



THE BARBADOS FOOD CONSUMPTION AND
ANTHROPOMETRIC SURVEYS
2000

Prepared
in collaboration with
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[Table of Contents](#)

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CONTENTS

[FOREWORD](#)

[ACKNOWLEDGEMENT](#)

[EXECUTIVE SUMMARY](#)

[The survey: objectives and methods](#)
[Main findings](#)
[Policies and programmes: issues and actions](#)

ACRONYMS

1. BACKGROUND TO THE SURVEY

[Demography and health: trends and indicators](#)
[The economy](#)
[Education](#)
[Agriculture and food supply](#)
[Health care](#)
[Nutrition services](#)

2. THE SURVEY

[Survey methodology](#)
[Data processing and analysis](#)
[Recommendations for future surveys: difficulties encountered and limitations of the survey](#)

3. MAIN FINDINGS

[Household characteristics](#)
[Individuals' characteristics](#)
[Nutrient and food intakes](#)

4. VULNERABILITY PROFILES

[Determinants of overweight and obesity](#)
[Determinants of micronutrient adequacy](#)
[Determinants of dietary diversity](#)
[Poverty profile: links with nutrition, health and socio-economic factors](#)
[Older people](#)

5. SPECIAL ISSUES

[Iron-deficiency anaemia](#)
[Healthy lifestyles](#)
[Younger adults](#)

6. POLICIES AND PROGRAMMES: ISSUES AND ACTIONS

[Making informed choices](#)
[Taking preventive action](#)
[Improving dietary management](#)
[Special targeted programmes](#)
[Strategies](#)

ANNEXES

I. References

II. Table A.1: Frequency of consumption of 84 foods

III. Table A.2: Best food sources of nutrients, based on consumers only

IV. Table A.3: List of generic foods

V. List of participants: Barbados food consumption and anthropometric survey (2000)

<http://www.fao.org/docrep/008/y5883e/y5883e00.htm#Contents>

FOREWORD

Good nutrition is one of the primary objectives of a country's development and emphasis is placed on the prevention and control of the nutrition-related diseases because of the high costs they can impose on a country's health system and its economy.

In 1992 at the International Conference on Nutrition (ICN), held in Rome, nutrition was brought into focus at the global level as it sought to incorporate nutrition objectives into development policies and programmes. As a follow-up to the ICN, the National Nutrition Centre (NNC), in collaboration with agencies in the public and private sector developed a National Plan of Action (NPAN). This Plan identified, inter alia, the need for information on household food consumption and nutrition to facilitate policy and programme formulation with the goal of improving the nutritional status and health of Barbadians.

In 2000 the NNC conducted the Barbados Food Consumption and Anthropometric Survey (BFCS). The Survey Report is a concise analysis of the socio-economic, demographic, food acquisition and preparation practices, and assessment of the health and nutritional status of the respondents. It discusses proposed policies, programmes and actions to address nutrition-related problems and recommends that strategic alliances should be formed, as required, between the public and private sectors, especially the food sector, to address specified nutrition problems. The organisation and style of the Report make it a useful reference document for health and nutrition planners as well as decision makers in the food industry. It will also add to the data on food and nutrition surveys in the Caribbean for which few are currently available.

The findings of the Survey revealed the following:

- a high prevalence of obesity in the population, especially among the youth thereby putting them at a high risk for developing any of the chronic non-communicable diseases (CNCDS).
- a high prevalence of nutrition-related CNCDS among older persons
- Barbadians do not have enough understanding of the individual, family and community risks associated with obesity, the CNCDS and the poor quality of life that will result from these risks.
- Apart from obesity and overweight, Barbadian diets lack diversity and tend to be inadequate in vitamins and minerals.

The innovative approach of compiling vulnerability profiles from the data to describe individuals among the Barbadian population who are likely to be nutritionally vulnerable, provides a ready reference to economic and demographic factors that are likely to put such

individuals at risk. The profiles provide information on the determinants of such nutrition problems as obesity and micronutrient adequacy among others, thus providing programme planners and decision-makers with "tools" to guide policy formulation and design better-targeted programmes

ACKNOWLEDGEMENT

This survey report signals the end of a period of fieldwork, pilot testing, data collection, data cleaning, entry and analysis, interpretation of findings, and report compilation for the Barbados Food Consumption Survey (BFCS) 2000. This process finished with the organization of a workshop at which the results were presented. This initiative was stimulated by the Ministries of Health and Agriculture and Rural Development requesting the Food and Agriculture Organization of the United Nations (FAO) for financial and technical assistance in conducting a food consumption and anthropometric survey in Barbados. In view of the emerging epidemic of obesity and related chronic diseases in the Caribbean region, FAO gave careful consideration to this request and agreed to prepare a Technical Cooperation Programme (TCP) project document that would provide the necessary assistance for carrying out such a survey. Project activities commenced in June 1999 as project TCP/BAR/8922 (Household Food Consumption and Anthropometric Survey). The project report was finalized and presented at a national seminar from 10 to 11 March 2003, as part of the Food Insecurity and Vulnerability Information and Mapping Systems' (FIVIMS) efforts in the Caribbean region. The National Nutrition Centre (NNC), a Department of the Ministry of Health, was designated the government counterpart institution working in close collaboration with the Ministry of Agriculture and Rural Development, particularly the Economic Planning Division, which played a central role in acquiring support from FAO. Special thanks are extended to Mr Winston Rudder, FAO's Sub-Regional Representative, and to his predecessor Mr Joseph Johnson, for their support.

The Ministry of Health extends special thanks to The Survey Planning Committee, consisting of: Dr Frederick Baker, FAO; Mr DeCoursey Eversley, Barbados Statistical Services; Professor Henry Fraser, Director of the Chronic Disease and Research Centre; Dr Joy St. John, Senior Medical Officer of Health, and Dr Elizabeth Ferdinand, whom she replaced; Mrs. Carmen Dardano, FAO; and Mrs Elaine Yarde and Mrs Joan Sealy, NNC.

Several government departments, ministries, private sector individuals and organizations and regional and international organizations contributed to the production of this document. Special mention is due to the Ministry of Agriculture and Rural Development, particularly the Economic Planning Division, for its assistance in acquiring technical and funding support from FAO, as well as to the administrative and technical staff and Director of the Caribbean Food and Nutrition Institute (CFNI), the occupants of the 1 051 survey households and the 1 704 survey respondents.

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presentation, compiling the final report and presenting the findings at the workshop, with assistance from NNC staff; and Ms Melinda Mills, FAO Sub-Regional Office for the Caribbean (FAOSLAC), whose valuable logistical support and follow-up helped facilitate the report's finalization. The technical and logistical support of Dr Robert Weisell, FAO (Rome), including his presentation at the workshop, is also greatly appreciated. Thanks are also extended to Miss Claire Forrester, Pan-American Health Organization/World Health Organization (PAHO/WHO), specifically for her input as a resource person at the workshop.

The Ministry of Health thanks all sponsors, consultants, individual professionals and all those who participated in this capacity building project, which provides scientific data on food, nutrition and the health of the Barbadian population

EXECUTIVE SUMMARY

The survey: objectives and methods

The Barbados Food Consumption and Anthropometric Survey was carried out in 2000/2001 by the National Nutrition Centre (NNC) of the Ministry of Health, in collaboration with the Barbados Statistical Service (BSS) and the Ministry of Agriculture and Rural Development. It received funding and technical assistance from FAO and the Ministry of Health, and technical assistance from the Caribbean Food and Nutrition Institute (CFNI).

The main purpose of the survey was to provide a basis for policy and programme planning by determining the food intake and dietary patterns of the adult population aged 18 years and over, the prevalence of obesity and diagnosed nutrition-related chronic non-communicable diseases (CNCs), and the relationship of these to dietary patterns.

The specific objectives of the survey were to:

- determine the nutritional adequacy of Barbadians' diets;
- examine food choices, food purchasing patterns and food sources;
- assess the extent of home food production and its contribution to household diets;
- determine the prevalence of obesity (and undernutrition) and diagnosed nutrition-related CNCs, and their relationship to dietary patterns;
- investigate the association between demographic, social and economic characteristics and dietary practices.

The survey gathered information on:

- demographic and socio-economic factors;
- health status - prevalence of four diagnosed CNCs (diabetes, hypertension, heart disease and cancers);
- nutritional status - weights and heights measured to calculate body mass index (BMI) and the prevalence of undernutrition, overweight (pre-obesity) and obesity;
- food acquisition habits - production, purchase, use of ready-to-eat meals;
- food and health practices - dieting, food preparation, exercise;
- food patterns - through a food frequency questionnaire;

- dietary intakes - using the 24-hour recall method, to derive daily intakes and adequacy of intakes of energy, macronutrients (fats, carbohydrate and protein) and the important micronutrients (vitamins and minerals).

Main findings

Key findings of the survey are presented as highlighted text in this section.

THE SURVEY SAMPLE: DEMOGRAPHIC AND SOCIO-ECONOMIC CHARACTERISTICS

A total of 1 051 households were represented in the sample. Some important findings were that:

- 25.2% were single-person households;
- 16.9% of households consisted of men only, and 17.6% of women only;
- 44.6% of households were headed by women.

Nearly a quarter of the households failed to provide information on income. The following findings are based on those households that provided such information:

- the median monthly income per person was B\$600 (approximately US\$300);
- using the United Nations Development Programme (UNDP) poverty cut-off (B\$5 503 per annum), 14.9 percent of households fell below the poverty line;
- significantly lower per capita monthly incomes were found in:
 - large families;
 - women-only households;
 - households headed by women.

A total of 1 704 individuals (945 women and 759 men) from the survey households completed questionnaires. The following is a profile of those respondents:

- the mean age was nearly 49 years (and the range 18 to 99 years);
- 20.5 percent of men and 22.6 percent of women were aged 65 years or more;
- 68 percent of men and 53.1 percent of women were employed; 25.8 percent of men and 40.2 percent of women were students, housewives or retired; thus 6.2 percent of men and 6.7 percent of women were not working, but may have been seeking employment;
- educational attainment was high: 67.2 percent had completed secondary-level education or higher. The majority of respondents with primary school education only were in the older age groups.

HEALTH AND NUTRITION

Respondents were asked whether they had been diagnosed with one or more of the CNCDS - diabetes, high blood pressure, heart disease or cancer - and whether either parent had suffered from any of these diseases. Respondents were also asked whether they were on any form of diet.

- **The prevalence of CNCDs was high - 24.2 percent of men and 37.5 percent of women stated that they had been diagnosed with one or more of the conditions investigated.**
- Among respondents over 50 years of age, prevalence rose to 39 percent in men and 61 percent in women.
- In the whole sample, the prevalence of hypertension was highest (17.3 percent in men and 28.8 percent in women), followed by that of diabetes (10.1 percent in men and 15.2 percent in women).
- Comparable figures from earlier years are lacking. However, it would seem that the prevalence of both diabetes and hypertension has risen since the previous national food and nutrition survey (1981). Similarly, figures from the 1993 Wildey study (Foster et al., 1993) suggest that the prevalence of diabetes has risen, especially among women.
- On the whole, reported adherence to dietary regimens for CNCDs was poor. More individuals diagnosed with diabetes (50.2 percent) than those with hypertension (32.5 percent) claimed to follow diets that could assist in the dietary management of the disease. Women's reported adherence was better than that of men.
- A family history apparently provoked preventive action (through appropriate dieting) in 10 percent of people without diabetes and 17 percent of people without hypertension. Such preventive action, i.e. the targeting of high-risk individuals, is an important component of a health promotion strategy.

Weights and heights were measured in order to calculate BMI as an indicator of nutritional status. Respondents were asked whether they considered themselves to be underweight, overweight or of the correct weight, and whether they took planned exercise.

- **The prevalence of overweight (pre-obesity) and obesity among adult Barbadians is alarmingly high: 55.8 percent in men and 63.8 percent in women. This is clearly a matter for serious concern, given the established links between obesity, a high prevalence of CNCDs and high mortality.**
- The prevalence of mild undernutrition was low, and there was virtually no moderate or severe undernutrition.
- Trends in nutritional status are difficult to discern because earlier surveys used different indicators. However, it seems that the prevalence of obesity (excluding overweight or pre-obesity) has risen since the 1993 Wildey study, at least among men.
- **Of special concern is the finding that the prevalence of overweight and obesity is already high among young men (nearly 30 percent) and young women (more than 50 percent) aged 18 to 29 years. These are the older adults of tomorrow.**
- Overweight and obesity are more likely to be found among individuals with poorer educational attainment (after controlling for age), and in households with lower food expenditure (after controlling for household size).
- Very few overweight or obese respondents claimed to be on a weight reduction diet: 7.3 percent of men and 10 percent of women. Clearly Barbadian adults take little or no action until a CNCd has been diagnosed. This indicates a lack of understanding of the risk that obesity presents, and an absence of preventive action.
- 48 percent of men and 37.6 percent of women stated that they engaged in planned exercise. Walking was by far the most popular form of exercise. This survey's finding represents a small fall since the 1992 Barbados Risk Factor survey, which found that 48 percent of both men and women engaged in planned exercise.
- The first step towards weight reduction is the recognition that one is overweight. Correct perception of own nutritional status in the survey sample was poor (although

possibly better than it was in 1981): only 40.1 percent of overweight or obese men and 59.2 percent of such women recognized their condition. An encouraging finding, however, is that a higher proportion of young women (18 to 29 years) have a correct perception of their nutritional status.

- Obese respondents were more likely to want to change their weight, a finding that suggests that a weight reduction or a healthy lifestyle campaign may be well received by those who need it most.

FOOD AND FOOD ACQUISITION PRACTICES

Food production

- 32.2 percent of households engaged in food crop production, fruit trees being the most frequently mentioned crop. Home food production has fallen steadily over the past 30 years: in 1969, 74 percent of households produced food, and in 1981, 56.2 percent.
- 11.2 percent of households reared livestock, with poultry, sheep and pigs being the animals mentioned most frequently.
- Access to land was the primary constraint to increased food production.

Food purchasing practices

- The fish market was the most popular source of fish (66 percent of households), with supermarkets (18 percent) and fishers (15 percent) also mentioned.
- For the sample as a whole, supermarkets were the primary source of fruits, vegetables and other groceries, but wayside vendors were also popular for the purchase of fruits and vegetables.
- However, lower-income households and households headed by women were more likely to purchase produce from wayside vendors and fish from the fish market (lower-income households only) than other households. This finding has implications for any programme aiming to improve access and promote healthy food choices through supermarkets.
- Purchasing ready-to-eat meals and eating out are widely prevalent in Barbados: 45.3 percent of men and 31 percent of women consume ready-to-eat meals at least once or twice a week. Fast-food outlets were the most popular source of ready meals, followed by canteens and restaurants.
- Young adults (< 30 years) were more likely to eat out: more than 76 percent of young men and 66 percent of young women ate out at least once or twice a week. Not surprisingly, the use of fast-food outlets was also highest in this age group. These findings, together with the high level of obesity in young adults, highlight the need to engage the private sector in efforts to promote and make available healthier food choices.
- While 80 percent of respondents felt that they consumed adequate amounts of fruits and vegetables, only 14 percent of them actually consumed the daily amount recommended by the World Health Organization (370 g). However, underreporting of consumption may have occurred.

