulations are expected by the end of 2005 (Booyzen, Directorate Food Control, personal communication, 2005). These new regulations are more informative than the present ones and will provide the consumers with detailed nutrition information. In future consumers will be able to determine whether the products they purchase and consume comply with recommendations for a healthy diet, particularly in terms of fats, free sugars and sodium. Furthermore, this regulatory framework will further minimize misleading food, health and nutrition claims. However, consumers need to be educated about these regulations and how to select "healthy" foods accordingly. Clearly the Nutrition Directorate of the Department of Health together with the Directorate of Food Control will need to plan and implement specific strategies to do this.

Marketing and advertising standards

To date, there have been no regulations regarding the marketing of energy-dense foods to children. Ideally it is hoped that in the near future there will be bans on advertising of energy-dense, high fat and high sugar foods on television to young children, particularly since this has been shown to be an effective way of persuading children to make undesirable and unhealthy choices (Swinburn *et al.*, 2004).

Policies aimed at improving the environment

Inter-sectoral action is required to modify the environment to enhance and promote physical activity and a healthy diet in schools, the work-place and the community. This should include limiting the exposure of young children to

heavy marketing practices of energy-dense, micronutrient-poor foods. This can be done by introducing school policies which prohibit the presence of vending machines and unhealthy food sales in schools, crèches and after-school centres. Furthermore, it is essential that food items which are included in the primary school meal programme are healthy options. It is also important to ensure that children have safe and adequate space at school and in the community to play sport and games which promote them being physically active. The onus also rests with employers to try to make the workplace one which encourages physical activity and provides “healthy” foods and meals.

Nutrition health logos

In South Africa the Heart Foundation and the Cancer Association provide their logos to food products which meet certain specified health claims and nutrition standards. They are therefore raising the awareness of consumers and manufacturers to the value of using healthy foods. This trend should be encouraged by the Department of Health in an effort to persuade the food industry of the benefits of producing healthier food and meal options.

Nutrition education programmes at primary health care facilities

Lastly, it is important that the food-based dietary guidelines initiated by the Nutrition Directorate be given priority as a tool of nutrition education and be incorporated in primary health care programmes and in the school curricula. Since these guidelines also cater for overnutrition and promote healthy eating habits for all South Africans, they need to be implemented by all departments and district health authorities, with the important emphasis on avoiding both over- and undernutrition.

Furthermore, it has been found that health professionals working at primary care level have an inadequate knowledge about nutrition and lifestyle modification regarding NCDs and therefore their basic training needs to be updated in this regard (Talip *et al.*, unpublished data 2005).

8. CONCLUSIONS

The following important findings regarding nutrition and chronic diseases need to be kept high on the health agenda. Firstly, it needs to be recognised that malnutrition (both under- and overnutrition) are prevalent in all ethnic groups in South Africa and that a poor diet together with other unhealthy behaviours lead to the development of a substantial (and growing) burden of chronic diseases. Secondly, it needs to be recognised that many children and adults in South Africa lead an unhealthy lifestyle. They have a high intake of energy, total fat and added sugar, and a low intake of fruit and vegetables. Many are inactive, smoke cigarettes and have a high intake of alcohol. Lastly, in order to reduce the burden of chronic diseases over the next few decades we need to address these unhealthy behaviours now.

