Dietary changes and their health implications in the Philippines

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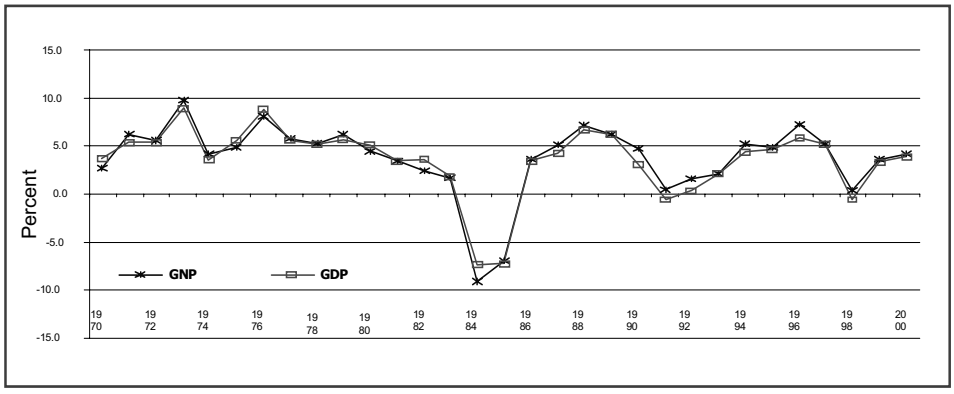
INTRODUCTION

In recent years, social, economic and demographic developments within the Southeast Asian region have accelerated to varying degrees. Nutritional status has improved widely in many countries, with some experiencing a transition in nutrition or the double burden of undernutrition and overnutrition. This report examines evidence of the dietary changes and whether or not the Philippines, in common with some of its neighbours in the region, is facing the double burden of under- and overnutrition.

The population of the Philippines was estimated at 85.5 million people in 2005, compared with 76.5 million in 2000. Growing at an annual 2.11 percent, the population is expected to reach 102.8 million in 2015. The Philippine economy has grown in recent years, with gross national product (GNP) expanding at an average of 5.05 percent and gross domestic product (GDP) at an average of 4.52 percent from 2001 to 2004 (NEDA, 2005). However, there has been a boom–bust pattern of growth over the 30 years from 1970 to 2000 (Figure 1). The sharp fall in growth of the economy from 1982 to 1984 coincided with political and economic crises. The dip from 1988 to 1990 reflected the impact of successive political shocks (i.e., coup attempts) and several natural disasters, as well as an economic slowdown that affected not only the Philippines but also the rest of the world; the Philippines was not spared the effects of the Asian crisis in 1997 (Templo, 2003).

FIGURE 1
Real GNP/GDP growth, 1970 to 2000



Source: Templo, 2003.

The Philippines has made remarkable progress in improving life expectancy and reducing infant mortality. Life expectancy has increased from 58 to about 70 years over the past 30 years, and infant mortality has decreased from 60 to 29 deaths per 1 000 live births

(UNDP, 2004). In addition to improvements in health care services, high levels of literacy (94 percent simple literacy rate), high primary school enrolment rates (90 percent elementary participation rate) and access to safe water (80 percent) have contributed to these remarkable reductions in infant mortality and increased life expectancy.

TABLE 1
Key development indicators

Indicator	Value	Year
Estimated total population	85.5 million	2005
Population growth rate	2.11%	2000–2005
Human development index (HDI), HDI rank	0.753, 83rd	2002
Gender development index (GDI), GDI rank	0.751, 66th	2002
GDP per capita (US$)	1 026	2004
Social sector expenditure (as % of total expenditure)	42.81%	2003
Share of poorest quintile in income or consumption	4.7%	2003
Share of richest quintile in income or consumption	53.3%	2003
Male life expectancy: (at birth in years)	67.2	2003
Female life expectancy: (at birth in years)	72.5	2003
Unemployment rate	10.9%	2004
Underemployment rate	16.9%	2004
Poverty headcount ratio (% of families below national poverty line) (Preliminary)	24.7%	2003
Population with access to safe water supply	80%	2002
Simple literacy rate	94%	2003
Elementary school participation rate	90%	2002
Under-five mortality rate (per 1 000 children)	40	2003
Maternal mortality rate (per 100 000 live births)	172	1998

Sources: NEDA; UNDP, 2004; Family Income Expediture Survey (FIES), 2003

The age structure of the population is also shifting. The dependency ratio (defined as the ratio of people aged 0 to 14 years or over 64 years per 100 people aged 15 to 64 years) has decreased from 88 to 64 over the past 30 years. This decrease is due more to changes in the proportion of children, rather than elderly people. The child dependency ratio dropped from 88 to 64, while the elderly dependency ratio has remained constant at 6 (UN Population Division, 2004).

The last 30 years witnessed rapid urbanization in the Philippines, with the urban proportion of the population rising from 32 percent in 1970 to 54 percent in 1995. In 2001, 59 percent of the population lived in urban areas, and the urban growth rate was 5.14 percent (Table 2). The proportion of urban population is expected to increase to 68 percent in 2015.

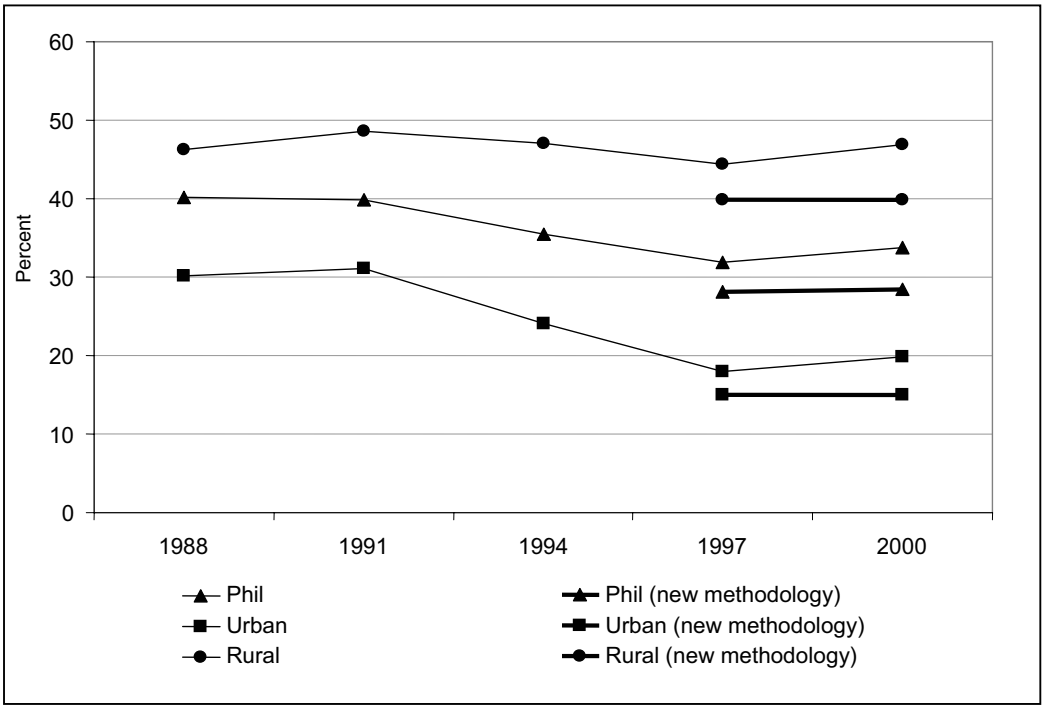
TABLE 2
Trends in urban and rural growth rates, 1960 to 2001

Indicators	1960	1970	1975	1980	1990	1995	2001
Percentage urban	29.8	31.8	33.3	37.2	48.6	54.1	59.1
Urban growth (%)	2.7	4.0	3.0	4.9	5.0	5.0	5.14
Rural growth (%)	2.5	2.6	2.6	1.5	0.3	0.3	-

Source: Population Commission, 2002.

A new methodology for estimating poverty was adopted in 1997. Figure 2 illustrates the trends in prevalence of poverty among Philippine families over the last 17 years, and compares the estimates made with the earlier official methodology, which applied a constant Engel's coefficient (i.e., the proportion of food expenditure to total expenditure), with estimates from the new methodology, which employs a changing Engel's coefficient (i.e., depending on the year). Poverty decreased between 1991 and 1997, while GNP and GDP were increasing (Figure 1), and then increased slightly or remained unchanged (depending on the method used to estimate poverty) during a short period of growth slump brought on by the Asian economic crisis. The estimates indicate that in 2003, 24.7 percent of Philippine families were considered poor (measured as income below the poverty threshold of 12 267 Philippine pesos [p]), compared with 28.4 percent in 2000.

FIGURE 2
Trends in prevalence of poverty among Philippine families, 1988 to 2000



Source: Reyes, 2003.

While poverty has decreased in urban areas, it persists essentially as a rural phenomenon. Three out of four poor people reside in rural areas. In 2000, 13 percent of urban and 36 percent of rural families were considered poor, or had income below the poverty threshold of 12 267 p per year (Reyes, 2003). Disparities in poverty are also seen across different regions of the country, with the autonomous region of Muslim Mindanao, the Caraga region and the Zamboanga Peninsula – all in Mindanao or Southern Philippines – being the poorest (NEDA, 2005).

Income distribution in the Philippines has remained largely unequal as measured by the GINI ratio, which assigns values ranging from 0 to 1 – the closer to 1 the more unequal. Compared with its Asian neighbours, the Philippines has wider disparity in terms of income distribution. Between 1998 and 2000, the Philippine GINI ratio worsened from 0.4446 to 0.4822, but then improved slightly to reach 0.4660 in 2003.

DATA SOURCES USED IN THE CASE STUDY

The major sources of data used in this case study are the surveys of the Food and Nutrition Research Institute, Department of Science and Technology (FNRI-DOST). These are periodic National Nutrition Surveys (NNS), and regional updating of the nutritional status of Philippine children. The dietary data reported here were obtained from the 1978, 1982, 1987, 1993 and 2003 NNS, while the data on nutritional status of various population groups and nutrition-related risk factors for non-communicable diseases (NCDs) among adults come from Regional Updating of the Nutritional Status of Children and the 1993, 1998 and 2003 NNS. Data on mortality trends are from the Field Health Service Information System (FHSIS) of the Department of Health. These are components of the Philippine Statistical System, and provide vital inputs to the country's nutrition, health and development programmes.

National Nutrition Surveys

FNRI-DOST conducts NNS every five years to obtain information on the nutritional status of the Philippine population through recording food consumption in households and using 24-hour recall for children and pregnant and lactating women. Surveys were carried out in 1978, 1982, 1987, 1993, 1998 and 2003, each of which included anthropometric, biochemical and clinical assessment of nutritional status. A food consumption survey component was carried out in all the surveys except for that of 1998.

Nutritional status is assessed by anthropometric measurements of all age groups, biochemical indicators (serum retinol and haemoglobin) in children aged 0 to five years and pregnant and lactating women, and urinary iodine excretion of children aged six to 12 years and pregnant and lactating women. Anthropometric measurements include weight and height for children and adults, and recumbent length for children under two years of age. Nutritional status of children 0 to ten years of age is assessed using the World Health Organization/National Center for Health Statistics (WHO/NCHS) growth curves (WHO, 1995); for pre-adolescents and adolescents aged 11 to 19 years body mass index (BMI)-for-age is used (Must, Dallal and Dietz, 1991), and for adults aged 20 years and over WHO's recommendations for BMI are used (WHO, 1995). The nutritional status of pregnant women is based on a Philippine reference population (Magbitang *et al.,* 1988).

The fifth (1998) and sixth (2003) NNS also included measurements of blood pressure, fasting blood glucose and blood lipids (triglyceride, cholesterol, HDL and LDL) for individuals aged 20 years and over in order to assess hypertension, diabetes and dyslipidaemia as nutritional factors associated with chronic degenerative diseases among adults.

Household food consumption data are collected through one-day household food weighing, which involves weighing all foods in "as-purchased" (AP) form before they are cooked. Food is weighed before breakfast, lunch and dinner. Food waste (i.e., edible and inedible food parts that are thrown away, given to pets, etc.) and plate waste are weighed after meals. Beginning and end inventories of all non-perishable food items such as coffee, sugar, salt and other condiments are taken, and food recall by all household members for foods eaten outside the home is recorded. The information generated is the aggregated measure of the foods eaten and the energy and nutrient intakes of all household members, which are divided by the number of people in the household during the reference period in order to derive per capita intakes. Energy and nutrient intakes from the foods consumed are based on the Philippines Food Composition Table (FCT); nutrient values of fortified foods, particularly of vitamin A, iron and iodine, are from food labels. The nutrient values in the latest Philippine FCT (1997) were revised using results from interlaboratory food

composition analyses. The revision included new iron values for about 30 food items, many of which were fresh and processed fish.

Per capita percentage adequacies of energy and nutrient intakes were estimated for each household, after computing for the mean recommended dietary allowances (RDAs) or recommended energy and nutrient intakes (RENI), by summing the RDAs of each household member and dividing by the number of household members. There have been two revisions to the original 1976 RDAs for the Philippines, one in 1989 and the other in 2002. The original 1976 RDAs were used in the 1978, 1982 and 1987 NNS, the 1989 revision was used to determine energy and nutrient adequacy in the 1993 survey, and the 2002 revision was used in 2003. (For more details see Annexes 1, 2 and 3.)

Assessment of the dietary intake of children aged 0 to five years and of pregnant and lactating women was included in the 1987, 1993 and 2003 NNS. Information on the food intake of these groups is obtained through 24-hour food recall. Mothers are asked to recall all the foods and beverages consumed by their children in the previous 24 hours. Aids to assist the estimation of portion sizes include using standard household measures, such as cups and spoons, and an album of standard food portion sizes, which the mother can look at to estimate the amount consumed by the child.

Sampling design of NNS

All the NNS employed a multi-stage stratified sampling design, and covered all regions of the country. In the 1978, 1982, 1987 and 1993 NNS, the number of sample provinces or cluster areas for each of the regions and Metro Manila was selected based on probability proportional to the number of households. From each sample province, an equal allocation of urban and rural barangays[1] (i.e., four urban and four rural barangays) were selected at random. In the case of Metro Manila, eight barangays – all urban – were selected per cluster. A systematic sample of ten households per barangay, with replacements, were then selected in the final stage of sampling. In the 1998 and 2003 surveys, all provinces were covered and the number of barangays or enumeration areas was based on probability proportional to the number of households. The 2003 NNS adopted the Master Sample developed by the Philippine Statistical System for the 2003 Family Income and Expenditure Survey (FIES) and other national surveys.

For the 1978, 1982, 1987, 1993 and 2003 NNS, the final sampling unit was the household, and all the members of each household were included. In the 1998 NNS (when there was no household food consumption survey), the final sampling unit was the individual – i.e., subjects or respondents aged 0 to five years, six to 12 years, 13 to 19 years and 20 years and over were sampled within sample barangays.

Regional Updating of the Nutritional Status of Children

The nutritional status of children aged 0 to ten years is updated two to three years after each NNS, using anthropometry. The first updating survey was carried out in 1989/1990. The sampling design of the regional updating surveys is similar to that of the 1998 NNS, in which the barangay was the primary sampling unit and children aged 0 to ten years were the secondary sampling units. The update surveys generate national- and regional-level estimates.

[1] A barangay is the smallest local government unit in the Philippines, and is similar to a village.

TABLE 3
Sampling design of NNS and the Regional Updating of the Nutritional Status of Children, 1978 to 2003

	1978[1]	1982[1]	1987[1]	1989/ 1990[2]	1993[1]	1996[2]	1998[1]	2001[2]	2003[1]
Sampling design	**Stratified 3-stage**	**Stratified 3-stage**	**Stratified 3-stage**	**Stratified 2-stage**	**Stratified 3-stage**	**Stratified 2-stage**	**Stratified 2-stage**	**Stratified 2-stage**	**Stratified 2-stage**
Stratification	Region Urban/rural	Region Urban/rural	Region Urban/rural	Region Province Urban/rural	Region Province Urban/rural	Region Province Urban/rural	Region Province Urban/rural	Region Province Urban/rural	Region Province
Sampling units	Province Barangay Household	Province Barangay Household	Province Barangay Household	Barangay Individual	Barangay Household	Barangay Individual	Barangay Individual	Barangay Individual	Barangay Household
Sample size									
Households	2 800	2 280	3 200		4 050		–		5 514
0–5 years				6 932	4 977	10 385	28 698	10 634	4 111
6–10 years				5 382	3 223	15 530	3 040	1 791	3 436
11–19 years					4 111		6 079		4 856
≥ 20 years					8 480		9 299		11 685
Pregnant women					850		2 880		593
Lactating mothers					1 105		2 990		1 201

[1] NNS: there was no food consumption survey component in NNS 1998.
[2] Regional Updating of the Nutritional Status of Children included anthropometry among Philippine children only.

The Field Health Service Information System and Philippine Health Statistics

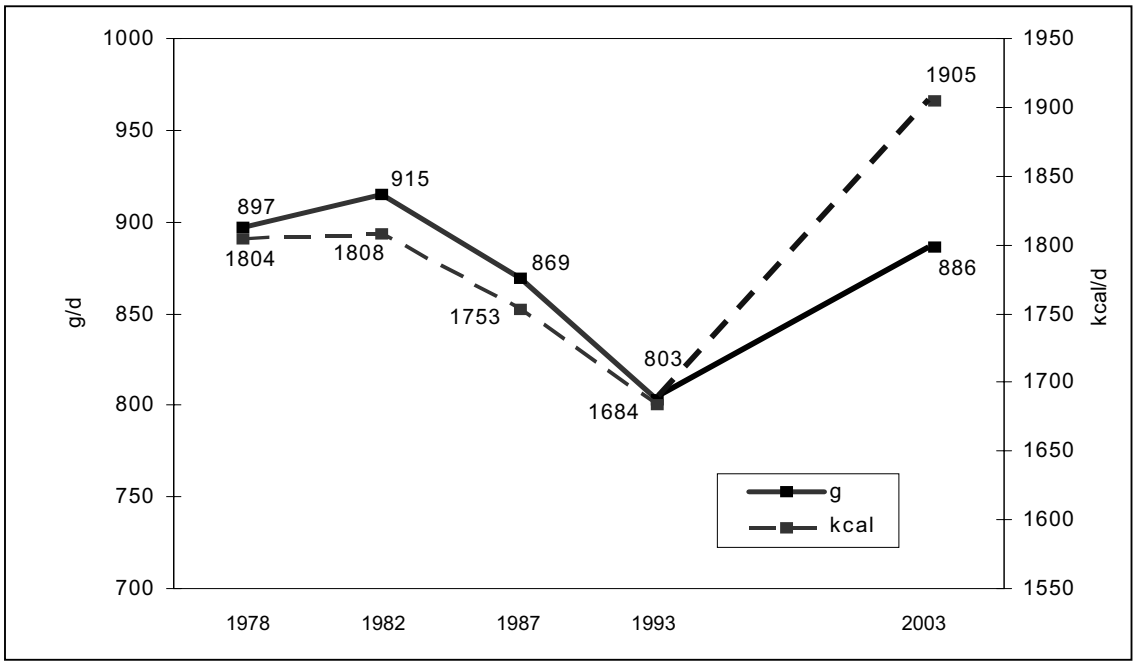
FHSIS is a nationwide compilation of health indicators collected by city and provincial health offices from health facilities such as district hospitals, rural health units (RHUs) and barangay health stations (BHS). The indicators collected reflect the state of health programmes: Maternal and Child Health, Family Planning, the Expanded Programme on Immunization, Nutrition, Dental, Communicable and Non-Communicable Disease Prevention and Control, and Environmental Health. Philippine Health Statistics (PHS) provides summary statistical data of births and deaths registered and reported in a given year, as well as the notified diseases reported in FHSIS.

DIETARY CHANGES 1978 TO 2003

Trends in food consumption

Food consumption in Philippine households has been analysed in two forms: as per capita intake in grams, and converted into kilocalories (kcal) of dietary energy. Food consumption recorded as raw as-purchased (AP) weight in grams has not changed significantly over the last 25 years. However, when converted into dietary energy, the mean daily per capita energy intake increased from 1 804 kcal in 1978 to 1 905 kcal in 2003 (Figure 3). Thus, while food intake has not increased in terms of weight, the energy density of diets is increasing. Figure 3 also demonstrates fluctuations in intake as measured both in grams and in kcal. The decreasing food intakes from 1982 to 1987 and from 1987 to 1993 may be related to the negative growth of the Philippine economy up to 1986 and from 1988 to 1991, the modest progress in reducing poverty, and lingering income inequality. The positive growth from 1991 to 1996 and from 1998 to 2003, on the other hand, reflects the increasing food intake from 1993 to 2003.

FIGURE 3
Trends in mean per capita food intake (g/day and kcal/day) in Philippine households, 1978 to 2003



Sample sizes: 1978, 2 800; 1982, 2 280; 1987, 3 200; 1993, 4 050; 2003, 5 514.
Sources: NNS, 1978; 1982; 1987; 1993; 2003.

Trends in per capita food consumption (in grams) by food group

Generally, the overall dietary pattern in Philippine households remains that of rice, vegetables and fish (Table 4), which contributed 34, 13 and 12 percent, respectively, of food weight in 2003. The proportional contributions of rice and fish have remained similar over the past 25 years, while the proportion of vegetables has declined slightly.

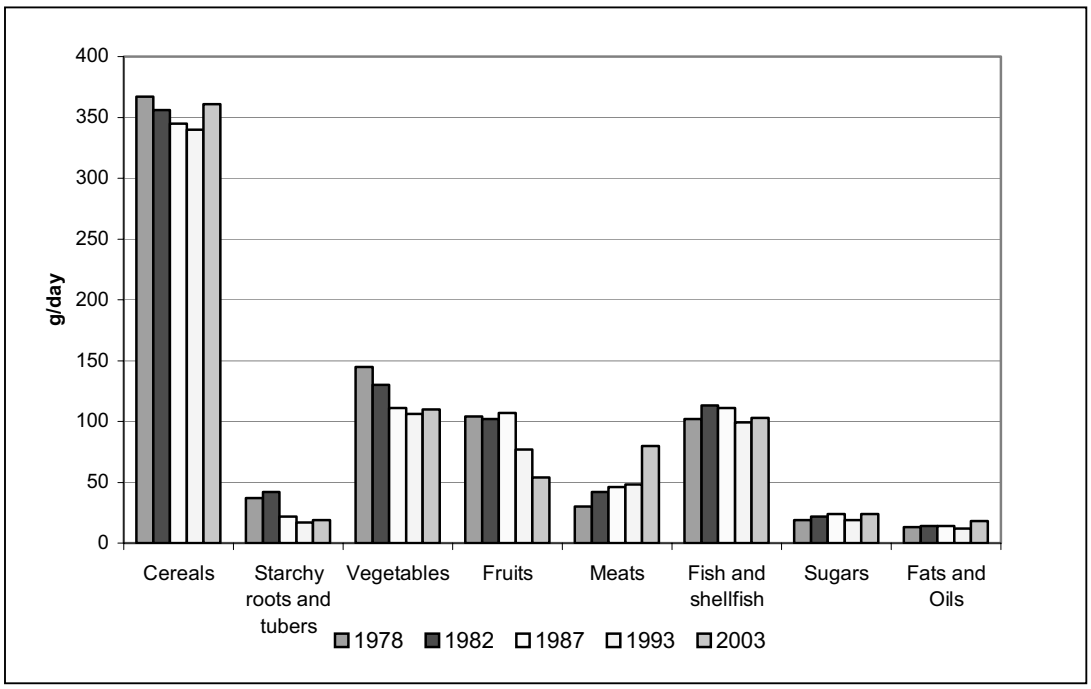
TABLE 4
Trends in mean daily per capita food consumption, by food group, 1978 to 2003

Food group/sub-group	Consumption (g/day, raw, AP)				
	1978	1982	1987	1993	2003
Cereals and cereal products	367	356	345	340	364
Rice and products	308	304	303	282	303
Maize and products	38	34	24	36	31
Other cereals and products	21	18	18	22	30
Starchy roots and tubers	37	42	22	17	19
Sugars and syrups[1]	19	22	24	19	24
Fats and oils[2]	13	14	14	12	18
Fish, meat and poultry	133	154	157	147	185
Fish and products	102	113	111	99	104
Meat and products	23	32	37	34	61
Poultry	7	10	9	14	20
Eggs	8	9	10	12	13
Milk and milk products	42	44	43	44	49
Whole milk				35	35
Milk products				9	14
Dried beans, nuts and seeds[3]	8	10	10	10	10
Vegetables	145	130	111	106	111
Green leafy, yellow vegetables	34	37	29	30	31
Other vegetables	111	93	82	76	80
Fruits	104	102	107	77	54
Vitamin C-rich foods	30	18	24	21	12
Other fruits	74	84	83	56	42
Miscellaneous	21	32	26	19	39
Beverages[4]					26
Condiments					13
Total (g/day)	**897**	**915**	**869**	**803**	**886**

Sample sizes: 1978, 2 800; 1982, 2 280; 1987, 3 200; 1993, 4 050; 2003, 5 514.
[1] Includes soft drinks (sugar content), sherbet and similar preparations.
[2] Includes grated coconut and coconut milk (fat).
[3] Includes mung beans, soybeans, peanuts and other dried beans, nuts.
[4] Includes coffee, tuba (local wine), alcoholic beverages and others.
Numbers may not add up to totals owing to rounding off.
Sources: NNS, 1978; 1982; 1987; 1993; 2003.

Among the cereals, the intake of rice and its products has generally not changed; the mean per capita intake fluctuated from 282 g in 1993 – the lowest recorded intake in the 25-year period – to between 303 and 308 g during the other survey years, including 2003. The consumption of maize, which is more common as a staple in combination with rice in Central and Southern Philippines, particularly in rural areas, generally declined, except in 1993. The intake of starchy roots and tubers was half as much in 2003 (19 g/day) as in 1978 (37 g/day), reflecting the diminishing consumption of traditional and ethnic foods, such as snacks made from locally available yams and tubers.

FIGURE 4
Trends in per capita food intake (grams) by food group, 1978 to 2003



Sample sizes: 1978, 2 800; 1982, 2 280; 1987, 3 200; 1993, 4 050; 2003, 5 514.
Sources: NNS, 1978; 1982; 1987; 1993; 2003.

The consumption of other cereals and cereal products, which include breads and bakery products, noodles and snack foods made from wheat flour, peaked at 30 g in 2003 – an increase of 36 percent on the 22 g of 1993. The intake of sugars and syrups, including soft drinks, increased. The consumption of soft drinks increased by 150 percent, from 2 g in 1993 to 5 g in 2003.

Other food groups for which major increases in mean per capita intake between 1993 and 2003 were recorded include fats and oils (50 percent higher in 2003), meat and meat products (79 percent higher), poultry (43 percent higher), milk and milk products (11 percent higher) and miscellaneous food items (105 percent higher). With regard to meat and meat products, in 2003 the intake of pork (32 g) – whether fresh meat or popular processed meat products (e.g., hotdogs, meatloaf, sausages) and cooked foods – was greater than that of fresh beef (5 g) or organ meats (6 g). In 2003, processed meat products represented nearly 30 percent of meat intake. Among the miscellaneous food items, 33 percent (13 g) of the per capita daily intake in 2003 comprised alcoholic beverages. It will be important to track the trends in consumption of these foods and beverages over time, as excessive consumption of processed meat products (which contain more sodium and preservatives than fresh products) and alcoholic beverages may contribute to the incidence of hypertension and related NCDs.

TABLE 5
Comparison of fresh and processed meat intakes (g/day), 2003

Food group/sub-group	g/day
Fresh meat	38
Pork	32
Beef	5
Carabeef	N
Other fresh meat	1
Organ meat	6
Pig	2
Cow	1
Carabao	N
Chicken and other poultry	1
Other organ meats	N
Organ meat recipes	2
Liver spread	N
Processed meat	18
Popular processed meat	15
Canned	1
Cooked mixed recipes	2

Consumption of vegetables and fruits declined, as did their percentage contribution to total food intake. The intake of fruits, both vitamin C-rich and other, hit a low of 54 g in 2003, a decrease of 50 g since 1978 after a steady 30 percent reduction during the periods 1987 to 1993 and 1993 to 2003. Among vegetables, the intake of green leafy and yellow vegetables has remained the same since 1987, while that of other vegetables has increased – albeit by only 4 g – in the past decade.

Trends in per capita food consumption (in kilocalories) by food group

Rice and rice products continue to be the major source of dietary energy, but their contribution to total per capita dietary energy intake has declined, particularly in the last 13 years (Table 6). Between 1978 and 1987, this group provided 1 050 to 1 022 kcal per capita/day (58 to 56 percent of total per capita dietary energy intake), decreasing to 1 006 kcal (53 percent of total intake) in 2003. The contribution of other traditional staples such as maize and starchy roots and tubers also declined between 1978 and 2003: maize from 137 to 98 kcal per capita/day, and starchy roots and tubers from 40 to 23 kcal. These two food groups fell from providing 10 percent of total dietary energy in 1978 to providing 6 percent in 2003. Other cereals and cereal products, meat and meat products, poultry, fats and oils, sugars and syrups, and miscellaneous food items, including beverages, have been increasing. The contribution of other cereals and cereal products to dietary energy increased from 4 to 10 percent (or 3 to 6 kcal/g), while that of fish, meats and poultry rose from 8 to 12 percent (or 1.00 to 1.24 kcal/g).

In 1978, the energy intake from milk and milk products (94 kcal) was more than three times that of later surveys, even though the quantity of milk and milk products remained very similar (Table 4). Sweetened condensed milk was more frequently consumed in 1978 than in succeeding periods. The energy value of sweetened condensed milk is 321 kcal/100 g compared with 60 kcal/100 g for whole milk and 35 kcal/100 g for skim milk (USDA, no date).

TABLE 6
Trends in per capita dietary energy intake (kcal) by food group and sub-group, 1978 to 2003

Food group/sub-group	Consumption (kcal)				
	1978	**1982**	**1987**	**1993**	**2003**
Cereals and cereal products		1 262	1 213	1 196	1 286
Rice and products	1 050	1 032	1 022	950	1 006
Maize and products	137	130	82	114	99
Other cereals and products	70	99	109	131	181
Starchy roots and tubers	40	42	23	17	23
Sugars and syrups[1]	67	81	84	71	84
Fats and oils[2]	88	112	110	99	112
Fish, meat and poultry	135	155	166	160	229
Fish and products	68	65	70	62	65
Meat and products	58	78	86	82	141
Poultry	9	11	11	17	23
Eggs	11	13	14	17	19
Milk and milk products	94	27	23	24	27
Whole milk				22	23
Milk products				2	4
Dried beans, nuts and seeds[3]	20	24	23	22	21
Vegetables	34	29		25	32
Green leafy, yellow vegetables	9	9	7	7	10
Other vegetables	25	20	60[a]	18	23
Fruits	45	42		35	30
Vitamin C-rich foods	14	11	12	8	4
Other fruits	31	31		29	27
Miscellaneous	11	18	18	18	42
Beverages[4]					30
Condiments					8
Others					4
Total (kcal)	**1 804**	**1 808**	**1 753**	**1 684**	**1 905**

Sample sizes: 1978, 2 800; 1982, 2 280; 1987, 3 200; 1993, 4 050; 2003, 5 514.
[1] Includes soft drinks (sugar content), sherbet and similar preparations.
[2] Includes grated coconut and coconut milk (fat).
[3] Includes mung beans, soybeans, peanuts and other dried beans, nuts.
[4] Includes coffee, tuba (local wine), alcoholic beverages and others.
[a] Includes other fruits and other vegetables
Numbers may not add up to totals owing to rounding off.
Sources: NNS, 1978; 1982; 1987; 1993; 2003.

Trends in nutrient adequacy

Based on absolute intakes, the mean per capita intakes of energy, protein, vitamin A, calcium, thiamine, riboflavin and niacin increased in 2003 from the levels in 1993 and earlier years. Intakes for most other nutrients, however, remained inadequate, particularly those for iron, calcium, riboflavin and vitamin C, all of which were less than 80 percent of the recommended levels – an indication that these nutrients are probably inadequately provided for by the average food consumption pattern in Philippine households (see reference RENIs for 2002 in Annex 3).