FOOD AND NUTRIENT INTAKES

Valid dietary intake data were obtained from 1 600 respondents. Healthy eating guidelines (for nutrients and foods) broadly include:

- a reduction in fat intake (in absolute terms and in relation to energy intake), especially of saturated fats;
- a diet that is rich in micronutrients (especially the antioxidants);
- a reduction in the consumption of sugar;
- an increase in the consumption of fruits and vegetables.

The survey identified the best food sources of energy and of the nutrients investigated, both in Barbados' food supply and as consumed by the survey respondents. This is essential information to guide the design of programmes that promote healthy eating.

Intakes of energy and macronutrients (fats, protein and carbohydrates)

- **Median energy intake was 2 136 kcals (8.95 MJ) for men and 1 715 kcals (7.17 MJ) for women. Compared with daily requirements, these figures represent 80 percent adequacy for men and 82 percent for women.**
- The methodology used for dietary intake generally underestimates actual consumption. The survey findings for energy intake are not unusually low, and are similar to those from the United Kingdom, where high levels of obesity are also found.
- Protein intakes are high, reflecting a high consumption of meat, fish and poultry. Meat was also a rich source of fats and saturated fats.
- The survey found that the percentage of calories derived from fat in the Barbadian diet (close to 25 percent) is below the recommended WHO maximum of 30 percent, but well above the recommended Caribbean maximum of 15 to 20 percent.
- The fact that the average contribution of fat to energy intake is not excessive (and well below that of the United Kingdom, for example) is no reason for complacency. It is important to recognize that nearly one-third of the respondents were consuming high-fat diets, and exceeding the recommended WHO maximum of 30 percent.
- Of equal concern is the finding that a significantly higher proportion of younger (< 50 years) than older (≥ 50 years) Barbadians exceeded the WHO maximum. This indicates a disturbing trend towards higher-fat diets.
- The contribution of carbohydrates to the calorie intake is acceptable, at about 59 percent. **However, the consumption of sugar and high-sugar beverages is high: carbonated beverages are among the six best sources of energy and carbohydrates.**
- The consumption of sugar and carbonated beverages by younger adults (< 30 years) - both men and women - exceeds by far their consumption by all other age groups.

Vitamins and minerals (micronutrients)

Owing to incomplete food composition data, intakes of some micronutrients may be underestimated. This applies especially to zinc, and to a lesser extent folate.

- **Men's average intakes of most vitamins and minerals were adequate when compared with the recommended dietary allowances (RDAs) for the Caribbean. Possible exceptions are intakes of calcium and zinc.**
- **Women's average intakes of three minerals (calcium, iron and zinc) and folate fell below the RDAs.**
- In the case of zinc, the survey recommends further research before action is taken, because the survey figures are likely to be underestimates. Barbadians are unlikely to be suffering from zinc deficiency.

- In view of the possible link between calcium intake and osteoporosis in later years, programme planners may wish to consider recommending increased intakes of calcium, especially among women. This link, however, remains controversial, and action should probably await the outcome of further research.
- **Of serious concern are the iron intakes of women of child-bearing age: relative to RDAs, women aged 18 to 49 years achieved only 80 percent adequacy. Equally disturbing is that more than 40 percent of these women were consuming very low levels of iron: less than 70 percent of the RDA.**
- These findings present a challenge to the nutritionist. Increasing the consumption of iron-rich foods generally also leads to increases in energy intakes, which are undesirable in the Barbadian context. This dilemma highlights the importance of exercise as an essential component of a weight reduction strategy, and the importance of an effective education programme for pregnant women and women of childbearing age.
- Adequacy of folate intakes is also poorest among women of child-bearing age, and this is another matter of concern in view of the link between low folate status and certain types of birth defects. Clearly, nutrition promotion programmes need to encourage higher folate intakes among women of childbearing age, and planners may wish to consider a supplementation programme for women who are planning a pregnancy (supplementation during pregnancy is of little use, unless started very early).
- Intakes of other micronutrients (vitamins A and C, thiamine, riboflavin and niacin) were generally adequate, although lower than those found among United Kingdom adults under 65 years (with the exception of vitamin C). This may reflect a lower consumption of fortified foods, such as breakfast cereals. Barbadians' intakes of micronutrients could be raised by the fortification of one or two key foods, such as crackers (biscuits) or bread.
- The survey found that, even after correcting for energy intake, substantial proportions of men and women still have inadequate intakes of a number of micronutrients.
- This finding has important policy and programme implications. **Clearly what is needed is not more or less of the same diet, but rather a more diverse diet, with foods that contribute significantly to the intakes of certain vitamins and minerals, but not to fat intake.** Examples of such foods are fruits and vegetables and low-fat dairy products.
- Micronutrient adequacy was poorest among young men and women (< 30 years), and older men (³ 65 years).
- **Poorer micronutrient adequacy was associated with less healthy diets containing more alcohol, fats and sugar, and fewer fruits and vegetables.**
- Dietary diversity is an important predictor of dietary adequacy: as diversity increased, micronutrient adequacy improved.
- Lower expenditure on food was associated with poorer diversity and poorer micronutrient adequacy.
- Respondents from households engaged in food production are likely to have greater dietary diversity. This finding justifies past efforts to encourage home food production. However, further efforts to increase home food production may not meet with much success, so other strategies to improve the Barbadian diet should also be considered.

VULNERABILITY PROFILES

Most Barbadians enjoy a high standard of living. Nonetheless, the basic analyses of survey data suggest that economic and demographic factors (often interrelated) may influence food and nutrient intakes and health status.

Lower-income households

In comparison with respondents from wealthier households, respondents from households in the lowest third of the income per capita range are:

- more likely to be women, older, and unemployed or employed in manual occupations, as well as to have lower educational attainment;
- more likely to suffer from diabetes and hypertension;
- more likely to have inadequate intakes of micronutrients (and less likely to take micronutrient supplements);
- less likely to take planned exercise;
- less likely to consume meals outside the home;
- less likely to consume sufficient fruit and vegetables.

Single-sex households

In comparison with their counterparts living in households composed of both sexes:

- men and women living in single-sex households are more likely to be older, have a lower educational attainment, and be unemployed (or work in manual occupations);
- women in single-sex households have poorer intakes of iron, cereals, fruits and vegetables, and legumes - their diets lack diversity;
- men in single-sex households consume fewer cereals, fruits and vegetables, legumes, meat and dairy products - their diets are both less diverse and less adequate in terms of micronutrient content.

Female-headed households

Despite significantly lower per capita incomes, households headed by women appear to be coping well nutritionally, compared with households headed by men. In fact, the main nutritional difference to emerge was that older (³ 45 years) men and women living in female-headed households achieved greater dietary diversity than their counterparts in male-headed households.

Older people

Barbados, as most other countries, is experiencing a major demographic shift towards an ageing population. **In general, nutrient adequacy was good in older Barbadians (³ 65 years), and better than that of younger Barbadians (and that of older people in the United Kingdom).** There are significant differences in dietary patterns compared with younger (< 65 years) people: older people consume more starchy roots and tubers, but less sugar, carbonated beverages, cereals, legumes and fruits. CNCDs are more prevalent in older people, who are therefore more likely to be on diets, which may restrict dietary diversity. The poorest dietary diversity was found among older people living alone.

SPECIAL ISSUES

Three special issues were examined in detail: iron-deficiency anaemia, healthy lifestyles, and the situation of young Barbadians. Based on the points already mentioned, the survey concluded the following:

- Women of child-bearing age have low intakes of dietary iron, and the intakes of more than 40 percent of these women are severely deficient. The risk of **iron-deficiency anaemia** and its consequences is high in this section of the population.
- **Healthy lifestyles** should be promoted, both as a preventive action (against CNCDS) and for the management of CNCDS. The survey concluded that:
 - respondents who claimed to be dieting either were not in fact doing so, or had poor compliance with dietary guidelines;
 - the dietary message that has been best understood, by both men and women, seems to be the need to reduce sugar;
 - advice to increase fruit and vegetable consumption is largely ignored;
 - a comprehensive weight reduction strategy that includes taking planned exercise is not followed;
 - overweight individuals in general do not diet until they have been diagnosed with a CNCDS: less than 10 percent of overweight respondents not suffering from a CNCDS stated that they were dieting, in contrast with nearly 41 percent of overweight respondents with a diagnosed CNCDS. In short, no preventive action is being taken.
- The survey reported some disturbing findings about the food and nutrition situation of **young Barbadians** (< 30 years). Unless preventive action is taken soon, a generation of Barbadians is emerging who will enter middle and old age already overweight or obese and with poor dietary practices, such as a high consumption of high-calorie fast foods, sugars and carbonated beverages, and a low consumption of vegetables. On the positive side, younger Barbadians are educated to a higher level and may show some awareness of their own dietary deficiencies (such as having better recognition of inadequate intakes of fruit and vegetables). These findings emphasize the importance of starting health and nutrition promotion early, i.e. during adolescence, and the need for collaboration across government sectors, non-governmental agencies, and the private sector.

Policies and programmes: issues and actions

Achieving good nutrition is a crucial step towards achieving a healthy population. Research repeatedly highlights the links between diet and health. Both obesity and low intakes of antioxidants are established risk factors for a range of CNCDS, while recent studies have shown that the increased consumption of fruits and vegetables can reduce blood pressure and heart disease rates, the latter by as much as 15 to 20 percent. Whether such dietary effects work through increased antioxidant levels, changes in fat profiles or other means is not clear. There are also indications now that higher than normal intakes of some micronutrients may delay the onset of AIDS in HIV-positive individuals. Other links between diet and disease include calcium with osteoporosis, salt with hypertension, and folate with birth defects.

The cost of diet-related disease is high both to a country's health system and economy and to its people, in human and financial terms. In common with many of its Caribbean neighbours, Barbados has experienced changes that may have had a negative impact on lifestyles and health: socio economic development, changed patterns of food acquisition and consumption, and increasingly sedentary lifestyles. The survey results highlight a number of key nutritional and nutrition-related problems that merit urgent attention. The survey report contains a wealth of information to guide the choice and design of appropriate policies and programmes. The following are some proposed areas for action, in the context of an overall nutrition strategy, and the operational strategies needed to achieve successful programmes. The overarching goal of such a nutrition strategy is clear, and reflects the goals of Barbados' National Plan of Action on Nutrition (approved by Cabinet in 1998) and the mission of NNC: the improvement of the nutrition and health of all sections of the population - and the maintenance of such improvement - through information, access to a safe, affordable food supply, and the promotion of healthy lifestyles.

MAKING INFORMED CHOICES

Creating an informed consumer is an essential first step towards achieving lifestyle change. Barbados has clear advantages in this regard: its food supply is plentiful, it has an educated population, and most Barbadians enjoy a high standard of living. To make informed choices, the consumer needs:

- nutrition knowledge;
- food labelling;
- ready access to safe, cheap, healthy foods.

TAKING PREVENTIVE ACTION

While the dietary management of CNCDS receives commendable attention from NNC, the survey found that prevention of obesity and CNCDS appear not to be adequately addressed. Preventive action could include the following elements:

- a public awareness campaign;
- the targeting of high-risk individuals;
- the promotion of healthy lifestyles, including:
 - healthy eating;
 - legislation and taxation to reduce smoking and alcohol consumption;
 - promoting exercise by providing opportunities and facilities.

IMPROVING DIETARY MANAGEMENT

Current practices in the dietary management of CNCDS should be examined to find ways of increasing the diversity of foods in diet plans. When providing dietary counselling, health professionals need to stress foods that the client can eat, or should eat more of, and not just those to be avoided. Moreover, every effort should be made to reach overweight clients who are not suffering from a CNCDS, in order to encourage weight reduction before a chronic disorder such as diabetes or hypertension develops. Individual weight reduction plans, including those for CNCDS sufferers, should be comprehensive and include all aspects of a healthy lifestyle, especially an exercise programme.

SPECIAL TARGETED PROGRAMMES

Women of child-bearing age

Using the survey results and other information, nutritionists need to find ways of improving dietary folate and iron intakes and the bioavailability of the latter, without increasing the intake of energy.

Schoolchildren

The finding that substantial obesity exists among young adults highlights the need for starting action at an early age. Imaginative approaches are needed to make nutrition exciting to schoolchildren, and to further strengthen the existing food, nutrition and home economics programmes in schools.

Young adults

Most of the actions recommended for the previous two categories will also have an impact on young adults. However, young adults greatest need is for an awareness of their own nutritional status, of the risks associated with obesity, and of the importance of early action.

Older people

The survey found that, on the whole, older Barbadians were coping well, nutritionally. Moreover, many of the actions described for the previous three categories can be designed to encourage active older people to participate. However, special attention should be paid to older people's dietary: meals with high fibre content and high micronutrient density, more frequent, smaller meals, and improved dietary diversity that accommodates food preferences. The emphasis must be on improving quality of life, and on enabling the older person to remain independent and living at home for as long as possible.

STRATEGIES

Political commitment

An essential precondition for all action is demonstrated political commitment, which translates into financial support and a willingness to engage all relevant sectors to address the problems. NNC alone cannot undertake the necessary actions.

Strategic use of NNC resources

It is recommended that NNC re-examine its approach to addressing the nutrition problems that are prevalent in Barbados. The individual dietary counselling that is currently offered by the technical staff of NNC can be carried out in collaboration with other health professionals with suitable training. In addition, the community nutrition programmes should be targeted, not only to the traditional vulnerable groups, but also to specific groups such as young people. The data that have been collected provide community-based nutrition programmes with the tools to develop effectively targeted interventions at the community level.

Strategic alliances

Virtually all the proposed actions require strategic alliances and often unconventional partnerships. At the very least, the collaboration of other government departments and ministries (such as those of agriculture and education) and the cooperation of the private sector (especially the food sector) are crucial to the success of an overall nutrition strategy.

Monitoring the food and nutrition situation

A simple, cost-effective system should be established to monitor progress in the implementation of a nutrition strategy and the achievement of its goals. Frequent food consumption surveys are costly and unrealistic. What is needed instead is the routine gathering of simple data on food patterns, nutritional status and CNCDs. There are a number of possible ways of achieving this.

ACRONYMS

Ag	Acting
BMI	Body mass index
BSS	Barbados Statistical Service
CDC	Centres for Disease Control
CFNI	Caribbean Food and Nutrition Institute
CNCD	Chronic non-communicable disease
CNO	Community Nutrition Officer
ED	Enumeration District
FAO	Food and Agriculture Organization of the United Nations
FBS	Food Balance Sheets
FIVIMS	Food Insecurity and Vulnerability Information and Mapping Systems
GDP	Gross domestic product
HMSO	Her Majesty's Stationery Office (United Kingdom)
NHANES	National Health and Nutrition Examination Survey (United States)
NNC	National Nutrition Centre (Barbados)
PAHO	Pan-American Health Organization
RDA	Recommended dietary allowance
SPSS	Statistical Package for the Social Sciences
UNDP	United Nations Development Programme
WHO	World Health Organization

1. BACKGROUND TO THE SURVEY

Barbados is the most easterly island of the West Indies, situated 13° 4' north of the equator on latitude 59° 37' west. The island has an area of approximately 430 km², and is mostly of coral formation and flat, except for the central part, which rises to a height of 336 m. Average

annual rainfall ranges from 760 mm in the coastal areas to 2 000 mm in the central parts of the island. Located within the hurricane belt, Barbados is cooled by the trade winds from the North Atlantic, and experiences little variation in temperature (ranging from 22° to 32° C).