9. REFERENCES

- Archer S, Bromberger N, Nattrass N, Oldham G. 1990. Unemployment and Labour Market Issues—A Beginner' Guide. In: Nattrass N, Ardington E (eds.). *The Political Economy of South Africa*. Cape Town: Oxford University Press.
- Actuarial Society of South Africa AIDS sub-committee. 2002. ASSA2002 AIDS and demographic model [Online]. Available: <http://www.assa.org.za/> [2005, July 20].
- Bamford L, Loveday M, Verkuil S. Tuberculosis. In: *South African Health Review 2003/04*. Durban: Health Systems Trust 2004
- Blaauw D, Gilson L. 2001. *Health and Poverty Reduction Policies in South Africa*. Johannesburg: Centre for Health Policy.
- Bourne LT, Langenhoven ML, Steyn K, Jooste PL, Laubscher JA, van der Vyver E. 1993. Nutrient intake in the urban African population of the Cape Peninsula, South Africa. The Brisk study. *Cent Afr J Med*, 39(12): 238-247.
- Bourne LT. 1996. Dietary intake in an urban African population in South Africa—with special reference to the nutrition transition. Ph.D. Thesis. University of Cape Town, Cape Town.
- Bradshaw D, Dorrington RE, Sitas F. 1992. The level of mortality in South Africa in 1985 - what does it tell us about health? *S Afr Med J*, 82: 237-240.
- Bradshaw D, Bourne D, Schneider M, Sayed R. 1995. Mortality patterns of chronic diseases of lifestyle in South Africa. In: Fourie Journal, Steyn K (eds.). *Chronic Diseases of Lifestyle in South Africa*. MRC Technical Report. Cape Town: South African Medical Research Council, 5-32 pp.
- Bradshaw D, Groenewald P, Laubscher R, Nannan N, Nojilana B, Norman R, Pieterse D, Schneider M. 2003. Initial burden of disease estimates for South Africa, 2000. *S Afr Med J*, 93(9): 682-688.
- Bradshaw D, Nannan N, Laubscher R, Groenewald P, Joubert J, Nojilana B, Norman R, Pieterse D, Schneider M. 2004. South African National Burden of Disease Study, 2000: Estimates of Provincial Mortality. Tygerberg: MRC.
- Cole TJ, Bellizzi MC, Flegal KM, Dietz WH. 2000. Establishing a standard definition for child overweight and obesity worldwide: international survey. *BMJ*, 320: 1240-1243.
- Cook-Mozaffari P, Azordegan F, Day NE, Ressicaud A, Sabai C, Aramesh B. 1979. Oesophageal cancer studies in the Caspian Littoral of Iran: Results of a case-control study. *Br J Cancer*, 39, p293.
- Dannhauser A, Bam R, Joubert G, *et al.* 1999. Iron status of pregnant women attending the antenatal clinic at Pelonomi Hospital, Bloemfontein. *S Afr J Clin Nutr* 12: 8-16.
- Day NE. 1984. The geographic pathology of cancer of the oesophagus. *Br Med Bull*, 40: 32-334.
- Department of Health. 1998. *Integrated Nutrition Programme for South Africa. Summary of Broad Guidelines for Implementation*. Pretoria: Department of Health.
- Department of Health, South African Medical Research Council & Measure DHS+. 2002. *South Africa Demographic and Health Survey 1998. Full report Report* [Online]. Available: <http://www.doh.gov.za/facts/sadhs-f.html> [2005, July 20]. Available from URL: <http://www.doh.gov.za/facts/1998/sadhs98/>
- Department of Labour. 2002. *Sectoral Determination 7: Domestic Worker Section of the Basic Conditions of Employment Act, No. 75 of 1997*. Government Gazette No. 23732. Pretoria: Department of Labour.
- Dorrington RE, Bradshaw D, Johnson L, Budlender D. 2004. *The Demographic Impact of HIV/AIDS in South Africa. National indicators for 2004*. Cape Town: Centre for Actuarial Research, South African Medical Research Council and Actuarial Society of South Africa.
- Ewing JA. 1984. Detecting alcoholism. The CAGE questionnaire. *JAMA*, 252:1905-7.