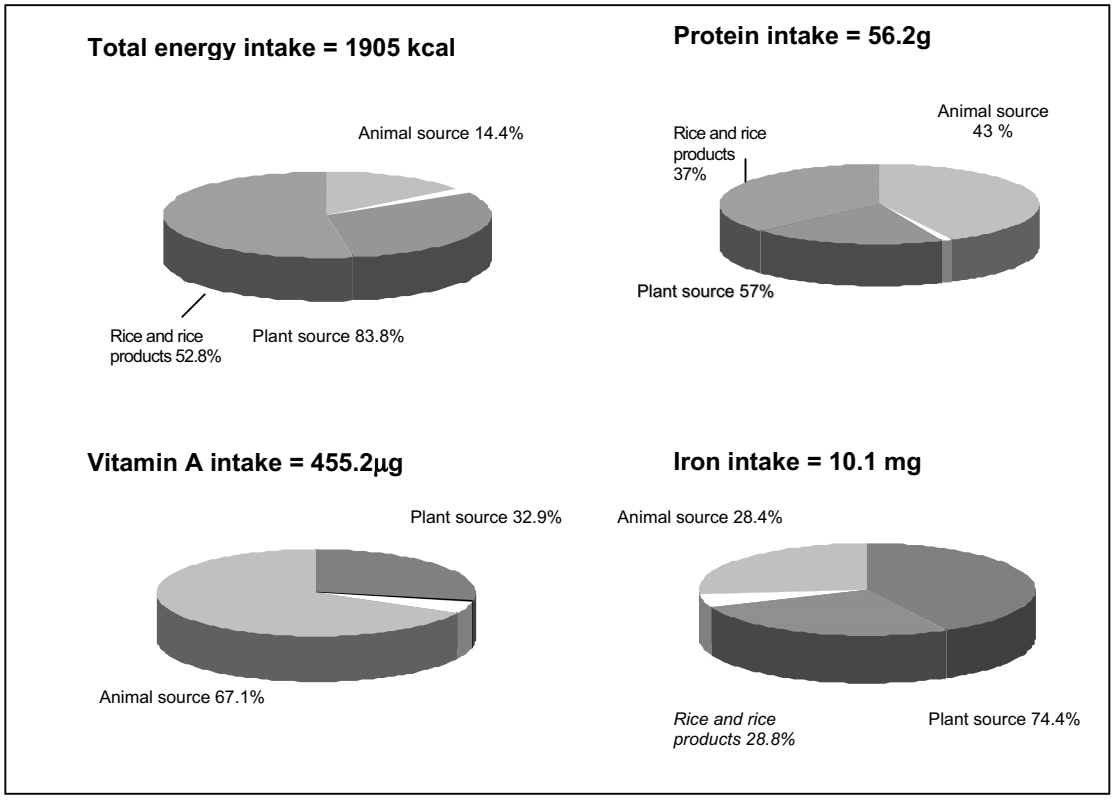
TABLE 7
Trends in per capita energy and nutrient intakes and percentage adequacy based on Philippine RDAs and RENIs, 1978 to 2003

Nutrients	1978[1]	1982[1]	1987[1]	1993[2]	2003[3]
Energy					
Intake (kcal)	1 804	1 808	1 753	1 684	1 905
% adequacy	88.6	89.0	87.1	87.8	98.3
Protein					
Intake (g)	53.0	50.6	49.7	49.9	56.2
% adequacy	102.9	99.6	98.2	106.2	99.2
Iron					
Intake (mg)	11.0	10.8	10.7	10.1	10.1
% adequacy	91.7	91.5	91.5	64.7	60.1
Vitamin A					
Intake (ug RE)	-	-	389.7	391.9	455.2
% adequacy	-	-	75.9	88.1	91.4
Calcium					
Intake (g)	0.44	0.45	0.42	0.39	0.44
% adequacy		80.4	75.0	67.0	57.1
Thiamine					
Intake (mg)	0.73	0.74	0.68	0.67	0.88
% adequacy		71.8	66.7	68.4	86.3
Riboflavin					
Intake (mg)	0.53	0.58	0.56	0.56	0.73
% adequacy		56.3	54.4	57.1	68.0
Niacin					
Intake (mg)	15.3	16.4	16.3	16.1	20.6
% adequacy		119.7	119.9	68.0	156.4
Ascorbic acid					
Intake (mg)	66.8	61.6	53.6	46.7	46.5
% adequacy		91.1	80.0	73.2	75.0
Fats					
Intake (g)		30	30	29	38
Carbohydrates					
Intake (g)		327	313	310	333

Sample sizes: 1978, 2 800; 1982, 2 280; 1987, 3 200; 1993, 4 050; 2003, 5 514.
[1] 1976 RDA for Philippines (Annex 1).
[2] 1989 RDA for Philippines (Annex 2).
[3] 2002 RENI for Philippines (Annex 3).
Sources: NNS, 1978; 1982; 1987; 1993; 2003.

The contributions of animal and plant food sources to total energy, protein, vitamin A and iron intakes are shown in Figure 5. Plant foods, particularly cereals such as rice and rice products, continue to be the major contributors of energy, protein and iron in Philippine diets. Rice and rice products alone contributed 53, 37 and 29 percent, respectively, of total energy, protein and iron intakes in Philippine households.

FIGURE 5
Percentage contributions of animal and plant foods to total energy, protein, vitamin A and iron intakes, 2003



Sample size: 5 514.
Source: NNS, 2003.

The declining intake of vitamin C over the years may be explained by the generally declining intake of vitamin C-rich fruits. There was also no increase in iron intake in 2003, in spite of the reported increased intake of meat, because most of this increase was in the form of pork, which in general has lower iron content (0.8 mg/100 g) than beef (2.8 mg/100 g). In addition, the revised iron values in the updated Philippine FCT – particularly those affecting about 30 food items, many of which were fresh and processed fish – were generally lower, as reflected in the lower iron contribution from fish in spite of an increased intake in 2003 (Annexes 6 and 7).

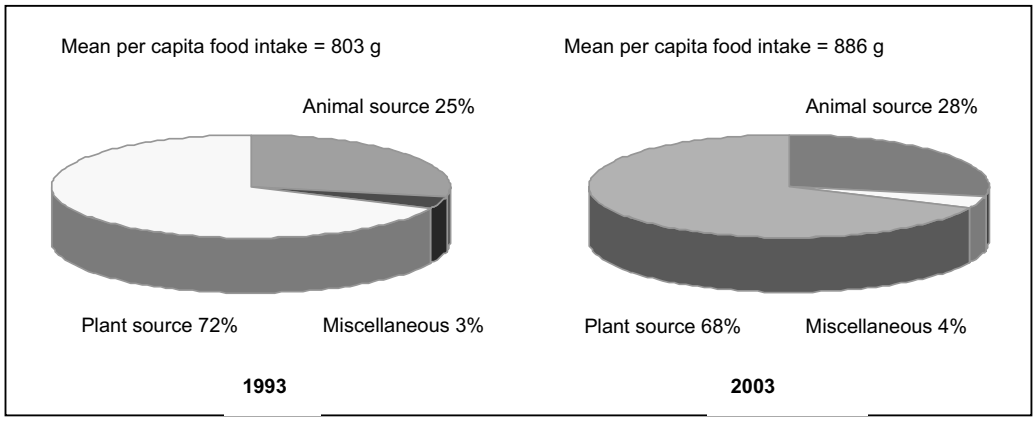
The remarkable drop in iron adequacy since 1987, from 91.5 to < 65 percent in 1993 and 2003 in spite of absolute intakes that remained nearly the same throughout the same period, is attributed to the revisions in recommended nutrient intakes already noted. Specifically for iron, differences in estimating the basal or obligatory losses and the requirements for growth among children resulted in higher requirements in the 1989 RDAs and 2002 RENIs compared with those of 1976. There were also notable changes in the niacin and calcium requirements. For niacin, the requirement in the 1976 RDAs and 2002 RENIs was based only on preformed niacin, and therefore lower than that in the 1989 RDA, which included the contribution of tryptophan. This explains the drop in mean per capita niacin adequacy in 1993, even though the absolute intake was virtually the same as in preceding years. With regard to calcium, the requirement was increased in the 2002 RENIs, primarily because of a shift in the paradigm for setting calcium requirements, i.e., a

change in objective from that of attaining calcium balance to that of preventing osteoporosis. This also explains the drop in calcium adequacy in 2003, in spite of an increase in calcium intake.

Achievement of population nutrient intake goals

The increased intakes of fats and oils, fish, meats and poultry, and milk and milk products are consistent with the Nutritional Guidelines for the Philippines (Annex 4), which has called for specific improvements to the quality of Philippine diets by including more animal foods (Guideline no. 4), fats and oils (Guideline no. 6) and milk and milk products (Guideline no. 7). Overall, the proportion of animal foods in total food intake has increased – from 20 percent in 1978, to 25 percent in 1993 and to 28 percent in 2003 (Figure 6). These increases may also be attributed to the increasing trend in consumption of fast foods and could signal a detrimental increase in saturated fat and cholesterol, which will be discussed in the following sections.

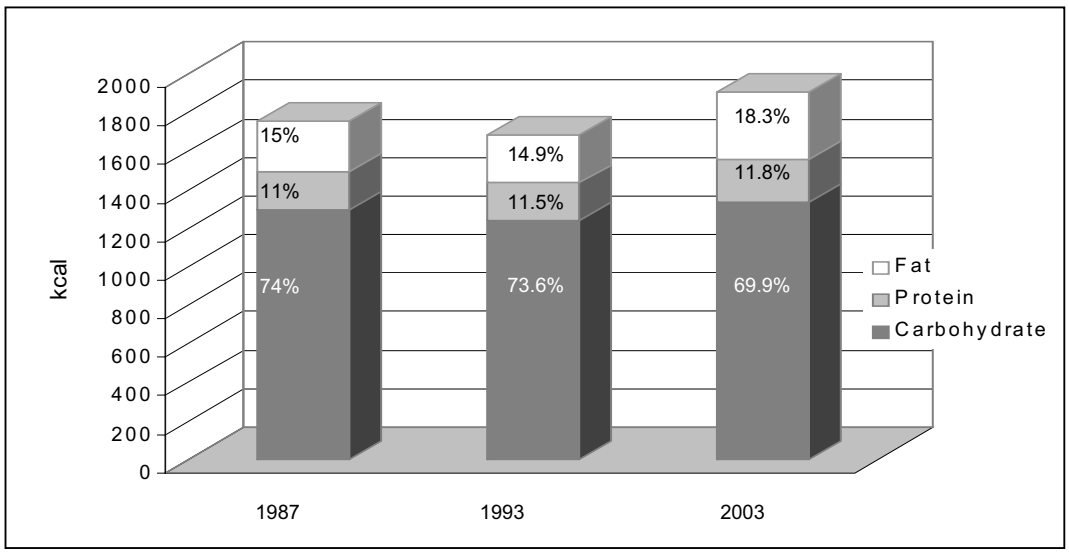
FIGURE 6
Mean per capita food intake by source, 1993 and 2003.



Sample sizes: 1993, 4 050; 2003, 5 514.
Sources: NNS, 1993; 2003.

The average contribution of fat to total dietary energy intake increased from 15 to 18 percent, and that of carbohydrate decreased from 74 to 70 percent. The proportion of households with per capita fat consumption or contribution within the WHO/FAO (2003) recommendations of 15 to 30 percent of energy intake increased from 38 percent in 1993 to 46 percent in 2003. The proportion of households with per capita carbohydrate consumption of between 55 and 75 percent of energy intake increased from 53 to 58 percent over the same period.

FIGURE 7
Percentage distribution of per capita dietary energy from fat, protein and carbohydrates, 1987, 1993 and 2003



The continuing pattern of decreasing fruit and vegetable consumption is reflected in the declining proportion of households that consume ≥ 400 g fruits and vegetables per capita per day, particularly in the last ten years. In 1993, 11.5 percent of Philippine households had a per capita intake of ≥ 400 g fruits and vegetables a day; this figure had declined to 8.2 percent in 2003 – a drop of about one-third (Table 8).

TABLE 8
Trends in achievement of population nutrient intake goals, 1993 and 2003

Year	% of population with 15–30% energy intake from fat	% of population with < 10% energy intake from free sugars	% of population with 55–75% energy intake from carbohydrate	% of population consuming ≥ 400 g/day fruits and vegetables
1993	37.6	94.3	53.0	11.5
2003	46.2	92.1	57.9	8.2

Sample sizes: 1993, 4 050; 2003, 5 514.
Sources: NNS, 1993; 2003.

The proportion of households with less than 100 percent of mean per capita energy adequacy was 57 percent in 2003, an improvement from 1993's figure of 74 percent. The Millennium Development Goal (MDG) for hunger calls for halving the proportion of population below the minimum level of dietary energy consumption. Data collected by FAO to measure the proportion of undernourished people show a declining trend in the proportion of the population considered undernourished (FAO, 2003).

Trends in food and nutrient intakes in urban and rural areas

The 1987 and 1993 NNS show urban and rural differences in food (Table 9) and energy and nutrient intakes (Table 10). Generally, in both years, the intakes of cereals and cereal products, particularly rice and maize products, starchy roots and tubers, fish, and vegetables, including green leafy and yellow and other vegetables were higher in rural than in urban areas. Urban households, on the other hand, had higher per capita intakes of other cereals and cereal products (which include breads and bakery products, noodles and snack

foods made from wheat flour), sugars and syrups, fats and oils, meat and poultry, eggs, milk and milk products, dried beans, nuts and seeds, and vitamin C-rich fruits. Between 1987 and 1993, the consumption of milk and milk products, in particular, increased in urban areas but decreased in rural ones.

TABLE 9
Trends in per capita food consumption (grams) by urban and rural residence, 1987 and 1993

Food group/sub-group	Rural		Urban	
	1987	1993	1987	1993
Cereals and cereal products	361	350	318	318
Rice and products	317	289	281	273
Maize and products	31	55	11	17
Other cereals and products	13	16	26	28
Starchy roots and tubers	25	21	17	13
Sugars and syrups[1]	22	17	26	20
Fats and oils[2]	12	11	15	14
Fish, meat and poultry	145	133	174	161
Fish and products	109	99	112	97
Meat and products	28	23	52	44
Poultry	8	9	11	19
Eggs	8	9	13	15
Milk and milk products	34	24	56	64
Whole milk	30	22	45	48
Milk products	4	2	11	16
Dried beans, nuts and seeds[3]	9	8	11	11
Vegetables	104	102	91	86
Green leafy, yellow vegetables	32	34	25	25
Other vegetables	72	68	66	61
Fruits	115	84	123	93
Vitamin C-rich foods	31	26	44	39
Other fruits	84	58	79	54
Miscellaneous	27	16	24	23
Beverages[4]	13	6	10	11
Condiments	11	9	11	9
Others	3	1	3	2
Total (g)	**863**	**786**	**869**	**819**

Sample sizes: 1987, 3 200; 1993, 4 050.
[1] Includes soft drinks (sugar content), sherbet and similar preparations.
[2] Includes grated coconut and coconut milk (fat).
[3] Includes mung beans, soybeans, peanuts and other dried beans, nuts.
[4] Includes coffee, tuba (local wine), alcoholic beverages and others.
Numbers may not add up to totals owing to rounding off.
Sources: NNS, 1987; 1993.

The food intake in rural areas has followed the same trend as that in urban areas. As in urban areas, the consumption of rice and rice products, starchy roots and tubers, and fruits decreased in rural areas between 1987 and 1993, while that of other cereals and cereal products increased. Urban patterns of food consumption are reflected significantly in the diets of the rural population for various reasons, including the influence of urban migrants on the families they leave behind, improved transport and communications between urban and rural areas, and the increasing availability of processed foods in rural markets. It should be noted that reduced intakes were reported for nearly all of the food groups in terms of weight and total dietary energy intake, in both urban and rural areas between 1987 and 1993; this is shown in the national data in Table 4.

In terms of adequacy of energy and nutrients in the diet, urban and rural households did not differ. In 1993, both had inadequate intakes of energy and nutrients, except protein in urban and rural areas and vitamin A in urban areas only. Per capita vitamin A intake was more than 100 percent adequate in urban households, but only 74 percent in rural ones.

TABLE 10
Trends in per capita nutrient intakes and percentage adequacy, by urban and rural residence, 1987 and 1993

Nutrients	Rural		Urban	
	1987[1]	1993[2]	1987[1]	1993[2]
Energy				
Intake (kcal)	1 748	1 696	1 761	1 673
% adequacy	87.2	88.6	86.9	87.0
Protein				
Intake (g)	49.1	49.1	50.7	50.8
% adequacy	97.6	104.9	99.0	107.6
Iron				
Intake (mg)	10.5	9.9	10.9	10.2
% adequacy	91.3	64.3	91.6	64.6
Vitamin A				
Intake (ug RE)	357.5	327.9	440.4	457.0
% adequacy	70.3	73.8	84.9	102.7
Calcium				
Intake (g)	0.43	0.39	0.42	0.39
% adequacy	76.8	66.1	76.4	67.2
Thiamine				
Intake (mg)	0.65	0.65	0.73	0.70
% adequacy	63.7	66.3	70.9	71.4
Riboflavin				
Intake (mg)	0.52	0.51	0.62	0.61
% adequacy	51.0	52.0	60.2	61.6
Niacin				
Intake (mg)	16.1	15.8	16.6	16.5
% adequacy	118.4	86.3	121.2	89.7
Ascorbic acid				
Intake (mg)	54.7	48.7	51.8	44.6
% adequacy	82.0	76.6	76.5	69.7

Sample sizes: 1987, 3 200; 1993, 4 050.
[1] 1976 RDA for Philippines (Annex 1).
[2] 1989 RDA for Philippines (Annex 2).
Sources: NNS, 1987; 1993.

Urban and rural differences are also noted with regard to the contributions of fat, protein and carbohydrate to total dietary energy supply (Table 11). Generally, the contribution of fats to total dietary energy has been higher in urban (about 18 percent in 1987 and 1993) than in rural (13 percent) households, while the latter consume more carbohydrates (75 to 76 percent versus 70 percent of dietary energy).

TABLE 11
Trends in percentage proportions of per capita dietary energy from fat, protein and carbohydrates, by urban and rural residence, 1987 and 1993

	Total dietary energy intake (kcal)		% dietary energy from fat		% dietary energy from protein		% dietary energy from carbohydrates	
	1987	1993	1987	1993	1987	1993	1987	1993
Urban	1 761	1 673	18.4	18	11.3	12.3	70.2	69.7
Rural	1 748	1 696	13.0	12.9	10.8	11.7	76.2	75.4

Sample sizes: 1987, 3 200; 1993, 4 050.
Sources: NNS, 1987; 1993.

The urban–rural disaggregation of the 2003 NNS data is not yet available, but regionally disaggregated data on food intake (Annex 8) support the urban–rural differences in diet patterns that were noted from the earlier surveys. In very urban areas such as Metro Manila, the consumption of other cereals and cereal products, fats and oils, meats and meat products, and milk and milk products continues to be higher, while that of vegetables is lower than in other regions with varying extents of urbanization. Apart from Metro Manila, the regions with the highest proportion of urban population (specifically, Central Luzon and Calabarzon, which are at least 60 percent urban) have higher consumption of other cereals and cereal products, meats and meat products, eggs, and milk and milk products than the least urbanized regions (Cagayan Valley and Eastern Visayas, which are only 19 to 22 percent urban). Central Luzon and Calabarzon have lower intakes of starchy roots and tubers and vegetables than most of the other less urbanized regions.

Dietary changes in the Philippines in the past 25 years have followed much the same pattern as those described in the nutrition transition literature of, for example, Shetty and Gopalan (1998) and Popkin (1994). The Philippine diet has become more energy-dense, with a greater proportion of energy from fat. Important changes in the types of food in the diet include:

- increasing intake of other cereals and cereal products, including breads and other bakery products and different forms of noodles and pasta;
- increasing intakes of sugars and syrups, fats and oils, and animal food sources such as meat, poultry, eggs and dairy products;
- decreasing intakes of fruit, vegetables, and starchy roots and tubers.

There are noticeable differences between the consumption patterns of urban and rural groups. In particular, urban residents are showing a strong trend towards consumption of non-traditional staples and animal source foods, accompanied by a declining intake of fruits and vegetables.

In general, the overall adequacy of the Philippine diet has improved, as illustrated by the increasing adequacy of energy and most micronutrients. There are, however, some declining trends in adequate intakes of iron and vitamin C. The latter is most probably associated with a steep drop in consumption of vitamin C-rich fruits, while the decline in iron intake is more difficult to understand, but most likely involves a combination of increasing requirements from the updated Philippine RENIs and decreasing amounts of iron considered to be bioavailable.

Food and nutrient intake of preschool-age children

Infant and young child feeding practices in the Philippines have been shown to be inadequate. The prevalence of breastfeeding was 87 to 89 percent between 1993 and 2003

(Philippines National Demographic and Health Survey, 2003; NNS, 2003), but the mean duration of breastfeeding in 2003 was only 5.6 months (NNS, 2003). In the same year, the prevalence of exclusive breastfeeding was only 41.7 percent among infants under two months of age, and 33.4 percent among those aged two to three months; at four to five months of age, only 11.5 percent of infants were still exclusively breastfed (NNS, 2003).

There is a dearth of published national data on the food intake of Philippine preschool children. Unpublished reports on the food intake of non-breastfeeding preschool-age children from the 1978, 1982, 1993 and 2003 NNS imply that the food intake of preschool children in general has been inadequate in energy and the essential nutrients, except protein. Although, rice, milk and milk products, fish, meat and poultry, and fruits have been the major contributors to preschool children's dietary patterns, intakes have apparently been inadequate to meet those recommended for several essential nutrients, particularly iron, vitamin A and calcium. The consequences of inadequate food and nutrient intakes among children are reflected in their poor nutritional status, which is described in the following sections.

TABLE 12
Trends in mean per capita food consumption (grams) in preschool-age children, 1978 to 2003

Food group/sub-group	1978[a]	1982[a]	1993[b]	2003[c]
Cereals and cereal products	-	-	163	166
Rice and products	88	101	121	122
Maize and products	-	-	15	17
Other cereals and products	-	-	27	27
Fats and oils[1]	n	5	2	6
Fish, meat and poultry	71	82	85	95
Eggs	7	8	8	8
Milk and milk products	88	109	111	179
Vegetables	28	29	22	23
Fruits	77	72	70	31
Other food groups	103[5]	90[5]		
Starchy roots and tubers	-	-	11	8
Dried beans, nuts and seeds[2]	-	-	6	4
Sugars and syrups[3]	-	-	12	15
Miscellaneous[4]	-	-	10	27
Total intake (g)	462	496	500	506

Sample sizes: 1978, 2 800; 1982, 2 280; 1993, 4 050.
[1] Includes grated coconut and coconut milk (fat).
[2] Includes mung beans, soybeans, peanuts and other dried beans, nuts.
[3] Includes soft drinks (sugar content), sherbet and similar preparations.
[4] Includes beverages, condiments and others.
[5] Includes maize and maize products, other cereals, starchy roots and tubers, dried beans, nuts and seeds, sugars, and miscellaneous (beverages, condiments and others).
[a] Six months to four years of age.
[b] Three to 59 months of age (unpublished).
[c] Six months to five years of age.
– = less than 0.5 g.
Numbers may not add up to totals owing to rounding off.
Sources: NNS, 1978; 1982; 1993.

TABLE 13
Trends in mean per capita energy and nutrient intakes and percentage adequacy in preschool-age children, 1978 to 1993

Nutrient	1978[1a]	1982[1a]	1993[2b]	2003[3c]
Energy				
Intake (kcal)	742	873	887	980
% adequacy	53.8	63.3	68.0	83.0
Protein				
Intake (g)	23.8	27.3	28.8	31.5
% adequacy	87.2	100	105.9	102.8
Iron				
Intake (mg)	4.5	5.4	6.0	6.2
% adequacy	67.2	80.6	63.6	72.7
Vitamin A				
Intake (ug RE)	-	-	234.3	315.9
% adequacy	-	-	66.3	79.0
Calcium				
Intake (g)	0.28	0.29	0.27	0.37
% adequacy		58.0	47.6	73.4
Thiamine				
Intake (mg)	0.43	0.47	0.43	0.65
% adequacy		65.3	63.0	123.2
Riboflavin				
Intake (mg)	0.41	0.44	0.41	0.74
% adequacy		61.1	61.8	142.3
Niacin				
Intake (mg)	6.4	8.2	8.6	10.4
% adequacy		87.2	66.6	163.8
Ascorbic acid				
Intake (mg)	29.4	28.9	25.0	31.7
% adequacy		77.1	68.5	105.5

Sample sizes: 1978, 2 800; 1982, 2 280; 1993, 4 050; 2003, 5 514.
[1] 1976 RDA for Philippines (Annex 1).
[2] 1989 RDA for Philippines (Annex 2).
[3] 2002 RENI for Philippines (Annex 3).
[a] Six months to four years of age, non-breastfeeding.
[b] Three to 59 months of age, non-breastfeeding.
[c] Six months to five years of age, non-breastfeeding.
Sources: NNS, 1978; 1982; 1993; 2003.

CHANGES IN NUTRITIONAL STATUS

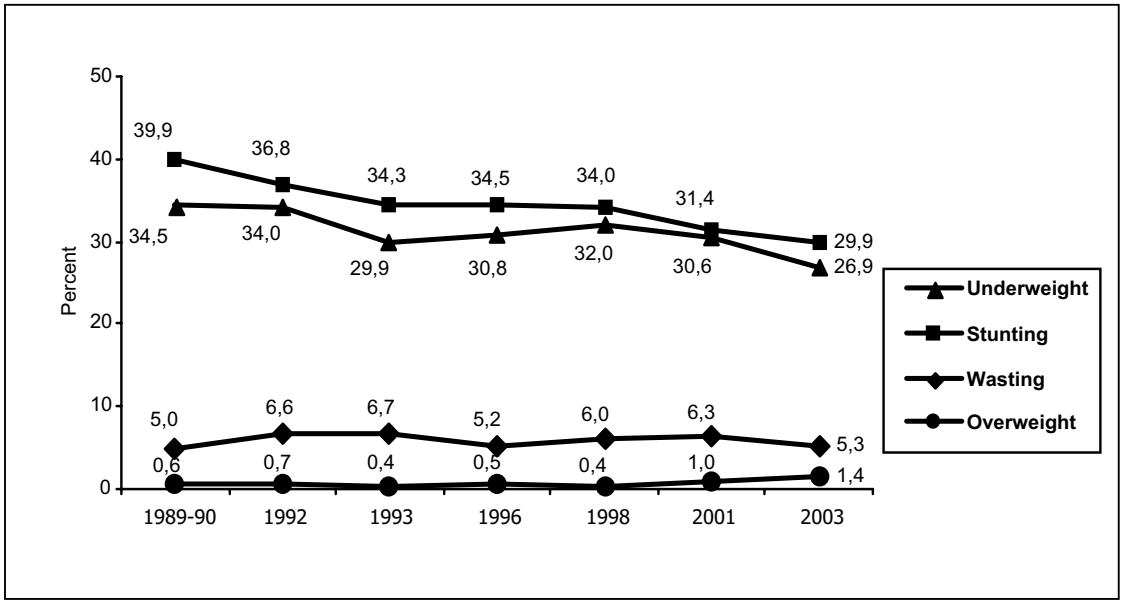
Data on the nutritional status of the Philippine population come from the NNS rounds in 1993, 1998 and 2003 and the Regional Updating of the Nutritional Status of Children in 1989/1990, 1992, 1996 and 2001.

Trends in the nutritional status of children aged 0 to ten years

Undernutrition among children continues to be a public health problem. In 2003, underweight and stunting still affected three out of every ten children aged 0 to 5.9 years (Figure 8) and six to 10.9 years (Figure 9). According to 2003 population projections based on 2000 census data from the National Statistics Office, there are 3.2 million underweight children aged 0 to 5.9 years, and 2.4 million aged six to 10.9 years; for stunting the respective figures are 3.4 million and 3.3 million.

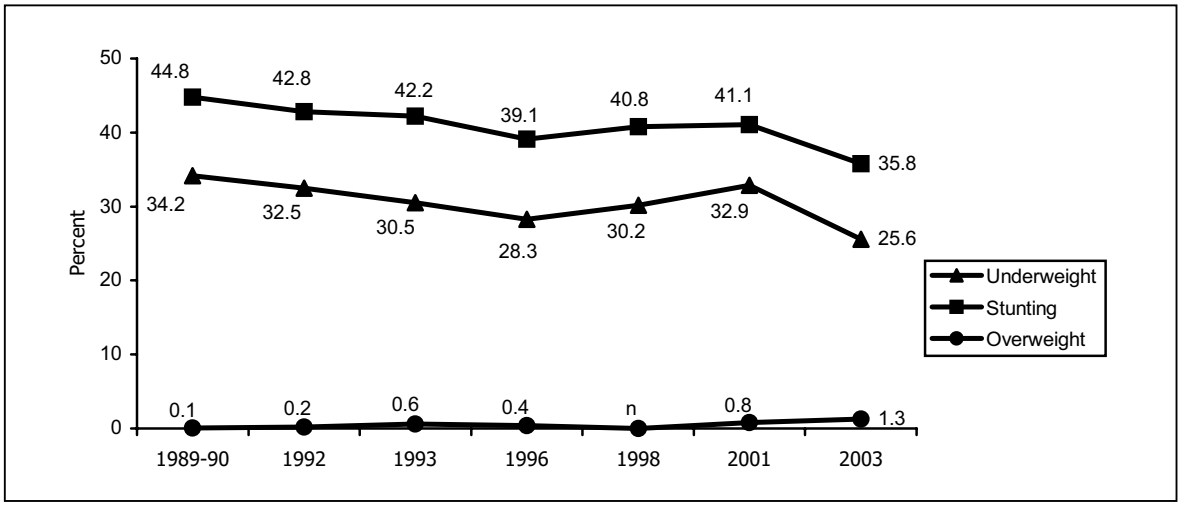
However, there was declining prevalence of undernutrition – underweight and stunting – in both age groups between 1989/1990 and 2003. Within this period, the proportion of underweight children aged 0 to five years declined by 7.6 percentage points, from 34.5 to 26.9 percent (an average reduction of 0.58 percentage points a year); among six- to ten-year-old children, the prevalence of underweight dropped by 8.6 percentage points, from 34.2 to 25.6 percent (an average 0.66 percentage points a year). Stunting among 0- to five- and six- to ten-year-old children also declined by 10.0 (0.77 a year) and 9.0 (0.69 a year) percentage points, respectively. Meanwhile, the prevalence of acute malnutrition (wasting) among children aged 0 to five years has not improved, and increased from 5.0 percent in 1989/1990 to 5.3 percent in 2003.

FIGURE 8
Trends in the prevalence of malnutrition among children aged 0 to 5.9 years, 1989/1990 to 2003



Sample sizes: 1989/1990, 8 008; 1992, 7 243; 1993, 24 000 household members; 1996, 10 385; 1998, 28 698; 2001, 10 634; 2003, 4 110.
References: International Reference Standard/NCHS Growth Reference: underweight = weight-for-age < -2SD; wasting = weight-for-height < -2SD; stunting = height-for-age < -2SD; overweight-for-age = weight-for-age > 2SD.
Sources: NNS, 1993; 1998; 2003; Regional Updating of the Nutritional Status of Children, 1989/1990; 1992; 1996; 2001.

FIGURE 9
Trends in the prevalence of malnutrition among children aged six to 10.9 years, 1989/1990 to 2003



Sample sizes: 1989/1990, 4 306; 1993, 5 636; 1993, 24 000 household members; 1996, 15 530; 1998, 3 040; 2001, 1 791; 2003, 3 436.
References: International Reference Standard/NCHS Growth Reference: underweight = weight-for-age < -2SD;
wasting = weight-for-height < -2SD; stunting = height-for-age < -2SD; overweight-for-age = weight-for-age > 2SD.
Sources: NNS, 1993; 1998; 2003; Regional Updating of the Nutritional Status of Children, 1989/1990; 1992; 1996; 2001.