An independent nation, Barbados is a member of the Commonwealth and of the Caribbean Community. It has a two-party democratic parliamentary system of government with a Senate of 21 members and a House of Assembly of 28. There is no local government system. The island is divided into 11 parishes, with Bridgetown being the capital and the only seaport. The postal, transport and telecommunication systems are excellent.

Demography and health: trends and indicators

The island has a high population density of 620 people per square kilometre, most of whom live in the southern, southeastern and southwestern sections. Two censuses (1990 and 2000) and other government reports provide the following information on recent demographic and health trends and indicators:

- Between 1990 and 2000, the population increased from 260 491 to 268 792, while the growth rate decreased from 0.5 to 0.2 percent.
- In 2000, women (51.9 percent of the total population) outnumbered men (48.1 percent).
- There were 83 026 households in 2000, a large proportion of which (44.5 percent) were headed by women.
- Barbadian households have the following amenities:
 - 96.5 percent have electricity and piped water;
 - liquid propane gas is the cooking fuel used by most households (78.5 percent);
 - 91 percent own household appliances such as refrigerators, stoves, televisions, and radios;
 - 82.5 percent are connected to the telephone line.
- The proportion of the population living in rural areas has fallen steadily, from 59.8 percent in 1980, to 55.3 percent in 1990, and 50.2 percent in 2000.
- The proportion engaged in agriculture has also fallen, from 10 percent in 1980 to 4.1 percent in 2000.
- In both 1990 and 2000, 22 percent of the population was under 15 years of age.
- In 1990, 11.6 percent, and in 2000, 12 percent of the population were aged 65 years or over.
- The birth rate stands at a little over 14 percent, and the mortality rate at slightly over 9 percent.
- Life expectancy at birth is 72 years for men and 77 years for women.
- Between 1997 and 2000, the infant mortality rate increased from 10.6 to 13.4 deaths per thousand live births.
- Among individuals aged 15 to 24 years, homicide, motor vehicle accidents, heart disease and HIV/AIDS are now the leading causes of death.
- Among adults, heart disease, cerebrovascular disease, diabetes, cancer, hypertension and HIV/AIDS are the leading causes of death.

- Health clinic data indicate that the conditions most commonly treated among adults aged 20 to 65 years are chronic non-communicable diseases (CNCDs), i.e. hypertension, diabetes, coronary heart disease and cancers.
- Morbidity rates from CNCDs are highest in the group aged 45 to 65 years.

The economy

In 2000, the Barbadian economy experienced its eighth consecutive year of growth. Real gross domestic product (GDP) grew by an estimated 3.6 percent in 2000, compared with 0.8 percent in 1993, which was the first year of growth following implementation of the Stabilization and Adjustment Programme in 1991-1992. This programme comprised measures to reduce expenditure, enhance revenue, rebuild reserves and resuscitate the productive sectors. Construction, tourism and sugar were the major sectors contributing to growth in the economy. In 2000, the unemployment rate stood at a record low of 9.3 percent, having fallen from 24.3 percent in 1993. The inflation rate was 2.5 percent: increases in oil prices led to increases in the costs of fuel, light, transportation, housing and food prices.

Despite improvements in the economy and reductions in unemployment, poverty continues to exist in Barbados: 9 percent of Barbadians are estimated to live below the United Nations Development Programme (UNDP) poverty line of B\$5 503^[1] per household per annum. The Poverty Alleviation Bureau, established in 1998, is the administrative agency responsible for eradicating poverty in Barbados. The bureau also collaborates with and assists government and non-governmental agencies with the implementation of various programmes. It provides assistance to individuals in four categories:

- the low-paid, working poor;
- the unemployed;
- one-parent families;
- mentally and physically challenged persons and noncontributory pensioners.

Education

Barbados has a high literacy rate of approximately 95 percent. It has a well-developed educational system providing primary, secondary and tertiary education. Education is compulsory for all children aged between five and sixteen years, and is provided free at government institutions for all levels - primary, secondary and tertiary, as well as in vocational institutions. Students in selected primary schools are trained in computer skills as part of the Education Sector Enhancement Programme, which was introduced in 1998. There are special schools to cater for the needs of physically and mentally challenged children. A low-cost lunch (B\$0.10) is available to all children in all government and some private primary, composite and senior schools, as well as to selected students in secondary and special schools. The lunch aims to provide one-third of the school-aged child's daily nutrient requirement.

Agriculture and food supply

Barbados relies heavily on imports to meet its food needs. With an economy that is increasingly geared to tourism, local agriculture supplies less and less of the national food supply, as reflected by the decreased proportion of the population engaged in agriculture (from 10 to 4 percent between 1980 and 2000). Food imports have risen steadily over the past

20 years, as follows (all figures are inclusive of food cost, insurance and freight, and are averaged over the three year periods):

- 1981-1983: BS\$576/year/person;
- 1991-1993: BS\$731/year/person;
- 1999-2001: BS\$1 244/year/person.

Table 1.1 provides data from Barbados' Food Balance Sheets (FBS) for the periods 1968-1970, 1978-1980, 1988-1990 and 1998-2000.^[2] As comparison, it also provides data for 1998-2000 from Jamaica, Trinidad and the United Kingdom. It is essential to note that data from FBS cannot be compared with data from food consumption surveys.^[3]

Table 1.1 Trends in food supplies, 1968-2000 (three-year averages)

	BARBADOS				JAMAICA	TRINIDAD	UK
	1968-1970	1978-1980	1988-1990	1998-2000	1998-2000	1998-2000	1998-2000
Total energy (kcal/capita/day)	2 781	3 058	3 191	3 025	2 680	2 721	3 326
Total fat (g/capita/day)	76	93.9	109.3	97.8	77.1	76.3	142.1
Percentage of calories from:							
Fat	24.6	27.6	30.8	29.1	25.9	25.2	38.5
Vegetable products	72.9	73.4	72.6	76.6	84.7	84.2	69.3
Animal products	27.1	26.6	27.4	23.4	15.3	15.8	30.7
Food groups:							
Cereals	30.9	28.5	28.6	29.7	33.2	36.5	24.4
Starchy roots and tubers	8.2	5.4	3.9	4.0	7.9	2.1	6.0
Sweeteners (sugar, honey)	18.1	20.3	16.9	18.9	17.5	21.5	10.6
Pulses	2.9	2.4	2.3	1.9	0.8	3.8	1.7
Vegetable oils	6.4	7.9	12.4	12.0	14.2	13.5	15.1
Vegetables	0.7	1.1	1.1	1.7	1.7	1.0	1.9
Fruit	1.5	1.5	2.2	2.7	6.3	2.9	2.9
Meats and offal	12.5	13.7	15.1	12.6	8.5	5.5	13.7
Animal fats	3.9	4.5	2.0	2.5	2.2	3.2	4.6
Milk and eggs	8.8	6.3	8.2	6.1	2.9	6.2	11.4
Fish and seafood	1.8	2.1	2.0	2.2	1.7	0.8	1.0

Data include the total calorie and fat supply available for human consumption, expressed in terms of per capita per day, as well as the proportions of calories contributed by food groups to the total supply. The table indicates the following trends and comparisons:

- Both total energy supply and fat supply have increased steadily over the past 30 years, with the possible exception of a fall in 1998-2000. Barbados' energy supply now falls almost exactly midway between that of the United Kingdom and those of its Caribbean neighbours.
- The percentage of calories from fat has increased substantially over the period, again with a possible fall in the most recent figures. The Barbados figure is substantially higher than those of Jamaica and Trinidad, but still much lower than that of the United Kingdom.
- After 20 years of little variation, the percentage of calories from vegetable products seems to have risen in 1998-2000, but still falls far short of its equivalents in Jamaica and Trinidad.
- There has been little change in the calorie contribution of cereals, but the contribution of starchy roots and tubers has fallen sharply to less than half its 1968-1970 value.
- As in its Caribbean neighbours, the contribution of sugar and other sweeteners to total calorie supply is very high in Barbados, and shows no clear signs of decreasing.
- Pulses contribute little to total calorie supply, and their contribution seems to be falling. Trinidad has a higher contribution from pulses, which is likely to be a reflection of the ethnic mix of its population.
- Calories from vegetable oils have increased sharply to almost double their 1968-1970 figure, while calories from animal fats have fallen. This figure is now similar to those from the comparison countries.
- There seems to be an encouraging rise in the contribution of fruits and vegetables to the total calorie supply.
- Meat consumption is clearly an important feature of the Barbadian diet: in Barbados the contribution of meats, poultry and offal to the energy supply is much higher than it is in either of neighbours, and similar to that in the United Kingdom.
- In comparison with the United Kingdom, the contribution of milk and eggs is low in all three Caribbean countries.

In summary, it seems that Barbados' food supplies have altered substantially over the last 30 years, reflecting changing food consumption patterns. While still retaining features common to Jamaica and Trinidad, some aspects are closer to the food supply of an industrialized nation such as the United Kingdom. From a health and nutrition perspective, there are some worrying trends, however: increased fat calories and the continuing high contribution of sugar are the most important of these. On the positive side, supplies of fruit and vegetables may have improved, and meat consumption may be falling.^[4]

Health care

Comprehensive health care is available from both the public and private sectors. In the public sector, care is administered through the Ministry of Health and is free of charge to the entire population at the point of delivery, with the exception of technologically intensive services (such as MRI), which are offered free only to individuals who qualify under the Medical Aid Scheme. The present system offers preventive, rehabilitative and curative services through:

- the Queen Elizabeth Hospital, a 547-bed facility that offers 24-hour acute, secondary, tertiary and emergency care;
- one geriatric hospital and three district hospitals offering geriatric care;
- a mental health hospital;
- a half-way house for substance abusers;
- two rehabilitation institutions for the physically and mentally challenged;

- an AIDS hostel;
- a development centre for children and adolescents who are physically challenged;
- a nutrition centre.

Primary health care is also offered free to all Barbadians at the country's eight polyclinics and four satellite clinics, whose services include:

- maternal and child health care;
- family life development;
- dental care;
- eye care;
- community-based mental health care;
- nutrition advice and services;
- pharmaceutical services;
- environmental health services;
- programmes for the control and management of both communicable and non-communicable diseases;
- physiotherapy;
- chiropody;
- dermatology.

Public health nurses routinely visit schools to monitor the health of schoolchildren and provide BCG inoculations against tuberculosis. Adolescents from schools are invited to attend adolescent health clinics, which offer advice and guidance on relevant topics.

In addition to health services from the health system's hospitals and clinics, the government has allocated funds to the Alternative Care for the Elderly Programme, which purchases space in private nursing homes for the care of ambulant older people. An Inspection and Advisory Committee is responsible for licensing and monitoring the private nursing homes.

Health care is also available from the private sector, in which more than 100 general practitioners and consultants operate in individual and group practices. Private sector care is offered through one private hospital, homes for long-term care, and centres and individuals offering pharmaceutical, diagnostic, dental, psychiatric, nutrition and physical therapy services.

Nutrition services

The National Nutrition Centre (NNC) is the Ministry of Health department with responsibility for implementing programmes to improve the nutritional status of the population. Nutrition services were decentralized in 1980, and Community Nutrition Officers (CNOs) now operate through polyclinics, where the focus is on counselling on the prevention and management of obesity and CNCs (diabetes, hypertension and coronary heart disease). CNOs also conduct counselling and education programmes at the health clinics and participate in a variety of community nutrition education programmes, such as those promoting backyard gardening, nutrition and food preparation.

NNC also advises the government on all issues related to food and nutrition, including providing recommendations based on the findings of local and national surveys. It implements, monitors and evaluates community-based nutrition education programmes, and conducts growth monitoring of young children as part of the Nutrition Surveillance

Information System. Schoolchildren aged ten to fourteen years are targeted through the annual summer camp, which is conducted at different schools throughout the island. The aim is to educate children about good nutrition and healthy eating practices through theoretical and practical activities. There is also an annual Food, Nutrition and Health Day for adolescents, which aims to focus attention on World Food Day.

The centre offers advice on nutritional policies and hospital-based food services to the dietary departments of the geriatric and district hospitals and the St Andrew's Children Centre. Similar advice is available to other government institutions on request. NNC also provides training in nutrition to medical and paramedical personnel and child care workers.

^[1] B\$1.00 = approximately US\$0.50.

^[2] The data are extracted from FAO's database. Three-year averages are used to control for annual fluctuations.

^[3] FBS provide estimates of food available for human consumption, whereas food consumption surveys provide data on food actually consumed. The sources of error in FBS data are substantial, and have been shown to vary with the nature and complexity of a country's food system. The FBS of countries reliant on subsistence agriculture generally underestimate the real food supply, because little of the food reaches the market. The FBS of industrialized countries and countries with a highly processed food supply tend to overestimate real food supply. Thus, for example, the FBS for the United Kingdom indicate that 3 219 calories per capita per day were available in 1990. In contrast, the 1990 Dietary and Nutritional Survey of Adults states that an average of 2 065 calories per capita per day was consumed, which is more than 1 000 calories less than the FBS figure. There is a similar difference between Barbados' FBS figure for 1998-2000 (3 025 calories, see Table 1.1) and the findings of this food consumption survey (1 896 calories, see Table 3.17). In short, FBS data should only be used to highlight trends in food availability.

^[4] Fruit and vegetable supplies are generally underestimated, because supplies from home garden production are often not included. Moreover, when home food production is falling, an apparent rise in FBS figures may only reflect an increase in market availability and purchases.



2. THE SURVEY

The purpose of the Barbados Food Consumption and Anthropometric Survey (2000) was to determine the food intake and dietary patterns of the country's adult population, the prevalence of obesity and diagnosed nutrition-related CNCs, and the relationship between these and dietary patterns. The information obtained through this study will enable NNC to plan and execute various targeted intervention programmes with the aims of increasing the population's levels of awareness of health-related risks and of actually reducing those risks by adopting more appropriate eating and lifestyle patterns.

The specific objectives of the survey were to:

- determine the nutritional adequacy of Barbadians' diets;
- examine food choices, food purchasing patterns and food sources;
- assess the extent of home food production and its contribution to household diets;
- determine the prevalence of obesity and diagnosed nutrition-related CNCDs, and their relationship to dietary patterns;
- determine whether there are significant pockets of undernutrition in Barbados;
- investigate the association between demographic, social and economic characteristics and dietary practices.

Survey methodology

This survey was designed to provide national results at a 3 percent tolerance with a 95 percent degree of confidence. The sample design was a *systematic random two-stage cluster design*.

SAMPLE SELECTION

Selection of households

The *first stage* involved the selection of 42 Enumeration Districts (EDs) from a total of 547. In the *second stage*, 13 clusters of three households each were selected systematically within each of the 42 selected EDs. Each cluster consisted of a primary household and two secondary households. The secondary households were the households immediately before and immediately after the primary household. A total of 1 638 households were selected, and 1 051 were in the final sample (see the section on Recommendations for future surveys: difficulties encountered and limitations of the survey). Enumerators reported that several of the houses were vacant, or occupied by tourists on a short-term basis. The occupants of some houses refused to participate.