- FAO Food Balance Sheets. 2004. [Online]. Available: <http://www.fao.org/faostat> [2005, July 20].
- FAO & WHO Expert Consultation Group. 2002. Human Vitamin and Mineral Requirements. Rome: World Health Organization.
- Gelderblom D, Kok P. 1994. Urbanisation: South Africa's Challenge. Volume 1: Dynamics. Pretoria: Human Sciences Research Council Publishers.
- Human Sciences Research Council. 2003. Synthesis Report on Social and Economic Impacts of Government Programmes since 1994. Prepared for Policy Coordination and Advisory Services, Office of the President. Pretoria: Human Sciences Research Council Publishers.
- Immelman R, Towindo T, Kalk WJ. 2000. Report of the South African Institute for Medical Research (SAIMR) on the Iodine Deficiency Disorder Survey of Primary School Learners for the Department of health, South Africa. Johannesburg: SAIMR.
- International Agency for Research on Cancer. 1988. Alcohol Drinking. In IARC Monographs on the Evaluation of the Carcinogenic Risk of Chemicals to Humans, Vol 44. Lyon: WHO, IARC.
- Jooste PL, Steenkamp HJ, Benadé AJS, Rossouw JE. 1988. Prevalence of overweight and obesity and its relation to coronary heart diseases in the CORIS study. *S Afr Med J*, 74: 101-104.
- Kennedy-Oji C, Coutsoudis A, Kuhn L, Pillay K, Mburu A, Stein Z, Coovadia H. 2001. Effects of vitamin A supplementation during pregnancy and early lactation on body weight of South African HIV-infected women. *J Health Popul Nutr*, 19(3):167-76.
- Kok P. 2004. Unpublished Notes. Pretoria: Human Sciences Research Council.
- Kok P, O'Donovan M, Bouare O, Van Zyl J. 2003. Post-apartheid Patterns of Internal Migration in South Africa. Pretoria: Human Sciences Research Council Publishers.
- Kruger M, Dhansay MA, Van Staden E., *et al.* 1994. Anaemia and iron deficiency in women in the third trimester of pregnancy receiving selective iron supplementation. *S Afr J Food Sci Nutr*, 6: 132-137.
- Kustner HGV. 1987. First RHOSA Nutrition Study: Anthropometric assessment of nutritional status in black under-fives in rural South Africa. *Epidemiological Comments*, 14(3): 1-32.
- Labadarios D, Steyn NP, Maunder E, MacIntyre U, Swart R, Gericke G, Huskisson J, Dannhauser A, Vorster HH, Nesamvuni EA. 2000. The National Food Consumption Survey (NFCS): Children aged 1-9 years, South Africa, 1999. Pretoria: Department of Health.
- Love P, Maunder E, Green M, Ross F, Smale-Lovely J, Charlton K. 2001. South African food-based dietary guidelines: Testing of the preliminary guidelines among women in KwaZulu-Natal and the Western Cape. *S Afr J Clin Nutr*, 14:9-19.
- Lubbe AM. 1973. Nutritional status of Pretoria schoolchildren from four racial groups. *S Afr Med J*, 47: 679-688.
- Langenhoven ML, Steyn K, van Eck M. 1988. The food and meal pattern in Cape Peninsula coloured population. *Ecol Food Nutr*, 22: 107-116.
- MacIntyre UE, Kruger HS, Venter CS, Vorster HH. 2002. Dietary intakes of an African population in different stages of transition in the North West Province, South Africa: the THUSA study. *Nutr Res*, 22: 239-256.
- Martin G, Steyn K, Yach D. 1992. Beliefs about smoking and health and attitudes toward tobacco control measures. *S Afr Med J*, 82:241-245.
- May J. 1998. Poverty and Inequality In South Africa. Summary Report. [Online]. Available: <http://www.polity.org.za/html/govdocs/reports/poverty.html> [2004, September 20].
- May J. 2004. Poverty, social policy and the social wage. Paper presented at a conference on "The politics of socio-economic rights in South Africa: 10 years after Apartheid". Oslo, Norway: 8 - 9 June.