The average annual percentage reduction of 0.58 percent is not sufficient to meet the MDG target of reducing the proportion of underweight-for-age children under five years of age to 17.25 percent by 2015. There are geographical (regional) disparities in the nutritional status of children, and measures to reduce the prevalence of undernutrition will have to be strengthened in the regions where the problem is greatest. The proportions of underweight-for-age children are higher in the Administrative Region of Muslim Mindanao (34 percent) – one of the poorest in the country – and Mimaropa region (34.2 percent) in Southern Luzon than in Metro Manila (17.8 percent), Central Luzon (21.7 percent) and the Cordillera Administrative Region (16.3 percent).

Meanwhile, although overweight-for-age affects smaller proportions of children (1.4 and 1.3 percent, respectively, in the 0 to 5.9 years and the six to 10.9 years age groups), it has increased significantly between 1998 and 2003. The prevalence of overweight among both age groups in 1989/1990 and 1998 was unchanged, but in 2003 it had increased nearly threefold among children aged 0 to 5.9 years and more than tenfold among those aged six to 10.9 years compared with 1998 levels.

Trends in the nutritional status of 11- to 19-year-olds

In 2003, the proportion of underweight among adolescents aged 11 to 12 years was nearly the same as that among children up to ten years of age – about three out of ten (25.9 percent). Underweight among those aged 11 to 19 years decreased between 1993 and 2003 for both males and females, but the decrease among females was twice that among males, particularly after 1998. On the other hand, overweight increased, affecting 4.2 percent of 11- to 12-year-olds, and 3.4 percent of 13- to 19-year-olds in the same year. The prevalence of overweight among these groups has increased steadily, with larger percentage increases among females than males.

TABLE 14
Trends in the prevalence of underweight and overweight among 11- to 19-year-olds

Gender/age group	Underweight			Overweight		
	1993	1998	2003	1993	1998	2003
	% prevalence					
Male						
11–12 years	32.1	37.3	31.0	2.6	1.8	4.9
13–19 years	28.8	31.8	17.0	2.5	1.0	2.9
All males	29.8	33.1	20.5	2.6	1.2	3.4
Female						
11–12 years	36.3	36.5	20.6	1.5	3.2	3.4
13–19 years	29.7	32.0	6.4	2.5	5.2	3.9
All females	30.7	33.1	10.1	2.2	4.7	3.8
Male and female						
11–12 years	34.0	37.0	25.9	2.2	2.5	4.2
13–19 years	28.7	31.9	12.0	2.5	3.1	3.4
All adolescents	**30.2**	**33.1**	**15.5**	**2.4**	**2.9**	**3.6**

Sample sizes: 1993, 24 000 household members; 1998, 6 079; 2003, 4 860.
References (Must, Dallal and Dietz, 1991): underweight = < 5 percentile of BMI-for-age; overweight = > 85 percentile of BMI-for-age.
Sources: NNS, 1993; 1998; 2003.

Trends in the nutritional status of adults

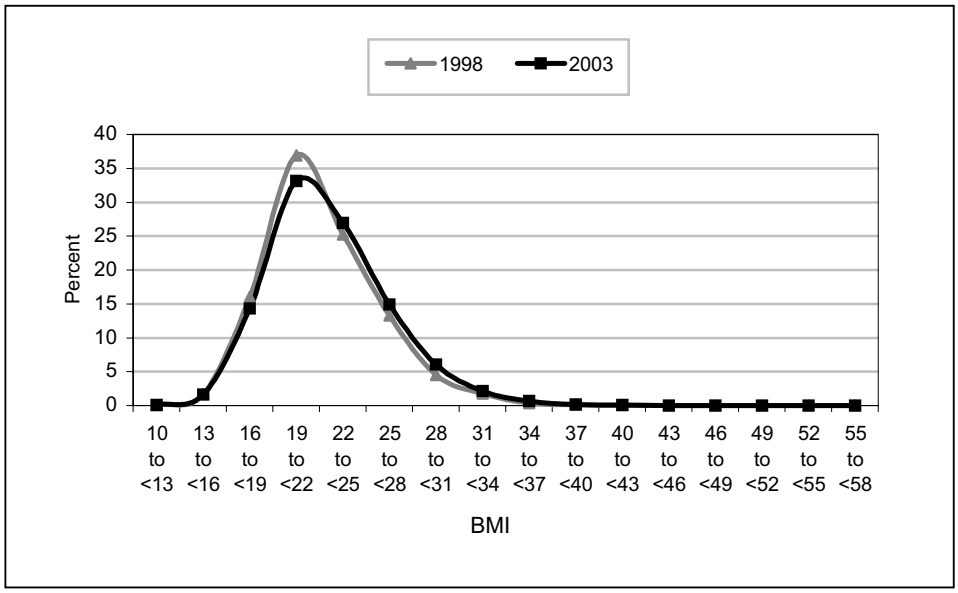
In 2003, 12.3 percent of adults were affected by undernutrition (BMI < 18.5). Based on the WHO cut-off for a healthy adult population in which only 3 to 5 percent have BMI below 18.5 (WHO, 1995), adult undernutrition in the Philippines is a problem that needs to be addressed. On the other hand, 24 percent of adults are overweight or obese, with more females (27.3 percent) than males (20.9 percent) affected (overweight = BMI of 25 to < 30; obese = BMI ≥ 30). Although progress in reducing underweight has been slow (about 10 percent over ten years), prevalence of BMI > 25 has been increasing steadily by 20 percent in each five-year interval from 1993 to 2003. The BMI distribution of the population has shifted slightly to the right over the past five years (Figure 10).

TABLE 15
Prevalence of underweight and overweight among adults, 1993 to 2003

Gender/age group	Underweight			Overweight/obese		
	1993	1998	2003	1993	1998	2003
	% Prevalence					
Male	11.5	11.1	10.6	14.4	17.0	20.9
Female	16.1	15.4	14.2	18.6	23.3	27.3
Male and female						
20–39 years	11.0	11.2	10.6	14.4	18.5	20.6
40–59 years	14.5	12.0	10.4	23.2	25.3	30.8
60 years and over	29.1	25.4	23.4	11.4	14.6	19.1
All	13.9	13.2	12.3	16.6	20.2	24.0

Sample sizes: 1993, 24 000 household members; 1998, 9 299; 2003, 11 696.
References: Underweight/chronic energy deficiency (CED) = BMI < 18.5; overweight/obese = BMI ≥ 25.
Sources: NNS, 1993; 1998; 2003.

FIGURE 10
Changes in distribution of adult BMI, 1998 to 2003



Using the BMI cut-off points recommended by the WHO expert consultation to determine public health and clinical action in relation to cardiovascular disease (CVD) (i.e., BMI 23 to 27.4 = moderate risk; BMI ≥ 27.5 = high to very high risk), the proportion of Philippine adults with moderate to very high risk of co-morbidities related to CVD reaches even more significant proportions than even the overweight or obesity figures imply (Table 16).

TABLE 16
Distribution of adults by cut-off points for determining risk of co-morbidities of CVD based on BMI

Age group (years)	CED (< 18.5)	Low risk (18.5 to < 23.0)	Moderate risk (23.0 to ≤ 27.4)	High risk (≥ 27.5)
20–39	10.6	53.0	27.4	9.0
40–59	10.4	40.6	34.8	14.1
60 and over	23.6	43.7	24.2	8.5
All	12.4	47.4	29.5	10.7

Sample size: 2003, 11 696.
Reference (WHO Expert Consultation, 2004): CED = BMI < 18.5; low risk = BMI 18.5 to < 23.0; moderate risk = BMI 23.0 to ≤ 27.4; high risk = BMI ≥ 27.5.
Source: NNS, 2003.

The problem of overnutrition among adults is further highlighted when waist-to-hip ratio (WHR) and waist circumference (WC) are used. WC reflects intra-abdominal fat mass, while WHR is an index of abdominal fat distribution. Both are indicators of android obesity, which is a risk factor for CVD. The 2003 statistics reflect an overnutrition problem of public health concern, especially among female adults (Tables 17 and 18). Using WHR, android obesity affects one in every two women (54.8 percent) 20 years of age and over; this figure is 38.7 percent higher than the 1998 level. Using WC, android obesity in women increased even more rapidly, by 70 percent (from 10.7 to 18.3 percent) between 1998 and 2003.

TABLE 17
Trends in prevalence of high WHR among adults, 1998 and 2003

Gender	Age group (years)	1998	2003
		% prevalence	
Male	20–29	3.0	6.0
	30–39		11.7
	40–49	12.8	15.1
	50–59		18.8
	60–69	6.8	20.8
	70 +		13.7
	All	7.9	12.1
Female	20–29	36.3	38.7
	30–39		49.6
	40–49	45.8	66.2
	50–59		70.0
	60–69	38.6	64.4
	70 +		62.0
	All	39.5	54.8

Sample sizes: 1998, 9 299; 2003, 4 753.
Reference: male, WHR ≥ 1.0; female, WHR ≥ 0.85.
Sources: NNS, 1998; 2003.

TABLE 18
Trends in the prevalence of high WC among adults, 1998 and 2003

Gender	Age group (years)	1998	2003
		% prevalence	
Male	20–29	1.7	2.1
	30–39		2.7
	40–49	5.1	4.5
	50–59		4.9
	60–69	1.8	3.3
	70 +		1.0
	All	2.7	3.1
Female	20–29	10.0	10.2
	30–39		10.7
	40–49	11.7	23.8
	50–59		34.8
	60–69	11.5	22.9
	70 +		21.5
	All	10.7	18.3

Sample sizes: 1998, 9 299; 2003, 4 753.
Reference: male, WC ≥ 102 cm; female, WC ≥ 88 cm.
Sources: NNS, 1998; 2003.

Micronutrient status of population groups

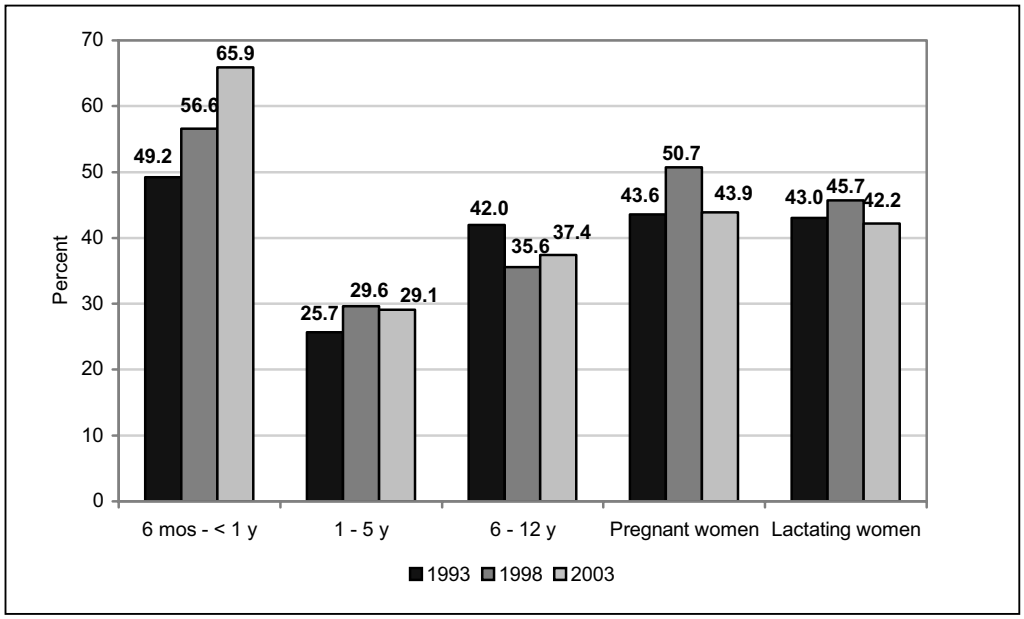
Trends in iron deficiency

Anaemia among infants aged six months to less than one year increased alarmingly from 49.2 percent in 1993 to 66 percent in 2003. Although anaemia was not of public health magnitude among children aged one to five years when aggregated as a group, 53 percent of children aged 12 to 23 months were found to be anaemic in 2003. Pregnant women and

lactating mothers also had anaemia prevalence that was higher than the public health cut-off of 40 percent, a situation that did not change in the ten years from 1993 to 2003.

The unabated problem of anaemia among young children and pregnant and lactating women is partly attributed to continuing inadequate iron intakes. Low birth weight also contributes to the risk of anaemia during early childhood, because low-birth-weight infants are born with low iron stores, which consequently become depleted early. Philippine data in the *State of the world's children* (UNICEF, 2003) placed the prevalence of low birth weight over the period 1998 to 2003 at 20 percent. Among pregnant and lactating women, dietary iron intakes are very low – 28.8 and 33.4 percent, respectively, of those recommended (NNS, 2003). The government is addressing iron deficiency anaemia (IDA) through an iron supplementation programme for pregnant women. However, as the trends show (Figure 11), this supplementation has not been successful because the iron supplements need to be taken daily and their distribution – when supplies are available – depends on pregnant women making regular visits to health centres.

FIGURE 11
Prevalence of anaemia by age/physiologic group, 1993 to 2003



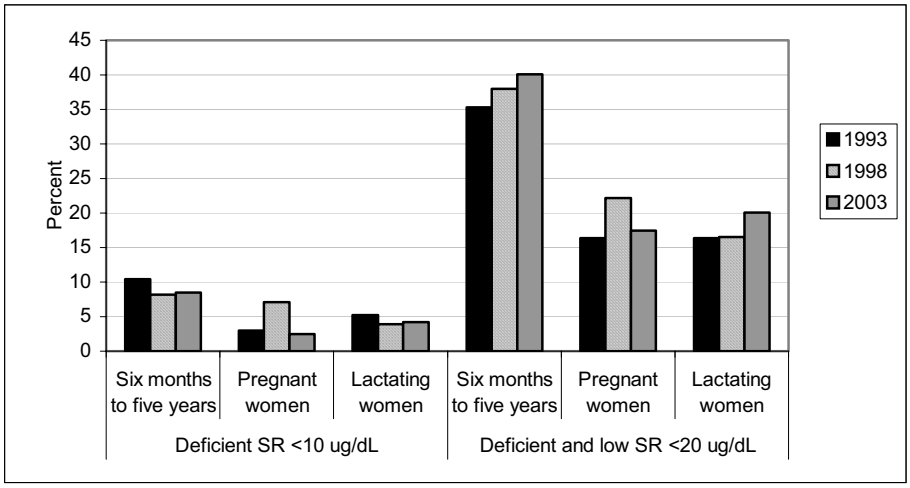
Sample sizes: 6 months to < 1 year – 1993, 400; 1998, 2 790; 2003, 329; 1 to 5 years – 1993, 3 859, 1998, 12 089; 2003, 3 291; 6 to 12 years – 1993, 2 135; 1998, 3 069; 2003, 4 647; pregnant – 1993, 782; 1998, 3 103; 2003, 586; lactating – 1993, 1 043; 1998, 3 260; 2003, 1 190.
Reference (WHO): children 6 months to 6 years, 11.0g/dl; children 6.1 to 14 years, 12.0g/dl; pregnant women, 11.0 g/dl; lactating women, 12.0g/dl.
Sources: NNS, 1993; 1998; 2003.

Trends in vitamin A deficiency

As with anaemia, vitamin A deficiency (VAD) – defined as serum retinol (SR) < 20 µg/dl – is a lingering public health problem that has been affecting more than the public health cut-off of 15 percent of children aged six to 59 months and pregnant and lactating women over the last ten years. The data on VAD from the 2003 NNS reveal that the prevalence among children aged six to 59 months increased from 35 percent in 1993 and 38 percent in 1998 to 40.1 percent. The proportion of children with severe VAD (SR < 10 µg/dl) was 8.5 percent, which is not significantly different from the 8.2 percent of 1998. The prevalence of VAD among lactating women increased from 16.5 percent in 1998 to 20.1 percent in

2003. Referring back to dietary data presented in the previous section, it is clear that the vitamin A intake of preschool children (Table 13) was inadequate. The poor micronutrient status of pregnant and lactating women also explains in part why the prevalence of VAD in young children remains high, in spite of an ongoing national programme of twice-yearly vitamin A supplementation, which was started in 1993.

FIGURE 12
Prevalence of VAD by age/physiologic group, 1993 to 1998



Sample sizes: 6 months to 5 years – 1993, 5 073; 1998, 14 291; pregnant – 1993, 765; 1998, 2 963; lactating – 1993, 1 051; 1999, 3 165.
Reference: deficient = SR < 10 ug/dl; deficient and low = SR < 20 ug/dl.
Sources: NNS, 1993, 1998.

Trends in iodine deficiency

In 1998, iodine deficiency was recognized as a mildly severe public health problem based on International Council for Control of Iodine Deficiency Disorders (ICCIDD) epidemiological criteria (i.e., median urinary iodine excretion [UIE] of between 50 to 99 µg/l among children aged six to 12 years). In that year, the median UIE level among Philippine children aged six to 12 years was 71 µg/L, and 36 percent of them had levels of less than 50 µg/l. In 2003, a significant improvement in the iodine status was noted. The median UIE among six- to 12-year-old children had increased to 201 µg/l, and the proportion of children with UIE levels less than 50 µg/l was down to 11 percent.

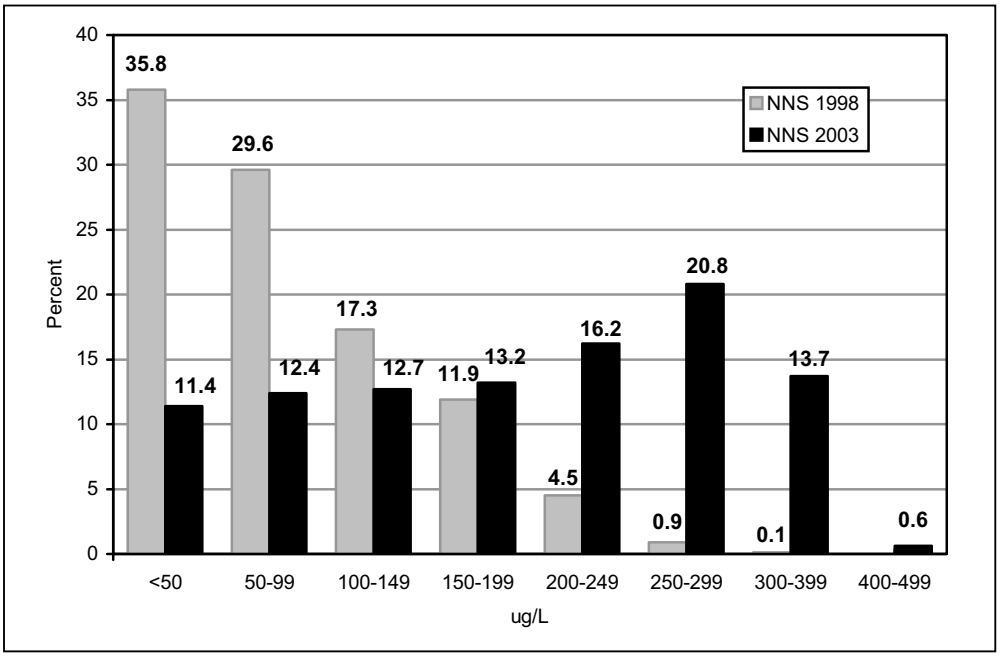
TABLE 19
Iodine status of selected population groups, 1998 and 2003

Group	Median UIE (µg/l)		Prevalence (%) of iodine deficiency (UIE < 50 µg/l)	
	1998	2003	1998	2003
6–12 years	71	201	35.8	11.0
Pregnant		142		18.0
Lactating		111		23.7

Sample sizes: 6 months to 12 years – 1998, 10 616; 2003, 4 665; pregnant – 2003, 583; lactating – 2003, 1 184.
Reference: UIE < 50 ug/l.
Sources: NNS, 1998; 2003.

Much of the dramatic improvement in iodine status has been attributed to the Salt Iodization Programme, and the increasing availability and consumption of processed foods among this age group of children in particular. These foods include processed foods and instant noodles that use iodized salt as mandated by the Salt Iodization Programme (described later in this case study). From the distribution of UIE values among six- to 12-year-old children shown in Figure 13 it can be noted that a high proportion (34.3 percent) of the children have UIE values ≥ 250 μg/l, and 14.3 percent have UIE ≥ 300 μg/l. These values correspond to more than adequate and possible excess in iodine intake, respectively (WHO/UNICEF/ICCIDD, 2001), which makes it even more important that compliance with recommended iodine levels in salt is ensured at production and retail sites.

FIGURE 13
Frequency distribution of UIE values of children aged six to 12 years, 1998 and 2003



A high proportion of lactating women (23.7 percent) continue to have low UIE (< 50 μg/l), and the challenge of eliminating iodine deficiency in this population group remains. Differences in diet provide a plausible explanation for why this group is generally more iodine deficient than children, even when they come from the same households; processed foods, including instant noodles, snack foods and processed meats, are more commonly consumed by children than lactating women.

TRENDS IN PREVALENCE OF DIET-RELATED CVD RISK FACTORS

NNS reports increasing prevalence of nutrition-related risk factors for CVD among Philippine adults aged 20 years and over. These include overweight and obesity, as discussed earlier, as well as hypertension, diabetes and some indicators of dyslipidaemia.

Hypertension

In NNS 2003, 22.5 percent of Philippine adults were diagnosed as hypertensive, based on blood pressure (BP) (systolic BP > 140 mm Hg, or diastolic BP > 90 mm Hg) – a

significant increase from the 21 percent of 1998. The figures among middle-aged and elderly adults were even higher, ranging from 26.4 percent among those aged 40 to 49 years, to 40.2 percent among those aged 50 to 59 years, 45.8 percent in the 60 to 69 years age group, and 56 percent among people aged 70 years and over.

TABLE 20
Trends in the prevalence of hypertension among adults aged 20 years and over, 1998 and 2003

Age group (years)	1998	2003
	% prevalence	
20–29	11.3	8.8
30–39		14.1
40–49	29.0	26.4
50–59		40.2
60–69	44.3	45.8
70 +		56.0
All	**21.0**	**22.5**

Sample sizes: 1998, 9 299 ; 2003 – 20 to 39 years, 1402 ; 40 to 59 years, 1 021; ≥ 60 years, 2 330.
Reference: systolic BP > 140 mm Hg; diastolic BP > 90 mm Hg.
Source: NNS, 1998; 2003.

Dyslipidaemia

The prevalence of hypercholesterolaemia among Philippine adults in 2003 was 8.5 percent, which is more than twice the rate of 4 percent in 1998. There was a significant increase in the prevalence of hypercholesterolaemia over this period, particularly among middle-aged and older adults, among whom the condition remained significantly more prevalent (at 10 to 20 percent and 15 percent, respectively) than it did in younger adults.

The prevalence of elevated LDL-cholesterol among Philippine adults in 2003 was 3.7 percent, which is significantly higher than (nearly double) the 1998 rate of 2 percent. Over the five-year period, the prevalence of elevated LDL-cholesterol increased significantly among middle-aged and elderly adults.

The increasing trend in hypercholesterolaemia and elevated LDL-cholesterol may be associated with increased consumption of animal-based foods, particularly meats and possibly fats and oils, as well as the decreasing fruit and vegetable consumption as discussed earlier. There is no evidence to suggest increases in the prevalence of low HDL-cholesterol (< 35 mg/dl), which was 3.5 percent in 2003. However, using the cut-off of < 40 mg/dl, 54.2 percent of Philippine adults in NNS 2003 had predisposition to low HDL. Low HDL is associated with low consumption of fruits and vegetables, low physical activity and smoking. In NNS 2003, 62 percent of Philippine adults reported being physically inactive, 35 percent were current smokers, and 10 percent were former smokers.

TABLE 21
Trends in dyslipidaemia among adults aged 20 years and over, 1998 and 2003

Age group (years)	Elevated total cholesterol[1]		Elevated LDL-cholesterol[2]		Low HDL-cholesterol[3]	Elevated triglycerides[3]	
	1998	2003	1998	2003	2003	1998	2003
20–29	3.0	3.3	1.7	1.5	2.9	0.4	0.4
30–39		6.0		2.1	3.2		0.4
40–49	5.8	9.6	2.5	4.5	4.9	1.4	1.3
50–59		19.9		8.3	3.8		1.2
60–69	4.1	15.6	2.3	7.4	2.9	0.4	0.8
70 +		15.4		7.0	4.2		1.1
All	4.0	8.5	2.0	3.7	3.5	0.8	0.7

Sample sizes: 1998, 9 299; 2003 – 20 to 39 years, 1 402; 40 to 59 years, 1 021; ≥ 60 years, 2 330.
[1] Elevated total cholesterol = ≥ 240 mg/dl.
[2] Elevated LDL-cholesterol = > 190 mg/dl.
[3] Low HDL-cholesterol = < 35 mg/dl.
[4] Elevated triglycerides = ≥ 400 mg/dl.
Source: NNS, 1998; 2003.

There is also no evidence of an increasing prevalence of elevated triglycerides that could be associated with the increasing consumption of fats and oils (most of which is coconut oil) in Philippine households. Overall, fewer than 1 percent (0.7 percent) of Philippine adults had elevated triglycerides, which was slightly lower than the 1998 rate (0.8 percent).

In a study on hypertension among Philippine adults, which used data from NNS 1998, Duante *et al.* (2001) identified triglyceride level as one of the significant risk factors for hypertension, but there was no attendant increase in triglycerides with the increased prevalence of hypertension between 1998 and 2003. However, disaggregating the data by age group reveals increasing prevalence of elevated triglycerides among the elderly, rising from only 0.4 percent in 1998 to 0.8 percent among 60- to 69-year-olds and 1.1 percent among those aged 70 years and over in 2003. These groups also had the highest prevalence of hypertension.

Diabetes

The Philippine data show no evidence of a trend towards increasing prevalence of diabetes mellitus; this is surprising given that obesity increased significantly. The proportion of Philippine adults with diabetes mellitus was 3.9 percent in 1998, and 3.4 percent in 2003. However, the proportion of Philippine adults with impaired fasting blood glucose (FBG) – a prediabetic condition that increases the risk of diabetes – rose from 2.5 percent in 1998 to 3.2 percent in 2003 (FBS = 100 – 125 mg/dl).

TABLE 22
Trends in the prevalence of impaired FBG and diabetes mellitus among adults aged 20 years and over, 1998 and 2003

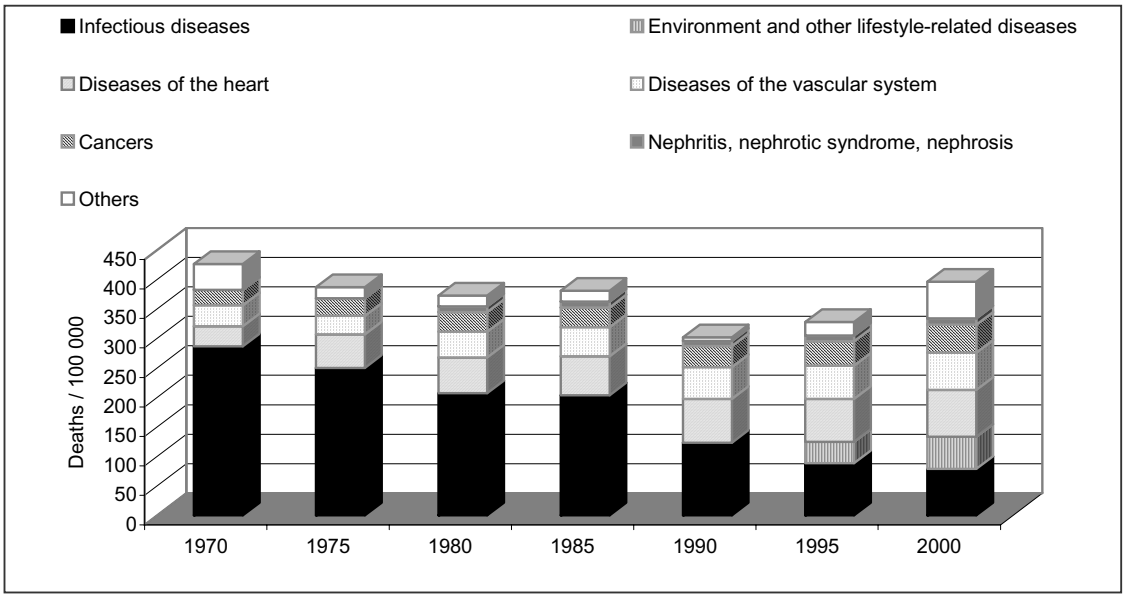
Age group (years)	1998		2003	
	% prevalence			
	Impaired FBG[1]	Diabetes mellitus	Impaired FBG[2]	Diabetes mellitus
20–29	1.9	2.6	1.2	0.7
30–39			2.1	2.0
40–49	3.1	5.4	5.0	4.9
50–59			5.7	8.9
60–69	3.2	6.2	5.6	6.3
70 +			6.2	5.1
All	2.5	3.9	3.2	3.4

Sample sizes: 1998, 9 299; 2003 – 20 to 39 years, 1 402; 40 to 59 years, 1 021; ≥ 60 years, 2 330.
Diabetes mellitus = FBS ≥ 126 mg/dl.
[1] FBS = 110 – 125 mg/dl.
[2] FBS = 100 – 125 mg/dl.
Source: NNS, 1998; 2003.

TRENDS IN MORTALITY FROM ALL CAUSES

Over the last 30 years, mortality from infections (including pneumonias, tuberculosis and bronchitis), other infectious diseases (such as gastroenteritis and colitis, diarrhoea and measles), tetanus, avitaminosis and other nutritional deficiencies has been declining significantly. In 1970, the reported deaths from pneumonia were 118 per 100 000 population, which dropped to 42.7 per 100 000 in 2000. Pneumonia was the leading cause of death in the Philippines in 1970 and until about 1985. Tuberculosis and other infectious diseases were the second and third leading causes of death, with 80 and 63 deaths per 100 000, respectively, in 1970; deaths due to all forms of tuberculosis were down to 36 per 100 000 by 2000. Meanwhile, the pattern regarding deaths from NCDs, such as diseases of the heart (including coronary artery disease and heart failure), diseases of the vascular system (e.g. strokes) and various cancers, has exhibited a significantly increasing trend in the last 30 years. This trend may be associated with changes in food consumption over the past 25 years, including increasing energy density with greater proportions of fat in total energy, and declining intakes of fruits, vegetables and traditional foods. It is also associated with the high prevalence of smoking. NNS 2003 revealed that 35 percent of Philippine adults were current, and 10 percent former, smokers. Diseases of the heart overtook other infectious diseases to become the third leading cause of death by 1975; they overtook tuberculosis as the second leading cause of death by 1980, and pneumonia as the number one cause of death by 1990. In 2000, diseases of the heart (at 79 deaths per 100 000 population), diseases of the vascular system (63 deaths) and various cancers (48 deaths) ranked first, second and fourth, respectively, as leading causes of deaths in the Philippines. Environment and other lifestyle-related diseases (including chronic obstructive pulmonary diseases, other respiratory diseases and diabetes) have emerged as a leading cause of mortality since 1995, and ranked as the third leading cause of death in 2000.

FIGURE 14
Mortality trends by cause of death, 1970 to 2000



Sources: PHS, 1970; 1975; 1980; 1985; 1990; 1995; 2000.

NATIONAL NUTRITION POLICIES, STRATEGIES AND PROGRAMMES

The Philippines' nutrition policies, strategies and programmes are reflected in the Medium-Term Philippine Plan of Action for Nutrition (MTPPAN), which is formulated every five to six years by the National Nutrition Council (NNC), whose members include representations from various government agencies (e.g., the Departments of Health, Agriculture, Education, Social Welfare, Science and Technology, Interior and Local Government, and Budget and Management) and non-governmental organizations (NGOs). The MTPPAN is the government's blueprint for action to address the nutrition problems identified from NNS. The MTPPAN for 2005 to 2010 specifically aims to reduce underweight among children aged 0 to five years to levels based on the MDG target of 17.2 percent by 2015. This calls for accelerating the reduction rate of child undernutrition from the 0.58 percentage points a year (ppy) of 1998 to 2003, to no less than 0.81 ppy for 2005 to 2010 (NNC, 2005). The 2005 to 2010 MTPPAN also aims to reduce stunting and micronutrient deficiencies, particularly nutritional anaemia and VAD, among this group of children. Its other aims include reducing the following: underweight and stunting among children aged six to ten years; low birth weight; chronic energy deficiency among pregnant women; and micronutrient deficiencies among children aged six to 12 years and pregnant women. Targets are based on the reduction rates that were achieved in previous periods, or on the minimum prevalence for public health significance (e.g., 15 percent for VAD and 20 percent for iodine deficiency).