The sample was selected from the EDs that were used by the Barbados Statistical Service (BSS) for the population census in May 2000. These EDs had been created to include approximately 150 households each - EDs used in previous population censuses were divided in order to ensure this. Each ED thus had an equal probability of selection.

The EDs were first ordered from the northwestern corner of Barbados, moving in a serpentine fashion to the east and south, with the last ED listed being located in the southeastern corner. Only households in these EDs were enumerated. In each selected ED, the 13 clusters of three households were selected systematically with a random start.

Selection of individuals

Two people of at least 18 years of age were interviewed in each household, except in one-person households or in those where only one person was 18 years or more. The head of the household or the person who prepared the meal was interviewed for the household questionnaire and the first individual questionnaire. A second individual questionnaire was administered to a second person who was selected randomly according to the rules set out in the survey manual.

In general, interviewers conducted household visits in pairs to facilitate the weighing and measuring of the respondents, but this practice was not always possible and some households

were visited by only one enumerator. Interviewers were advised to leave a callback card at the households of people who were not at home asking them to contact NNC; however none of these prospective respondents called. The interviewer made two follow-up visits, and if contact was not established, "refusal" was indicated on the questionnaire, which was given to the supervisor.

THE FIELD TEAM

The survey team consisted of three supervisors, to each of whom was assigned a group of 12 enumerators at the start of the data collection phase. The enumerators included community nutrition officers, a dietetic technician, a school meals supervisor, nurses, an environmental health officer, agricultural field officers and field and supervisory staff who had recently been employed on other surveys.

It was the responsibility of each supervisor to identify and indicate the 13 clusters of households in each ED to the enumerators. In most cases, two enumerators visited each household, but there were instances when only one interviewer visited in order to ensure that the identified respondents were interviewed as scheduled. Interviews were conducted in the evenings and at weekends, as well as during regular working hours.

STANDARDIZATION AND TRAINING

Three standardization and training workshops were conducted for interviewers, who were taught skills for conducting interviews and for collecting anthropometric and dietary intake information. Each received a copy of the *Interview manual for Barbados*, which was the reference document during the sessions. Consultants from FAO and the Caribbean Food and Nutrition Institute (CFNI), and technical staff from BSS and NNC were the resource persons at the standardization workshops. Data collection commenced on 5 September 2000.

Interviewers were trained to:

- ask each question in the same way;
- estimate the weights of preportioned cooked foods, before they were informed of the actual weights. For fruits and vegetables, edible portions were used before the "as purchased" weight was divulged. During the interviews, the interviewers used common household measuring equipment such as measuring cups, pot-spoons and measuring spoons to assist respondents in recalling food intake. Where possible, the weight of food reported by the respondent was recorded. All food portions were converted to the measurements stated in the food composition tables;
- probe in order to determine the method of food preparation and the addition of fat, sugar, salt and other condiments.

After the first workshop, the interviewers pilot-tested the instrument in parishes that BSS identified as having similar demographic profiles to those in which the survey would be conducted. Following the pilot tests, the consultants and other resource persons made adjustments to the instrument as required.

A second pilot test was carried out, and discussions were held with the consultants and interviewers before final changes were made to the instrument.

The following quality control measures were implemented during data collection for the survey:

- One week after data collection, all enumerators were invited to a meeting at which to discuss issues that had emerged and that were relevant to the carrying out of interviews and the identification of foods. Information was summarized and distributed to the enumerators as a complement to the information in the interview manual.
- The supervisors attended the discussions and performed spot checks to assess the enumerators' interview techniques, as well as to ensure that the questionnaires were being administered as planned.
- The coordinator held regular meetings with the three supervisors to review the progress of fieldwork and make adjustments as required.
- Each enumerator was required to insert the food code from the food composition tables into each item of the 24-hour recall period.
- The supervisors checked the questionnaires to ensure that all items and questions were completed.

THE SURVEY QUESTIONNAIRES

The following two questionnaires were used to gather the information for the survey:

- *A household-level questionnaire* was administered to the head of household and included questions on:
 - household composition;
 - income and food expenditure information;
 - food production activities;
 - shopping habits;
 - food preparation practices.
- *An individual-level questionnaire* was administered to the head of household and to one other household member (see section on Sample selection) and included questions on:
 - demographic and socio-economic factors (age, sex, education, occupation);
 - diagnosis and family history of CNCs;
 - healthy lifestyle practices (exercise, dieting, food preparation practices, frequency of purchase of ready-to-eat meals);
 - perception of own nutritional status;
 - use of micronutrient and dietary supplements.

In addition, anthropometric measurements were taken. The interviewers were trained to perform standard anthropometric assessment. Each individual was weighed and measured twice. When the difference between the two measurements was within pre-set limits, the second measurement was recorded. Body weight was recorded to the nearest half pound

(converted later to kilograms) with an electronic scale, and height was measured to the nearest centimetre with a metal measuring tape and a stadiometer.

A *24-hour recall period* was used to determine each individual's food intake in the 24 hours prior to the interview, using a standardized four-step protocol: 1) a complete list of all foods and beverages consumed during the previous 24-hour period, or preceding day, was obtained; 2) detailed descriptions of all the foods and beverages consumed, including cooking methods and brand names (if possible), were recorded; 3) estimates of the amounts of all foods and beverages consumed were obtained, using household measurement equipment such as kitchen spoons, cups and kitchen scales; and 4) the interviewer reviewed the recall with the respondent to ensure that all items had been recorded correctly.

In addition, a *semi-quantitative food frequency questionnaire* with a list of 84 foods was administered. Frequency was coded as daily, weekly, monthly or none, and the number of predefined measuring units consumed was recorded. A measuring unit, approximated by staff from NNC in collaboration with the CERES^[5] consultant, served as a reference portion from which the enumerator determined the amount that the respondent stated he or she had consumed, according to the frequency of intake specified. Portions were also recorded in grams, as required for foods that were recorded by weight.

A pilot study was conducted to validate these methods. Interviewers were provided with a bag containing household equipment such as a kitchen scale, measuring cups and spoons to help respondents recall the quantity of foods eaten. For food items such as carbonated drinks and juices packed in boxes, a chart was prepared showing the amounts in each container of various beverages.

Data processing and analysis

DATA CLEANING AND ENTRY

Supervisors and a team of nutritionists checked the 24-hour recalls and the semi-quantitative food frequency questionnaires before two trained data entry clerks entered the data. As a quality control measure, the CERES consultant randomly selected and entered 200 of the completed questionnaires in order to compare this with the data entry carried out by the clerks. Household measures were converted to grams and used to record quantities of cooked or raw food, as appropriate. A preliminary data analysis (frequencies and histograms) was used to identify errors and outliers, which were then corrected or recoded as missing values. The Statistical Package for the Social Sciences (SPSS) Version 8 was used for all data analysis.

FOOD AND NUTRITIONAL DATA HANDLING

The CERES computer program was used to determine the nutritional value and nutrient adequacy of the diet, using *Food composition tables for use in the English-speaking Caribbean* (FCT) and *Recommended dietary allowances for the Caribbean* (RDA) (CFNI, 1993 and 1998).

The nutritional value and adequacy of the diet was calculated from the 24-hour recalls. The semi-quantitative food frequency questionnaire was used to examine dietary diversity and to identify the best food sources for the nutrients.

The nutrient compositions of some frequently consumed local recipes were calculated and added to the food composition table in the CERES program. Local foods were also grouped into the "generic" classification and installed into the CERES program. The calculation of the 38 generic foods (see Annex IV) was based on the quantities used in FCT.

RDA was used as the standard against which the adequacies of energy and selected nutrient intakes for each respondent were assessed. Four age groups were used in analysing the results: 18 to 29 years (<30 years); 30 to 49 years; 50 to 64 years; and ³ 65 years.

Using the information collected from the 24-hour recall and the CERES program, the following information was obtained:

- intakes of energy and nutrients;
- percentages of adequacy of energy and nutrient intakes, based on age- and sex-specific RDAs;
- contributions to total energy from proteins, fats and carbohydrates;
- per capita consumption of the 38 generic foods.

Based on World Health Organization (WHO) standards, percentages of adequacy of respondents' energy and nutrient intakes were categorized for the analysis into the following categories: £ 70 percent (very inadequate), 70.1 to 90 percent (inadequate), 90.1 to 110 percent (adequate) and > 110 percent (excessive). Adequate dietary protein, fats and carbohydrate intakes as percentages of total energy were determined and categorized as follows:

- proteins, 10 to 15 percent of dietary energy;
- total fats 15 to 20 percent of dietary energy;
- carbohydrates 55 to 60 percent of dietary energy.

The nutrient goal for fruits and vegetables was set at 370 g per day. Two scores were developed: 1) the *micronutrient adequacy score* was calculated from the levels of adequacy of a range of micronutrients, using data from the 24-hour recalls (see the subsection on Micronutrient adequacy in Chapter 3); and 2) the *dietary diversity score* was calculated from the number of items consumed and the frequency of their consumption, using data from the food frequency questionnaire (see the subsection on Dietary diversity in Chapter 3).

Body mass index (BMI) was calculated from each respondent's weight and height according to the following equation:

$$\text{BMI} = \text{weight (kg)}/\text{height (m)}^2$$

The standard WHO/FAO classification was used to define underweight, normal weight, overweight (also called pre-obesity), and obesity classes I to III (see Table 3.11).

DATA ANALYSIS

Statistical analysis was performed using SPSS Version 8. Frequency distributions, medians, means and standard deviations were used to describe the data. Cross-tabulations and chi-squared tests were performed to evaluate the strength of association between categorical variables, especially to examine differences across age groups and sexes. For continuous variables (such as BMI and dietary intake data), t-tests and one-way analyses of variance were

used to investigate differences between age groups and sexes. In all cases, $p < 0.05$ was used as the cut-off for statistical significance.

Vulnerability profiles were developed using a number of definitions of vulnerability (see Chapter 4). This was done either by performing multiple regression analyses to determine the contributions of a range of variables to the variation of certain key indicators (BMI, micronutrient adequacy scores and dietary diversity scores), or by using t-tests, one-way analyses of variance and chi-square tests to examine other potentially vulnerable conditions (poverty, old age, and female-headed households). The results of in-depth analyses of three key issues - iron deficiency anaemia, healthy lifestyles and younger adults - are presented in Chapter 5.

Throughout this report, the results from the Barbadian survey have been put into context by comparing them with earlier Barbadian data (to examine trends), with data from other Caribbean countries and, in some instances, with data from the United Kingdom or the United States. Chapters 3, 4 and 5 focus on significant findings, rather than presenting the results of all the analyses undertaken. Chapter 6 presents the policy and programmatic implications, as well as recommendations based on the survey results.

Recommendations for future surveys: difficulties encountered and limitations of the survey

A national survey such as this one requires considerable forward planning. It demands a substantial commitment of time and resources, and should therefore be undertaken only when adequate time and resources exist and when the survey results will be put to good use in guiding policy construction and programme planning. It is useful to examine the planning and implementation of this survey in order to extract lessons learned that might benefit future surveys. The following recommendations are based on the experience of a survey that was successfully executed by NNC. Many of the lessons learned, difficulties experienced and limitations of the data are by no means unique to this survey, and can be found in textbooks on survey methodology, especially those on dietary methodology and nutritional epidemiology. However, it is helpful to consider them in the context of this survey.

PLANNING AND IMPLEMENTING THE SURVEY

- A national food consumption and nutrition survey cannot be undertaken by a relatively small nutrition unit or centre (such as NNC) alone; it needs the support, approval and collaboration of at least one government ministry (in this case, the Ministries of Health and of Agriculture and Rural Development were involved), as well as of other government departments (BSS for this survey). Securing such support, approval and commitment is the essential first step in planning the survey. However, political commitment to support the nutrition centre and oversee all stages of the survey is equally essential.
- If the results of the survey are to be used in policy and programme planning, potential users need to be consulted at an early stage in the planning phase. Users need to specify what information they require and in what form. Ideally, a survey advisory committee should be formed, including users, at least one statistician and a nutritionist. In this survey, a committee was formed comprising two senior medical officers of health, NNC staff, statisticians from BSS and FAO, and the director of the Chronic Disease Research Centre.

- Adequate human resources need to be found and committed for all stages of the survey (planning and supervision, data collection, data entry, data analysis and preparation of the report). Survey staff must be dedicated full-time to the survey from an early stage, and should not attempt to carry out other jobs and duties at the same time. A statistician needs to be consulted and involved from the start of survey planning. It is recommended that large surveys be coordinated by a department that is oriented to survey methodology and has access to suitable, well-trained enumerators.
- The survey budget must be realistic. The sample size of the survey needs to be calculated ahead so that a realistic estimate of the time and staff needed for data collection can be made, bearing in mind that much interviewing will have to be conducted after working hours and on weekends. Where applicable, allowance needs to be made for the costs of travel and meals, equipment, and repeat visits to ensure the inclusion of as many selected sample households as possible.
- A public information campaign is needed well ahead of survey implementation to alert the public that they may be called on to participate in the survey, and to urge their compliance. A high refusal rate can produce biased results and causes much time wasting.
- The size of the survey team needs to be carefully planned. On the one hand, a team that is too large can pose problems regarding adequate supervision and quality control. On the other hand, if enumerators are asked to conduct too many interviews, boredom can set in and affect the quality of the work.
- A work plan needs to be developed early during survey planning, with the timing of key events clearly marked. This requires a realistic assessment of the time needed for fieldwork. Training should be conducted close to the start of data gathering, and refresher training must also be scheduled. In this survey, delays in training and in the availability (and set-up) of computers, as well as the imminent start of the national census, resulted in the start of the survey being postponed from January to September 2000.
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- The training of enumerators is crucial, regardless of whether they have a nutrition background. Some enumerators may "fail" the training, so more enumerators than needed for the survey should be trained, and the weakest trainees placed in reserve. In this survey, some enumerators were absent from some training sessions, which limited the adequacy of the training they received, despite efforts to compensate for absences by providing written instructions. If the fieldwork is to be of long duration, refresher training may be needed. Training for a food consumption and anthropometry survey must include the following:

- standardization of anthropometric techniques, including assessing enumerators' abilities by calculating the technical errors of measurement made by each enumerator, and providing ample opportunity for repeated practice sessions;

- measuring and weighing each person twice, and assessing the adequacy of the measurements by comparing the values;

-instruction in the care and standardization of all equipment;

-standardization of interview techniques, and achieving familiarity with the questionnaire and the 24-hour recall method. Role play is a useful training tool for this.

- A schedule for supervising fieldwork is essential to ensure quality control throughout the fieldwork. This must include random, but regular, observation of enumerators, frequent meetings to discuss problems, and routine daily checking of completed questionnaires. Regular meetings between supervisors and enumerators are especially important, and time and opportunity must be allowed for these.
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- Quality control of data entry can be ensured either by double data entry of all questionnaires or by double data entry of a sample of questionnaires. Double data entry entails entering data from a questionnaire twice, then comparing the records, and correcting if needed. This survey employed double data entry for a sample (200 questionnaires), the second data entry being done by the CERES consultant.
- Entry of the 24-hour recall data is best done by a nutritionist, because judgements regarding dietary data need to be made by someone knowledgeable in the subject. If it is not possible to employ a nutritionist for the data entry, the dietary information needs first to be coded by a nutritionist and then entered by a data entry clerk, under the close supervision of a nutritionist.
- The coding of dietary data includes the food item code (which is related to the food analysis program's database, and hence to whether cooked or raw food is referred to) and the quantity of food consumed (in grams). This entails converting household measures into grams and assessing the composition of composite dishes and pre-prepared foods. It also entails making a separate list of foods (such as composite dishes or purchased pre-prepared foods) that are not included in the database, so that

these may be included in the data analysis. Decisions regarding the coding of dietary data, quantities and compositions of non-database foods are best made through discussion with nutritionists.