- McCoy D. 1997. An evaluation of the Primary School Nutrition Programme. Durban: Health Systems Trust.
- Moonasar D, Johnson L, Maloba B, Kruger P, Le Grange K, Mthembu, K, Van den Ende J. Malaria. In: South African Health Review 2003/04. Durban: Health Systems Trust, 2004
- Mostert WP, Hofmeyr BE, Oosthuizen JS, Van Zyl JA. 1998. Demography: Textbook for the South African Student. Pretoria: HSRC Publishers.
- Moultrie TA, Timæus IM. 2004. The South African fertility decline: Evidence from two censuses and a Demographic and Health Survey. *Population Studies*, 57(3): 265-283.
- Mqoqi NP, Kellett P, Madhoo J, Sitas F. 2004. Cancer in South Africa: Incidence of Histologically Diagnosed Cancer in South Africa, 1996-1997. Johannesburg: National Cancer Registry Report, National Health Laboratory Service.
- National Food Fortification Task Group. 1998, 2002. Pretoria: DOH.
- Nel JH, Steyn NP. 2002. Report on South Africa Food Consumption Studies Undertaken Amongst Different Population Groups (1983-2000): Average Intakes of Foods Most Commonly Consumed [Online]. Available: <http://www.sahealthinfo.org/nutrition/scientific.htm> [2005, January].
- Nutrition Directorate: Nutrition and Provincial Nutrition Units. 2001. Integrated Nutrition Programme Strategic Plan 2001/02 to 2006/7. Pretoria: Department of Health.
- Parkin DM, Ferlay J, Hamdi-Chériff M, Sitas F, Thomas JO, Wabinga H, Whelan SL. 2003. Cancer in Africa: Epidemiology and Prevention. IARC Scientific Publication No.153. IARC Press, Lyon.
- Popkin BM. 2001. The nutrition transition and obesity in the developing world. *J Nutr*, 131(3): 871S-873S.
- Reddy SP, Panday S, Swart D, Jinabhai CC, Amosun SL, James S, Monyeki KD, Stevens G, Morejele N, Kambaran NS, Omardien RG, Van den Borne HW. 2003. The 1st South African National Youth Risk Behaviour Survey 2002. Cape Town: South African Medical Research Council.
- Reddy P, Meyer-Weitz, Abedian I, Steyn K, Swart D. 1998. Implementable strategies to strengthen comprehensive tobacco control in South Africa: Towards an optimal policy intervention mix. MRC Policy Brief. Cape Town: MRC.
- Richardson BD. 1977. Underweight- A nutritional risk. *S Afr Med J*, 51: 42-48.
- Rossouw JE, du Plessis JP, Benadé AJS, Jordaan PC, Kotze JP, Jooste PL, Ferreira JJ. 1983. Coronary risk factor screening in three rural communities. *S Afr Med J*, 64: 430-436.
- Seedat YK, Mayet FGH, Khan S, Somer SR, Joubert G. 1990. Risk factors for coronary heart diseases in the Indians in Durban. *S Afr Med J*, 78: 447-454.
- Solarsh G, Goga A. 2004. Child Health. In: South African Health Review 2003/2004. Durban: Health Systems Trust: pp.101-126.
- South African Vitamin A Consultative Group (SAVACG). 1995. Children Aged 6 - 71 Months in South Africa, 1994: Their Anthropometric, Vitamin A, Iron and Immunization Coverage Status. Stellenbosch: University of Stellenbosch.
- Statistics South Africa. 1998. The People of South Africa, Population Census 1996: Census in Brief. Pretoria: Statistics South Africa.
- Statistics South Africa. 2003. Census 2001: Census in Brief. Report no. 03-02-03 (2001). Pretoria: Statistics South Africa.
- Statistics South Africa. 2004. Census 2001: Community Profiles. Pretoria: Statistics South Africa.
- Steyn K, Jooste P, Langenhoven ML, Benadé AJ, Rossouw JE, Steyn M, Jordaan PC, Parry CD. 1985. Coronary risk factors in the coloured population of the Cape Peninsula. *S Afr Med J*, 67: 619-625.
- Steyn K, Jooste PL, Bourne L, Fourie J, Badenhorst CJ, Bourne DE, Langenhoven ML, Lombard CJ, Truter H, Katzenellenbogen J, Marais M, Oelofse A. 1991. Risk factors for coronary heart diseases in the black population of the Cape Peninsula. *S Afr Med J*, 79: 480-485.