With regard to NCDs, the 2005 to 2010 MTPPAN will contribute to the achievement of targets that were identified by the National Coalition on the Prevention and Control of Non-Communicable Diseases, including reducing by 30 percent the prevalence of smoking, physical inactivity, hypertension, high FBG, obesity and total cholesterol among adults, and increasing the per capita intake of vegetables (NNC, 2005).

A E 23
MTPPAN targets for 2005 to 2010

	2005	2010	Estimated % reduction[1]
Prevalence of underweight among children 0 5 years old	25 88	21 58	1 2
Prevalence of underweight among children 10 years old	25 54	22 4	11 4
Prevalence of stunting among children 0 5 years old	28 9	25 3	12 4
Prevalence of stunting among children 10 years old	34 78	30 48	12 4
Prevalence of chronic energy deficiency among pregnant women	24 9	20 8	1 4
Prevalence of IDA among infants	59 20	41 70	29
Prevalence of IDA among children 1 5 years old	25 10	15 10	39 8
Prevalence of IDA among children 12 years old	34 00	25 50	25 0
Prevalence of IDA among pregnant women	43 30	42 10	2 8
Prevalence of VAD among children months to 5 years old	32 90	15 00	54 7
Prevalence of VAD among pregnant women	15 2	10 92	30 1
Prevalence of VAD among lactating women	18 4	15 00	19 5
Prevalence of iodine deficiency among lactating women	22 4	20 00	11 7
Prevalence of current smoking among adult males	49 5	34 7	30%
Prevalence of current smoking among adolescent females	10	7 5	30%
Per capita total vegetable intake (g/day)	123 2	1 0 2	
Prevalence of hypertension among adult males	19 8	13 9	30%
Prevalence of adults with high F G	3 0	2 1	30%
Prevalence of central obesity (WHR) among females	48 2	33 8	30%
Prevalence of high total serum cholesterol among adult males	7 5	5 2	30%

[1] Computed by subtracting the 2010 target from the 2005 estimated baseline, and dividing by the 2005 estimated baseline.

In spite of its apparently uneven targets for under- and overnutrition, the 2005 to 2010 MTPPAN clearly recognizes and addresses undernutrition as a public health problem among children, and pregnant and lactating women; it also recognizes and addresses nutritional factors associated with overnutrition and risks of NCDs among adults. This can be inferred from the plan's adoption of the life cycle approach, which recognizes that intergenerational consequences of undernutrition start from poor nutrition during pre-pregnancy and adolescence, and include the contribution of foetal undernutrition to adult chronic diseases (Aggett and Schofield, 2000).

The MTPPAN promotes the programmes described in the following paragraphs. Each of these programmes has the potential to address the double burden or coexistence of under- and overnutrition in households and communities, whether implicitly as in the case of micronutrient supplementation and food fortification, or explicitly as with home and community food production and nutrition education.

Home, school and community food production

This programme involves kitchen gardens and small animal raising activities to increase the supply of inexpensive, nutrient-rich sources of energy, protein, vitamin A and iron, as well as dietary fibre, in households. It has the potential to increase home and community production of fresh fruits and vegetables, which can improve the quality of diets for both under- and overweight individuals, while increasing intakes of essential micronutrients (Hawkes *et al.,* 2005). The MTPPAN document makes explicit reference to the role of home and community gardens in increasing the intakes of essential micronutrients and dietary fibre, thereby addressing both undernutrition and the nutrition-related risk factors for CVD, hypercholesterolaemia, elevated LDL-cholesterol levels and certain cancers.

Nutrition education

This programme aims to promote desirable food, health and nutrition practices and lifestyle behaviours to ensure nutritional well-being, and addresses both under- and overnutrition. The intervention uses the Nutritional Guidelines for the Philippines (see Annex 4) as its framework, and follows the life cycle approach by targeting preschool children, schoolchildren, pre-adolescents, teenagers, pregnant and lactating women, and mothers and care providers. Promotion of the Nutritional Guidelines for the Philippines aims to address undernutrition by emphasizing the importance of exclusive breastfeeding, appropriate complementary feeding, consumption of a variety of foods, growth monitoring, and positive health-seeking behaviours. It also aims to address overweight and obesity and other diet and lifestyle factors associated with NCDs by, for example, limiting the consumption of fatty and salty foods, sugars and alcoholic beverages, increasing physical activity and avoiding smoking.

In addition, there are ongoing efforts to incorporate modules into the curricula of public and private schools; these are designed to increase physical activity and healthy lifestyles among schoolchildren. The National Coalition on the Prevention and Control of Non-Communicable Diseases and the Department of Health are carrying out other initiatives, including campaigns for healthy lifestyle in the workplace, communities and restaurants.

Food fortification

To address the persistent problem of micronutrient deficiencies, the Philippines has enacted two laws on food fortification to ensure adequate intakes of vitamin A, iron and iodine among all sectors of the population. These laws include the mandatory fortification of staples such as rice with iron, sugar and cooking oil with vitamin A, and wheat flour with iron and vitamin A, which were introduced in 2000, and the iodization of salt, which was introduced in 1995. The programme also promotes voluntary micronutrient fortification of other processed foods. Under this scheme, the Department of Health awards a Sangkap Pinoy Seal of approval, which the manufacturer puts on to the food label indicating that the food contains the recommended amount and type of fortification. Currently, 142 processed foods on the market carry the Sangkap Pinoy Seal.

However, there has been resistance to the law on mandatory fortification of rice, sugar and cooking oil on the part of manufacturers who object to having to bear the additional costs involved. Legislative consultations with various interest groups, including manufacturers and the public, are being carried out to identify how best to address the concerns of both groups.

Micronutrient supplementation

Similar to food fortification, the micronutrient supplementation programme aims to reduce micronutrient deficiencies. This programme includes universal vitamin A supplementation for all children six months to six years of age and for lactating women, and targeted supplementation to selected populations, particularly iron for infants and young children, pregnant and lactating women and adolescent females, and iodine for schoolchildren and women of child-bearing age in high-risk areas.

Between 1999 and 2003, the vitamin A supplementation programme reached 23 726 215 children, or 92.8 percent of those in the target 12 to 83 months age group, and 3 503 315 or 73.9 percent of nursing women. Over the same period, iron supplementation was provided to 12 979 689 (85.7 percent) pregnant and lactating women, 3 097 116 (80.3 percent) preschool-age children, 1 577 618 (73.3 percent) infants and 3 367 795 (83.2 percent) schoolchildren through the local health system (NNC, 2005). The outreach for

iodine supplementation has been far lower, covering 56.2 percent of targeted women and 74.4 percent of targeted schoolchildren.

Clearly, the country's nutrient supplementation and food fortification programmes, except perhaps salt iodization, have not yet had the desired impact on the micronutrient status of target population groups. The iron supplementation programme has been beset with funding problems and inadequate supplies of iron supplements. The current six-monthly dosing schedule for the universal vitamin A supplementation programme, which started in 1993, may be inadequate for areas with high prevalence of VAD (Pedro *et al.,* 2005; Perlas *et al.,* 1996). It is not clear how the target 55 percent reduction of VAD in children can be achieved through universal six-monthly vitamin A supplementation alone.

Food assistance

This programme serves as a short-term, stop-gap measure to rehabilitate undernourished populations, particularly preschool children, immediately and to prevent undernutrition in areas affected by calamities or emergency situations during the critical periods of complementary feeding for children aged six to 24 months and among women in the second trimester of pregnancy. Food assistance also includes the provision of basic food commodities at subsidized prices to poor households in nutritionally and economically depressed communities, as a contribution to the government's poverty alleviation programme. Also being tested are food-for-work and food-for-school schemes, which entail the provision of basic nutritional food commodities to poor households (NNC, 2005).

Other programmes in the 2005 to 2010 MTPPAN are livelihood assistance; the integration of nutrition concerns into mother-and-child health programmes, including newborn screening, infant and young child feeding, integrated management of childhood illnesses, adolescent health and early childhood care and development; and the provision of safe and potable water supply and environmental sanitation (NNC, 2005).

CONCLUSION

The dietary changes that have occurred in Philippine households in the last 25 years are reflections of the increasing urbanization of the country. Urbanization increased from 37 percent in 1980 to 60 percent in 2000. Urban diets have been associated with increasingly Westernized food habits, such as high-fat diets, processed foods and refined carbohydrates. Data from the Philippines exhibit a pattern of increasing intakes of fats and oils, sugars and syrups, meats and processed meat products, and other cereals and cereal products (including breads and bakery products, noodles, and snack foods made from wheat flour), and declining fruit and vegetable consumption. It is likely that these trends will continue given the escalating urbanization of the Philippine population (the urban proportion is expected to reach 68 percent by 2015), coupled with the effects of increasing globalization such as trade liberalization, which has increased the availability and variety of processed and fast foods, the frequency of eating outside the home, the use of computers and computer games, and the influence of mass media.

Based on national data, the food intake in Philippine households in 2003 represents general improvements in quality and quantity, except with regard to declining fruit and vegetable consumption. The improvements have been in the direction of dietary goals and Philippine nutritional guidelines, including increasing the intakes of animal foods ("to increase good quality proteins and absorbable iron to satisfy nutritional requirements") and fats and oils ("as a remedy to caloric deficiency and to help lower the risk of vitamin A deficiency by facilitating its absorption and utilization"). In terms of the Philippines'

progress in achieving the MDGs, in 2003 fewer households had less than 100 percent per capita energy adequacy than in 1993. However, the improvement falls short of the rate necessary to meet the target. In spite of increased consumption of the food sources of iron, calcium and riboflavin, as demonstrated by increasing intake of animal source foods – including meats and dairy – these nutrients remain inadequate.

While the increased intake of animal foods and fats and oils was generally an improvement, there may be a trade-off in terms of increased cholesterol and saturated fats in diets, and increased overweight in children, adolescents and adults when coupled with sedentary lifestyles. Although the data show no evidence of increasing prevalence of low HDL-cholesterol and elevated triglycerides, the trend towards increasing obesity, hypercholesterolaemia and elevated LDL-cholesterol, which are known risk factors for CVD, is alarming. There has been increasing mortality from diseases of the heart and vascular system, which in the last ten years have become the top two leading causes of death in the country. While consumption of animal foods and fats and oils, prevalence of obesity, hypercholesterolaemia and elevated LDL-cholesterol, and mortality from CVD and other NCDs are moving in the same direction, the consumption of fruits and vegetables and other traditional staples such as maize and root crops has steadily declined over time. Among the reasons cited for the low intake of fruits and vegetables are cost or affordability and the declining production of fruits and vegetables, including indigenous produce, for local markets. This trend has been associated with policies on trade liberalization and globalization. It should not be discounted that other lifestyle-related factors, particularly physical inactivity and lack of exercise, stress, smoking and alcohol consumption – which are also known risk factors for obesity, hypertension, CVD and other chronic degenerative diseases – have contributed significantly to the increasing incidence of these lifestyle diseases.

"Unhealthy" or "faulty" diets, i.e., those characterized by high fat, refined carbohydrates and meat, are more likely to occur in certain sectors of the population than others: more among urban than rural dwellers, and more among higher-income than lower-income groups, even within urban areas. "Unhealthy" diets at the other end of the spectrum (i.e., those that are inadequate in energy, protein and many essential nutrients) are more common among lower-income groups. The available data on food consumption and nutritional status show national or regional estimates, and should therefore be disaggregated to ascertain disparities in the dietary patterns and malnutrition across income groups (although these are probably decreasing considering the declining income inequality as measured by the Gini ratio), as well as across age groups.

Although there has been progress in addressing undernutrition in the Philippines, it is still a problem of far greater magnitude than overnutrition is, especially among children. Out of every 100 children aged 0 to five years, 27 are underweight-for-age, 30 are stunted, more than 30 are anaemic, 40 are vitamin-A deficient, and only one is overweight. Out of every 100 children aged six to ten years, 27 are underweight, 37 are stunted, 37 are anaemic, 11 are iodine deficient, and again only one is overweight. The burden of undernutrition is also greater among 11- to 12-year-olds and 13- to 19-year-olds, with six underweight to every one overweight in the former, and four underweight to every one overweight in the latter age group. Among adults, on the other hand, there are twice as many cases of overweight as underweight.

There are indications that the country is facing a double burden of malnutrition, as evidenced by the coexistence at the population level of undernutrition among children and the elderly with overnutrition among adults. The malnutrition double burden within households, e.g., an underweight child and an overweight mother, is also reported to be

emerging, with prevalence of 8.2 percent in one poor urban community, rising to about 20 percent in a high-income urban community (Agdeppa, Laña and Barba, 2003). There is increasing scientific evidence to support Barker's hypothesis that chronic diseases such as CVD, type-2 diabetes and hypertension in later life may have their origins in foetal cardiovascular, metabolic and endocrine adaptation to intrauterine growth retardation (Aggett and Schofield, 2000). The prevalence of low birth weight was estimated to be about 9 to 11 percent in the 1990 to 1997 period, rising to about 18 percent in 1995 to 2000 (UNICEF 2000; 2002; de Onis, Blössner and Villar, 1998). Based on this hypothesis, the increasing prevalence of non-communicable or chronic degenerative diseases may be associated with maternal and foetal undernutrition, rather than dietary and lifestyle changes alone. Thus, addressing undernutrition from early life, including pre-pregnancy and maternal undernutrition, will contribute to reducing NCDs in the Philippines. Overnutrition increases with age, so programmes aimed at preventing overweight/obesity and NCDs in later life should start with children, particularly by increasing physical activity and exercise.

The life cycle approach calls for integrated, rather than distinct, intervention programmes that address under- and overnutrition in both communities and households by, for example, increasing fruit and vegetable production and consumption, encouraging the consumption of dried beans, nuts and seeds, marine products and lean meats, and promoting increased physical activity and exercise in children and adults.

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ANNEX 1: PHILIPPINE RDAs, 1976

Age group	Weight kg	Energy kcal	Protein g	Calcium g	Iron mg	Vitamin A RE	Vitamin B12 IU	Thiamine mg	Ribo-flavin mg	Niacin mg	Vitamin C mg
Males											
20 39 years	5	2 580	3	0 5	10	50	4 500	1 3	1 3	17	75
40 49 years	5	2 450	3	0 5	10	50	4 500	1 2	1 2	1	75
50 59 years	5	2 320	3	0 5	10	50	4 500	1 2	1 2	15	75
0 9 years	5	2 0 0	3	0 5	10	50	4 500	1 0	1 0	14	75
70 years	5	1 810	3	0 5	10	50	4 500	0 9	0 9	13	75
Females											
20 39 years	48	1 920	54	0 5	18*	550	3 800	1 0	1 0	13	70
40 49 years	48	1 820	54	0 5	18*	550	3 800	0 9	0 9	13	70
50 59 years	48	1 730	54	0 5	8	550	3 800	0 9	0 9	13	70
0 9 years	48	1 540	54	0 5	8	550	3 800	0 8	0 8	13	70
70 years	48	1 340	54	0 5	8	550	3 800	0 7	0 7	13	70
Infants, 6–11 months	9	970	25	0	9	250	1 800	0 5	0 5		30
Children											
1 3 years	13	1 310	2	0 5		250	1 800	0 7	0 7	9	35
4 years	18	1 40	32	0 5	8	325	2 300	0 8	0 8	11	45
7 9 years	24	1 870	37	0 5	7	400	2 800	0 9	0 9	12	55
Boys											
10 12 years	32	2 270	43	0 7	11	500	3 500	1 1	1 1	15	5
13 15 years	44	2 510	59	0 7	12	550	4 300	1 3	1 3	17	75
1 19 years	55	2 700	7	0	13	50	4 500	1 4	1 4	18	90
Girls											
10 12 years	35	2 170	48	0 7	18*	500	3 500	1 1	1 1	14	70
13 15 years	44	2 200	59	0 7	18*	550	4 300	1 1	1 1	15	75
1 19 years	48	2 0 0	59	0	18*	550	4 300	1 0	1 0	14	80

Age group	Weight kg	Energy kcal	Protein g	Calcium g	Iron mg	Vitamin A RE	Vitamin B12 IU	Thiamine mg	Ribo-flavin mg	Niacin mg	Vitamin C mg
Pregnant, 2nd and 3rd trimesters											
13 15 years		2 30	73	1 0	18	25	4 300	1 5	1 5	18	120
1 19 years		2 490	73	1 0	18	25	4 300	1 4	1 4	17	120
20 39 years		2 350	8	1 0	18	575	4 000	1 4	1 4	1	120
40 49 years		2 250	8	1 0	18	575	4 000	1 3	1 3	1	120
Nursing, 1st 6 months											
13 15 years		2 750	87	1 0	18	975	800	1 4	1 7	19	120
1 19 years		2 10	87	1 0	18	975	800	1 3	1	18	120
20 39 years		2 470	82	1 0	18	975	800	1 3	1	17	120
40 49 years		2 370	82	1 0	18	975	800	1 2	1 5	17	120
Nursing, next 6 months											
13 15 years		2 40	75	1 0	18	800	5 00	1 4	1 5	18	120
1 19 years		2 500	75	1 0	18	800	5 00	1 3	1 4	17	120
20 39 years		2 3 0	70	1 0	18	800	5 00	1 3	1 4	1	120
40 49 years		2 2 0	70	1 0	18	800	5 00	1 2	1 3	1	120
Per capita/day[1]		**2 016**	**50**	**0.6**	**12**	**520**	**3 612**	**1.0**	**1.0**	**14**	**67**

***** It is preferable that these amounts be higher than indicated Supplemental iron is recommended during pregnancy,
[1] ased on 1977 population structure (low assumption)

ANNEX 2: PHILIPPINE RDAs, 1989

Age group	Weight kg	Energy kcal	Protein g	Vitamin A ug	Vitamin C mg	Thiamine mg	Ribo-flavin mg	Niacin mg	Folate ug	Calcium g	Iron mg	Iodine mg
Infants												
3 < months		20	a	325	30	0 3	0 3	5	20	300	10	40
< 12 months	9	880	14	325	30	0 4	0 4	8	30	400	15	50
Children												
1 3 years	13	1 350	27	350	35	0 7	0 7	13	40	00	9	55
4 years	18	1 00	32	375	45	0 8	0 8	15	0	00	10	5
7 9 years	24	1 740	35	400	55	0 9	0 9	17	80	00	12	70
Males												
10 12 years	32	2 090	45	425	5	1	1	20	100	700	1	85
13 15 years	44	2 340	0	475	75	1 2	1 2	22	140	700	18	105
1 19 years	55	2 580	9	525	90	1 3	1 3	25	170	700	17	120
20 39 years	5	2 570	0	525	75	1 3	1 3	25	170	500	12	120
40 49 years	5	2 440	0	525	75	1 2	1 2	23	170	500	12	120
50 59 years	5	2 320	0	525	75	1 2	1 2	22	170	500	12	120
0 9 years	5	2 090	0	525	75	1	1	20	170	500	12	120
70 years	5	1 880	0	525	75	0 9	0 9	18	170	500	12	120
Females												
10 12 years	35	1 910	49	400	70	1	1	18	110	700	17	80
13 15 years	44	2 010	5	425	75	1	1	19	140	700	21	100
1 19 years	48	2 020	5	450	80	1	1	19	150	500	25	100
20 39 years	49	1 900	52	450	70	1	1	18	150	500	2	100
40 49 years	49	1 800	52	450	70	0 9	0 9	17	150	500	2	100
50 59 years	49	1 710	52	450	70	0 8	0 8	1	150	500	11	100
0 9 years	49	1 540	52	450	70	0 8	0 8	15	150	500	11	100
70 years	49	1 390	52	450	70	0 7	0 7	13	150	500	11	100
Pregnant												
1st trimester		0	9	25	10	0	0	0	200	400	41	25
2nd trimester		300	9	25	10	0 3	0	3	200	400	41	25
3rd trimester		300	9	25	10	0 3	0	3	200	400	41	25
Lactating												
1st months		500	1	325	35	0 4	0 4	5	100	400	23	50
2nd months		500	12	275	30	0 4	0 4	5	100	400	23	50

ANNEX 3: PHILLIPINE RENIs, 2002

Age group	Weight kg	Energy kcal	Protein g	Vitamin A ug	Vitamin C mg	Thiamine mg	Ribo-flavin mg	Niacin mg	Folate ug	Calcium mg	Iron mg	Iodine mg
Infants												
< 3 months		0	0	0	0	0	0	0	0	0	0	0
3 < months		5 0	9	375	30	0 2	0 3	1 5	5	200	0	90
< 12 months	9	720	14	400	30	0 4	0 4	4	80	400	10	90
Children												
1 3 years	13	1 070	28	400	30	0 5	0 5		1 0	500	8	90
4 years	19	1 410	38	400	30	0	0	7	200	550	9	90
7 9 years	24	1 00	43	400	35	0 7	0 7	9	300	700	11	120
Males												
10 12 years	34	2 140	54	400	45	0 9	1	12	400	1000	13	120
13 15 years	50	2 800	71	550	5	1 2	1 3	1	400	1000	20	150
1 18 years	58	2 840	73	00	75	1 4	1 5	1	400	1000	14	150
19 29 years	59	2 490	7	550	75	1 2	1 3	1	400	750	12	150
30 49 years	59	2 420	7	550	75	1 2	1 3	1	400	750	12	150
50 4 years	59	2 170	7	550	75	1 2	1 3	1	400	750	12	150
5 years	59	1 890	7	550	75	1 2	1 3	1	400	800	12	150
Females												
10 12 years	35	1 920	49	400	45	0 9	0 9	12	400	1000	19	120
13 15 years	49	2 250	3	450	5	1	1	14	400	1000	21	150
1 18 years	50	2 050	59	450	70	1 1	1 1	14	400	1000	27	150
19 29 years	51	1 8 0	58	500	70	1 1	1 1	14	400	750	27	150
30 49 years	51	1 810	58	500	70	1 1	1 1	14	400	750	27	150
50 4 years	51	1 20	58	500	70	1 1	1 1	14	400	800	27	150
5 years	51	1 410	58	500	70	1 1	1 1	14	400	800	10	150
Pregnant												
1st trimester		0		800	80	1 4	1 7	18	00	800	27	200
2nd trimester		300		800	80	1 4	1 7	18	00	800	34	200
3rd trimester		300		800	80	1 4	1 7	18	00	800	38	200
Lactating												
1st months		500	81	900	105	1 5	1 7	17	500	750	27	200
2nd months		500	7	900	100	1 5	1 7	17	500	750	30	200

ANNEX 4: NUTRITIONAL GUIDELINES FOR THE PHILIPPINES, 2000

1. Eat a variety of foods every day.
2. Breastfeed infants from birth to four to six months, and then give appropriate foods while continuing breastfeeding.
3. Maintain children's normal growth through proper diet, and monitor their growth regularly.
4. Consume fish, lean meat, poultry or dried beans.
5. Eat more vegetables, fruits and root crops.
6. Eat foods cooked in edible/cooking oil daily.
7. Consume milk, milk products and other calcium-rich foods, such as small fish and dark-green leafy vegetables, every day.
8. Use iodized salt, but avoid excessive intake of salty foods.
9. Eat clean and safe food.
10. For a healthy lifestyle and good nutrition, exercise regularly, do not smoke and avoid drinking alcoholic beverages.

ANNEX 5: TRENDS IN PERCENTAGE CONTRIBUTION OF FOOD GROUPS TO TOTAL DIETARY ENERGY INTAKE (KCAL), 1978 TO 2003

Food group/sub-group	% distribution				
	1978	1982	1987	1993	2003
Energy giving foods					
Cereals and cereal products	9 7	9 8	9 2	71 0	7 5
Rice and products	58 2	57 1	58 3	5 4	52 8
Maize and products	7	7 2	4 7	8	5 2
Other cereals and products	3 9	5 5	2	7 8	9 5
Starchy roots and tubers	2 2	2 3	1 3	1 0	1 2
Sugars and syrups[1]	3 7	4 5	4 8	4 2	4 4
Fats and oils[2]	4 9	2	3	5 9	5 9
Body building foods					
Fish, meat and poultry	7 5	8	9 5	9 5	12 0
Fish and products	3 8	3	4 0	3 7	3 4
Meat and products	3 2	4 3	4 9	4 9	7 4
Poultry	0 5	0	0	1 0	1 2
Eggs	0	0 7	0 8	1 0	1 0
Milk and milk products	5 2	1 5	1 3	1 4	1 4
Whole milk				1 3	1 2
Milk products				0 1	0 2
Dried beans, nuts and seeds[3]	1 1	1 3	1 3	1 3	1 1
Regulating foods					
Vegetables	1 9	1		1 5	1 7
Green leafy and yellow vegetables	0 5	0 5	0 4	0 4	0 5
Other vegetables	1 4	1 1	3 4[a]	1 1	1 2
Fruits	2 5	2 3		2 1	1
Vitamin C-rich foods	0 8	0	0 7	0 5	0 2
Other fruits	1 7	1 7		1 7	1 4
Miscellaneous	0	1 0	1 0	1 1	2 2
everages[4]					1
Condiments					0 4
Others					0 2
Total kcal	**1 804**	**1 808**	**1 753**	**1 684**	**1 887**

Sample sizes: 1978, 2 800; 1982, 2 280; 1987, 3 200; 1993, 4 050; 2003, 5 514.
[1] Includes soft drinks (sugar content), sherbet and similar preparations.
[2] Includes grated coconut and coconut milk (fat).
[3] Includes mung beans, soybeans, peanuts and other dried beans, nuts.
[4] Includes coffee, tuba (local wine), alcoholic beverages and others.
[a] Includes other fruits and other vegetables.
Numbers may not add up to totals owing to rounding off.
Sources: NNS, 1978; 1982; 1987; 1993; 2003.

ANNEX 6: TRENDS IN MEAN PER CAPITA IRON INTAKE (MG) BY FOOD GROUP, 1978 TO 2003

Food group/sub-group	Consumption (mg)				
	1978	1982	1987	1993	2003
Energy giving foods					
Cereals and cereal products	4.7	4.6	4.5	4.1	4.6
Rice and products	3.8	3.4	3.3	2.7	2.8
Maize and products	0.3	0.4	0.2	0.3	0.2
Other cereals and products	0.7	0.9	1.0	1.2	1.5
Starchy roots and tubers	0.3	0.3	0.2	0.2	0.2
Sugars and syrups[1]	0.1	0.0	0.0	0.0	0.1
Fats and oils[2]	0.1	0.1	0.1	0.1	0.1
Body building foods					
Fish, meat and poultry	2.6	2.6	2.8	2.9	2.2
Fish and products	2.2	2.1	2.1	2.2	1.0
Meat and products	0.3	0.4	0.6	0.6	1.0
Poultry	0.1	0.1	0.1	0.1	0.2
Eggs	0.2	0.2	0.3	0.3	0.3
Milk and milk products	0.1	0.1	0.1	0.1	0.2
Whole milk				0.1	0.2
Milk products				0.1	0.0
Dried beans, nuts and seeds[3]	0.4	0.4	0.4	0.4	0.4
Regulating foods					
Vegetables	1.3	1.2		1.1	1.1
Green leafy and yellow vegetables	0.7	0.7	0.6	0.6	0.5
Other vegetables	0.6	0.5	0.8[a]	0.5	0.5
Fruits	0.5	0.5		0.3	0.2
Vitamin C-rich foods	0.2	0.2	0.2	0.1	0.1
Other fruits	0.3	0.3		0.2	0.2
Miscellaneous	0.7	0.6	0.6	0.6	0.8
Beverages[4]					0.4
Condiments					0.3
Others					0.1
Total mg	**11.0**	**10.8**	**10.7**	**10.1**	**10.0**

Sample sizes: 1978, 2 800; 1982, 2 280; 1987, 3 200; 1993, 4 050; 2003, 5 514.
[1] Includes soft drinks (sugar content), sherbet and similar preparations.
[2] Includes grated coconut and coconut milk (fat).
[3] Includes mung beans, soybeans, peanuts and other dried beans, nuts.
[4] Includes coffee, tuba (local wine), alcoholic beverages and others.
[a] Includes other fruits and other vegetables.
Numbers may not add up to totals owing to rounding off.
Sources: NNS, 1978; 1982; 1987; 1993; 2003.

ANNEX 7: TRENDS IN PERCENTAGE CONTRIBUTIONS OF FOOD GROUPS TO IRON INTAKE (MG), 1978 TO 2003

Food group/sub-group	% distribution				
	1978	1982	1987	1993	2003
Energy giving foods					
Cereals and cereal products	42.6	42.8	42.1	40.9	45.7
Rice and products	34.1	31.1	30.4	26.4	28.8
Maize and products	2.4	3.3	2.3	2.7	1.6
Other cereals and products	6.1	8.3	9.4	11.8	15.3
Starchy roots and tubers	3.0	3.0	1.7	1.5	1.7
Sugars and syrups[1]	1.3	0.4	0.4	0.3	0.5
Fats and oils[2]	0.6	0.9	0.8	0.7	0.7
Body building foods					
Fish, meat and poultry	23.8	23.8	25.9	28.4	22.0
Fish and products	20.2	19.0	19.6	21.5	10.0
Meat and products	3.0	3.8	5.4	5.6	10.2
Poultry	0.6	0.9	0.9	1.3	1.8
Eggs	1.8	2.1	2.4	2.9	3.2
Milk and milk products	0.6	0.9	1.2	1.0	1.6
Whole milk				0.9	1.5
Milk products				0.5	0.1
Dried beans, nuts and seeds[3]	3.4	3.7	4.1	4.0	3.9
Regulating foods					
Vegetables	11.7	11.5		11.0	10.5
Green leafy and yellow vegetables	6.7	6.6	5.7	5.7	5.2
Other vegetables	5.0	4.9	7.6[a]	5.3	5.3
Fruits	4.5	4.9		3.2	2.4
Vitamin C-rich foods	2.1	2.4	2.1	0.9	0.5
Other fruits	2.4	2.5		2.3	1.9
Miscellaneous	6.4	5.8	6.0	6.2	7.8
Beverages[4]					4.5
Condiments					2.8
Others					0.5
Total mg	**11.0**	**10.8**	**10.7**	**10.1**	**10.0**

Sample sizes: 1978, 2 800; 1982, 2 280; 1987, 3 200; 1993, 4 050; 2003, 5 514.
[1] Includes soft drinks (sugar content), sherbet and similar preparations.
[2] Includes grated coconut and coconut milk (fat).
[3] Includes mung beans, soybeans, peanuts and other dried beans, nuts.
[4] Includes coffee, tuba (local wine), alcoholic beverages and others.
[a] Includes other fruits and other vegetables.
Numbers may not add up to totals owing to rounding off.
Sources: NNS, 1978; 1982; 1987; 1993; 2003.