- The entry of dietary data is time-consuming, and this needs to be allowed for. In this survey, it would have been better to check the dietary data as the questionnaires came in, rather than after the fieldwork had been completed. To ensure the accurate coding of dietary data, a system needs to be established in which a second person recodes a sample of dietary recalls, which should then be compared with the original coded data. This will highlight issues and problems that can be discussed at meetings. In this survey, the food codes recorded by enumerators were reviewed by nutritionists, but after a considerable lapse of time. The 24-hour recalls of respondents with very high or very low energy intakes were checked.
- The 24-hour recall method presents the following difficulties and limitations, which were experienced in this survey:

- It relies on the respondent's memory, hence the need for adequate probing by the interviewer.

- Interviewers experience difficulties in recording quantities consumed and assessing portion sizes. Respondents may also fail to quantify accurately the amounts of food consumed.

- The nutrient content database (and hence the CERES database used in this survey) is incomplete: nutrient content information is not available for every food item in FCT. For example, the zinc and cholesterol contents of many foods are missing. An apparently low zinc intake (as found in this survey) may therefore be the result of the incomplete database, rather than reflecting a real dietary zinc deficiency. Unfortunately, the CERES program used to analyse this survey's dietary data does not indicate cases of incomplete information.

- The nutrient values provided in FCT (and hence CERES) were extracted from other tables, and not obtained from the analysis of Caribbean foods. This may have introduced errors in the moisture content of staple foods and the vitamin content of processed foods and fresh fruit and vegetables.

- Foods and composite dishes can be added to the CERES database. Local recipes from a Caribbean cookery book were used to enter composite dishes, and there may have been errors in the nutrient values of these dishes. Furthermore, the nutrient compositions of many foods that are pre-prepared and processed in Barbados were not available from the food companies concerned, so estimates based on similar foods may have been inaccurate for some nutrients.

- The food frequency method used in this survey entailed the gathering of information on the frequency of consumption (monthly, weekly, daily) of 84 foods, and the number of portions of predetermined size consumed. It is recommended that in future no effort be made to quantify the information (through portions consumed), but that a more detailed breakdown of frequency of consumption be obtained. Although the food frequency method is often described as "quick and dirty", it demands the same level of training in good technique as any other method. It provides valuable information on dietary patterns that are not captured by 24-hour recalls.

- All scales and measuring tapes used in this survey were calibrated in both metric and imperial units, but enumerators were instructed to record in the unit of their choice. As both data entry and data checking took place long after the fieldwork was complete, it was necessary to return to some homes to re-measure respondents because it was not clear which units had been used for the original measurements. This experience emphasizes the importance of early data entry and checking.
 - Data analysis must not be carried out by a statistician alone, but must be a collaborative effort between an experienced nutritionist (preferably with a good understanding of statistics) and a statistician (preferably with experience in nutrition surveys). The plan of the analysis and the structure of the survey report need to be agreed before data analysis begins. Input from potential users at this stage would be valuable.
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^[5] CERES is the software package that was used to analyse the food intake data. It was developed by the Instituto de Nutrición e Higiene de los Alimentos in Havana, with funding from FAO, and incorporates the Caribbean food composition tables.

2. THE SURVEY

The purpose of the Barbados Food Consumption and Anthropometric Survey (2000) was to determine the food intake and dietary patterns of the country's adult population, the prevalence of obesity and diagnosed nutrition-related CNCDS, and the relationship between these and dietary patterns. The information obtained through this study will enable NNC to plan and execute various targeted intervention programmes with the aims of increasing the population's levels of awareness of health-related risks and of actually reducing those risks by adopting more appropriate eating and lifestyle patterns.

The specific objectives of the survey were to:

- determine the nutritional adequacy of Barbadians' diets;
- examine food choices, food purchasing patterns and food sources;
- assess the extent of home food production and its contribution to household diets;
- determine the prevalence of obesity and diagnosed nutrition-related CNCDS, and their relationship to dietary patterns;
- determine whether there are significant pockets of undernutrition in Barbados;
- investigate the association between demographic, social and economic characteristics and dietary practices.

Survey methodology

This survey was designed to provide national results at a 3 percent tolerance with a 95 percent degree of confidence. The sample design was a *systematic random two-stage cluster design*.

SAMPLE SELECTION

Selection of households

The *first stage* involved the selection of 42 Enumeration Districts (EDs) from a total of 547. In the *second stage*, 13 clusters of three households each were selected systematically within each of the 42 selected EDs. Each cluster consisted of a primary household and two secondary households. The secondary households were the households immediately before and immediately after the primary household. A total of 1 638 households were selected, and 1 051 were in the final sample (see the section on Recommendations for future surveys: difficulties encountered and limitations of the survey). Enumerators reported that several of the houses were vacant, or occupied by tourists on a short-term basis. The occupants of some houses refused to participate.

The sample was selected from the EDs that were used by the Barbados Statistical Service (BSS) for the population census in May 2000. These EDs had been created to include approximately 150 households each - EDs used in previous population censuses were divided in order to ensure this. Each ED thus had an equal probability of selection.

The EDs were first ordered from the northwestern corner of Barbados, moving in a serpentine fashion to the east and south, with the last ED listed being located in the southeastern corner. Only households in these EDs were enumerated. In each selected ED, the 13 clusters of three households were selected systematically with a random start.

Selection of individuals

Two people of at least 18 years of age were interviewed in each household, except in one-person households or in those where only one person was 18 years or more. The head of the household or the person who prepared the meal was interviewed for the household questionnaire and the first individual questionnaire. A second individual questionnaire was administered to a second person who was selected randomly according to the rules set out in the survey manual.

In general, interviewers conducted household visits in pairs to facilitate the weighing and measuring of the respondents, but this practice was not always possible and some households were visited by only one enumerator. Interviewers were advised to leave a callback card at the households of people who were not at home asking them to contact NNC; however none of these prospective respondents called. The interviewer made two follow-up visits, and if contact was not established, "refusal" was indicated on the questionnaire, which was given to the supervisor.

THE FIELD TEAM

The survey team consisted of three supervisors, to each of whom was assigned a group of 12 enumerators at the start of the data collection phase. The enumerators included community nutrition officers, a dietetic technician, a school meals supervisor, nurses, an environmental health officer, agricultural field officers and field and supervisory staff who had recently been employed on other surveys.

It was the responsibility of each supervisor to identify and indicate the 13 clusters of households in each ED to the enumerators. In most cases, two enumerators visited each household, but there were instances when only one interviewer visited in order to ensure that

the identified respondents were interviewed as scheduled. Interviews were conducted in the evenings and at weekends, as well as during regular working hours.

STANDARDIZATION AND TRAINING

Three standardization and training workshops were conducted for interviewers, who were taught skills for conducting interviews and for collecting anthropometric and dietary intake information. Each received a copy of the *Interview manual for Barbados*, which was the reference document during the sessions. Consultants from FAO and the Caribbean Food and Nutrition Institute (CFNI), and technical staff from BSS and NNC were the resource persons at the standardization workshops. Data collection commenced on 5 September 2000.

Interviewers were trained to:

- ask each question in the same way;
- estimate the weights of preportioned cooked foods, before they were informed of the actual weights. For fruits and vegetables, edible portions were used before the "as purchased" weight was divulged. During the interviews, the interviewers used common household measuring equipment such as measuring cups, pot-spoons and measuring spoons to assist respondents in recalling food intake. Where possible, the weight of food reported by the respondent was recorded. All food portions were converted to the measurements stated in the food composition tables;
- probe in order to determine the method of food preparation and the addition of fat, sugar, salt and other condiments.

After the first workshop, the interviewers pilot-tested the instrument in parishes that BSS identified as having similar demographic profiles to those in which the survey would be conducted. Following the pilot tests, the consultants and other resource persons made adjustments to the instrument as required.

A second pilot test was carried out, and discussions were held with the consultants and interviewers before final changes were made to the instrument.

The following quality control measures were implemented during data collection for the survey:

- One week after data collection, all enumerators were invited to a meeting at which to discuss issues that had emerged and that were relevant to the carrying out of interviews and the identification of foods. Information was summarized and distributed to the enumerators as a complement to the information in the interview manual.
- The supervisors attended the discussions and performed spot checks to assess the enumerators' interview techniques, as well as to ensure that the questionnaires were being administered as planned.
- The coordinator held regular meetings with the three supervisors to review the progress of fieldwork and make adjustments as required.
- Each enumerator was required to insert the food code from the food composition tables into each item of the 24-hour recall period.
- The supervisors checked the questionnaires to ensure that all items and questions were completed.

THE SURVEY QUESTIONNAIRES

The following two questionnaires were used to gather the information for the survey:

- *A household-level questionnaire* was administered to the head of household and included questions on:
 - household composition;
 - income and food expenditure information;
 - food production activities;
 - shopping habits;
 - food preparation practices.

- *An individual-level questionnaire* was administered to the head of household and to one other household member (see section on Sample selection) and included questions on:
 - demographic and socio-economic factors (age, sex, education, occupation);
 - diagnosis and family history of CNCs;
 - healthy lifestyle practices (exercise, dieting, food preparation practices, frequency of purchase of ready-to-eat meals);
 - perception of own nutritional status;
 - use of micronutrient and dietary supplements.

In addition, anthropometric measurements were taken. The interviewers were trained to perform standard anthropometric assessment. Each individual was weighed and measured twice. When the difference between the two measurements was within pre-set limits, the second measurement was recorded. Body weight was recorded to the nearest half pound (converted later to kilograms) with an electronic scale, and height was measured to the nearest centimetre with a metal measuring tape and a stadiometer.

A 24-hour recall period was used to determine each individual's food intake in the 24 hours prior to the interview, using a standardized four-step protocol: 1) a complete list of all foods and beverages consumed during the previous 24-hour period, or preceding day, was obtained; 2) detailed descriptions of all the foods and beverages consumed, including cooking methods and brand names (if possible), were recorded; 3) estimates of the amounts of all foods and beverages consumed were obtained, using household measurement equipment such as kitchen spoons, cups and kitchen scales; and 4) the interviewer reviewed the recall with the respondent to ensure that all items had been recorded correctly.

In addition, a *semi-quantitative food frequency questionnaire* with a list of 84 foods was administered. Frequency was coded as daily, weekly, monthly or none, and the number of predefined measuring units consumed was recorded. A measuring unit, approximated by staff from NNC in collaboration with the CERES^[5] consultant, served as a reference portion from which the enumerator determined the amount that the respondent stated he or she had consumed, according to the frequency of intake specified. Portions were also recorded in grams, as required for foods that were recorded by weight.

A pilot study was conducted to validate these methods. Interviewers were provided with a bag containing household equipment such as a kitchen scale, measuring cups and spoons to help respondents recall the quantity of foods eaten. For food items such as carbonated drinks and juices packed in boxes, a chart was prepared showing the amounts in each container of various beverages.

Data processing and analysis

DATA CLEANING AND ENTRY

Supervisors and a team of nutritionists checked the 24-hour recalls and the semi-quantitative food frequency questionnaires before two trained data entry clerks entered the data. As a quality control measure, the CERES consultant randomly selected and entered 200 of the completed questionnaires in order to compare this with the data entry carried out by the clerks. Household measures were converted to grams and used to record quantities of cooked or raw food, as appropriate. A preliminary data analysis (frequencies and histograms) was used to identify errors and outliers, which were then corrected or recoded as missing values. The Statistical Package for the Social Sciences (SPSS) Version 8 was used for all data analysis.

FOOD AND NUTRITIONAL DATA HANDLING

The CERES computer program was used to determine the nutritional value and nutrient adequacy of the diet, using *Food composition tables for use in the English-speaking Caribbean* (FCT) and *Recommended dietary allowances for the Caribbean* (RDA) (CFNI, 1993 and 1998).

The nutritional value and adequacy of the diet was calculated from the 24-hour recalls. The semi-quantitative food frequency questionnaire was used to examine dietary diversity and to identify the best food sources for the nutrients.

The nutrient compositions of some frequently consumed local recipes were calculated and added to the food composition table in the CERES program. Local foods were also grouped into the "generic" classification and installed into the CERES program. The calculation of the 38 generic foods (see Annex IV) was based on the quantities used in FCT.

RDA was used as the standard against which the adequacies of energy and selected nutrient intakes for each respondent were assessed. Four age groups were used in analysing the results: 18 to 29 years (<30 years); 30 to 49 years; 50 to 64 years; and ³ 65 years.

Using the information collected from the 24-hour recall and the CERES program, the following information was obtained:

- intakes of energy and nutrients;
- percentages of adequacy of energy and nutrient intakes, based on age- and sex-specific RDAs;
- contributions to total energy from proteins, fats and carbohydrates;
- per capita consumption of the 38 generic foods.

Based on World Health Organization (WHO) standards, percentages of adequacy of respondents' energy and nutrient intakes were categorized for the analysis into the following

categories: £ 70 percent (very inadequate), 70.1 to 90 percent (inadequate), 90.1 to 110 percent (adequate) and > 110 percent (excessive). Adequate dietary protein, fats and carbohydrate intakes as percentages of total energy were determined and categorized as follows:

- proteins, 10 to 15 percent of dietary energy;
- total fats 15 to 20 percent of dietary energy;
- carbohydrates 55 to 60 percent of dietary energy.

The nutrient goal for fruits and vegetables was set at 370 g per day. Two scores were developed: 1) the *micronutrient adequacy score* was calculated from the levels of adequacy of a range of micronutrients, using data from the 24-hour recalls (see the subsection on Micronutrient adequacy in Chapter 3); and 2) the *dietary diversity score* was calculated from the number of items consumed and the frequency of their consumption, using data from the food frequency questionnaire (see the subsection on Dietary diversity in Chapter 3).

Body mass index (BMI) was calculated from each respondent's weight and height according to the following equation:

$$\text{BMI} = \text{weight (kg)}/\text{height (m)}^2$$

The standard WHO/FAO classification was used to define underweight, normal weight, overweight (also called pre-obesity), and obesity classes I to III (see Table 3.11).

DATA ANALYSIS

Statistical analysis was performed using SPSS Version 8. Frequency distributions, medians, means and standard deviations were used to describe the data. Cross-tabulations and chi-squared tests were performed to evaluate the strength of association between categorical variables, especially to examine differences across age groups and sexes. For continuous variables (such as BMI and dietary intake data), t-tests and one-way analyses of variance were used to investigate differences between age groups and sexes. In all cases, $p < 0.05$ was used as the cut-off for statistical significance.