- Steyn NP, Senekal M, Brits S, Nel JH. 2000. Urban and rural differences in dietary intake, weight status and nutrition knowledge of black female students. *Asia Pacific J Clin Nutr*, 9(1): 11-16.
- Steyn NP, Burger S, Monyeki KD, Alberts M, Nthangeni G. 2001. Variation in dietary intake of the adult population of Dikgale. *S Afr J Clin Nutr*, 14 (4): 140-145.
- Steyn NP, Labadarios D, Maunder E, Nel J, Lombard C, Directors of the NFCS. 2005. Secondary anthropometric data analysis of the National Food Consumption Survey in South Africa: The double burden. *Nutrition*, 21: 4-13.
- Swinburn BA, Caterson I, Seidell JC, James WPT. 2004. Diet, nutrition and the prevention of excess weight gain and obesity. *PHN*, 7(1A):123-146.
- Terreblanche S, Nattrass N. 1990. A Periodization of the Political Economy from 1910. In: Nattrass N, Ardington E (eds). *The Political Economy of South Africa*. Cape Town: Oxford University Press.
- Terreblanche S. 2004. *A History of Inequality in South Africa, 1652-2002*. Pietermaritzburg: University of Natal Press and KMM Review Publishing Company.
- Tuyns AJ, Pequinot G, Jensen DM. 1979. Role of diet, alcohol and tobacco in oesophageal cancer, as illustrated by two contrasting high-incidence areas in the North of Iran and West of France. *Front Gastrointest Res* 4: 101-110.
- United Nations Development Programme. 2001. *South Africa Human Development Report 2000. Transformation for human development*. Cape Town: Oxford University Press.
- United Nations Development Programme. 2003. *South Africa Human Development Report 2003. The Challenge of Sustainable Development in South Africa: Unlocking People's Creativity*. Cape Town: Oxford University Press.
- Unwin N, Setel P, Rashid S, Mugusi F, Mbanya JC, Kitange H, Hayes L, Edwards R, Aspray T, Alberti KG. 2001. Noncommunicable diseases in sub-Saharan Africa: where do they feature in the health research agenda? *Bull World Health Organ*, 79(10): 947-953.
- Van Rensburg, SJ. 1981. Epidemiologic and dietary evidence for specific nutritional predisposition to oesophageal cancer. *J Natl Cancer Inst*, 67, p243.
- Van Walbeek C. 2005. *The Economics of Tobacco Control in South Africa*. PhD thesis, Cape Town: Department of Economics, University of Cape Town.
- Visser ME, Maartens G, Kossew G, Hussey GD. 2003. Plasma vitamin A and zinc levels in HIV-infected adults in Cape Town, South Africa. *Br J Nutr*, 89(4):475-82.
- Vorster HH, Oosthuizen W, Steyn HS, Van der Merwe AM, Kotze JP. 1995. Nutrient intakes of white South Africans- a cause for concern: The VIGHOR Study. *S Afr J Food Sci Nutr*, 7(3), 119-126.
- Walker ARP, Adam A, Küstner HGV. 1993. Changes in total death rate and in ischaemic heart disease death rate in interethnic South African populations, 1978-1989. *S Afr Med J* 83:602-605.
- World Health Organization. 2003. *The World Health Report 2002. Reducing Risks, Promoting Healthy Life*. WHO Technical Report Series, No. 916. Geneva: World Health Organization.
- World Health Organization. 2004. *Global Strategy on Diet, Physical Activity and Health*. Fifty-Seventh World Health Assembly. Agenda item 12.6, 17 April. Geneva: World Health Organization.
- WHO/FAO. 2003. *Diet, Nutrition and the Prevention of Chronic Diseases*. Report of a joint WHO/FAO expert consultation. Geneva: World Health Organization.
- WHO/UNICEF. 2004. *Review of National Immunization Coverage: 1980 – 2003, South Africa*. Geneva: WHO/UNICEF.
- Wolmarans P, Langenhoven ML, van Eck M, Swanepoel ASP. 1989. The contribution of different food groups to the energy, fat and fibre intake of the Coronary Risk Factors Study (CORIS) population. *S Afr Med J*, 75: 167-171.
- Wolmarans P, Langenhoven ML, Benadé AJS, Swanepoel ASP, Kotze TJvW, Rossouw JE. 1988. Intake of macronutrients and their relationship with total

cholesterol and high-density lipoprotein cholesterol. The Coronary Risk Factor Study, 1979. *S Afr Med J*, 73(9): 12-15.

Wolmarans P, Seedat YK, Mayet FGH, Joubert G, Wentzel E. 1999. Dietary intake of Indians living in the metropolitan area of Durban. *Public Health Nutr*, 2(1): 55-60.

Yach D, Townshend, D. 1988. Smoking and health in South Africa: The Need for Action. Centre for Epidemiological Research in Southern Africa. Technical Report No.1. Cape Town: South African Medical Research Council.