ANNEX 8: MEAN DAILY PER CAPITA FOOD CONSUMPTION BY REGION, 2003

Food group/sub-group	Philippines	NCR	Ilocos	CAR	Cagayan Valley	Central Luzon	Cala-barzon	Mima-ropa	Bicol
	Consumption, in grams raw as purchased								
Energy giving foods									
Cereals and cereal products	364	320	377	393	389	363	352	399	361
Rice and products	303	267	350	363	359	325	315	371	296
Maize and products	31	5 [a]	1 [a]	4 [a]	6 [a]	4 [a]	4 [a]	4 [a]	27 [a]
Other cereals and products	30	47	26	26	24	34	33	24	38
Starchy roots and tubers	19	19 [a]	14 [a]	34 [a]	32 [a]	13 [a]	10	26 [a]	23 [a]
Sugars and syrups[1]	24	28	27	25	22	27	24	23	23
Fats and oils[2]	18	29	16[a]	14[a]	16	18	22	17[a]	17
Body building foods									
Fish, meat and poultry	185	226	188	175	149	209	194	167	146
Fish and products	104	94	102	59	69	102	98	96	97
Meat and products	61	102	75	84	54[a]	82	73	59	43[a]
Poultry	20	30 [a]	11 [a]	3 [a] 2	26 [a]	25	23 [a]	12 [a]	6 [a]
Eggs	13	18	14	10 [a]	12	18	15 [a]	11	8 [a]
Milk and milk products	49	76	42	30 [a]	37 [a]	65	64	27	29
Whole milk	35	53	37	26 [a]	26 [a]	40	41	21	24 [a]
Milk products	14	23	5	4	11	25	23	6	5
Dried beans, nuts and seeds[3]	10	13 [a]	8	18 [a]	13	9	8	9 [a]	10
Regulating foods									
Vegetables	111	88	171	155	132	99	99	129	118
Green leafy and yellow vegetables	31	22	43	49	46	19	24	22	30
Other vegetables	80	66	128	106	86	80	75	107	88
Fruits	54	60 [a]	41 [a]	49 [a]	22 [a]	56	43 [a]	87 [a]	52 [a]
Vitamin C-rich foods	12	15 [a]	11 [a]	16 [a]	7 [a]	13 [a]	10 [a]	16 [a]	13 [a]
Other fruits	42	45 [a]	30 [a]	33 [a]	15 [a]	43 [a]	33 [a]	71 [a]	39 [a]
Miscellaneous	39	56 [a]	29	26 [a]	26 [a]	38	50 [a]	41 [a]	25 [a]
Beverages[4]	26	43 [a]	16 [a]	18 [a]	15 [a]	20	36 [a]	28 [a]	14 [a]
Condiments	10	10	11	6	9	10	10	10	10
Others	3	3	2	2	2	8	4	3	1
Total food	**886**	**933**	**927**	**929**	**850**	**915**	**881**	**936**	**812**

Food group/sub-group	Western Visayas	Central Visayas	Eastern Visayas	Zamboanga Peninsula	Northern Mindanao	Davao	Sossk-Sargen	Caraga	ARMM
	Consumption, in grams raw as purchased								
Energy giving foods									
Cereals and cereal products	390	350	357	380	404	381	401	385	350
Rice and products	351	187	309	243	252	300	364	308	336
Maize and products	18 [a]	136	26 [a]	116 [a]	133 [a]	55 [a]	22 [a]	54 [a]	1 [a]
Other cereals and products	21	27	22 [a]	21 [a]	19	26	15	23	13
Starchy roots and tubers	14 [a]	18 [a]	18 [a]	22 [a]	35 [a]	30 [a]	17 [a]	25 [a]	29 [a]
Sugars and syrups[1]	22	21	20	17	16	28	24	21	21
Fats and oils[2]	11	13	19	13 [a]	16	16 [a]	11	14 [a]	12 [a]
Body building foods									
Fish, meat and poultry	200	153	168	138	158	194	170	157	151
Fish and products	140	103	122	108	101	113	117	105	120
Meat and products	43	43 [a]	34 [a]	21 [a]	37	53 [a]	39 [a]	35 [a]	13 [a]
Poultry	17 [a]	7 [a]	12 [a]	9 [a]	20 [a]	28 [a]	14 [a]	17 [a]	18 [a]
Eggs	14	12	8 [a]	8 [a]	10 [a]	14	9 [a]	10 [a]	9 [a]
Milk and milk products	49 [a]	31 [a]	33 [a]	21 [a]	46	57 [a]	32 [a]	36 [a]	19 [a]
Whole milk	35 [a]	26 [a]	28 [a]	20 [a]	38	37	21	29	19 [a]
Milk products	14 [a]	5 [a]	5 [a]	1 [a]	8 [a]	20 [a]	11 [a]	7 [a]	0 [a]
Dried beans, nuts and seeds[3]	8 [a]	11 [a]	10	9 [a]	13 [a]	11	8	9 [a]	4 [a]
Regulating foods									
Vegetables	127	108	93	84 [a]	131	101	139	121	80
Green leafy and yellow vegetables	35	43 [a]	20	29 [a]	42	39	44	37	19
Other vegetables	92	65	73	55 [a]	89	62	95	84	61
Fruits	58 [a]	39 [a]	44 [a]	51 [a]	66 [a]	98 [a]	56	60 [a]	38 [a]
Vitamin C-rich foods	7 [a]	9 [a]	4 [a]	3 [a]	17 [a]	24 [a]	13 [a]	12 [a]	4 [a]
Other fruits	51 [a]	30 [a]	40 [a]	48 [a]	49	74 [a]	43	48 [a]	34 [a]
Miscellaneous	40 [a]	30	43 [a]	23 [a]	38 [a]	43 [a]	31	48 [a]	16 [a]
Beverages[4]	28 [a]	17 [a]	31 [a]	9 [a]	24 [a]	29 [a]	18 [a]	33 [a]	9 [a]
Condiments	10	12 [a]	11	12	12	12	11	14	6
Others	2 [a]	1 [a]	1 [a]	2 [a]	2 [a]	2 [a]	2 [a]	1 [a]	1 [a]
Total food	**933**	**786**	**813**	**766**	**933**	**973**	**898**	**886**	**729**

Sample size: 5 514.
[1] Includes soft drinks (sugar content), sherbet and similar preparations.
[2] Includes grated coconut and coconut milk (fat).
[3] Includes mung beans, soybeans, peanuts and other dried beans, nuts.
[4] Includes coffee, tuba (local wine), alcoholic beverages and others.
[a] CV $\geq$ 15 percent.
Numbers may not add up to totals owing to rounding off.
Source: NNS, 2003.

ANNEX 9: MEAN DAILY PER CAPITA ENERGY AND NUTRIENT INTAKES AND PERCENTAGE ADEQUACY BY REGION, 2003

	Region					
	NCR	**Ilocos**	**Cagayan**	**CAR**	**Central Luzon**	**Cala-Barzon**
Energy (kcal)						
Intake	1 942	1 944	1 940	2 072	1 955	1 888
RNI	1 955	1 922	1 938	1 971	1 946	1 943
% adequacy	99.4	101.2	100.1	105.1	100.5	97.2
Protein (g)						
Intake	61.4	56.6	53.3	60.4	57.9	56.7
RNI	56.8	56.8	56.9	57.3	56.9	56.9
% adequacy	108.1	99.6	93.5	105.4	101.8	99.7
Iron (mg)						
Intake	11.2	11.0	10.2	11.4	10.6	10.4
RNI	17.3	16.3	16.6	16.8	16.8	17.2
% adequacy	64.6	67.5	61.3	67.8	62.8	60.3
Retinol equivalent (mcg)						
Intake	557.1	524.3	461.1	718.2	374.2	583.5
RNI	499.6	497.8	497.7	497.9	500.0	498.2
% adequacy	111.5	105.3	92.6	144.2	74.8	117.1
Calcium (g)						
Intake	0.46	0.50	0.45	0.47	0.42	0.41
RNI	0.76	0.77	0.77	0.77	0.76	0.77
% adequacy	60.8	65.5	58.5	60.4	55.2	54.1
Thiamine (mg)						
Intake	0.97	0.93	0.89	1.17	0.89	0.91
RNI	1.03	1.03	1.03	1.03	1.03	1.03
% adequacy	93.9	90.3	86.8	113.1	86.6	88.3
Riboflavin (mg)						
Intake	0.84	0.78	0.74	0.88	0.74	0.82
RNI	1.08	1.07	1.07	1.08	1.07	1.07
% adequacy	77.8	73.3	68.7	82.0	69.2	76.3
Niacin (mg)						
Intake	22.4	21.4	20.2	24.7	20.9	21.6
RNI	13.3	13.2	13.3	13.3	13.2	13.3
% adequacy	168.4	161.5	152.2	185.6	157.9	162.5
Ascorbic acid (mg)						
Intake	47.8	45.5	42.9	60.8	42.6	39.5
RNI	62.8	62.2	62.3	62.3	62.3	62.5
% adequacy	76.0	73.1	68.9	97.6	68.3	63.3

Nutrients	Region					
	Mima-Ropa	Bicol	Western Visayas	Central Visayas	Eastern Visayas	Zamboanga Peninsula
Energy (kcal)						
Intake	2 008	1 856	1 936	1 782	1 803	1 762
RNI	1 921	1 924	1 937	1 925	1 912	1 914
% adequacy	104.5	96.5	99.9	92.6	94.3	92.1
Protein (g)						
Intake	54.8	50.6	58.0	51.8	51.6	50.6
RNI	56.0	56.7	56.4	56.4	55.9	56.0
% adequacy	97.8	89.2	102.8	91.8	92.4	90.4
Iron (mg)						
Intake	10.1	9.2	10.5	8.7	8.7	7.9
RNI	16.6	16.5	16.5	16.5	16.1	16.7
% adequacy	61.2	55.9	63.8	52.9	53.9	47.7
Retinol equivalent (mcg)						
Intake	469.5	371.3	426.2	349.1	361.5	337.7
RNI	495.0	500.7	496.1	495.6	491.5	492.1
% adequacy	94.9	74.2	85.9	70.4	73.5	68.6
Calcium (g)						
Intake	0.43	0.40	0.50	0.42	0.41	0.37
RNI	0.76	0.76	0.76	0.77	0.76	0.77
% adequacy	56.5	51.8	65.8	54.4	54.4	48.6
Thiamine (mg)						
Intake	0.88	0.80	1.08	0.79	0.77	0.69
RNI	1.01	1.03	1.02	1.02	1.01	1.01
% adequacy	87.1	77.7	106.2	77.3	76.6	68.0
Riboflavin (mg)						
Intake	0.67	0.62	0.70	0.64	0.61	0.57
RNI	1.05	1.07	1.06	1.06	1.05	1.05
% adequacy	63.8	57.4	65.6	60.1	58.4	54.4
Niacin (mg)						
Intake	21.3	18.3	21.7	16.2	19.4	16.8
RNI	13.0	13.2	13.1	13.1	12.9	13.0
% adequacy	163.5	138.6	165.1	124.1	149.6	129.5
Ascorbic acid (mg)						
Intake	52.8	47.2	45.9	50.1	38.1	37.7
RNI	60.8	62.3	61.6	61.3	60.7	60.7
% adequacy	86.9	75.7	74.4	81.8	62.8	62.1

Nutrients	Region				
	Northern Mindanao	Davao	Soccsk-Sargen	Caraga	ARMM
Energy (kcal)					
Intake	1 955	1 998	1 911	1 898	1 683
RNI	1 994	1 948	1 980	1 898	1 874
% adequacy	98.0	102.6	96.5	100.0	89.8
Protein (g)					
Intake	57.7	59.0	56.8	52.6	47.4
RNI	58.1	56.9	57.2	55.4	53.7
% adequacy	99.3	103.8	99.2	94.9	88.3
Iron (mg)					
Intake	9.9	10.4	9.3	9.8	7.5
RNI	16.6	16.9	16.8	16.2	16.0
% adequacy	59.2	61.3	55.6	60.8	46.8
Retinol equivalent (mcg)					
Intake	399.3	451.5	380.0	597.9	236.2
RNI	505.0	504.1	502.0	495.6	484.7
% adequacy	79.1	89.6	75.7	120.7	48.7
Calcium (g)					
Intake	0.46	0.45	0.41	0.44	0.32
RNI	0.77	0.76	0.77	0.75	0.75
% adequacy	59.6	58.5	53.2	58.1	43.3
Thiamine (mg)					
Intake	0.83	0.87	0.83	0.80	0.59
RNI	1.05	1.03	1.03	1.00	0.97
% adequacy	78.8	84.9	80.9	79.9	61.6
Riboflavin (mg)					
Intake	0.67	0.76	0.66	0.72	0.53
RNI	1.10	1.08	1.08	1.05	1.01
% adequacy	61.2	70.9	61.0	69.2	52.9
Niacin (mg)					
Intake	19.8	21.8	22.3	19.4	19.1
RNI	13.5	13.2	13.3	12.9	12.3
% adequacy	146.6	165.1	167.9	151.1	155.3
Ascorbic acid (mg)					
Intake	62.0	61.8	48.1	52.8	31.8
RNI	63.4	62.4	62.3	60.3	57.7
% adequacy	97.8	99.1	77.3	87.6	55.1

Sample size: 5 514.
Source: NNS, 2003.

ANNEX 10: TRENDS IN LEADING CAUSES OF MORTALITY AND PERCENTAGE OF TOTAL DEATHS, 1970 TO 2000

Cause	1970		1975		1980		1985		1990		1995		2000	
	Rate	% of total	Rate	% of total	Rate	% of total	Rate	% of total	Rate	% of total	Rate	% of total	Rate	% of total
Pneumonias	118.2	17.6	102.0	16.0	93.6	15.2	96.7	15.8	66.3	13.1	49.0	10.4	42.7	8.9
Diseases of the heart	34.0	5.0	56.6	8.9	60.8	9.8	10.8	66.3	74.4	14.7	73.2	15.5	79.1	16.5
Tuberculosis, all forms	80.1	11.9	69.2	10.9	59.6	9.7	57.9	9.5	39.1	7.7	39.4	8.3	36.1	7.5
Diseases of the vascular system	35.8	5.3	31.8	5.0	43.8	7.2	49.7	8.1	54.2	10.7	56.2	11.9	63.2	13.2
Malignant neoplasms	25.7	3.8	29.4	4.6	33.2	5.4	33.2	5.4	35.7	7.1	41.5	8.8	47.7	9.9
Accidents	24.8	3.7	19.1	3.0	18.7	3.0	18.4	3.0	6.4	1.3	23.0	4.9	42.4	8.8
Avitaminosis and other nutritional deficiencies	25.5	3.8	26.0	4.1	15.3	2.5	13.0	2.1	-	-	-	-	-	-
Nephritis, nephrotic syndrome and nephrosis	-	-	-	-	9.3	1.5	10.0	1.6	8.3	1.6	9.6	2.0	10.4	2.2
Other infectious diseases (gastroenteritis and colitis, bronchitis, diarrhoeas, measles)	62.9	9.2	43.0	6.8	38.6	6.2	35.8	5.8	17.6	3.5	-	-	-	-
Lifestyle-related diseases (COPD and allied conditions, other diseases of the respiratory system, diabetes)	-	-	-	-	-	-	-	-	-	-	36.1	7.7	54.7	11.3
Other diseases (ill-defined disease peculiar to early infancy, tetanus, septicaemia)	19.1	2.8	10.0	1.6	-	-	-	-	9.4	1.9	-	-	-	-

Rates are given per 100 000 of population.

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

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INTRODUCTION

South Africa is a middle-income country with a variety of living conditions ranging through wealthy and middle-income suburbs, deprived peri-urban areas, rural farms and undeveloped rural areas. Changing social, political and economic factors have resulted in increased urbanization and changes in diet and health behaviours. Estimates for South Africa show that despite the high burden of infectious diseases, non-communicable diseases (NCDs) account for a large proportion of deaths. In 2000, infectious diseases accounted for 44 percent of deaths, and HIV/AIDS alone for 29 percent (Bradshaw *et al.,* 2003). NCDs accounted for 37 percent of deaths; cardiovascular disease (CVD) and diabetes accounting for 19 percent, and cancers for a further 7.5 percent. In contrast, nutritional deficiencies related to undernutrition accounted for 1.2 percent of deaths. As a result of the relatively high burdens of injuries and HIV/AIDS, the burden of disease in South Africa has been described as a "quadruple burden" of conditions related to underdevelopment, emerging chronic diseases related to unhealthy lifestyles, HIV/AIDS, and injuries.

This case study provides data from published research of diet, dietary trends, nutritional status and diet-related chronic diseases in South Africa over recent decades. These are assessed in the context of trends in the communicable disease burden. A review of the changes in diet and the health transition experienced in South Africa could contribute to the development of a national strategy with a strong dietary policy component that would be effective in the long term.

Brief historical background

South Africa has a heterogeneous population of approximately 46 million people of diverse origins. Historically, people of Khoi, San, Bantu, European and Indian descent pioneered the country, and at present more than a million people 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 organized religion is Christianity, and others include Islam, Hinduism and Judaism. In addition, many people follow a "traditionalist" belief system (Department of Health, SAMRC and Measure DHS+, 2002). The 2001 census (Statistics South Africa, 2003) incorporated the following self-classified and self-reported population groups: black/African (79 percent), coloured/mixed origin (8.9 percent), white (9.6 percent) and Asian/Indian (2.5 percent).[1]

[1] These population group classifications reflect self-reporting according to groups defined by the Population Registration Act of 1950. This classification highlights issues that reflect the effects of historical disparities, and the authors do not subscribe to it for any other purpose. The terms "black" and "African" are used interchangeably.

Segregation and discrimination had 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 1980s, escalating conflict, civil unrest, changes in the ideology of the then-ruling National Party, declining economic growth and international sanctions contributed to the creation of 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 and 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 (Figure 1), and a new governing system has been established at the national, provincial and local levels (Blaauw and Gilson, 2001).

The development challenge faced by South Africa is enormous. While aiming to build a society based on human rights and social justice, the country 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, strategies to promote economic growth are likely to reduce the likelihood of eliminating these inequalities in the near future (Terreblanche, 2004).

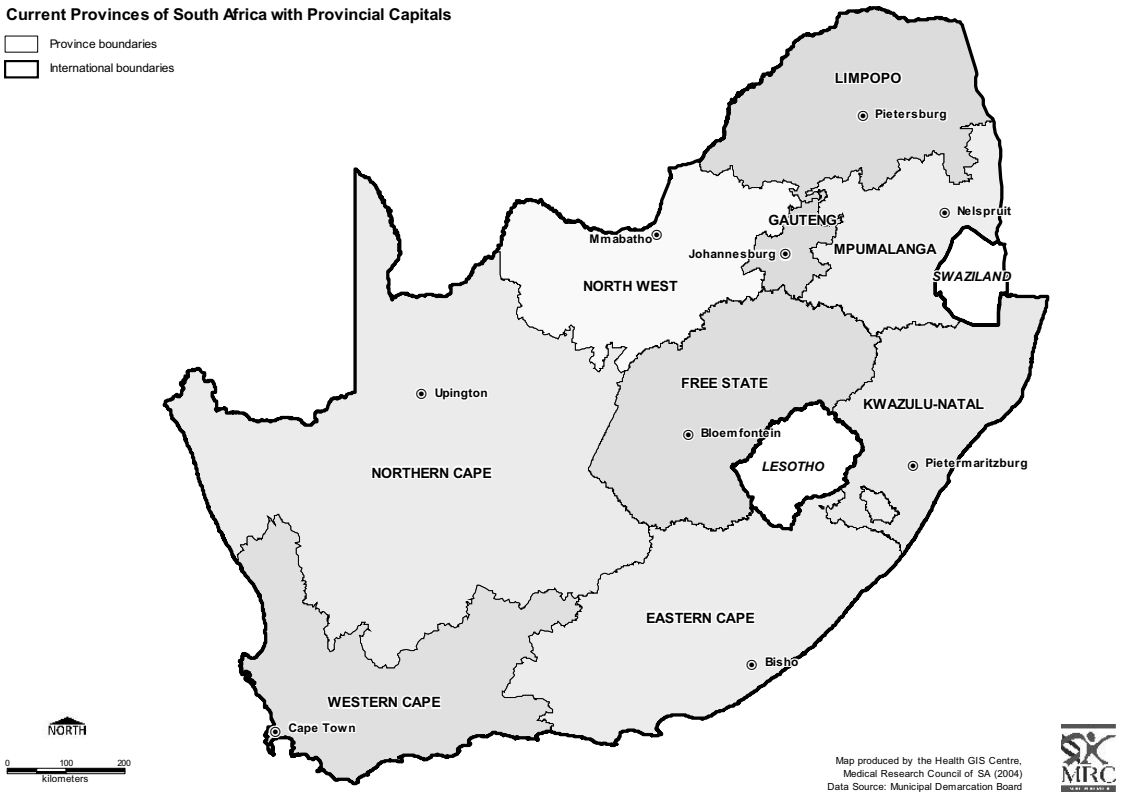
Demographic and socio-economic indicators

The dietary and individual risk behaviour of people 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 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 diverse roles in nutrition and health.

Selected demographic indicators

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 the processes and products of vital registration systems, but sources of complete and reliable vital statistics remain difficult to achieve (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 under even optimal circumstances. The internationally acknowledged model of the Actuarial Society of South Africa (ASSA) has the best potential for the purposes of this case study, which has used the ASSA2002 suite of models when empirical data were not available or reliable. Details of the models and their assumptions are available on the Internet at www.assa.org.za.

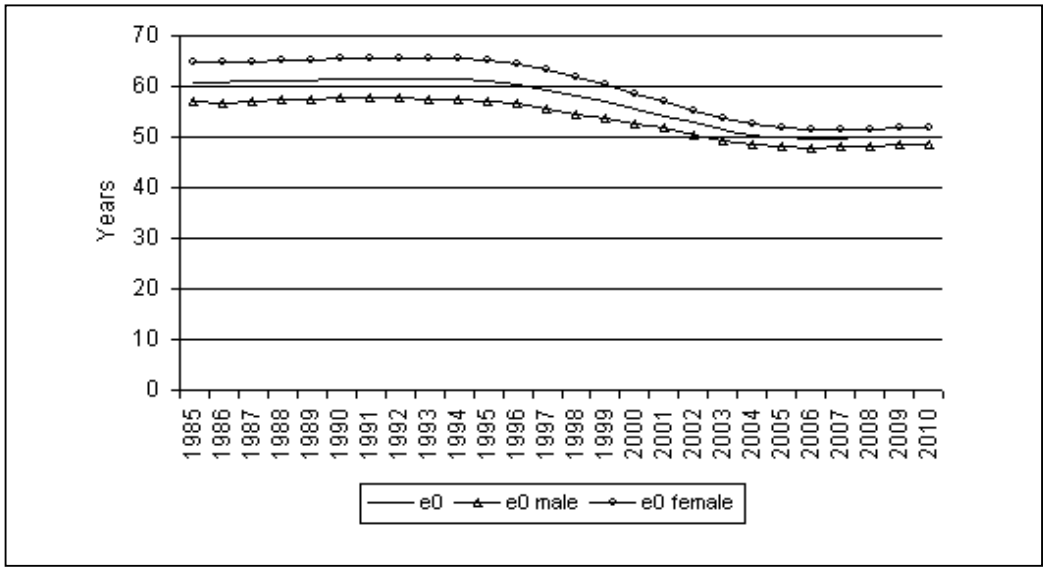
FIGURE 1
Current geographic composition of South Africa



Source: HSRC, 2003.

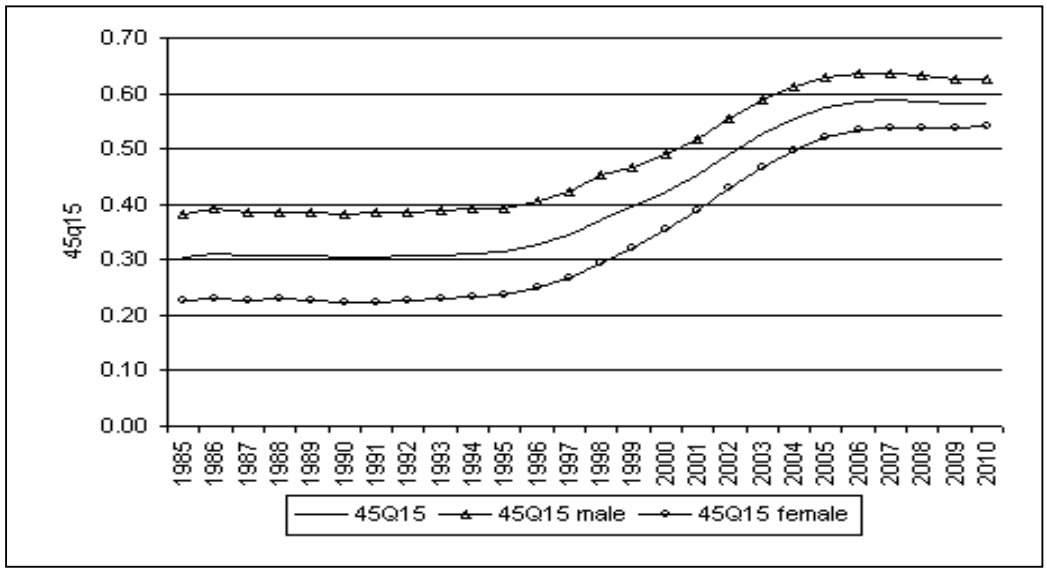
Life expectancy and adult, child and infant mortality rates: After a steadily increasing average life expectancy at birth throughout the 1980s, the mortality impact of the country's severe AIDS epidemic is evident in the considerable drop in life expectancy in the early 1990s, from 61.6 years in 1992 to 49.7 in 2006, and is also reflected in increased infant and child mortality. The harshness of the impact on women is made clear by the unusually rapid narrowing of the difference between female and male life expectancy, from eight years in the early 1990s to less than four years in 2010 (Figure 2). 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 will not live another 45 years to reach 60 years of age (Figure 3). The infant and child mortality rates do not reflect the country's middle-income economic status, particularly since the AIDS epidemic. However, assuming dedicated efforts to prevent vertical HIV transmission in the model, a recovery to and improvement of pre-AIDS trends in infant and child mortality are projected (Figure 4).

FIGURE 2
Average life expectancy at birth, 1985 to 2010



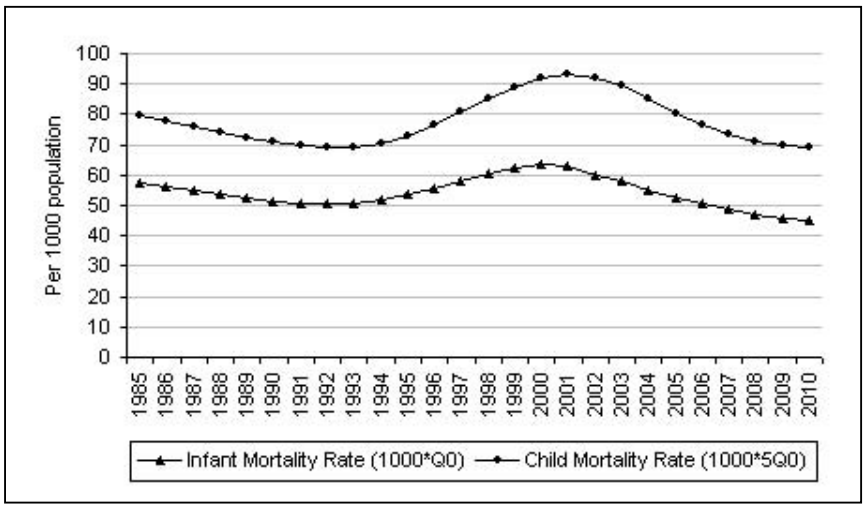
Source: ASSA2002 (ASSA, 2004).

FIGURE 3
Adult mortality,[1] 1985 to 2010



[1] *n*q*x* represents the proportion of people in a particular cohort who are alive at the beginning of an indicated age interval (*x*) and who will die before reaching the end of that age interval (*x* + *n*). In other words, the *n*q*x* values stand for the probability that a person at his/her *x*th birthday will die before reaching his/her *x* + *n*th birthday. So, 45q15 represents the probability that people aged 15 years will die before they reach the age of 60 (or 15 + 45). This can also be called "premature adult mortality". The 45q15 is widely used as a demographic indicator of adult mortality.
Source: ASSA2002 (ASSA, 2004).

FIGURE 4
Infant and child mortality rates, 1985 to 2010



Source: ASSA2002 (ASSA, 2004).

Total population and fertility rates: South Africa's total fertility rate has been declining for several decades, and is currently estimated at 2.6 children born alive per woman during her reproductive lifetime, indicating that the population is well-advanced in its fertility transition (Moultrie and Timæus, 2003). With increasing mortality rates and decreasing fertility and birth rates, the average annual growth rate of the total population is projected to decline dramatically over a short period. These demographic changes reflect an epidemic with a vast impact. Figures 29 and 30, presented in another section of this case study, convey part of the vastness by illustrating the projected numbers of HIV-infected and AIDS-sick people, and showing the huge mortality from AIDS alone compared with that from all other diseases, disabilities and injuries combined.

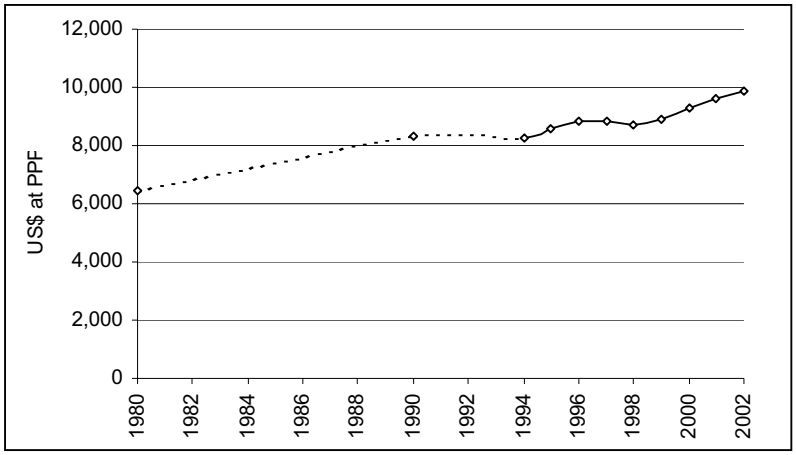
Urbanization trends: Urbanization and other migration patterns are perceived as important issues in health and nutrition, but relationships and patterns of migration are complex in South Africa, and suitable data sources are very scarce. The 1996 population census provides data on internal migration for the entire population for the first time, but the absence of suitable data prior to this has constrained the analysis of migration data over time (Kok *et al.,* 2003). Urbanization, in particular, has different histories for the country's four main population groups, with the urbanization levels of black South Africans diverging most prominently from those of other groups. Until July 1986 when it was abolished, "influx control" legislation prevented the black population from settling permanently outside the independent and self-governing states. The "group areas" legislation, repealed in June 1990, enforced the resettlement of millions of South Africans, mostly black African people (Gelderblom and Kok, 1994; Kok *et al.,* 2003). These and other political controls and legislation were directed not only towards restricting black migration, but also towards controlling black labour (Terreblanche and Nattrass, 1990). By 2001, almost 90 percent of the white and coloured population and nearly 100 percent of the Indian population were urbanized, compared with about 50 percent of the black population (P. Kok, personal communication, 2004).

Selected socio-economic indicators

Gross domestic product (GDP): Sufficient, safe and varied food supply can prevent under- and overnutrition and reduce the risk of chronic disease. However, there is also evidence that poverty and inequity are part of the root causes of malnutrition (WHO, 2003). South Africa's per capita GDP, corrected for purchasing power parity (PPP) at US$11 240 per year in 2001, placed it among 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); this indicator had deteriorated to 0.69 in 2000, making South Africa 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 for domestic and farm workers (cf. Department of Labour, 2002).

Figure 5 shows the country's per capita GDP, corrected for PPP, which has increased steadily since the 1980s. However, such macroeconomic indicators conceal important concerns that may affect community or individual nutritional status and well-being. For example, in 1993, 19 million people – almost half of the country's population – were categorized as poor (Klasen, 1997 cited in May, 1998), and 11.5 percent of the population were living on less than PPP$1 per day, while 35.8 percent lived on less than PPP$2 (World Bank, 2000 cited in May, 2004). In a rigorous analysis of poverty and related data, Woolard and Leibbrandt (2001 cited in May, 2004) used 1995 data to indicate that the situation continues to be bleak, with 40 to 50 percent of South Africans categorized as poor, including 25 percent 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 and May, 2003; Meth and Dias, 2004 – all cited in May, 2004).