Vulnerability profiles were developed using a number of definitions of vulnerability (see Chapter 4). This was done either by performing multiple regression analyses to determine the contributions of a range of variables to the variation of certain key indicators (BMI, micronutrient adequacy scores and dietary diversity scores), or by using t-tests, one-way analyses of variance and chi-square tests to examine other potentially vulnerable conditions (poverty, old age, and female-headed households). The results of in-depth analyses of three key issues - iron deficiency anaemia, healthy lifestyles and younger adults - are presented in Chapter 5.

Throughout this report, the results from the Barbadian survey have been put into context by comparing them with earlier Barbadian data (to examine trends), with data from other Caribbean countries and, in some instances, with data from the United Kingdom or the United States. Chapters 3, 4 and 5 focus on significant findings, rather than presenting the results of all the analyses undertaken. Chapter 6 presents the policy and programmatic implications, as well as recommendations based on the survey results.

Recommendations for future surveys: difficulties encountered and limitations of the survey

A national survey such as this one requires considerable forward planning. It demands a substantial commitment of time and resources, and should therefore be undertaken only when adequate time and resources exist and when the survey results will be put to good use in guiding policy construction and programme planning. It is useful to examine the planning and implementation of this survey in order to extract lessons learned that might benefit future surveys. The following recommendations are based on the experience of a survey that was successfully executed by NNC. Many of the lessons learned, difficulties experienced and limitations of the data are by no means unique to this survey, and can be found in textbooks on survey methodology, especially those on dietary methodology and nutritional epidemiology. However, it is helpful to consider them in the context of this survey.

PLANNING AND IMPLEMENTING THE SURVEY

- A national food consumption and nutrition survey cannot be undertaken by a relatively small nutrition unit or centre (such as NNC) alone; it needs the support, approval and collaboration of at least one government ministry (in this case, the Ministries of Health and of Agriculture and Rural Development were involved), as well as of other government departments (BSS for this survey). Securing such support, approval and commitment is the essential first step in planning the survey. However, political commitment to support the nutrition centre and oversee all stages of the survey is equally essential.
- If the results of the survey are to be used in policy and programme planning, potential users need to be consulted at an early stage in the planning phase. Users need to specify what information they require and in what form. Ideally, a survey advisory committee should be formed, including users, at least one statistician and a nutritionist. In this survey, a committee was formed comprising two senior medical officers of health, NNC staff, statisticians from BSS and FAO, and the director of the Chronic Disease Research Centre.
- Adequate human resources need to be found and committed for all stages of the survey (planning and supervision, data collection, data entry, data analysis and preparation of the report). Survey staff must be dedicated full-time to the survey from an early stage, and should not attempt to carry out other jobs and duties at the same time. A statistician needs to be consulted and involved from the start of survey planning. It is recommended that large surveys be coordinated by a department that is oriented to survey methodology and has access to suitable, well-trained enumerators.
- The survey budget must be realistic. The sample size of the survey needs to be calculated ahead so that a realistic estimate of the time and staff needed for data collection can be made, bearing in mind that much interviewing will have to be conducted after working hours and on weekends. Where applicable, allowance needs to be made for the costs of travel and meals, equipment, and repeat visits to ensure the inclusion of as many selected sample households as possible.
- A public information campaign is needed well ahead of survey implementation to alert the public that they may be called on to participate in the survey, and to urge their compliance. A high refusal rate can produce biased results and causes much time wasting.
- The size of the survey team needs to be carefully planned. On the one hand, a team that is too large can pose problems regarding adequate supervision and quality control.

On the other hand, if enumerators are asked to conduct too many interviews, boredom can set in and affect the quality of the work.

- A work plan needs to be developed early during survey planning, with the timing of key events clearly marked. This requires a realistic assessment of the time needed for fieldwork. Training should be conducted close to the start of data gathering, and refresher training must also be scheduled. In this survey, delays in training and in the availability (and set-up) of computers, as well as the imminent start of the national census, resulted in the start of the survey being postponed from January to September 2000.
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 - standardization of interview techniques, and achieving familiarity with the questionnaire and the 24-hour recall method. Role play is a useful training tool for this.
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- The entry of dietary data is time-consuming, and this needs to be allowed for. In this survey, it would have been better to check the dietary data as the questionnaires came in, rather than after the fieldwork had been completed. To ensure the accurate coding of dietary data, a system needs to be established in which a second person recodes a sample of dietary recalls, which should then be compared with the original coded data. This will highlight issues and problems that can be discussed at meetings. In this survey, the food codes recorded by enumerators were reviewed by nutritionists, but after a considerable lapse of time. The 24-hour recalls of respondents with very high or very low energy intakes were checked.
- The 24-hour recall method presents the following difficulties and limitations, which were experienced in this survey:
 - It relies on the respondent's memory, hence the need for adequate probing by the interviewer.

- Interviewers experience difficulties in recording quantities consumed and assessing portion sizes. Respondents may also fail to quantify accurately the amounts of food consumed.

- The nutrient content database (and hence the CERES database used in this survey) is incomplete: nutrient content information is not available for every food item in FCT. For example, the zinc and cholesterol contents of many foods are missing. An apparently low zinc intake (as found in this survey) may therefore be the result of the incomplete database, rather than reflecting a real dietary zinc deficiency. Unfortunately, the CERES program used to analyse this survey's dietary data does not indicate cases of incomplete information.

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4. VULNERABILITY PROFILES

This section presents the factors that contribute to specific nutrition conditions or situations, and describes the individuals who are more or less likely to be nutritionally vulnerable. In the first three sections it sets out to answer the following questions:

- Who are the overweight or obese individuals?
- Who is more likely to have a diet that is inadequate in micronutrients?
- Who is more likely to be consuming a diet that lacks diversity?

The answers to these questions can provide valuable information for programme planners and decision-makers in their efforts to design better-targeted programmes and formulate appropriate policies. Multiple regression analysis was used to answer the questions, so the explanatory factors that emerge as predictors or "descriptors" of the nutrition condition are those that are significant after controlling for all other variables.

The last two sections of the chapter examine economic and demographic vulnerability, and ask the following questions:

- How do poorer households differ from wealthier households in nutritional, health and socio-economic terms?
- Are households where there are only men or only women more nutritionally vulnerable than other households?
- Are female-headed households more nutritionally vulnerable than those headed by men?
- Are older people more nutritionally vulnerable than younger people? If so, how do their diets and socio-economic conditions differ from those of younger people?

Again, answers to these questions should provide important information for decision-makers.

Determinants of overweight and obesity^[16]

Body mass index (BMI) was used as an indicator of overweight and obesity. High BMI rather than low BMI is the primary nutritional concern in Barbados (see the subsection on Nutritional status in Chapter 3), both because of the link between obesity and mortality and because of its established link to CNCDS such as diabetes, hypertension, coronary heart diseases and certain cancers, as well as to the increased health care costs associated with the management of these and related complications.

The multiple regression analysis found that 24.7 percent of the variability in BMI was explained by factors that entered the analysis. The following factors were significantly associated with high BMI, i.e. with overweight and obesity:

- **Lower educational attainment.** In general, Barbados enjoys a high level of literacy and educational attainment, however the analysis identified those who completed only primary school as being more likely to be overweight (even after controlling for age).
- **Employment.** Those in employment were more likely to have a high BMI than those not in employment. Information on income was unfortunately not available for a large

proportion of the sample. As an alternative, the analysis included information on whether the individual was employed and the nature of that employment. It is important to state that the "unemployed" included students, housewives and retired people, in addition to those who were genuinely unemployed.

- **Lower food expenditure.** Food expenditure information was collected in six categories rather than as actual food expenditure. It was therefore not possible to calculate per capita food expenditure. However, even after controlling for household size, the analysis found that lower food expenditure was significantly associated with higher BMI.
- **Increasing age.** The relationship between age and BMI is not linear (see Figures 2 and 3). The prevalence of overweight and obesity increases with age until about 65 years, when it starts to fall.
- **Gender.** Barbadian women are more likely to be overweight or obese than Barbadian men. The prevalence of overweight and obesity (BMI > 25 kg/m²) was nearly 64 percent among women and 56 percent among men.
- **Desire for weight change.** Respondents with a high BMI were more likely to want to change their nutritional status. This finding shows that a weight reduction or healthy lifestyle campaign could be positively received by those who need it most.
- **Hypertension.** Not surprisingly, overweight and obese individuals were more likely to be suffering from diagnosed high blood pressure.
- **Dietary diversity.** Overweight and obese respondents were more likely to have a low dietary diversity score; in other words, these individuals were consuming a diet that not only provided more energy than they needed (hence the high BMI), but was also more monotonous.

Determinants of micronutrient adequacy

Using the micronutrient adequacy score as the indicator, multiple regression analysis found that 25 percent of the variability in the score was explained by the following factors, after controlling for all other relevant factors. Poorer micronutrient adequacy was associated with:

- household size - larger households were more likely to have a lower score;
- lower food expenditure;
- men in male-only households, compared with men in households composed of both sexes;
- gender - women were more likely than men to have poor scores;
- not dieting - this factor covered a range of diets, including weight-reducing diets, low-fat, low-cholesterol or low-salt diets. This finding could suggest that respondents with poorer micronutrient adequacy scores were generally less concerned about healthy lifestyles, as supported by the following dietary factors;
- higher alcohol consumption;^[17]
- higher percentage of energy from fats;
- higher percentages of energy from carbohydrates and sugars;
- lower consumption of fruits and vegetables;
- poorer diversity of diet.

Determinants of dietary diversity

Using the dietary diversity score as the indicator, multiple regression analysis found that 13.2 percent of the variability in the dietary diversity score was explained by the following, after controlling for all other relevant factors:

- Lower food expenditure.
- Not growing own food - respondents from households engaged in food production activities were more likely to benefit from a diverse diet. This is an important finding because it justifies past efforts to encourage home food production. However, further efforts to increase home food production are unlikely to meet with much success, and other strategies to improve the Barbadian diet should also be considered. It is also important to bear in mind the list of constraints that respondents identified as affecting their engagement in, or increasing of, home food production activities. The most important of these was insufficient access to land (see subsection on Food production in Chapter 3).
- Households with only male or only female members were more likely to have poor dietary diversity scores than households with both male and female members. In the case of female-only households, this may be a reflection of poverty (see the following two sections on Poverty profile and Older people). Male-only households were not poorer than households with both sexes, so their low dietary diversity may reflect a poorer ability (or willingness) to prepare food.
- Individuals diagnosed with diabetes were more likely to have poorer dietary diversity. This may be a reflection of the diabetic diet, and nutritionists should perhaps seek ways of improving the diversity of this diabetic. Poorer diversity was also associated with a higher BMI (overweight and obesity, as indicated in the previous section on Determinants of overweight and obesity).
- Poorer diversity was associated with lower dietary and micronutrient supplement usage, as well as with the unhealthy practice of adding oil or butter to gravy. In general this indicates a lack of concern for a healthy lifestyle, or perhaps poverty.
- Respondents with lower diversity scores were also more likely to have lower energy intakes. This may seem to contradict the relationship between diversity and obesity. However, obesity is not simply a result of high energy intakes, but is also an outcome of a low level of physical activity.^[18]
- Poorer micronutrient adequacy scores were associated with poorer diversity, a finding that re-emphasizes the importance of a diverse diet.

Poverty profile: links with nutrition, health and socio-economic factors

Most Barbadians enjoy a high standard of living. Nonetheless, the results of the regression analyses suggested that economic factors may influence food and nutrient intakes and health status. The study therefore examined respondents in the following categories to see whether they differed significantly from other respondents, in socio-economic, demographic, health and nutritional terms:

- the lowest third of the income^[19] per capita range;
- single-sex (male only or female only) households;^[20]
- female-headed households.

LOWER-INCOME RESPONDENTS

Regarding socio-economic and demographic factors, respondents from poorer households were found to be significantly *more likely* to:

- be older;
- be women;
- be unemployed, or employed in manual occupations;

- come from larger households;
- have lower educational attainment;
- engage in food production activities (growing food and rearing animals);
- purchase fruits and vegetables from wayside vendors, rather than supermarkets;
- purchase fish from the fish market, rather than supermarkets.

From a health and nutrition perspective, respondents from poorer households were significantly *more likely* to:

- be diagnosed with diabetes;
- be diagnosed with hypertension;
- have diets in which carbohydrates contributed a larger proportion of the energy;
- consume more cereals;
- add oil, butter or margarine to gravies and sauces (one of the three "unhealthy" practices investigated).

On the other hand, respondents from poorer households were significantly *less likely* to:

- take exercise;
- consume meals outside the home, especially at fast-food outlets;
- take micronutrient supplements;
- consume adequate amounts of fruits and vegetables;
- achieve micronutrient adequacy (i.e. they had lower micronutrient adequacy scores).

SINGLE-SEX HOUSEHOLDS

More than a quarter of the sample (25.6 percent of men and 25.3 percent of women) lived in single-sex households. Men and women in single-sex households were compared with their counterparts in households comprising both sexes. Women in single-sex households were *more likely* to:

- be older;
- be unemployed;
- have a lower educational attainment.

These women were also *less likely* to:

- engage in food production activities^[21] (grow food or rear animals);
- take exercise;
- consume meals outside the home;
- have adequate intakes of iron;
- consume cereals, legumes, fruits, vegetables and items providing calories only, such as sugar, carbonated beverages and alcohol;
- have diverse diets (i.e. their dietary diversity scores were lower).

Men in single-sex households were *more likely* to:

- be older;
- have higher per capita incomes (but see footnote 23);

- have lower educational attainment;
- work in manual occupations (rather than administrative, managerial and professional occupations);
- purchase fish at fish markets, rather than supermarkets;
- take dietary supplements (such as Supligen);
- consume alcohol;
- be diagnosed with hypertension.

These men were *less likely* to:

- take micronutrient supplements;
- remove skin and fat from meats and poultry (two of the "healthy" practices investigated);
- consume cereals, legumes, meat, dairy products, fruits, vegetables, fats and oils;
- have diverse diets (i.e. their dietary diversity scores were lower);
- achieve micronutrient adequacy (i.e. their micronutrient adequacy scores were lower).

FEMALE-HEADED HOUSEHOLDS

A high proportion of Barbadian households are headed by women: 44.6 percent. The survey also found that 23.6 percent of men and 58.9 percent of women lived in households headed by women. It found that these households had significantly lower median incomes than households headed by men (B\$1 200 per month, compared with B\$2 000), and that a higher proportion of them fell below the UNDP poverty line (19.8 percent, compared with 5.8 percent).

The survey found the following two differences in methods of food acquisition between male- and female-headed households:

- Households headed by women were significantly less likely to grow food crops.
- They were significantly more likely to purchase fruits and vegetables from wayside vendors.

Female-headed households were also more likely to engage in the healthy practice of removing the skin and fat from poultry during food preparation.

There were significant differences between the mean ages of men and of women dwelling in female- and male-headed households (Table 4.1):

- Men in female-headed households were younger than men in male-headed households.
- Women in female-headed households were older than women in male-headed households.