ADDENDUM A

Food balance sheet

Products	Year 1962					Year 1972					Year 1982					Year 1992					Year 2001									
	Kg*	Cal	Pro	Fat		Kg*	Cal	Pro	Fat		Kg*	Cal	Pro	Fat		Kg*	Cal	Pro	Fat		Kg*	Cal	Pro	Fat		Kg*	Cal	Pro	Fat	
Grand total	2603	1434	68.4	61.2		2819	1467	74.6	66.4		2905	1576	77.1	66.0		2790	1480	75.3	68.8		2921	1601	75.1	68.8		2790	1480	75.3	68.8	
Cereal-Excluding Beer	169.3	1434	38.7	10.9		173.4	1467	39.9	10.7		186.1	1576	43.1	11.1		173.4	1480	40.0	10.5		187.8	1601	42.6	10.5		173.4	1480	40.0	10.5	
Starchy roots	13.2	27	0.5	0.0		22.6	45	0.9	0.1		25.3	50	1.0	0.1		24.9	50	1.0	0.1		29.7	58	1.2	0.1		24.9	50	1.0	0.1	
Sugar & Sweeteners	39.4	383	0.0			40.5	394	0.0			39.6	386	0.0			35.5	346	0.0			32.8	319	0.0			35.5	346	0.0		
Pulses	2.5	23	1.5	0.1		3.4	32	2.1	0.1		3.2	29	1.9	0.1		4.0	37	2.4	0.2		2.8	25	1.7	0.1		4.0	37	2.4	0.2	
Tree nuts	0.1	0	0.0	0.0		0.1	1	0.0	0.1		0.1	1	0.0	0.1		0.2	1	0.0	0.1		0.3	2	0.1	0.2		0.2	1	0.0	0.1	
Oil crops	1.1	12	0.5	1.0		1.5	16	0.6	1.4		1.1	11	0.5	0.8		1.5	14	0.8	1.1		2.2	23	1.4	1.8		1.5	14	0.8	1.1	
Vegetable oils	5.7	137	0.0	15.6		7.3	176	0.0	19.9		7.5	183	0.0	20.6		9.4	229	0.0	25.9		14.5	352	0.0	39.8		9.4	229	0.0	25.9	
Vegetables	43.5	35	1.6	0.3		46.8	36	1.6	0.3		52.8	39	1.7	0.3		46.1	35	1.5	0.4		44.2	36	1.5	0.3		46.1	35	1.5	0.4	
Fruits	24.1	26	0.3	0.2		38.0	41	0.5	0.3		30.3	37	0.4	0.2		35.4	42	0.5	0.2		36.0	41	0.5	0.3		35.4	42	0.5	0.2	
Stimulants	1.7	5	0.4	0.3		1.8	6	0.4	0.4		1.3	5	0.3	0.4		1.1	2	0.2	0.1		1.1	3	0.2	0.2		1.1	2	0.2	0.1	
Spices	0.4	4	0.1	0.1		0.4	4	0.2	0.1		0.4	4	0.2	0.1		0.3	3	0.1	0.1		0.2	2	0.1	0.1		0.3	3	0.1	0.1	
Alcoholic Beverages	43.8	84	0.3			79.4	146	0.6			79.1	144	0.6			64.4	132	0.6			56.8	104	0.5			64.4	132	0.6		
Meat	31.6	202	11.9	16.8		35.4	221	13.3	18.3		36.8	222	14.0	18.0		43.0	246	16.6	19.4		37.5	204	14.4	15.8		43.0	246	16.6	19.4	
Offal, Edible	4.5	14	2.1	0.5		4.1	13	2.0	0.4		4.0	13	2.0	0.4		3.9	12	1.9	0.4		3.8	12	1.9	0.4		3.9	12	1.9	0.4	
Animal Fats	3.0	58	0.1	6.6		2.0	40	0.0	4.5		1.9	40	0.0	4.5		1.2	26	0.0	2.9		0.7	14	0.0	1.5		1.2	26	0.0	2.9	
Milk	78.0	134	7.0	7.9		94.8	149	8.3	8.2		85.8	134	7.5	7.5		60.3	97	5.3	5.5		54.1	85	4.7	4.8		60.3	97	5.3	5.5	
Eggs	2.5	9	0.8	0.7		3.6	14	1.1	1.0		4.6	18	1.4	1.2		4.7	18	1.5	1.3		6.1	23	2.0	1.6		4.7	18	1.5	1.3	
Fish	5.5	14	2.5	0.4		7.9	19	3.0	0.7		8.7	15	2.3	0.5		9.2	19	2.9	0.8		7.9	16	2.4	0.6		9.2	19	2.9	0.8	

* This amount can be divided by 365 to give per capita g per day