FIGURE 5
GDP per capita: 1980, 1990 and annual values for 1994 to 2002

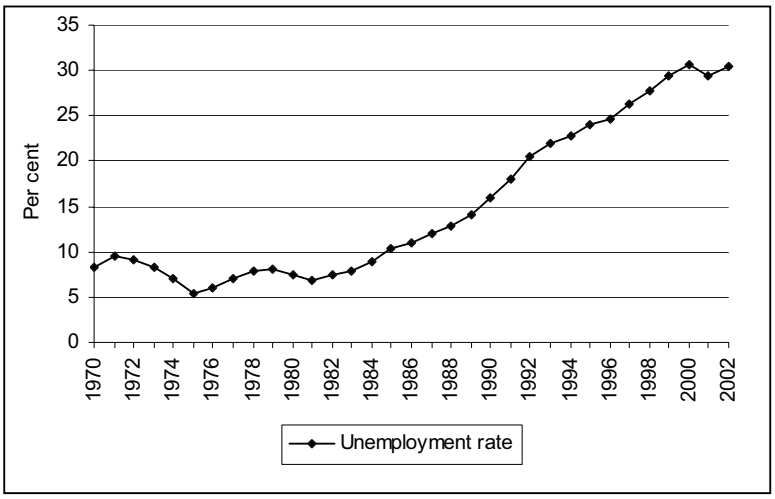


Data points for 1981 to 1989 and 1991 to 1993 are interpolated.
Source: Quatec Dataset in UNDP, 2003.

Unemployment: Differing conceptual, methodological, theoretical and ideological positions can influence the measuring of unemployment, and this seems to be particularly true in South Africa (Archer *et al.,* 1990). However, there is wide consensus that the unemployment rate has increased considerably over the past three decades (Figure 6). Since the mid-1970s, every year there have been fewer wage jobs available than the

number of people entering the labour market (Archer *et al.,* 1990). Towards the turn of the century this observation was highlighted by May (1998), who said that 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, after ten years of democracy the rate of unemployment had risen significantly – whether unemployment be defined broadly or narrowly (HSRC, 2003).

FIGURE 6
Unemployment rates, 1970 to 2002



Sources: South African Reserve Bank Quarterly Bulletin 2003, q1; EIU Country Data; World Bank Global Development Indicators; and IMF Financial Statistics – reported in UNDP, 2003.

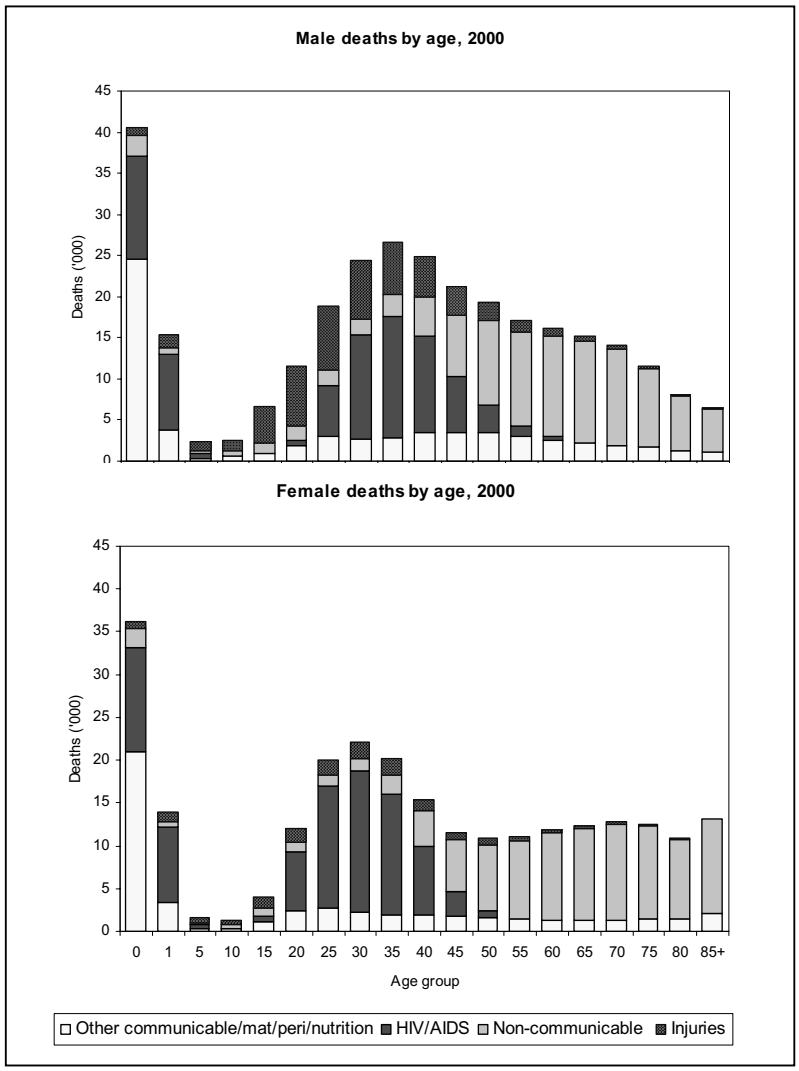
Housing and sanitation: The environment that people live in has the potential to aggravate or promote their health. Despite improvements over the past decade, almost a third of South Africa's households live in informal and traditional dwellings, about a third have piped water inside their homes, slightly more than half use a flush or chemical toilet, and 14 percent have no toilet. A considerable number of households continue to lack basic services, and much still has to be done to enhance the country's inherited skewed system of access to these services.

Burden of disease

The initial burden of disease study of 2000 (Bradshaw *et al.,* 2003) provides 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 underregistration of deaths and the misclassification of causes. Figure 7 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 clear. Communicable diseases occur across all ages, while injuries affect particularly young adult men. NCDs occur in adult age groups. More such deaths occur under the age of 60, reflecting the age structure of the population. The South African National Burden of Disease Study (SANBDS) estimates that in 2000 NCDs accounted for 37 percent of deaths, followed by HIV/AIDS, which accounted for 30 percent. NCDs accounted for 40 percent of female and 36 percent of male deaths. Stroke is the most common fatal NCD among women, and ischaemic heart disease (IHD) among men. Hypertensive heart disease, diabetes mellitus and chronic obstructive pulmonary disease were also among the leading causes of fatal

NCDs in 2000. These conditions coexist with low birth weight, protein–energy malnutrition and other infectious diseases as leading causes of death.

FIGURE 7
Male and female deaths by age and cause, 2000



Source: 2000 SANBD in Bradshaw *et al.,* 2003.

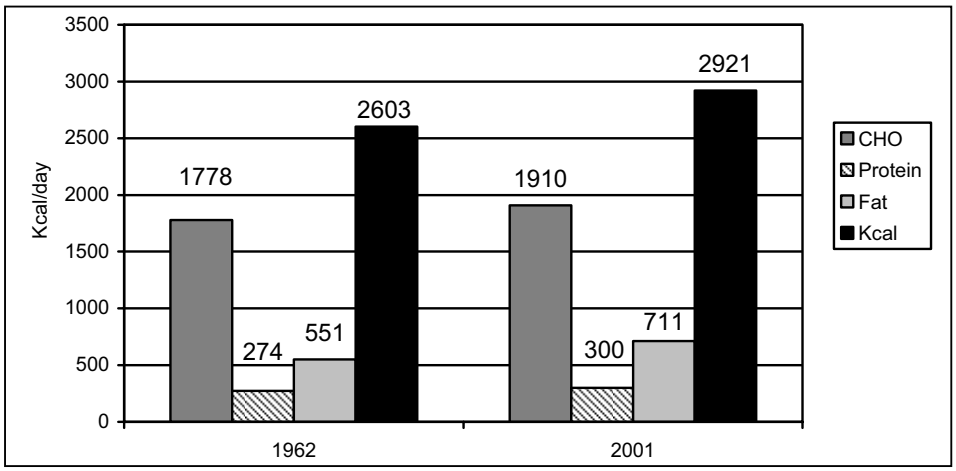
DIETARY TRENDS AND ASSOCIATED RISK FACTORS

Changes in total dietary energy, carbohydrate, protein and fat intakes

The food balance sheets for 1962, 1972, 1982, 1992 and 2001 were used to describe trends in per capita consumption and are presented in Annex 1 (FAO, 2004). The contributions of different macronutrients to total energy intake are shown in Figure 8. These ratios have not changed much, even though the available per capita energy supply has increased by more than 300 kcal. It is important to remember that food balance sheets present total amounts of food available (not consumed) and do not account for how commodities are distributed according to region, socio-economic sector, gender or 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.

FIGURE 8
Trends in dietary energy supplies from fat, protein and carbohydrate (CHO), 1962 and 2001



Source: FAO, 2004.

However, certain trends emerge for the 40-year period (Annex 1). The per capita available energy supply increased from 2 603 kcal/day in 1962 to 2 921 kcal in 2001, available protein supplies increased from 68.4 to 75.1 g, fat from 61.2 to 79 g, and available carbohydrate supplies from 445 to 478 g. The implication is that at the national level more food is available to consumers. However, the increase in fat availability per capita may be detrimental to health from a chronic diseases perspective.

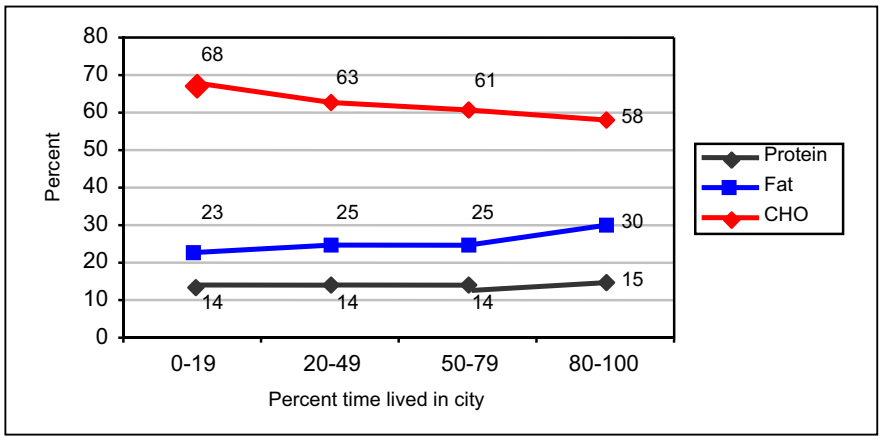
The first nationally representative dietary study in South Africa – the National Food Consumption Survey (NFCS) – was undertaken in 1999 (Labadarios *et al.,* 2000). It was a cross-sectional survey of children aged one to nine years, with provincial representation drawing on the 1996 census data. The aim of the survey was to collect baseline data from which to formulate appropriate policy guidelines for food fortification, as well as to develop appropriate nutrition education material for South African children. The final sample comprised 2 894 children, with a response rate of 93 percent. Socio-demographic, dietary and anthropometric data were collected for each participant.

As the NFCS was the first national dietary study in South Africa, it is not possible to compare macronutrients over time in a reliable manner. However, by examining two studies, one in adults and one in schoolchildren, some changes can be deduced. Bourne (1996) examined the macronutrient intake of black adults living in Cape Town (Figure 9). Certain trends are noticeable, for example, the intake of carbohydrate calculated as percentage of total energy intake decreased from 61.4 to 52.8 percent as people spent more of their lives in the city.[2] In contrast, fat intake increased from 23.8 to 31.8 percent according to 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 to 16.7 g – with increased time living in the city.

[2] People living in a city all their lives have spent 100 percent in an urban area. Alternatively, people living in rural areas for most of their lives (50 years) with five years in the city have spent only 10 percent of their lives in an urban area.

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 higher fat and sugar intakes and lower carbohydrate and fibre intakes (Popkin, 2001).

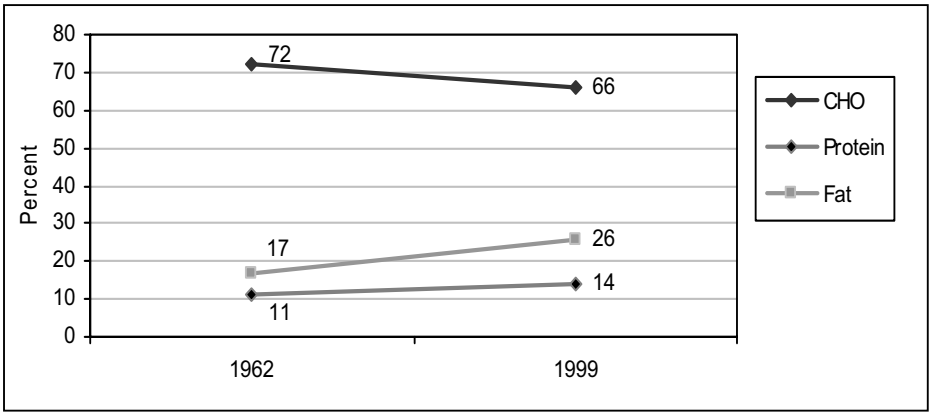
FIGURE 9
Changes in contributions of macronutrients to total energy intake among black adults (19 to 44 years) according to percentage of time lived in the city (Cape Town)



Sample size: 649.
Source: Bourne, 1996.

In urban areas of Gauteng, mean fat intake increased from 17 percent in 1962 to 25.8 percent in 1999, while carbohydrate intake decreased from 72 to 60.3 percent, as shown in Figure 10 (Lubbe, 1973; Labadarios *et al.,* 2000). Some differences between the two studies need to be kept in mind, however. Results from the 1962 study are reported for six- to nine-year-olds, using a modified diet history, while results from 1999 are for one- to nine-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 intakes have increased since 1962, as shown by the food balance sheets.

FIGURE 10
Macronutrient distribution as percentages of total energy consumed by black schoolchildren in urban areas of Gauteng in 1962 (six to nine years) and 1999 (one to nine years)



Sample sizes: 1962, 552; 1999, 427.
Sources: 1962 – Lubbe, 1973; 1999 – NFCS, 1999 (Labadarios *et al.,* 2000).

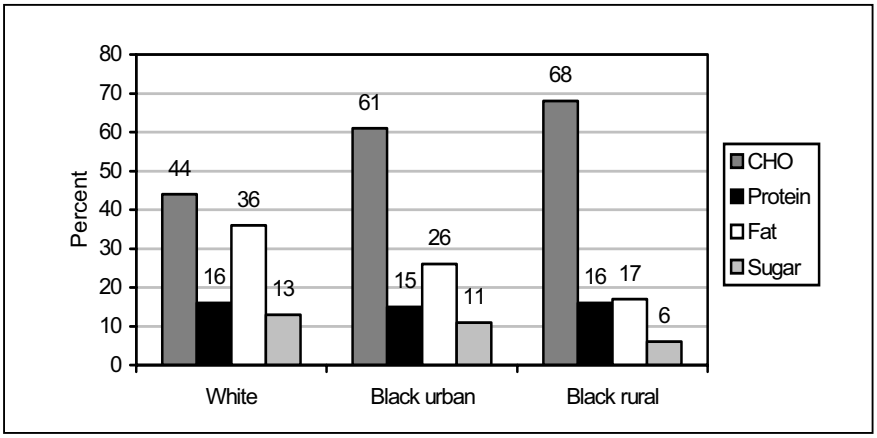
Differences in nutrient intake among ethnic groups and between urban and rural areas

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

In Figure 11, macronutrient distributions show marked differences among whites, urban blacks and rural blacks. White males (aged 35 to 44 years) have the highest intakes 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 of protein, fat and added sugar (Steyn *et al.,* 2001). Black urban males lie between the two extremes (Bourne *et al.,* 1993). This figure suggests that there is a diet transition among urban blacks from a traditional rural diet to an urban one that is approaching the completely Westernized diet of the white population. However, it should be remembered that the studies were not undertaken at the same point in time, which may have influenced the results.

FIGURE 11

Macronutrient distribution as percentages of total daily energy among adult white urban (15 to 64 years), black urban (19 to 44 years) and black rural (20 to 65 years) males



Sample sizes: white urban, 454; black urban, 285; black rural, 74.
Sources: white – Wolmarans *et al.,* 1989; black urban – Bourne *et al.,* 1993; black rural – Steyn *et al.,* 2001.

Table 1 shows the differences in dietary intake among all the main ethnic groups (males) in South Africa, with urban and rural subgroups for blacks (Bourne *et al.,* 1993; Langenhoven, Steyn and van Eck, 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 intakes 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 shows various transitions that have taken place in the black population (MacIntyre *et al.,* 2002).

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

TABLE 1
Comparison of macronutrient mean ranges in six dietary studies in adult males and females

Dietary factor	CORIS white rural n = 1 113 15–64 years	DIKGALE black rural n = 210 20–65 years	VIGHOR white urban n = 317 15–64 years	BRISK black urban n = 983 19–44 years	Indians urban n = 370 15–69 years	CRISIC coloured urban n = 276 20–34 years	WHO goals % energy
Energy (kJ)[1]	6.3–12.7	6.0–6.7	5.9–12.5	5.8–8.5	5–8.5	7.1–10.3	
Energy (kcal)	1 500–3 024	1 434–1 590	1 405–2 976	1 386–2 035	1 190–2 024	1 690–2 452	
Total fat (% E)[2]	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)[3]	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)[4]	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)[5]	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 /4.2kJ	-	76–117 mg /4.2kJ	290–440	≤ 300 mg/day

[1] kJ = kilojoules.
[2] E = energy.
[3] SFA = saturated fats.
[4] PUFA = poly-unsaturated fats.
[5] CHO = carbohydrate.
Sources: CORIS – Wolmarans *et al.,* 1988; DIKGALE – Steyn *et al.,* 2001; VIGHOR – Vorster *et al.,* 1995; BRISK – Bourne *et al.,* 1993; Indian Study – Wolmarans *et al.,* 1999; CRISIC – Langenhoven, Steyn and van Eck, 1988; WHO/FAO, 2003.

TABLE 2
Distribution of macronutrients in the diet of black South African males (15 to 80 years), by area and income

Dietary factor	Rural Low-income n = 194	Farm workers (rural) low-income n = 109	Urban (informal settlement) low-income 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 (kcal)	2 285	2 122	2 222	2 356	2 338	
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	

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

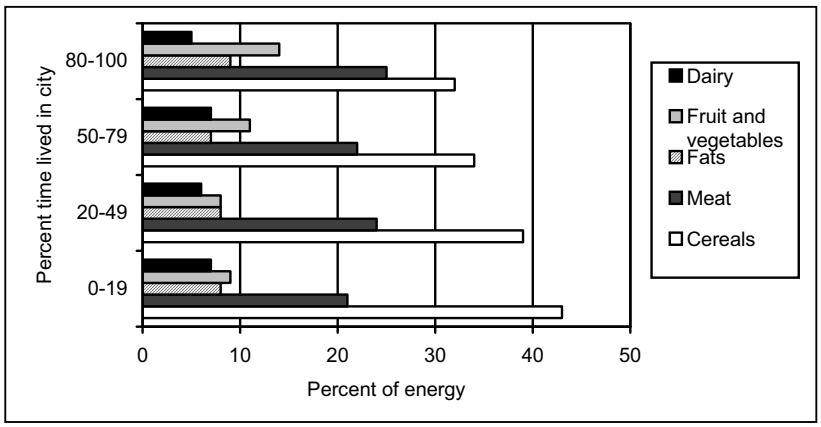
Changes in intakes of types of food and food groups over time

According to FAO data (Annex 1), cereal availability increased from 169.3 kg per capita per annum in 1962 to 187.8 kg in 2001; as did the availability of starchy roots (from 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 litres), meat (31.6 to 37.5 kg), eggs (2.5 to 6.1 kg) and fish (5.5 to 7.9 kg). Foods whose per capita availability decreased were sugar and sweeteners (from 39.4 to 32.8 kg), offal (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 reflect a number of scenarios. Availability of staple cereals gradually increased, as did that of other items mentioned in the previous paragraph; these increases account for the overall increase in energy intake. Vegetable oil and meat per capita also increased significantly, which accounts for the large increase in fat and saturated fat intakes. Of concern is the fact that vegetable availability remained constant (at 43.5 to 44.2 kg per annum). Overall fruit and vegetable availability was 185 g/day (excluding starchy roots), which is far less than the recommended intake of 400 g/day (WHO/FAO, 2003). This has serious implications, because low fruit and vegetable intake is a risk factor for many NCDs.

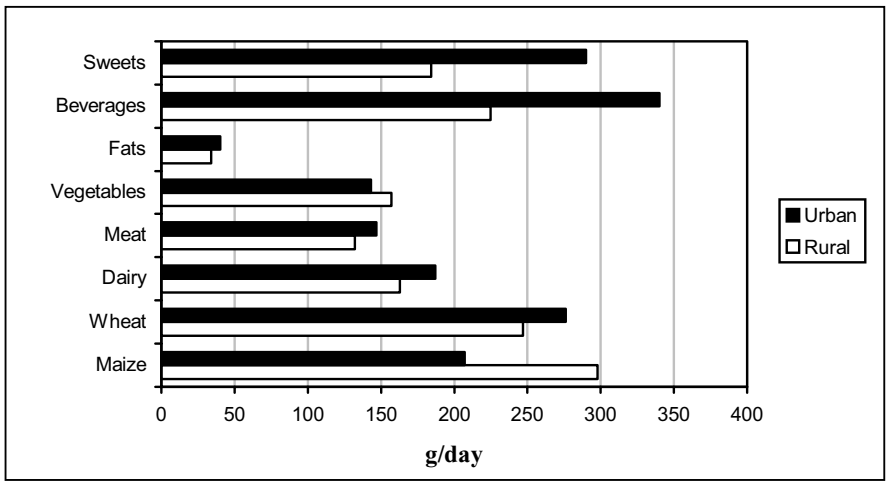
Among black adults, the amounts consumed from different food groups changed with increasing time spent in Cape Town, as shown in Figure 12. Groups for which consumption rose were meat, fruit and vegetables, fats and non-basic foods (such as drinks and sweets), while consumption from the dairy and cereal groups decreased. Similar findings are presented for young females in Figure 13. The higher consumption of sugar-containing food items in urban compared with rural areas is shown in Figure 14.

FIGURE 12
Percentage contributions of different food groups to energy, by time spent in Cape Town by black adults (19 to 44 years)



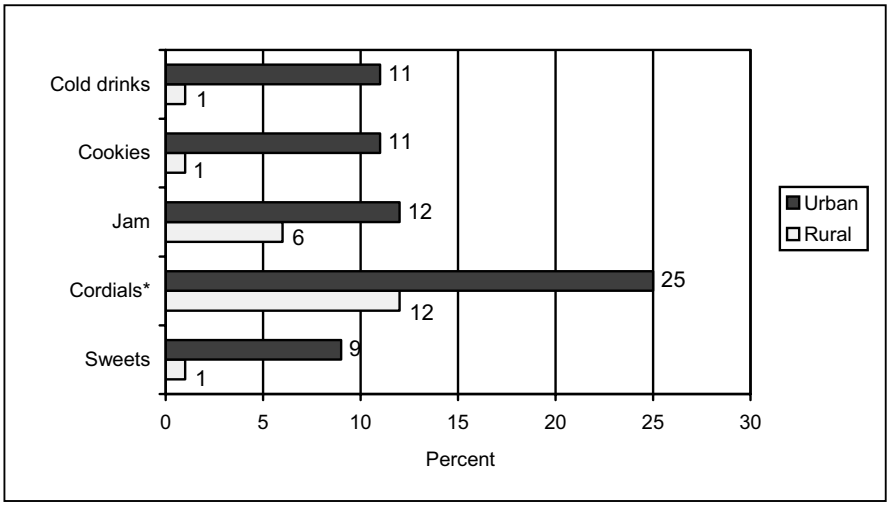
Sample size: 649.
Source: Bourne, 1996.

FIGURE 13
Food consumption of black female university students from urban and rural areas



Sample size: 115.
Source: Steyn *et al.,* 2000

FIGURE 14
Percentage consumption of sugar-containing items by children aged six to nine years



Sample size: 439.
Cordial = a drink made from sweet sucrose concentrate.
Cold drink = soft drink.
Source: NFCS in Labadarios *et al.,* 2000.

Current diet

The results from NFCS provide the first nationally representative dietary data for South Africa. Table 3 indicates the mean nutrient intakes of children and compares them with recommended nutrient intakes (RNI) (FAO/WHO, 2002). Overall, the energy intakes of both rural groups were less than the RNIs, as were the intakes of vitamins A and C, niacin, vitamin B_6 and zinc. For folate and calcium, urban and rural intakes were less than the RNIs. An important aspect of the study was the disparities in intakes between urban and rural areas. For most nutrients, the mean values in urban areas were significantly higher than those in rural ones.

To understand the dynamics of dietary change, the main food groups consumed by South African adults and children in urban and rural areas were examined (Table 4). In lieu of the lacking national data on adults, data from combined databases were summarized using secondary data analyses to show the dietary intakes of adults (Steyn *et al.,* 2001; Nel and Steyn, 2002) and children (aged one to five years) (Labadarios *et al.,* 2000). Although rural dwellers have higher cereal and vegetable intakes, urban adults and children far exceed the rural people's consumption of most other food groups, particularly sugar, meat, vegetable oil, dairy, fruit, roots and tubers and alcohol.

TABLE 3
Mean nutrient intakes of children

Nutrient	Children 1–3 years (n = 1 308)			Children 4–6 years (n = 1 083)		
	Urban	Rural	RSA	Urban	Rural	RSA
#Energy (kJ)	4 403 (2 043)	3 992* (1 790)	4 200 (1 933)	5 614 (2 375)	4 963* (2 283)	5 271* (2 349)
Energy (kcal)	1 048 (486)	950* (426)	1 000 (460)	1 337 (565)	1 182* (544)	1 255* (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 (1 313)	319* (1 007)	425* (1 167)
#Vitamin C (mg)	41 (96)	20* (36)	31* (73)	36* (65)	29* (78)	33* (72)
Thiamine (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 B 12 (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) RNI.
# = significant urban/rural differences ($p < 0.01$).
Source: Steyn *et al*. in Labadarios *et al.,* 2000

TABLE 4
Adults' and children's consumption, by food group and residence

Food group	Adults and children 10+ years (n = 817)			Children 1–5 years (n = 2 048)		
	RSA g/day	Urban g/day	Rural g/day	RSA g/day	Urban g/day	Rural g/day
Cereals	870	736	1 023	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 and tubers	40	59	19	29	32	27
Nuts and 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

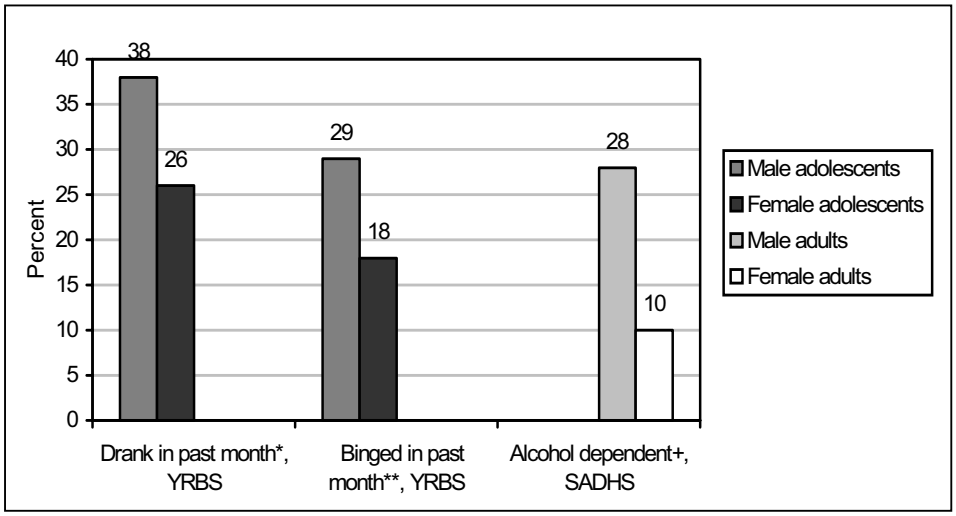
Source: Nel and Steyn, 2002.

Changes in alcohol intake

According to the food balance sheets, per capita alcohol consumption in South Africa increased between 1962 and 2001 (Annex 1). Certain trends are noticeable from two surveys carried out in the 1990s: SADHS in adults (Department of Health, SAMRC and Measure DHS+, 2002) and the Youth Risk Behaviour Study (YRBS) (Reddy *et al.,* 2003) in teenagers (Figure 15). YRBS found that more than 30 percent of teenagers had drunk and/or binged on alcohol in the preceding 30 days. According to SADHS, nearly 30 percent of adult males reported using alcohol excessively, based on the CAGE test (Ewing, 1984), compared with 10 percent of females. High alcohol consumption is a risk factor for chronic diseases such as stroke, diabetes and cancer of the oesophagus, liver and breast, and so needs to be addressed as an underlying determinant in the prevention of NCDs (WHO/FAO, 2003).

FIGURE 15

Prevalence of teenager (13 to 19 years) school attendees reporting drinking alcohol or bingeing in the past month, and prevalence of alcohol-dependent adults



* Consumed an alcoholic drink on one or more days during the previous month.
** Consumed five or more alcoholic drinks on one or more days during the previous month.
\+ According to the CAGE questionnaire.
Sources: YRBS; SADHS.

TRENDS IN NUTRITIONAL STATUS

Trends in the prevalence of undernutrition and protein–energy malnutrition

Nationally representative and comparable anthropometric data over time are only available for 1994 and 1999 in children and for 1998 in adults; hence, they do not show long-term trends. In order to obtain longer time trends, smaller localized studies have been used to provide comparisons with the 1994 and 1999 data on children. Data on one localized and two national studies undertaken in South Africa between 1986 and 1999 are shown in Table 5. Given the differences in children's ages, conclusions on trends should be interpreted cautiously. The 1986 study sampled black preschool children on farms in areas other than 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 democratization,

the health care services provided to the population in "homelands" were totally insufficient. In 1994, the South African Vitamin A Consultative Group (SAVACG, 1995) undertook a national study of preschool children, and the 1999 NFCS included school-going children. These studies showed similar results, with underweight ranging from 6.9 to 10.7 percent, stunting from 16.1 to 27 percent and wasting from 1.8 to 3.7 percent. Malnutrition prevalence was always higher in rural than urban areas. There appears to be a small improvement in the prevalence of stunting between 1994 and 1999 in these two nationally representative surveys.

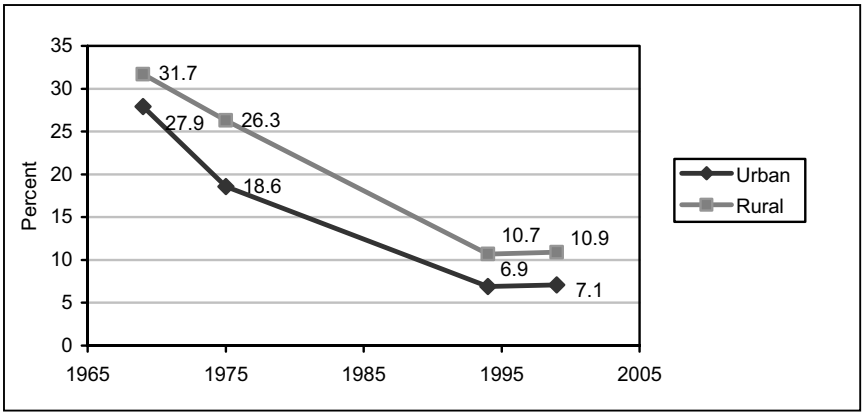
Two earlier studies (1969 and 1975) were undertaken as representative studies of the Transvaal, now partly Gauteng (Figure 16). These studies used the Harvard–3rd percentile as an indicator of underweight, while the later studies used the National Center for Health Statistics (NCHS) percentiles, and there are some discrepancies even though the two standards are very similar. There are large decreases in the prevalence of underweight in urban and rural areas until 1994. The smaller increases after 1994 in urban Gauteng are probably because of the large migration into this region following the lifting of migration restrictions.

TABLE 5
Prevalence of low weight-for-height, height-for-age and weight-for-age in children, 1986, 1994 and 1999

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

[1] Six to 71 months category not available.
[2] 12 to 96 months.
Sources: 1986 – Kustner, 1987; 1994 – SAVACG, 1995; 1999 – Labadarios *et al.,* 2000; Steyn *et al.,* 2005.