Table 4.1 Mean ages of respondents living in female- and male-headed households, by sex

<i>Sex</i>	<i>Mean age (SD) in years</i>	
	<i>Female-headed households</i>	<i>Male-headed households</i>
Men	39 (17)	51 (17)
Women	52 (19)	46 (17)

These age differences made it necessary to examine differences between the inhabitants of male- and female-headed households in two separate age groups (< 45 years and ³ 45 years). Few differences emerged from these analyses, despite the findings regarding household incomes already noted. The following were the significant differences:

- *Younger men (< 45 years) in female-headed households*, compared with those in male-headed households, were *more likely* to:
 - be unemployed;
 - have lower BMI;and *less likely* to:
 - suffer from high blood pressure;
 - consume alcohol.
- *Younger women (< 45 years) in female-headed households*, compared with those in male-headed households, were more likely to consume meals outside the home. This may be because women in female-headed households are *more likely* to work outside the home.
- *Older men (³ 45 years) in female-headed households*, compared with those in male-headed households, were more likely to: -have high protein intakes; -have high dietary diversity scores.
- *Older women (³ 45 years) in female-headed households*, compared with those in male-headed households, were *more likely* to:
 - suffer from a chronic disorder, especially hypertension;
 - have a low educational attainment (60 percent completed primary school only, compared with 45 percent of women in male-headed households);
 - have high dietary diversity scores.

In summary, respondents living in female-headed households appear to be no more nutritionally vulnerable than their counterparts in male-headed households, despite lower incomes. Arguably, the higher dietary diversity scores, at least among older men and women in female-headed households, indicate better diets.

Older people

Recent demographic trends in the Caribbean, as elsewhere in the world, indicate a major increase in the proportion of the population to be made up of older people. It is forecast that this proportion will reach or exceed 10 percent by 2025 in most Caribbean countries.

In Barbados, this figure has already been exceeded: in 1997, 12 percent of the population (32 730 men and women) were aged 60 years and over, and this proportion is expected to rise to 23.2 percent (67 037 people) by 2025, with 62 percent of these people being at least 75 years of age. In the survey sample, 20.5 percent of men and 22.6 percent of women were aged 65 years or over.

Older people face a range of risk factors that make them especially vulnerable to poor nutrition. These include the following:

- **Economic factors.** Many older people rely on limited pensions, savings and gifts from relatives, which are often inadequate to meet their needs or the rising cost of living.
- **Social isolation.** Emigration, the breakdown of the extended family and the death of younger adults from AIDS leaves many older people without essential social and support networks.
- **Physical and mental disabilities and disorders.** These include impaired mobility and poor functional ability (often related to bone, joint and muscle disorders such as arthritis), poor dentition, vision and hearing, and senile dementia.
- **Poor health.** Older adults are those most likely to suffer from CNCDS, such as diabetes, hypertension and cardiovascular disorders. Furthermore, in many countries, access to health care is limited because of poverty, poor mobility and a health system that is geared more to meeting the needs of infants, children and younger adults. In Barbados, however, older people enjoy ready access to health services, and utilization is high.
- **Physiological changes.** Age-related changes in taste, smell, appetite and gastrointestinal function can limit or substantially alter food preferences and consumption patterns. There are also age-related changes in nutritional requirements, which frequently go unrecognized by older people and their families. In addition, older people are often on long-term medication, which can have an impact on taste, appetite and nutrient needs and absorption.

Because a substantial proportion (22 percent, N = 352) of the sample comprised older people (³ 65 years), it was possible to analyse their food and nutrition situation, and related socio-economic and health factors. The analysis included:

- comparisons with United Kingdom (HMSO 1990 and 1998) and United States data (CDC, 1988-1994): dietary intakes (UK), and BMI (UK and USA);
- a comparison of the health and nutrition of older adults (³ 65 years) with those of younger adults (< 65 years);
- a comparison of men and women aged ³ 65 years;
- a comparison of older people living alone with those not living alone.

COMPARISON WITH UNITED STATES AND UNITED KINGDOM DATA

Table 3.10 provides comparative data from Jamaica, the United Kingdom and the United States. The mean BMI of older Barbadian men is lower than the mean BMIs of men in either the United Kingdom or the United States. Barbadian women, have a mean BMI that is close to those of women in the United Kingdom and of white United States women, but lower than that of black United States women; it is also higher than the mean BMI of older, urban Jamaican women. ^[22]

Table 4.2 compares dietary intake data from the Barbados survey with similar data from the United Kingdom. With the exception of fats, calcium and zinc, the dietary intakes of all nutrients are substantially higher among older Barbadian men and women than among their United Kingdom counterparts. Especially noteworthy are the substantially higher intakes of all micronutrients, except calcium and zinc. Clearly older Barbadians fare better in the comparison than younger Barbadians, whose intakes of all micronutrients except iron and vitamin C were lower than those of their United Kingdom counterparts.

Table 4.2 Comparison of Barbados and United Kingdom dietary intakes: median intakes of older men and women, aged ³ 65 years

<i>Nutrients</i>	<i>Men</i>		<i>Women</i>	
	<i>Barbados</i>	<i>UK</i>	<i>Barbados</i>	<i>UK</i>
	<i>18-64</i>	<i>16-64</i>	<i>18-64</i>	<i>16-64</i>
Energy (kcal)	2 026	1 915	1 720	1 414
Protein (g)	84.8	71.4	71.5	55.9
Carbohydrate (g)	270	230	247	175
Fats (g)	51.0	72.8	42.3	57.5
Calcium (mg)	575	824	505	655
Iron (mg)	14.9	10.5	12.3	8.3
Zinc (mg)	7.2	8.5	6.1	6.5
Vitamin A (RE)	963	387	729	422
Thiamin (mg)	1.53	0.76	1.27	0.83
Riboflavin (mg)	1.54	0.87	1.2	0.95
Niacin (mg)	23.2	16.5	18.0	17.2
Folate (µg)	208	138	196	137
Vitamin C (mg) % of energy from	74.8	30.3	70.1	35.1
Protein	16.6%	15.7%	16.2%	16.1%
Carbohydrates	58.8%	48.4%	59.3%	47.4%
Fats	24.2%	35.6%	25.0%	36.3%

COMPARISON WITH YOUNGER ADULTS

In general, older people in Barbados appear to enjoy good nutritional status and dietary intakes (see Tables 3.10, 3.17 and 3.18). Although the prevalence of undernutrition increases slightly after the age of 64 years, overweight and obesity decline (see Figures 2 and 3). Older people's nutrient intakes are adequate in relation to their RDAs for all nutrients except zinc (see comments on zinc intakes in the sections on Recommendations for future surveys: difficulties encountered and limitations of the survey in Chapter 2, and Nutrient intakes in Chapter 3) and calcium, the latter especially in the case of women.

Analysis to compare the health and nutrition of older and younger Barbadians showed positive and negative features from the perspective of older people. On the *positive side*, older adults were significantly *more likely* to:

- meet their nutrient needs for energy, iron, vitamin A, thiamin, riboflavin and niacin;
- consume starchy roots, tubers and fruit.

Also on the positive side, they were less likely to:

- be overweight;
- consume sugars, carbonated beverages and alcohol;
- eat meals outside the home (fast-food outlets, etc.).

On the *negative side*, older people were *more likely* to:

- be diagnosed with diabetes and/or hypertension and/or suffer from a coronary heart disorder;
- be on a diet that restricts diversity (hence their lower dietary diversity scores);
- add butter, oil or margarine to gravies (one of the "unhealthy" practices investigated by the survey).

Also on the *negative side*, they were *less likely* to:

- consume cereals, legumes and fruit;
- take micronutrient supplements (which is not necessarily a negative feature when dietary intakes are adequate).

COMPARISON OF OLDER MEN AND WOMEN

Older women were more likely than older men to:

- be overweight;
- suffer from a CNCD: diabetes, hypertension, and coronary heart disease;
- be on a diet, generally related to a CNCD.

Men were more likely than women to:

- consume alcohol;
- eat meals outside the home;
- consume legumes, meats, sugars, and carbonated beverages;
- achieve micronutrient adequacy.

COMPARISON OF OLDER PEOPLE LIVING ALONE WITH THOSE LIVING WITH OTHERS

Older people living alone appear to be more vulnerable to poor nutrition than those living in households with family (or other) members.

They were *less likely* to:

- meet their protein and thiamin requirements;
- consume cereals, starchy roots, fruits and tubers, meat and vegetables;
- achieve dietary diversity;
- take micronutrient supplements;
- remove skin and fat from poultry and meat (one of the "healthy" practices investigated).

SUMMARY

In Barbados, the growth of the older population has been accompanied by the development of a number of programmes, both public and private, to meet the needs of older people. A pension provides the main, often the sole, income during retirement. Facilities for older adults include government institutions (eight polyclinics and three satellite clinics in a government hospital, as well as three district hospitals; a residential home for older adults, a hostel and an

activity centre), and private or non-governmental institutions (more than 40 private nursing and residential care homes, one day-care centre, a meals centre, and a senior citizens' village complex). In addition, the government's Alternative Care for the Elderly programme purchases space from private nursing homes for the care of ambulant older people.

Fifty percent of admissions to government institutions are the result of chronic medical disorders, lack of social support, poor housing, poverty, and lack of adequate home care. A high percentage of these people die soon after admission: for the period 2000 to 2002, 47.5 percent of older people admitted to a government institution died within the first six months of admission. The reasons for this include apathy, withdrawal and inappropriate management of malnutrition.

While commendable progress has been made to address these issues, including the establishment of a non-governmental organization (NGO), the Barbados Association of Retired Persons, and the National Committee on Ageing, the following areas need attention:

- improving the quantity and quality of home and community-based care to permit older people to remain in their homes and communities if they wish;
- supporting families in their efforts to provide better care for older relatives;
- enacting legislation that addresses the abuse and neglect of older people, the deprivation of property and financial assets, and all forms of age discrimination;
- providing better nutrition support and guidance for older people, and making available nutrition information for older people, their care givers and health professionals. The survey results point to specific nutrition issues that need to be addressed: dietary diversity, improving the dietary management of CNCDS, and increasing the consumption of fresh fruits and vegetables;
- reaching and supporting older people living alone;
- recognizing the rights, contributions and dignity of older people.

While the survey results point to a generally good nutritional status and dietary intake for older people, there are trends indicating that younger adults may be engaging in dietary practices that will lead to a higher proportion of nutritional problems in the future.

^[16] Many factors are interrelated. Thus, for example, educational attainment influences the type of employment that the individual is engaged in, and hence his/her income. Multiple regression analysis seeks to answer such questions as: Does income itself affect the nutrition condition, regardless of educational attainment or type of employment?

^[17] It should be borne in mind that many respondents failed to answer the question on alcohol consumption; in general information on this topic is unreliable.

^[18] Overweight individuals are also more likely to underestimate or conceal their true food intake.

^[19] Nearly a quarter of the households failed to provide information on income, and so were excluded from this analysis of a poverty profile, which may have introduced a bias. In addition, the indicator of poverty used was income per capita, in an effort to capture the effect of household size. This indicator makes no allowance for the ages of household members, and may therefore incorrectly classify as "poor" households with young children whose nutritional needs are lower than those of adults. The cut-off used to define poverty is arbitrary; that used to identify the lowest third of the income per capita range was £ B\$400 per capita.

^[20] The rationale for selecting this form of potential vulnerability was that, on the one hand, female-only households are likely to be more economically deprived and, on the other hand, male-only households are more likely to have poor food preparation skills.

^[21] These activities may actually have been carried out by the men in mixed households, rather than the women in these households.

^[22] It should be noted that the Jamaican data are from a limited survey made in 1984 (Broome, 1984). The picture may be quite different now.

5. SPECIAL ISSUES

This chapter focuses on the three important nutritional problems found in the Barbadian population: iron-deficiency anaemia, obesity-related CNCs (in the context of a discussion of healthy lifestyles), and the situation of younger Barbadians.

Iron-deficiency anaemia

Iron-deficiency anaemia has long been recognized as one of the most common (and intractable) nutritional disorders. Clinical signs and symptoms are generally non-specific and often go unrecognized. Anaemia in young children is especially common at weaning age, and is associated with growth faltering, increased susceptibility to infection, fatigue and impaired mental and motor development, leading to poor school achievement. In adults, it is most common in women of child-bearing age, although it is also found in older women^[23] and in men. Anaemia in adults is associated with fatigue, impaired work capacity and lower productivity in manual occupations, especially those involving hard labour. This can have serious implications for a household's income, and hence for a country's economy and development. Severe anaemia in pregnancy can lead to increased maternal morbidity and mortality and lower birth weight.

The availability and absorption of dietary iron is influenced by many factors. Dietary iron is found in the following two forms:

- *Non-haem* iron is found in foods of both animal and plant origin, and has a low bioavailability (generally 1 to 10 percent), which is increased or decreased by other dietary constituents and by the haemoglobin status of the individual. Dietary constituents that enhance iron absorption include vitamin C, amino acids and protein, while inhibitors of iron absorption include phytates, certain phenolic compounds and calcium. In addition, an anaemic individual absorbs more non-haem iron than a non-anaemic individual.
- *Haem iron* is found only in foods of animal origin, and has a high bioavailability (20 to 30 percent), which is little affected by other dietary constituents or by the haemoglobin status of the individual. However, dietary calcium can substantially reduce haem iron absorption.

The best sources of iron are meats (especially offal). Legumes are the best plant-based source, while the much-promoted green leafy vegetables are in fact very poor sources of iron (1 to 2 percent absorption). Absorption of dietary iron from plant sources can be substantially

increased by including the enhancers of non-haem iron as part of a meal (e.g. a high-vitamin C drink) and avoiding inhibitors (e.g. milk, tea or coffee) at meal times.

The Barbadian diet encompasses many foods that are rich in iron, and provides some excellent sources of enhancers of iron absorption. Meats, offal, poultry, fish, legumes and fortified breakfast cereals and flours are rich sources of iron, while fresh fruit and juices (especially the Barbadian cherry, guavas and citrus fruit) are excellent sources of vitamin C to enhance the absorption of non-haem iron.

In Barbados, pregnant women are routinely screened for anaemia as part of antenatal care. Screening among children and other adults is not routine, and is conducted only if an individual displays the signs and symptoms of anaemia or has experienced severe blood loss. In 1969, Barbados' nutritional surveillance system indicated that the prevalence of anaemia among adult females (pregnant and non-pregnant) was 19 percent, but this figure was arrived at using a different cut-off from that used in later surveys. The 1981 National Nutrition Survey recorded a prevalence of 27.5 percent among adult females^[24] and 19.1 percent among adult males. The prevalence of iron-deficiency anaemia among Barbadian women is similar to that of their counterparts in St Lucia, Grenada, St Kitts and Guyana, but the prevalence among Barbadian males is lower than that of males from these countries. Curacao appeared to have a low prevalence of iron-deficiency anaemia in 1995: 7.2 percent among women and 0.5 percent among men (LeBlanc et al., 1995).

Table 5.1 Distribution of iron adequacy among women, by age

<i>Iron adequacy as % of RDA</i>	<i>Percentage of women in each group</i>				
	<i>< 30 years</i>	<i>30-49 years</i>	<i>50-64 years</i>	<i>> 64 years</i>	<i>All women</i>
< 70%	42.4	41.2	36.7	16.3	34.6
70-90%	20.0	15.5	11.1	14.8	15.0
> 90%	37.6	43.3	52.3	68.9	50.4

The survey did not obtain information on haemoglobin levels. This discussion of survey results therefore relies on dietary intake data and information from the food frequency questionnaire.