FIGURE 16
Prevalence of underweight in black preschool children (under 72 months), 1969, 1975, 1994 and 1999



Sample sizes: 1969, 2 073; 1975, 3 655; 1994, 11 238); 1999, 2 200.
Sources: 1969 and 1975 – Richardson, 1977; 1994 – SAVACG, 1995; 1999 NFCS – Labadarios *et al.,* 2000; Steyn *et al.,* 2005.

Trends in the prevalence of overweight and obesity

The prevalence rates of overweight and obese children at the time of NFCS 1999 are shown in Table 6. There were significant differences between urban and rural areas, among location domains and among age groups. Overweight was highest in formal urban areas and in children aged one to three years. The finding that overweight/obesity was higher in urban areas is an indication that the nutrition transition is under way, and that undernutrition and associated infectious diseases should not be the only health concern among policy-makers. The data show that the prevalence of combined overweight and obesity (17.1 percent) is nearly the same as that for stunting (21.6 percent) (Steyn *et al.,* 2005). Furthermore, stunting was associated with an increased risk (OR = 1.80, CI = 1.48–2.20) of being overweight (BMI $\geq$ 25) (Steyn *et al.,* 2005). This finding suggests that stunting in childhood predisposes to overweight or obesity when sufficient food becomes available. This poses a threat for the emergence of chronic disease risk factors when stunted children become obese adults.

TABLE 6
Percentages of children with BMI values ≥ 25 and ≥ 30 using the Cole *et al.* (2000) 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 = 2 200
% ≥ 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.
Source: 1999 NFCS in Steyn *et al.,* 2005.

SADHS (1998) was the first nationally representative health survey in adults aged 15 years and over, so in order to examine trends from previous years and compare with these data it is necessary to evaluate earlier studies that were representative of specific ethnic groups. Interpretation of these data should keep these limitations in mind. The earlier studies include a baseline study in 1979 on coronary heart diseases risk factors in white adults in three towns of the Western Cape Province (CORIS) (Jooste *et al.,* 1988), and similar studies in 1982 in the coloured population (CRISIC) (Steyn *et al.,* 1985), the black population in Cape Town (BRISK) (Steyn *et al.,* 1991) and the Indian population (Seedat *et al.,* 1990).

Figures 17 and 18 show the extent of obesity as a problem in men and women in South Africa. In women, the prevalence of obesity has remained high in all studies since 1979, particularly in black women, who show the highest prevalence. In men there appears to be a large increase in obesity in whites when the 1979 study is compared with that of 1998.

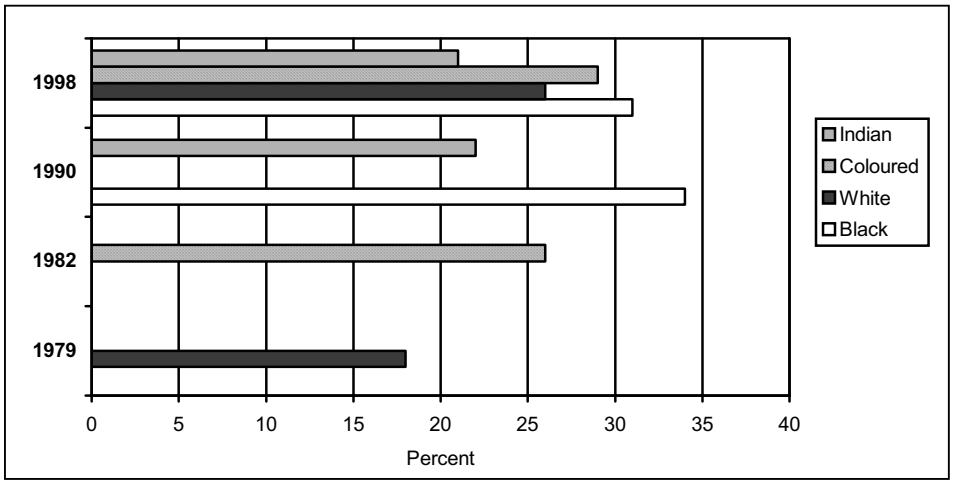
The most recent SADHS data on overweight and obesity in adults indicate that obesity increases with age until about 35 years in both men and women and declines from about 55 years. More than 40 percent of women aged 35 years and over are obese, and more than 20 percent of all women are overweight. For the ethnic groups, obesity is highest in black women and white men. At 12.9 percent and 5.6 percent, respectively, for men and women, the prevalence rate of underweight (BMI < 18.5) in adults is far lower than those of overweight and obesity (Department of Health, SAMRC and Measure DHS+, 2002).

The rising prevalence of obesity in South Africa gives cause for serious concern because of the increased risk of diabetes and CVD (WHO/FAO, 2003). These diseases have direct costs, which may be as high as 6.8 percent of total health care costs, as well as indirect costs, such as

workdays lost, doctor visits, impaired quality of life and premature mortality (WHO/FAO, 2003).

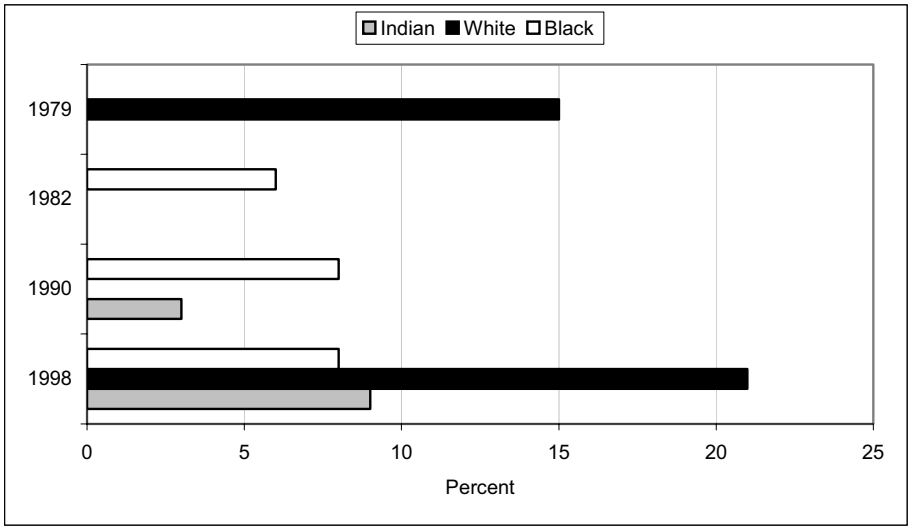
The data presented in this section of the case study illustrate that both over- and undernutrition exist in South Africa, with the extremes being most clearly seen among the black population.

FIGURE 17
The prevalence of obesity (BMI ≥ 30) in women, 1979 to 1998



Sample sizes : 1979, 3 831; 1982, 498; 1990, 544); 1998, 7 970.
Sources: 1979 – Jooste *et al.,* 1988; 1982 – Steyn *et al.,* 1985; 1990 – Seedat *et al.,* 1990; Steyn *et al.,* 1991; 1998 – Department of Health, SAMRC and Measure DHS+, 2002.

FIGURE 18
The prevalence of obesity (BMI ≥ 30) in men, 1979 to 1998



Sample sizes: 1979, 3 357; 1982, 478; 1990, 442; 1998, 5 558.
Sources: 1979 – Jooste *et al.,* 1988; 1982 – Steyn *et al.,* 1985; 1990 – Seedat *et al.,* 1990; Steyn *et al.,* 1991; 1998 – Department of Health, SAMRC and Measure DHS+, 2002.

Trends in micronutrient status

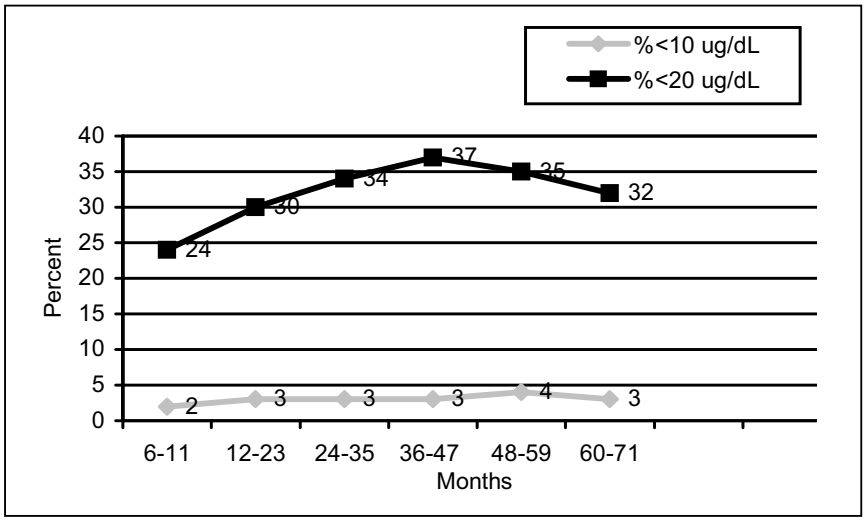
The nationally representative SAVACG survey in 1994 examined, among other factors, the vitamin A and iron status of children aged 0 to five years (SAVACG, 1995). This was the

first study to examine micronutrients in children at the national level. Micronutrient intakes of children will be measured again in 2005.

About 3 percent (Figure 19) of the sampled children showed serum vitamin A deficiency (VAD) (serum retinol < 10 ug/dl), while 33 percent were marginally deficient (serum retinol < 20 ug/dl) (SAVACG, 1995). Children in the 36 to 47 months age group were the most affected, with 11 percent having haemoglobin concentrations of less than 11 g/dl and 25 percent with low iron stores (ferritin < 12 ug/dl) (Figure 20). 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 the future.

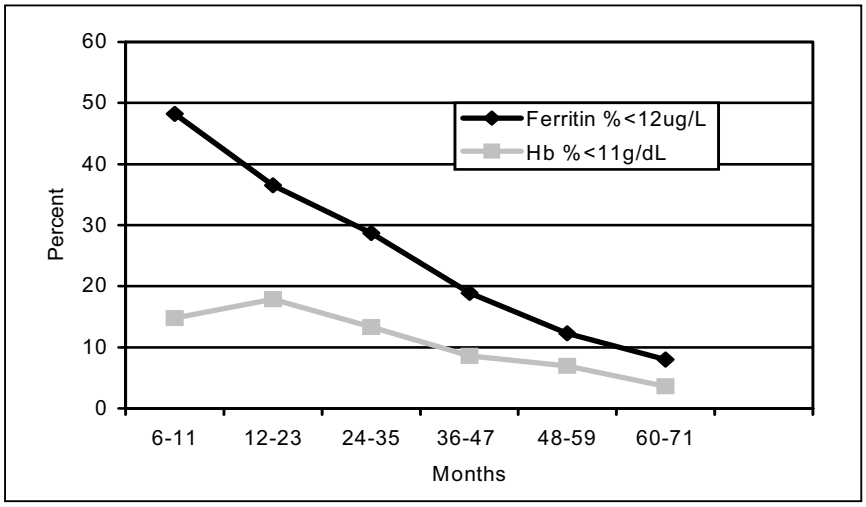
Results from an iodine deficiency survey in 1998 in primary schoolchildren show that within provinces between 0 and 42 percent of schools had children who were iodine deficient (Immelman, Towindo and Kalk, 2000) (Figure 21). Schools in rural areas of Mpumalanga and Limpopo provinces were most affected. The survey also found that mandatory salt iodization since 1995 had considerably improved the iodine status of children. However, there are still some minor weaknesses in the national salt iodization programme, such as the use of non-iodized salt in 6.5 percent of households and the under- or non-iodization of a substantial percentage of household salt.

FIGURE 19
Vitamin A status of children aged six to 71 months, 1994



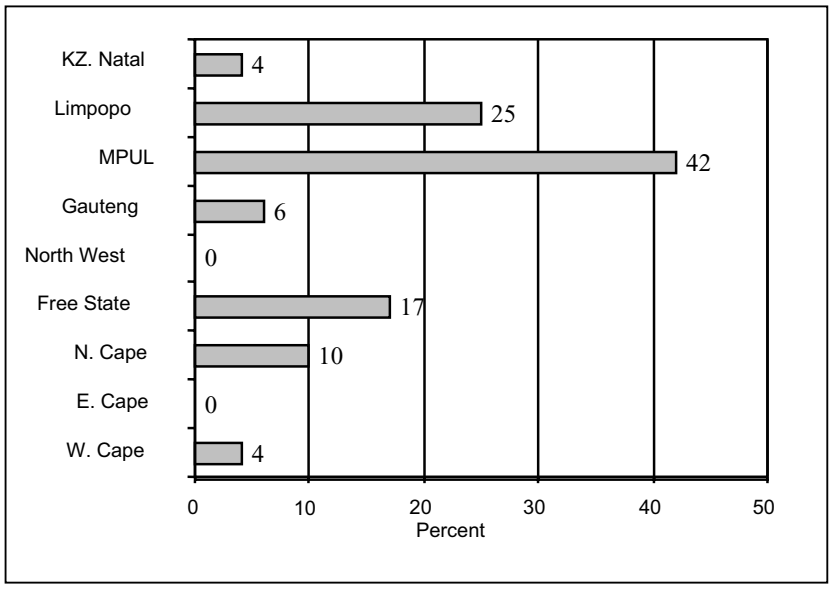
Sample size: 4 283.
Source: SAVACG, 1995.

FIGURE 20
Iron status of children aged six to 71 months, 1994



Sample size: 4 494.
Source: SAVACG, 1995.

FIGURE 21
Percent of schools whose students have low median urinary iodine, by province



Sample size: 179 schools.
Source: Immelman, Towindo and Kalk, 2000.

Micronutrient deficiencies continue to contribute to the burden of mortality in South Africa. Preliminary results of a study to assess the burden attributable to selected nutritional deficiencies estimate that in 2000 nearly 3 000 deaths to diarrhoea in children aged 0 to four years were attributed to VAD. Furthermore, about 200 maternal deaths were attributed to VAD in pregnant women, while more than 3 500 perinatal deaths and about 180 maternal deaths (0.7 percent of total deaths) were attributed to iron deficiency anaemia (IDA) (Nojilana *et al.,* in press).

No national data on biochemical deficiencies among adults are available. However, numerous localized studies have shown high prevalence of iron deficiency in women (Kruger *et al.,* 1994;

Dannhauser *et al.,* 1999) and of VAD, particularly in HIV-infected adults (Kennedy-Oji *et al.,* 2001; Visser *et al.,* 2003).

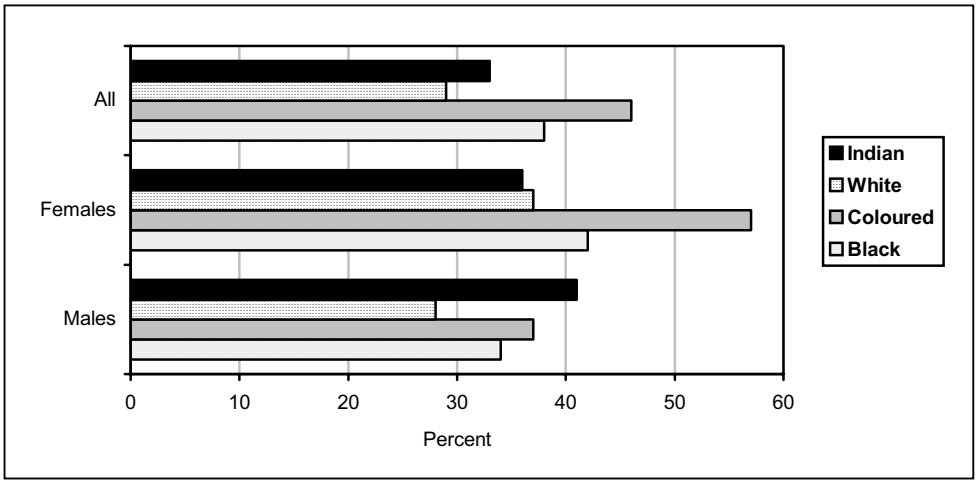
OTHER CHRONIC DISEASES AND ASSOCIATED LIFESTYLE RISK FACTORS

Physical inactivity

There is a paucity of data on the physical activity levels of South Africans, making it difficult to show trends over time. Figure 22 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 percent doing little or nothing. The high levels of inactivity go a long way to explaining the high levels of overweight, obesity and hypertension, particularly in women. Figure 23 reports data on inactivity in adults. With the exception of the black population, the prevalence of inactivity was very high (more than 90 percent), both at work and during leisure time.

FIGURE 22

Percentages of 13- to 19-year-olds reporting insufficient or no physical activity at work,* 2002

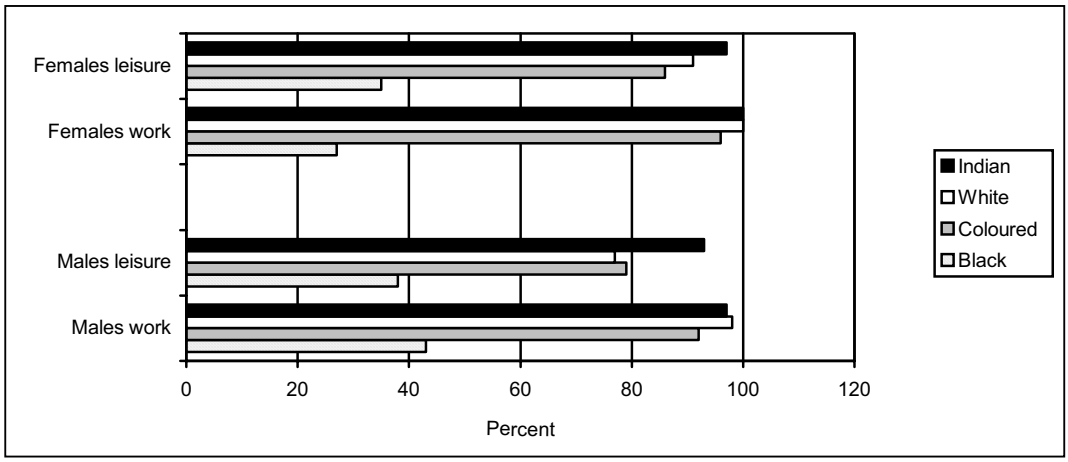


Sample size: 10 100.

* 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 seven days.

Source: YRBS, 2002 in Reddy *et al.,* 2003.

FIGURE 23
Percentages of 15- to 64-year-olds reporting insufficient or no physical activity at work (< 32 300 kJ/wk) and during leisure times (< 8 400 kJ/wk)



Sample sizes: white, 7 188; coloured, 976; black, 986; Indian, 778
Sources: white – CORIS in Rossouw *et al.,* 1983; coloured – CRISIC in Steyn *et al.,* 1985; black – BRISK in Steyn *et al.,* 1991; Indian – Seedat *et al.,* 1990.

All these studies identified physical activity patterns by means of questionnaires. The measurement of physical activity by questionnaires is challenging in large epidemiological studies. Consequently, the patterns shown here must be interpreted with caution, but the overall trends suggest that the Indian and white populations are the most inactive at work and leisure, while the black population is the least inactive.

Tobacco intake

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: tobacco control legislation and rapidly increasing excise taxes. Major legislative milestones include the Tobacco Controls Act, which was passed in 1993 and introduced health warnings on cigarette packets and advertisements. The act was amended in 1999 with the banning of all advertisements and prohibitions on smoking in all indoor public areas and on selling tobacco products to minors. In 1994, the government announced the phasing in of an increased excise tax, which added 50 percent to the retail price of tobacco. This resulted in a real increase of 256 percent in the excise tax per pack of cigarettes between 1994 and 2004; the real price of cigarettes increased by 127 percent over the same period. WHO's Tobacco Framework Convention has been ratified by South Africa and a 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).

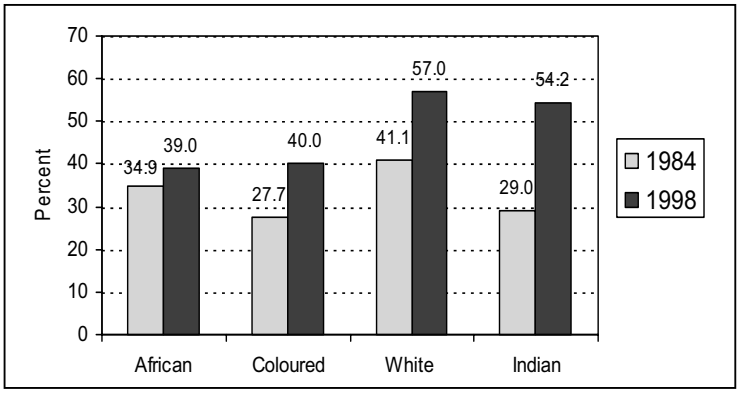
In 1992, Martin, Steyn and Yach reported that 31.5 percent of South Africans smoked. The prevalence rate peaked at 34 percent in 1995, as recorded by Reddy *et al.* (1998), declining steadily thereafter to reach 24 percent in 2003. The average number of cigarettes per smoker per year decreased from 229 packs in 1993 to 163 in 2003. Africans, males, young adults and poorer people experienced the most rapid decreases in smoking prevalence, while the decrease was less pronounced among whites, females and older and more affluent people.

Despite these positive trends, the prevalence of tobacco smoking is still high, particularly among youth. A recent survey found that the prevalence of cigarette smoking (daily and occasionally) was higher in 14-year-old adolescent males than females (21.5 versus 15.7 percent)

(Reddy *et al.,* 2003). At 16 years of age, 30.4 percent of males were already smoking cigarettes, rising to 38 percent in 18-year-old males.

In 1998, SADHS found that more than 39 percent of African, white, coloured and Indian adult males (15 years and over) smoked daily or occasionally, with the lowest prevalence in rural black males (37 percent). In rural areas, only 4 percent of black females smoked daily, compared with 6 percent in urban areas. The overall prevalence of daily smoking for females was lowest in the black population (5 percent) and highest among whites (27 percent) (Department of Health, SAMRC and Measure DHS+, 2002). Because tobacco use is a risk factor for heart disease and lung cancer, which are serious contributors to both morbidity and mortality in South Africa, it calls for preventive measures, particularly among youth. The finding that nearly one-third of 16-year-old males are current smokers is a serious concern. Figure 24 shows the prevalence of smoking in adult males for 1984 and 1998. The highest prevalence rates were in whites and Indians. Despite the finding that smoking prevalence peaked in 1995 (Reddy *et al.,* 1998), it is still considerably higher than it was in 1984.

FIGURE 24
Prevalence of smoking in adult males by population group, 1984 and 1998

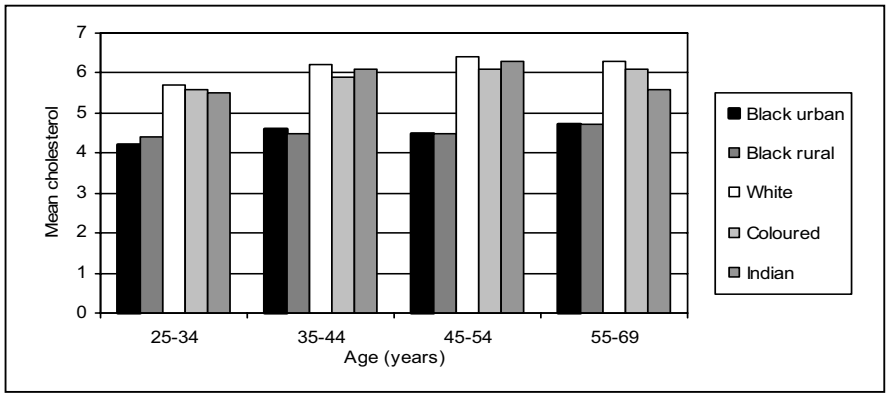


Sources: 1984 – Yach and Townshend, 1988; 1998 – SADHS.

Hypercholesterolaemia

No national surveys on serum cholesterol levels have been conducted. Figure 25 presents the results from four studies undertaken in different ethnic groups in localized settings. White men had the highest mean total cholesterol values, and black men the lowest. Indian and coloured men had similar mean values to those of 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 was a strong risk factor for CHD in South African men who are not black. These studies were conducted in the late 1970s and early 1980s, and it is not possible to say what trends and changes have taken place in the cholesterol values of black males since then.

FIGURE 25
Mean total serum cholesterol values (mmol/l) in adult males, by age and ethnic group

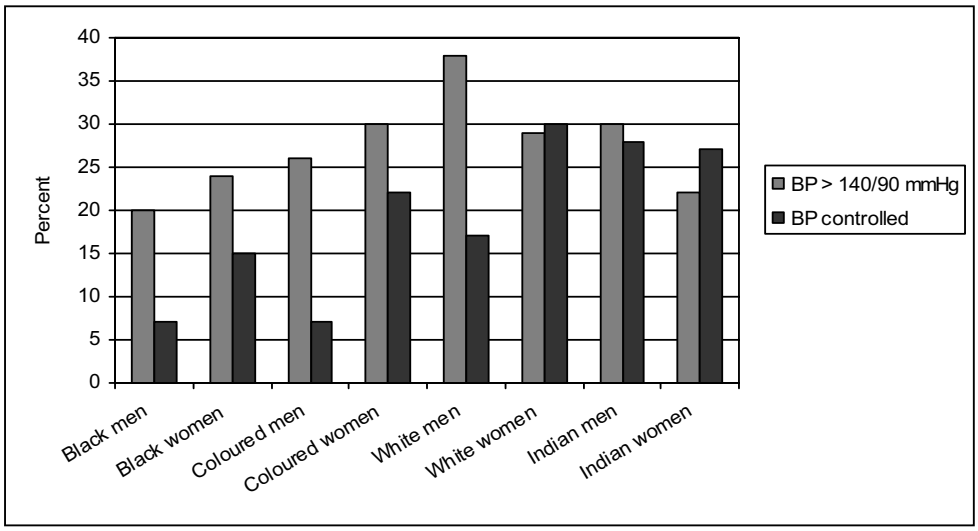


Sources: black – Norman *et al.,* unpublished data, 2005; white – CORIS in Rossouw *et al.,* 1983; coloured – CRISIC in Steyn *et al.,* 1985; Indian – Seedat *et al.,* 1990.

Hypertension

SADHS was the first national survey to measure blood pressure of adults, and its findings are presented in Figure 26. The lowest prevalence of hypertension (BP > 140/90 mmHg) was found in black men (20.2 percent) and the highest in white men (38 percent). Coloured and white women and Indian men also had very high prevalence, at close to 30 percent. 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, and the lowest in black men and coloured women. Fewer than 10 percent of the latter were found to be controlled. The high levels of hypertension illustrated in Figure 26, together with the high prevalence rates of obesity, tobacco use (shown earlier) and hypercholesterolaemia help to explain the high prevalence of CVD in adults.

FIGURE 26
Prevalence of hypertension (BP > 140/90 mmHg) in adults, 1998



Sample size: 2 049.
BP controlled = among those with hypertension, BP is < 140/90 mmHg, i.e. controlled.
Source: SADHS.

Cardiovascular diseases and diabetes

The poor quality of historical cause of death data makes it very difficult to assess trends in mortality. Bradshaw *et al. (*1995) calculated age-standardized deaths rates by population group for 1985, based on the deaths reported for the years 1984 to 1986 relative to population estimates for 1985. Rates for blacks were calculated for urban areas only because there was high underregistration of deaths for blacks in rural areas. These are compared with estimated death rates for 2000 (Bradshaw *et al.,* 2004). Figure 27 shows age-standardized mortality rates for IHD, stroke, hypertensive heart disease and diabetes in 1984 to 1986 compared with 2000, by population group. These comparisons must be interpreted carefully as the estimates for 2000 have been adjusted for misclassification and underregistration of deaths, but those for 1984 to 1986 have not. The increase in IHD across all groups is likely to be a result of the adjustment for misclassification of ill-defined cardiac causes in 2000. From Figure 27, it appears that hypertensive disease and stroke increased dramatically in the black population. Diabetes mortality increased in all ethnic groups, but most in the black population. The increased rates in the black population may be an artefact of the adjustment for underregistration of deaths in the 2000 estimate.

IHD was the main cause of mortality among CVDs and diabetes in white males between 1949 and 1985 (Bradshaw *et al.,* 1995). IHD mortality increased from 260 per 100 00 in 1949 to more than 300 per 100 000 between 1964 and 1979. It subsequently decreased from 312 per

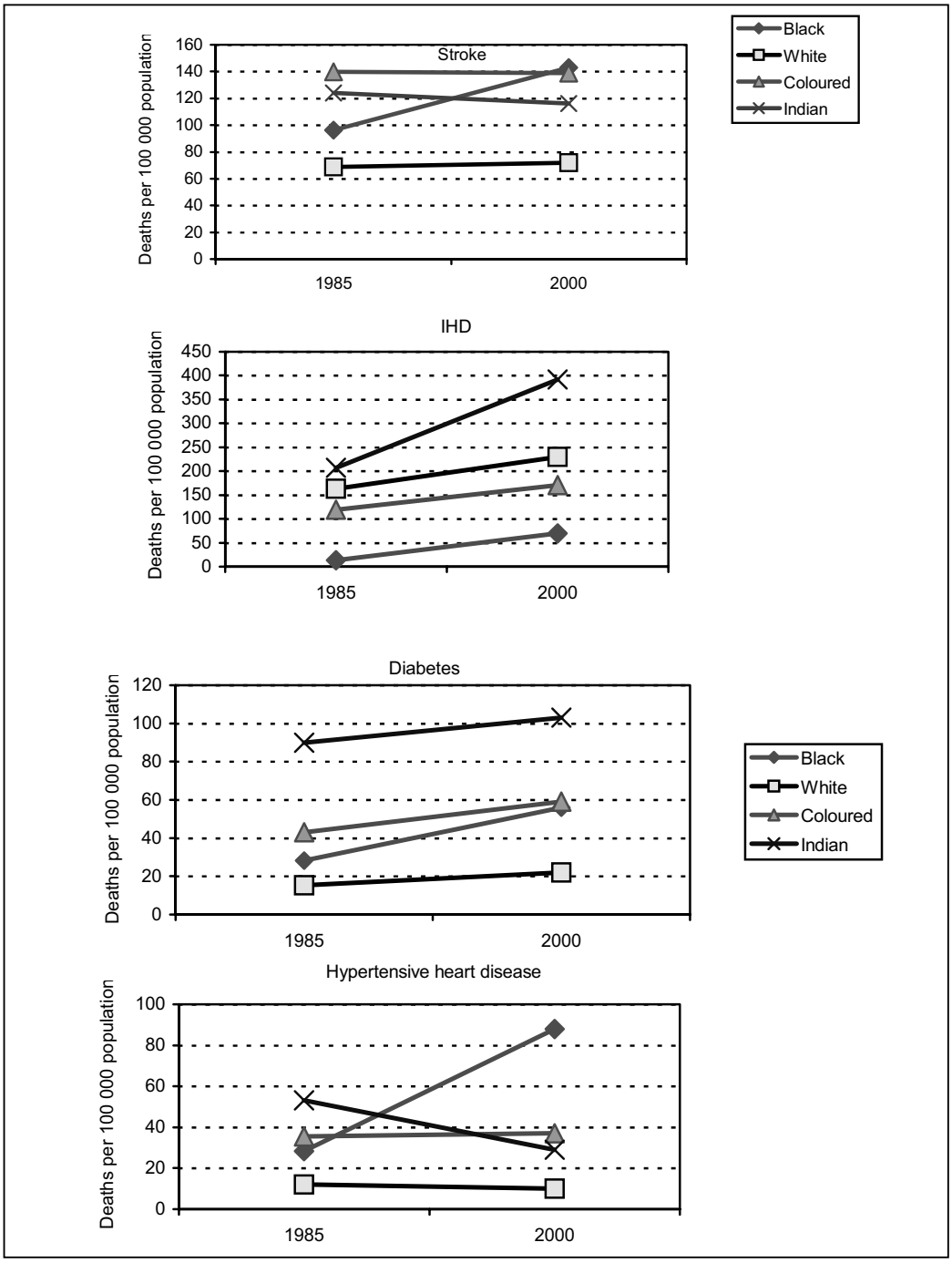
100 000 in 1978 to 139 in 1989 (Walker, Adam and Küstner, 1993). IHD was also the main cause of CVD mortality in white females, although the rates were about half those of males.

IHD was the main cause of mortality among CVDs and diabetes in coloured males until 1969, when it was replaced by stroke (Bradshaw *et al.,* 1995). There was a very large increase in mortality from IHD between 1958 and 1969; it then remained stable at about 150 per 100 000 until 1985. Stroke was the major cause of mortality in coloured females. Mortality from diabetes increased fourfold, from ten in 1949 to 40 in 1984.

IHD was the major cause of mortality from CVDs and diabetes in Indian males between 1949 and 1985, followed by stroke and diabetes (Bradshaw *et al.,* 1995). During this period the mortality rates remained fairly constant, except that IHD increased to more than 250 per 100 000 and diabetes to more than 70 in 1985. Stroke was the major cause of mortality in Indian females. There was also a dramatic increase in the mortality rate from diabetes, from about 20 per 100 000 in 1949 to 70 in 1984.

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 whites and Indians, while hypertensive heart disease and stroke are highest among the black population group.

FIGURE 27
Age-standardized mortality rates from hypertensive heart disease, stroke, IHD and diabetes, per 100 000 population, 1985 and 2000



Note: 2000 figures are adjusted for misclassification and underregistration of deaths, but not 1985 figures. 1985 figures for blacks are for urban blacks only.
Sources: 1985 – Bradshaw *et al.,* 1995; 2000 – Bradshaw *et al.,* 2003.

Cancers

In 2000, the South African National Burden of Disease Study (SANBDS) found that cancers as a group (the malignant neoplasms category) accounted for 41 691 deaths (7.5

percent of all deaths), ranking them the fourth leading cause of death for all people and the second leading cause of death for people aged 60 years and over (Bradshaw *et al.,* 2003). In males, trachea/bronchi/lung (also referred to as lung) cancer accounted for 22.5 percent of all cancer deaths, followed by oesophageal cancer (17.2 percent). Among the top causes of cancer deaths in females were cancer of the cervix (17.9 percent), breast (15.7 percent) and lung (10.9 percent).

Lung cancer

There have been marked increases in mortality rates for lung cancer among males of all population groups, with those among whites increasing almost threefold between 1949 and 1979, while those among coloured males increased even more dramatically. Smaller increases are seen among females. In 1984, 34.5 percent of all white deaths could be attributed to smoking-related diseases, compared with 24.5 percent for Indians, 14.5 percent for coloureds and 3.9 percent for blacks (Yach and Townshend, 1988).

From 1984 to 1986 the age-standardized mortality for lung cancer was 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). National age-standardized death rates for 2000 (not disaggregated by urban/rural residence) showed that coloured males had the highest rates (82.1/100 000), followed by white males (54.3/100 000). In 2000, the age-standardized death rates of black males and females were 33.4 and 6.0 per 100 000, respectively (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. (It is important to note, however, that these death rates reflect exposure to tobacco in the past.) In the older age groups, black men had lower rates than coloured and white men, but the lung cancer death rates in black males in the 35 to 44 years and 45 to 54 years age groups were higher than those in the white population. This, however, is not seen in black women, who have lower lung cancer death rates at all ages.

Oesophageal cancer

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

There are marked differences among population groups, with the highest incidence rates in the African population. The National Cancer Registry recorded a shift from oesophageal cancer as the leading cancer among African males in 1995, to prostate cancer in 1996 to 1999. Oesophageal cancer then became the second leading cancer in African males (with an age-standardized incidence rate [ASR] of 14.1/100 000), who had a lifetime risk of developing oesophageal cancer of 1 in 59.0 in 1999. Among African females (with an ASR 7.0/100 000), oesophageal cancer was the third leading cancer (after cervical and breast cancers), and the lifetime risk was 1 in 113 (Mqoqi *et al.,* 2004).

Because of its poor prognosis, oesophageal cancer contributes significantly to cancer mortality. In South Africa, it was the second leading cause of cancer deaths in males (17.2 percent of all male cancer deaths) and the fourth leading cause in females (10 percent). It was the leading cause of male cancer deaths in the African population (age-standardized mortality rate 43.5/100 000) and the second leading cause – after cervical cancer – in African females

(16.5/100 000), with relatively young age groups affected and rates increasing steadily from the 35 to 44 years age group (Bradshaw *et al.,* 2003).

The main risk factors for oesophageal cancer are tobacco use and alcohol consumption, and the joint effect of these is multiplicative (Tuyns, Pequinot and Jensen, 1979; Day, 1984; IARC, 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.

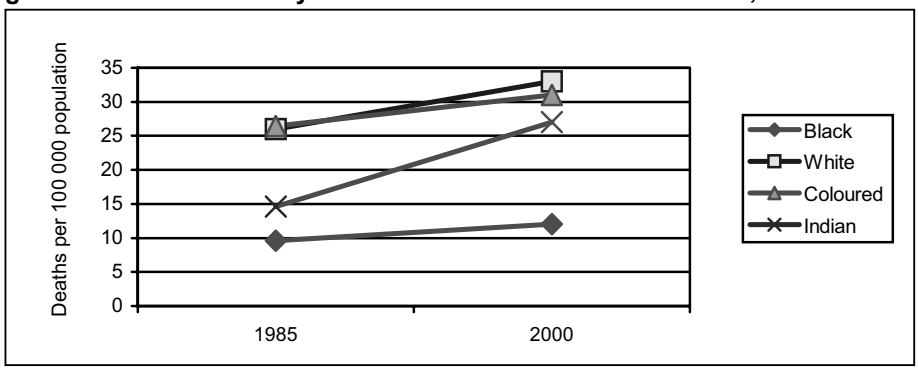
Breast cancer

In South Africa from 1984 to 1986, breast cancer age-standardized mortality rates were highest among coloured urban females (26.4/100 000) (Figure 28), followed closely by whites (26.0/100 000) and then urban Indians (14.6/100 000); black urban females had the lowest rates (9.6/100 000) (Bradshaw *et al.,* 1995). In 2000, the age-standardized mortality rates appeared to have increased since 1984 to 1986, although the 2000 national rates were not available by urban/rural residence, and the rate in urban females was probably higher than the national average. As before, the age-standardized death rates for white females were almost threefold those of blacks: whites had the highest rates (33.0/100 000), followed closely by coloureds (31.0/100 000) and Indians (27.4/100 000); black females had the lowest rates (12.1/100 000) (Bradshaw *et al.,* 2003).

However, the age-specific death rates indicate that black females aged 35 to 44 years have very similar rates to those in the corresponding white, coloured and Indian population groups, and it is only in the older age groups that black females have far lower rates. This pattern is also evident in terms of incidence.

FIGURE 28

Age-standardized mortality rates for females from breast cancer, 1985 and 2000



Note: 2000 figures are adjusted for misclassification and underregistration of deaths, but not 1985 figures. 1985 figures for blacks are for urban blacks only.
Sources: 1985 – Bradshaw *et al.,* 1995; 2000 – Bradshaw *et al.,* 2003.

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

The risk of breast cancer is clearly associated with high socio-economic status, and women with higher education or income are at higher risk (Parkin *et al.,* 2003). These differences may be because of differences in the distribution of risk factors among social classes, such as

reproductive factors and other known risk factors for breast cancer, including 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 in reducing the breast cancer risk at all ages.

Colorectal cancer

Cancers of the colon and 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 percent) and the fifth among females (6.6 percent) in terms of deaths (Bradshaw *et al.,* 2003). In 1999, colorectal cancer comprised 3.7 percent of all cancer cases in males and 3.4 percent in females, ranking third and fifth in females and males, respectively. The ASR for colorectal cancer in women was 6.6 per 100 000, while males had a higher rate of 9.7 (Mqoqi *et al.,* 2004).

Colorectal cancer was the second leading cause of cancer deaths in the South African white population. The age-standardized death rate was more than five times greater in this population (21.1/100 000) than in 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 white males (ASR of 25.4/100 000) are more than eight times those found in black males (3.0/100 000), while those in white females (17.5/100 000) are about seven times those in black females (2.3/100 000) (Mqoqi *et al.,* 2004).

Age-specific incidence rates by population group suggest an increased risk in younger black South Africans, probably caused by changing lifestyle and diet, resulting in a reduction in the incidence gap observed in elderly South Africans. Although there is an almost tenfold difference in incidence among the older age groups (75 years and over), at younger ages the incidence rates among 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 overemphasized in the prevention of cancers.

COMMUNICABLE DISEASE BURDEN

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

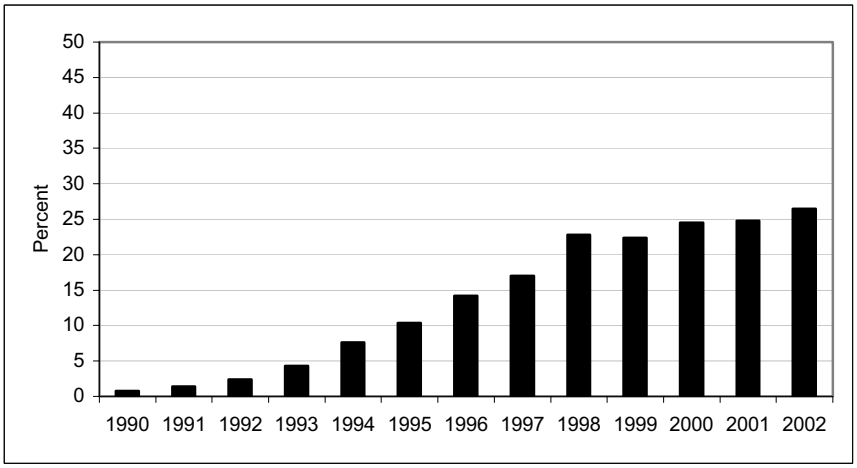
The prevalence of HIV among pregnant women attending public sector clinics has been surveyed annually to monitor trends. The surveys show that prevalence has increased from 0.8 percent in 1990 to 27.9 percent in 2003, reflecting a remarkable spread of the epidemic within a decade (Figure 29). It is estimated that in 2004, about 12 percent of the total population was infected with the virus (Dorrington *et al.,* 2004), and that by 2000 HIV/AIDS had become the biggest single cause of death in South Africa (Dorrington *et al.,* 2004).

Prior to 2004, AIDS treatment was available only in the private sector, which restricted its use to people with medical insurance or sufficient money to pay for costly medication. In 2004, the government adopted a treatment five-year plan to roll-out anti-retroviral therapy in the public sector with the aim of meeting at least 80 percent of the need. The ASSA2002 model shows that in 2004 approximately 5 million people were HIV-positive, and 500 000 were AIDS-sick.

Allowing for the impact of the treatment intervention, the number of infected people is projected to peak in 2013 and then decrease slowly, while the number of AIDS-sick people increases slowly. It is further predicted that in 2015 the number of AIDS-sick people will be about three-quarters of a million, with a projected 5.4 million-plus HIV-positive people. Currently, about 10 percent of HIV-positive people are AIDS-sick, and this will rise to just less than 13 percent.

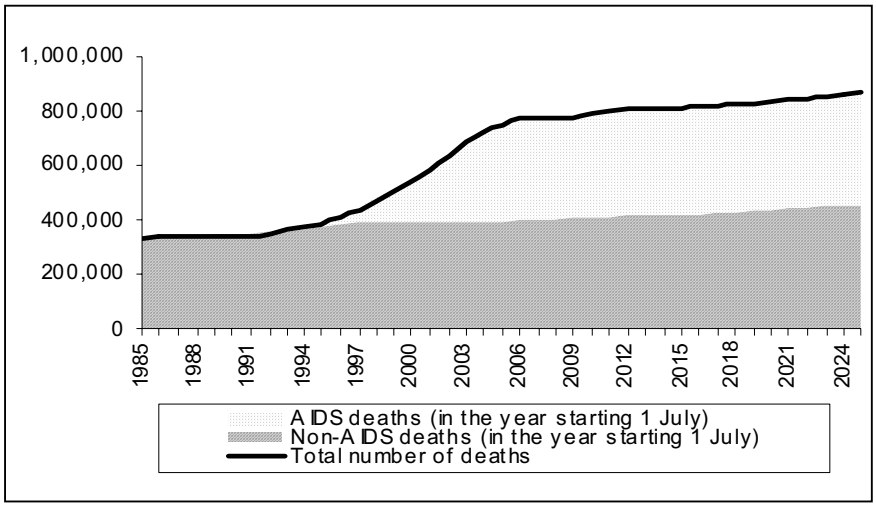
Figure 30 shows that the projected total number of deaths increased as a result of the gradual increase in non-AIDS deaths and the rapid increase in AIDS deaths during the late 1990s. In 2004, the model estimates 389 000 non-AIDS deaths and 311 000 AIDS deaths. The total deaths in 2004 were 701 000, i.e., about 44 percent of total deaths were AIDS deaths. The proportion of AIDS deaths to total deaths is fairly constant over the time span depicted in Figure 30.

FIGURE 29
Prevalence of HIV as determined by antenatal surveys, 1990 to 2002



Source: Health Systems Trust, 2004.

FIGURE 30
Projected annual numbers of AIDS and non-AIDS deaths, 1985 to 2025



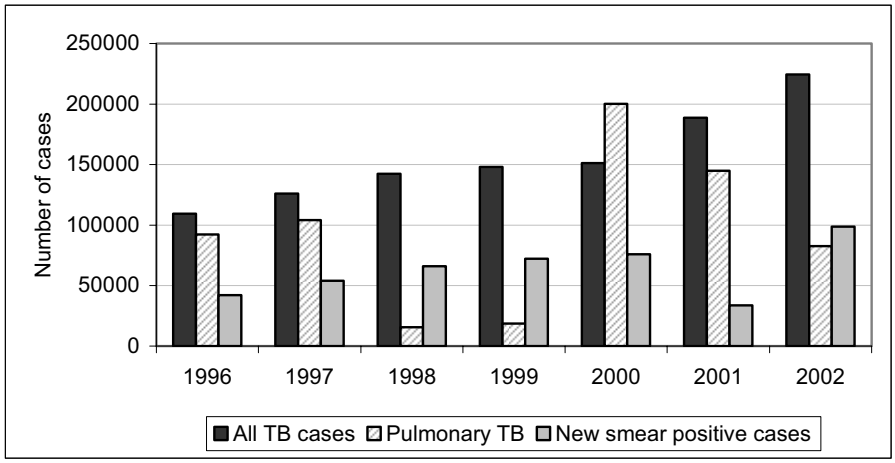
Source: ASSA2002 (ASSA, 2004).

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 causes of death, accounting for more than 5 percent 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.

In 2002, there were an estimated 243 000 cases of TB in South Africa, making it the country with the seventh highest number of TB cases. The number of TB cases, as well as the number of new smear cases, nearly doubled between 1996 and 2002 (Figure 31). The rise in the number of reported TB cases since the inception of the National TB Control Programme 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 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.

FIGURE 31
Numbers of TB, pulmonary TB and new smear cases reported, 1996 to 2000



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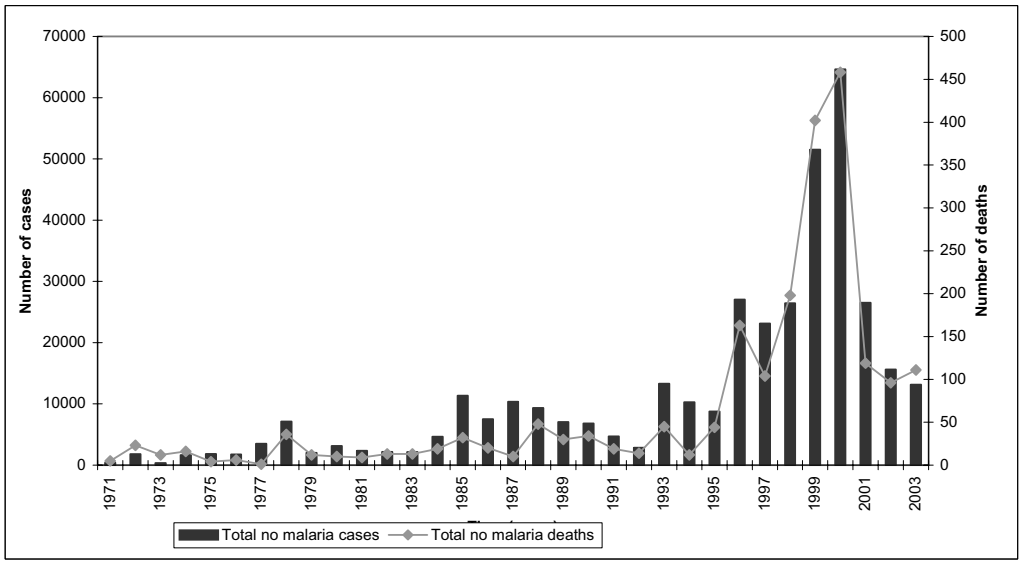
Malaria

Malaria affects only the northern and northeastern regions of South Africa. Systematic control efforts introduced in the late 1940s and good access to treatment have generally kept the disease in check. In contrast to most other countries in sub-Saharan Africa, malaria is not a major cause of death in South Africa.

For the period 1976 to 1995, annual reported malaria cases ranged from 2 000 to 13 000 per year. In 1996, slightly more than 27 000 cases were reported, rising to more than 60 000 in 2000. The number of notified malaria cases decreased considerably thereafter (Figure 32). The malaria vectors' resistance to existing pesticides, as well as antimalarial drug resistance, in part caused the dramatic increases in numbers of cases and deaths from malaria. Changes in the drugs and insecticide used contributed to the subsequent significant decrease in malaria morbidity and mortality in South Africa in subsequent years.

FIGURE 32
Annual notified malaria cases and deaths, 1971 to June 2003



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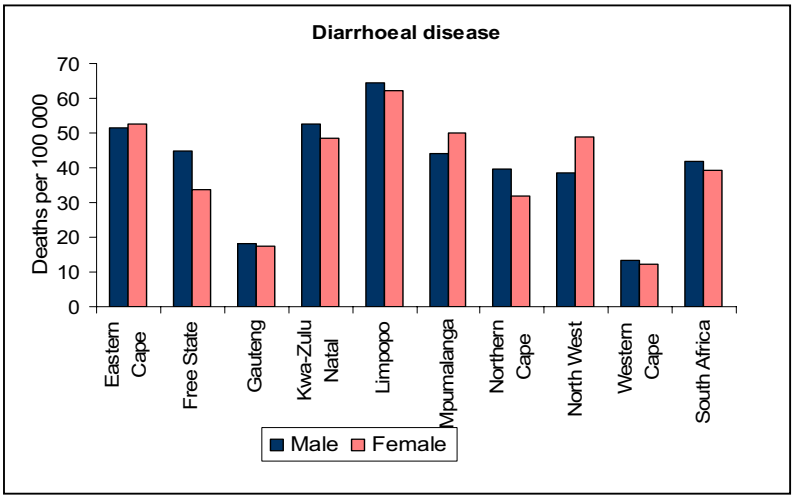
Diarrhoeal disease

SANBD found that diarrhoea accounted for nearly 3 percent 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 (Figure 33). The average rates for South Africa are about 42 per 100 000 for males and slightly fewer for females. Clearly, in some provinces deaths from diarrhoea still make a significant contribution, affecting infants, children and the elderly in particular. Serious cholera outbreaks have occurred in 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.

FIGURE 33
Mortality from diarrhoeal diseases in children, by province and sex



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

SUMMARY

Current burden of disease

The data presented show that South Africa has a quadruple burden of disease: 1) continuation of the infectious diseases associated with underdevelopment, poverty and undernutrition; 2) an emerging epidemic of chronic diseases linked to overnutrition and Western types of diet and lifestyle; 3) the explosive HIV/AIDS epidemic; and 4) the continued burden of injury-related deaths. In 2000, NCDs accounted for 37 percent of deaths, and HIV/AIDS and infectious diseases together for 44 percent (Bradshaw *et al.,* 2003). CVD and diabetes together accounted for 19 percent of total deaths, and cancers for a further 7.5 percent. In contrast, nutritional deficiencies related to undernutrition accounted for 1.2 percent of deaths. In terms of mortality from chronic diseases, in 2000 IHD and stroke accounted for 123 and 124 per 100 000 deaths, respectively, while hypertensive heart disease and diabetes accounted for 68 and 54 per 100 000 deaths, respectively (Bradshaw *et al.,* 2004).

Current nutritional status of the population

Undernutrition and its associated outcomes of stunting and underweight are still prevalent in children. In 1999, 22 percent of children aged one to nine years in South Africa were stunted, and 10 percent were underweight-for-age (Labadarios *et al.,* 2000). However, at the same time, 17 percent of children were overweight and obese (BMI ≥ 25) (Steyn *et al.,* 2005). In adults the prevalence of obesity (BMI ≥ 30) was very high in 1998, particularly in women, among whom it ranged from 21 to 31 percent in different population groups (Department of Health, SAMRC and Measure DHS+, 2002). In white males, the prevalence of obesity was 21 percent, while it was less than 10 percent in the other population groups; the prevalence of overweight (BMI ≥ 25) was 20 percent in all males. Underweight (BMI < 18.5) was less than 6 percent in the adult female population and 13 percent in males (Department of Health, SAMRC and Measure DHS+, 2002). Hence, both under- and overnutrition coexist in South Africa, and sometimes even in the same household, where a child is stunted and a parent/carer overweight or obese.

Micronutrient deficiencies are also still prevalent in children; in 1994, 39 percent of 0- to five-year-olds were marginally vitamin-A deficient and 25 percent had low iron stores (SAVACG, 1995). Iodine deficiency was still found to be prevalent in some provinces in 1998 (Immelman, Towindo and Kalk, 2000). No national data on biochemical deficiencies are available for adults, but numerous localized studies have shown high prevalence of iron deficiency in women (Kruger *et al.,* 1994; Dannhauser *et al.,* 1999) and of VAD, particularly in HIV-infected adults (Kennedy-Oji *et al.,* 2001; Visser *et al.,* 2003).

Current dietary intake patterns of the population

National dietary intake data are only available for children aged one to nine years (Labadarios *et al.,* 2000). The main findings from NFCS 1999 were that many children were deficient in energy and numerous micronutrients (vitamins A and C, niacin, vitamin B6, calcium, iron and zinc), and deficiency prevalence rates were always higher in rural areas. A few localized surveys provide some trends on dietary intake in adults. Studies in the white (Wolmarans *et al.,* 1988), coloured (Langenhoven, Steyn and van Eck, 1988) and Indian (Wolmarans *et al.,* 1999) populations showed that mean carbohydrate intakes were less than 55 percent of total energy, mean fat intakes more than 30 percent, and added (free) sugar intakes more than 10 percent. Rural blacks (Steyn *et al.,* 2001) had a prudent diet with a mean fat intake of less than 20 percent of total energy, carbohydrate intake of more than 60 percent and free sugar intake of less than 10 percent. Urban blacks, on the

other hand, had mean intakes that lay between the extremes of the Western diet and the rural prudent diet (Bourne *et al.,* 1993; Steyn *et al.,* 2001). In the urban upper-income black group (MacIntyre *et al.,* 2002) mean fat intake was more than 30 percent of total energy. Studies on dietary trends in urban blacks showed that the mean intake of fat increased from 24 to 32 percent of total energy among those aged 19 to 44 years as the time they spent in the city increased, while mean carbohydrate intakes decreased from 61 to 53 percent (Bourne, 1996). These trends are typical of the nutrition transition that is taking place.

CURRENT POLICIES AND STRATEGIES FOR ADDRESSING NUTRITION PROBLEMS IN SOUTH AFRICA

Programmes to improve protein-calorie malnutrition 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 child nutrition one of the cornerstones of its 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 SAVACG (1995). 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 (Department of Health, 1998). As part of this strategy, certain focus areas were devoted to improving the nutritional status of children and decreasing the prevalence of PEM nationally (Nutrition Directorate, 2001).

The most crucial focus area of this strategy is contributing to household food security with the objective of alleviating short-term hunger among primary schoolchildren. A school feeding programme was introduced into schools with needy learners in 1994 and about 5 million learners a year benefit annually from this. Despite many initial 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).

Additionally, there are three more focus areas in the Integrated Nutrition Programme aimed at dealing with the development and consequences of undernutrition. These are: 1) disease-specific nutrition support, treatment and counselling; 2) growth monitoring and promotion; and 3) promotion of breastfeeding. These are implemented at the primary health care level, where infants and children are brought for routine immunizations 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 percent nationally and to reduce the prevalence of stunting and underweight in children from 21.6 and 10.3 percent, respectively, in 1999 to 18 and 8 percent, 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 has adopted 11 guidelines, which were developed by a national working group (Love *et al.,* 2001) to promote healthy eating habits in the child and adult populations. Paediatric guidelines to be introduced in the near future are currently being tested.

HIV/AIDS is another focus area to receive much support in terms of promoting nutrition. Recently, the Nutrition Directorate has implemented an intervention programme aimed at people with TB and/or HIV/AIDS. The objective of this strategy is to provide an energy-dense meal and micronutrient supplements to people who qualify for the scheme. Nutritional guidelines are already available for such patients (Nutrition Directorate, personal communication, 2005).

Programmes 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 iodization of salt became compulsory in 1995, and the fortification of maize and wheat flour in October 2003. The latter have to be fortified so as to deliver 33 percent of the RDA per serving at the point of consumption (National Food Fortification Task Group, 1998; 2002). The fortificants added are vitamin A, thiamine, riboflavin, niacin, folic acid, vitamin B6, iron and zinc. Nutrition support for women and children is provided by health care workers at primary care facilities and includes vitamin A and iron supplementation and health promotion aimed at improving diets (Nutrition Directorate, 2001). Adoption of the food-based dietary guidelines will also contribute to eliminating micronutrient deficiencies because one of the guidelines encourages dietary diversity and increased consumption of fruit and vegetables (Love *et al.,* 2001).

Programmes to prevent and manage nutrition-related chronic diseases

The Global Strategy on Diet, Physical Activity and Health has clearly indicated that every 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 for diet, physical activity and health. National circumstances determine the priorities in the development of such strategies (WHO, 2004).

In 1996 the Department of Health instituted the Directorate of Chronic Diseases, Disabilities and Geriatrics, and the first director was appointed. This marked the start of a period during which NCDs were prioritized at national- and provincial-level departments of health. For the first time, provinces appointed people responsible for NCDs; this can be seen as a milestone in the organization 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 surveillance programme, incorporating health indicators such as BMI, physical inactivity and blood pressure. A nationally representative survey (SADHS) was undertaken in 1998 and repeated in 2003/2004, in order to provide a way of monitoring secular trends for these health indicators in response to the national health strategy.

The Nutrition Directorate has also supported the development of strategies for nutrition-related chronic diseases. In the late 1990s, the department 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 it has set strategic objectives aimed at reducing the prevalence rates of obesity from 9.3 percent in males and 30.1 percent in females in 2000 to 7 and 25 percent, respectively (Nutrition Directorate, 2001). To date, however, there is no clear indication of how these targets will be achieved in terms of strategies at the 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 that supports the strategic priorities for health care. Sport and Recreation South Africa is responsible for devising and implementing sport and recreation policy in South Africa, specifically targeting increased mass participation and 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 of Health Promotion and Chronic Diseases have also recognized the need to encourage physical activity, in particular among older adults, and have initiated guidelines for promoting "active ageing" (1999). More recently, in November 2004, the Directorate of Health Promotion in the Department of Health launched an intersectoral strategy aimed at promoting

healthy lifestyles and change from risky behaviour, particularly among 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 to 2009 (Nutrition Directorate, 2001).

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 CVD (WHO/FAO, 2003). As well as direct costs, which may be as high as 6.8 percent of total health care costs, there are also indirect costs such as workdays lost, doctor visits, impaired quality of life and premature mortality (WHO/FAO 2003). Over the last three decades, many chronic diseases have featured significantly in terms of overall morbidity and mortality. This is particularly so for IHD, hypertensive disease, stroke, diabetes, chronic obstructive pulmonary diseases, lung, oesophageal, breast and colorectal cancers.

In addition, communicable diseases are still major causes of mortality and morbidity in South Africa, and should remain priorities on the health agenda. The death rates from infectious diseases such as HIV/AIDS, TB and diarrhoeal disease are still high, and in the case of HIV and TB increasing. In addition, both under- and overnutrition are coexisting. It is important that health care policy-makers do not neglect any of these areas of concern and, despite the immediate pressure for relief against infectious diseases, the government should also be looking for long-term solutions for chronic diseases. The first step in this regard will be prevention, and it is most feasible that prevention efforts should be aimed mainly at children.

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

Fiscal policies and levies

Swinburn *et al.* (2004) highlighted the importance of introducing fiscal policies that influence the food supply in order to ensure that the population has access to safe and affordable foods that 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, including such items as soft drinks and crisps.

School-based intervention programmes

Schools are an established setting for health promotion activities and have the advantage of influencing health-related beliefs and behaviours early in the "health career" so that they become established as adult patterns. Children in schools also represent a large population who are present and accessible over prolonged periods in a setting that is relatively sheltered and where education and learning are 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 school-based health promotion is that by improving the health of schoolchildren, educational performance and learning may be enhanced. A large body of evidence indicates that positive educational outcomes are closely linked to good health in schoolchildren. These positive outcomes include classroom performance, school attendance, participation in school activities and 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), which recommended that: "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). It is hoped that this may lead to the introduction of similar strategies aimed at diet and physical activity.

Food labelling and claims

Food labelling is currently being revised by the Department of Health, and new regulations are expected for the end of 2005 (Booyzen, Directorate of Food Control, personal communication, 2005). These new regulations are more informative than the present ones, and will provide 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, the regulatory framework will minimize misleading food, health and nutrition claims. However, consumers need to be educated about these regulations and about 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 the television advertising of energy-dense, high-fat and high-sugar foods to young children, particularly because 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

Intersectoral action is required in order to modify the environment so that physical activity and a healthy diet are promoted and enhanced in schools, workplaces and communities. This should include limiting the exposure of young children to heavy marketing of energy-dense, micronutrient-poor foods, which can be done by introducing school policies that prohibit the presence of vending machines and unhealthy food sales in schools, crèches and after-school centres. Furthermore, it is essential that food items that are included in the primary school meal programme are healthy. It is also important to ensure that children have safe and adequate space at school and in the community for playing sports and games that promote physical activity. The onus rests with employers to make workplaces encouraging of physical activity and to provide healthy foods and meals.

Nutrition health logos

In South Africa the Heart Foundation and the Cancer Association provide their logos to food products that meet certain specified health and nutrition standards. In doing so, these associations are raising the awareness of consumers and manufacturers about the value of using healthy foods. The Department of Health should encourage this trend 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

It is important that the food-based dietary guidelines initiated by the Nutrition Directorate be given priority as a tool for nutrition education, and be incorporated into primary health care programmes and school curricula. As 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 an important emphasis on avoiding both over- and undernutrition.

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

CONCLUSIONS

The following important findings regarding nutrition and chronic diseases need to be kept high on the health agenda. First, it should be recognized that malnutrition (both under- and overnutrition) is prevalent in all ethnic groups in South Africa, and poor diet – together with other unhealthy behaviours – leads to the development of a substantial (and growing) burden of chronic diseases. Second, it should be recognized that many children and adults in South Africa have unhealthy lifestyles with high intakes of energy, total fat and added sugar, and low intakes of fruit and vegetables. Many people are inactive, smoke cigarettes and have high intakes of alcohol. In order to reduce the burden of chronic diseases over the next few decades these unhealthy behaviours need to be addressed now.

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ANNEX 1: FAO FOOD BALANCE SHEETS FOR SOUTH AFRICA, 1962 TO 2001

	1962				1972				1982				1992				2001			
Product	kg*	kcal	Pro	Fat	kg*	kcal	Pro	Fat	kg*	kcal	Pro	Fat	kg*	kcal	Pro	Fat	kg	kcal	Pro	Fat
Total		2 603	68.4	61.2		2 819	74.6	66.4		2 905	77.1	66.0		2 790	75.3	68.8		2 921	75.1	79.0
Cereal, excluding beer	169.3	1 434	38.7	10.9	173.4	1 467	39.9	10.7	186.1	1 576	43.1	11.1	173.4	1 480	40.0	10.5	187.8	1 601	42.6	11.5
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
Sugar and 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	
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
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
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
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
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
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
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
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
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	
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
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
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
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
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
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

* Divide this amount by 365 to obtain the daily per capita availability.