While dietary intakes of iron for the survey sample as a whole were more than adequate, there were considerable ranges in iron intakes and in the achievement of adequate iron nutrition. Men of all age groups consumed on average sufficient iron to meet their needs (see Tables 3.17 and 3.18), as did older women (> 64 years and, to a lesser extent, 50 to 64 years). Women of child-bearing age, however, were not meeting their iron needs (78 and 82 percent of their RDAs were being met by women aged < 30 years and 30 to 49 years, respectively). This is a matter for concern, because this group is the most vulnerable to iron-deficiency anaemia. Table 5.1 shows the percentage of each age group of women falling into three adequacy categories: < 70 percent, 70 to 90 percent, and > 90 percent of the RDA.

The rise in iron adequacy with increasing age was highly significant among women (see also Table 3.18). Among men, there was no significant change in iron adequacy with age (Table 3.18). Nearly 60 percent of women of child-bearing age were not meeting their requirements for iron (< 90 percent adequacy). Of even greater concern is the fact that more than 40 percent of these women had very low iron intakes: less than 70 percent of the RDA.^[25] A regression

analysis not only confirmed that men had significantly better iron adequacy than women, but also that poor iron adequacy was related to low fruit and vegetable consumption and poor dietary diversity.

Iron intakes are also strongly related to energy intakes. This presents the nutritionist with a dilemma: in the Barbadian context energy intakes should be reduced in order to address the problem of obesity. However, such a reduction would bring with it a reduction in iron intake, which is undesirable in women of child-bearing age. Nutritionists planning nutrition promotion programmes need to find ways to improve iron intake (and absorption) while limiting energy intakes. This also highlights the importance of an exercise programme as an essential component of a weight reduction strategy, and improvements in the education programme for women of child-bearing age as part of an anaemia reduction strategy.

Healthy lifestyles

The survey results presented in Chapter 3 show clearly that the primary nutritional problem of Barbadians is overweight and obesity (55.5 percent in men and 63.8 percent in women). Unfortunately, a direct comparison with Barbados' 1981 National Health and Nutrition Survey is not possible, as a different indicator of overweight and obesity was used. In that survey, 53 percent of women and 29.7 percent of men were identified as overweight or obese (> 110 percent weight for height).

Table 5.2 Prevalences of hypertension in Barbados, Jamaica and St Lucia*

	<i>Barbados</i>	<i>Jamaica</i>	<i>St Lucia</i>
Men	18.1%	13.3%	14.1%
Women	23.9%	20.8%	21.7%

* The cut-offs used to define hypertension were 160/95 mm Hg for systolic and diastolic pressures.

Linked to the high prevalence of overweight and obesity, the current survey also found a high prevalence of CNCDs (10.1 percent of men and 15.2 percent of women were diagnosed with diabetes, and 17.3 percent of men and 28.8 percent of women with hypertension). Again, data from the 1981 Barbados survey are not directly comparable. That survey report states that "approximately 6.6 percent of the total adult sample had had a previous history of diabetes". This is probably comparable with the current survey's figure of 12.9 percent for the total sample.

The 1981 survey also measured blood pressure. Using cut-offs of 160 mm Hg for systolic pressure and 90 mm Hg for diastolic pressure, the prevalence of hypertension was 28 percent for women and 27 percent for men. However, in relation to the current survey, a more comparable figure is 21 percent, namely the proportion of the 1981 sample that had received treatment for hypertension. This is a little lower than the current survey's figure of 23.7 percent diagnosed with hypertension in the whole sample.

A study conducted in 1996 (Freeman et al.) compared the prevalence of hypertension in Barbados, Jamaica and St Lucia (Table 5.2), and found it to be highest in Barbados.

The 1993 Wildey study from Barbados (Foster *et al.*, 1993) found a diabetes prevalence of 15 percent among men and 16 percent among women. Again the data are not directly comparable with the current survey, because the Wildey study was limited to adults aged 40 to 79 years living in the outskirts of Bridgetown, and the diagnosis of diabetes was based on fasting plasma glucose levels. However, the Wildey study also stated that 10.8 percent of sample men and 10.2 percent of sample women had previously been diagnosed with diabetes. Comparable figures from the current survey are 13.1 percent for men and 19.6 percent for women aged 40 to 79 years, suggesting that the prevalence of diabetes has risen since 1993,^[26] especially among women.

Not surprisingly, the prevalence of overweight and obesity (see Figure 2) and of diabetes and hypertension are higher in older people (diabetes: 15.8 percent for men and 27 percent for women; hypertension: 28.2 percent for men and 47.1 percent for women).

The survey also found that while the prevalence of overweight (BMI of 25.1 kg/m² to 30 kg/m²) was higher among men (40.4 percent) than women (34.2 percent), the prevalence of obesity (BMI > 30 kg/m²) was almost twice as high among women (29.6 percent) than men (15.4 percent). This latter finding can be compared with the Wildey study, which showed that the prevalence of obesity in women was three times that in men (30 percent compared with 10 percent). It would seem therefore that the prevalence of obesity has risen between 1993 and 2000 among men but not among women.

While the prevalence of overweight and obesity is higher in the older age groups, it is still alarmingly high among young adults (< 30 years), especially young women (see Figure 2). This bodes ill for the future, especially in light of the high usage of fast food and the poorer dietary patterns (lowest micronutrient adequacy scores) in this age group (see following section on Younger adults).

Obesity is not the only linking factor between diet and CNCs. Low intakes of antioxidants have been shown to be linked to higher risks of a range of CNCs. Studies aimed at reducing the CNC risk through the use of micronutrient supplements have proved disappointing (at least in relation to cardiovascular risk), but a number of recent studies have shown that increased consumption of fruits and vegetables can reduce blood pressure and heart disease rates (the latter by as much as 15 to 20 percent). Whether such dietary effects work through increased antioxidant levels, changes in fat profiles or other means is not clear.

The promotion of healthy lifestyles is a major issue facing most industrialized nations, as well as many of the developing nations that are coping with a double burden of disease and malnutrition, i.e. infectious diseases and CNCs coupled with undernutrition and overweight. Healthy lifestyles encompass a range of factors: improved diets, increased exercise, reduced alcohol consumption and smoking, and reduced stress. Such lifestyle and behavioural changes present a major challenge because they are difficult to achieve in the short term and few studies have demonstrated their long-term sustainability. The Barbados Diabetes Intervention Study illustrated clearly that although positive changes can be achieved, continued support and interventions are needed to ensure sustainability.

There seems to be a lack of comprehensive data on physical activity in the Caribbean region. The 1992 Barbados Risk Factor Survey Report stated that 48.4 percent of the sample supplemented their daily routine with additional exercise or physical activity in their leisure time. Walking was the most popular activity, followed by dancing, cycling, swimming, aerobics, ball games and gardening. Men engaged in more planned exercise than women. This

survey found that an even smaller proportion of respondents claimed to take planned exercise (42.2 percent) than in 1992, and again fewer women (37.6 percent) than men (48 percent) participated. Activity choices were similar, with walking being the most popular form of exercise.

Over the past few decades, in common with many of its Caribbean neighbours, Barbados has experienced a number of changes that may have had a negative impact on lifestyles. These include the following:

- Socio-economic development has increased the availability of foods that are imported, processed, nutritionally dense (especially in terms of high fat and sugar contents), inexpensive and easily prepared.
- There has been a rapid increase in the number of fast-food outlets, and the use of these outlets is now high, especially among the young (see subsection on Food practices in Chapter 3).
- Home food production activities have fallen sharply - in 1969, 74 percent of Barbadian households produced food; by 1981 this figure had fallen to 56.2 percent; and the survey found that only 32.2 percent of households planted food crops and 11.2 percent raised livestock.
- Increasingly sedentary lifestyles associated with socioeconomic development have reduced energy expenditure through the use of automobiles, increased television viewing, sedentary work, labour-saving devices in the home and at work, and reduced household-level food production activities.

In addition to dietary intake and food frequency data, socio-economic data and information on the presence or absence of a diagnosed non-communicable disorder, the survey also gathered information on a number of health-related issues: planned exercise, eating meals outside the home (including the use of fast-food outlets), food practices that could influence fat intake, alcohol consumption, dieting (a range of diets relevant to obesity and CNCDS were investigated), and the use of dietary and micronutrient supplements. This information is summarized in Chapter 3. The bureau also collaborates with and assists government and non-governmental agencies with the implementation of various programmes.

This section seeks to answer the following questions: Who suffers from CNCDS, and what food and nutrition features do they exhibit? and Who diets, and how has dieting made a difference to their food and nutrient intakes? Specifically, it examines more closely:

- the profile of men and women who suffer from a CNCDS;^[27]
- the comparison between overweight dieters and overweight non-dieters;
- the comparison between dieters and non-dieters with a CNCDS.

PROFILE OF MEN AND WOMEN WITH DIABETES AND/OR HYPERTENSION^[28]

Table 5.3 summarizes the findings, separated by sex, and places the features that characterize CNCDS sufferers into three categories: socio-economic and demographic features; health, food and nutrition features; and food practices.

Table 5.3 Features of respondents with diabetes and hypertension, by sex

<i>Category</i>	<i>Feature*</i>	<i>Diabetics</i>	<i>Hypertensives</i>
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		<i>Men</i>	<i>Women</i>	<i>Men</i>	<i>Women</i>	
Socio-economic and demographic	Older	×	×	×	×	
	Lower income	×			×	
	Lower educational attainment	×	×	×	×	
	Unemployment more likely	×	×			
	Occupation: professional/administrative/managerial more likely			×		
	Manual/unskilled more likely			×		
Nutritional status and food and nutrient intakes	More overweight or obese			×	×	
	Lower consumption of:	legumes		×		×
		dairy products	×	×		
		fruits	×	×		
		vegetables			×	×
		fats and oils		×		
		sugars, carbonated beverages	×	×		×
	alcohol	×				
	Higher consumption of: sugars, carbonated beverages			×		
	Lower dietary diversity score	×	×	×	×	
Higher percentage of energy from protein	×		×			
Lower percentage of energy from carbohydrates			×			
Healthy lifestyle practices	Less frequent meal consumption outside the home	×	×	×	×	
	Less frequent use of fast-food outlets	×	×	×	×	
	Less frequent addition of margarine, butter, oil to gravies	×	×			
	Less use of dietary supplements		×			
	Less use of micronutrient supplements		×		×	
	More likely to be on a diet	×	×	×	×	

** This table includes only those features that were found to be significantly different between CNCD sufferers and non-sufferers.*

The table shows that, with the exception of male hypertensives, CNCD sufferers are likely to be older men and women of lower socio-economic status and poorer education. Male hypertensives are found at both extremes of the occupation scale. Not surprisingly, CNCD sufferers are more likely to be overweight, and overall their diets lack diversity. The lack of diversity may to some extent reflect efforts to diet: there are encouraging signs that CNCD

sufferers have reduced their consumption of fats and oils, alcohol, sugar and carbonated beverages, as well as the practice of adding fat to gravy. It is more discouraging however that they have also reduced their consumption of fruit and vegetables, and that there was no significant difference between CNCD sufferers and non-sufferers in the percentages of energy obtained from fats.

The fact that respondents with CNCDs ate outside the home and at fast-food outlets less frequently is likely to be a reflection of their age (see the section on Older people in Chapter 4),^[29] rather than indicating a conscious effort to follow a healthier lifestyle. Fast foods are now increasingly popular among younger Barbadians, and there is concern that they will continue this practice even when they reach the more vulnerable age for CNCDs.

One notable absence from the list of healthy lifestyle practices is the taking of planned exercise. While it is encouraging that substantial percentages of Barbadian men (48 percent) and women (37.6 percent) claim to take planned exercise, it is surprising that there is no difference between respondents with CNCDs and those without.

COMPARISON OF OVERWEIGHT DIETERS AND OVERWEIGHT NON-DIETERS

The decision to diet to lose weight involves recognizing that one is overweight, that this carries serious health risks, and that one can, and wants to, take action to rectify the situation. Behaviour modification is long, complex and difficult, as evidenced by the failures of so many weight reduction efforts.

The subsection on Perceptions of nutritional status, dieting and exercise in Chapter 3 noted that only about 40 percent of overweight men and 59 percent of overweight women recognized that they were overweight or obese. Of respondents who were overweight or obese, only 7.3 percent (N = 28) of men and 10 percent (N = 55) of women stated that they were on a weight reduction diet. This is in the context of a prevalence of more than 60 percent for overweight and obesity among Barbadian adults.

Analysis to compare overweight dieters and non-dieters was limited by the small sample size of dieters. However, in both men and women, dieters appeared to engage more in planned exercise. Women dieters had a higher educational standard and ate more vegetables. Men dieters were more likely to be from households where fish, fruits and vegetables were bought from supermarkets. They also consumed fewer fats and cereals, and showed lower energy intakes. There were no other significant differences between dieters and non-dieters in food and nutrient intakes.

COMPARISON OF DIETERS AND NON-DIETERS WITH A CNCD

A substantially larger proportion of respondents with CNCDs claimed to follow a diet than was found among overweight and obese respondents: approximately 50 percent of diabetics and 30 percent of hypertensives stated that they were on a diet to control the disorder.

Unfortunately, however, there were few significant differences in the consumption of foods and none at all in nutrient intakes between CNCD respondents who claimed to be on a diet and those who were not dieting. Women dieters consumed fewer dairy products and less fruit, sugar and carbonated beverages. Men consumed less alcohol, sugar and carbonated beverages. Female dieters had poorer diet diversity, were older and ate outside the home less

frequently than their non-dieting counterparts. Male dieters came from smaller households and ate fewer meals outside the home.

The following conclusions can be drawn:

- Respondents who claimed to be dieting either were not in fact doing so, or had very poor dietary compliance.
- The dietary message that has been best understood by both men and women seems to be the importance of reducing sugar.
- The advice to increase fruit and vegetable consumption is being ignored.
- A comprehensive weight reduction strategy, including planned exercise, is not being followed.
- Overweight individuals in general do not diet until they have been diagnosed with a CNCD - less than 10 percent of overweight respondents who had no CNCD stated that they were dieting, in contrast with nearly 41 percent of overweight respondents with a diagnosed CNCD. In short, no preventive action is being taken.

Younger adults

The results of this survey highlighted some disturbing features about the food and nutrition situation and food practices of younger adults.^[30] These features should alert health and nutrition planners to problems that lie ahead as this generation of Barbadians approaches the age of increasing vulnerability to CNCDs. In this study, young men and women (< 30 years) were profiled by comparing them with their older counterparts and each other.

YOUNG WOMEN COMPARED WITH OLDER WOMEN

Regarding young women (< 30 years), the following two important findings have already been highlighted:

- the high prevalence of more than 50 percent of overweight and obesity (see Figure 2) among young women;
- the high prevalence of iron inadequacy - more than 60 percent of young women were consuming less than 90 percent of the recommended allowance for iron (see Table 5.1).

This section examines the differences between younger and older women, so as to identify features that can be addressed in health and nutrition promotion programmes.

Young women (< 30 yrs) were more likely than older women (30 to 59 years) to:

- achieve a higher education level - secondary as opposed to primary school only;
- consume meals outside the home, especially at fast-food outlets;
- have lower mean BMIs - 26.5 kg/m² compared with 28.1 kg/m². Nonetheless, a mean BMI of 26.5 is high, and falls in the overweight (pre-obesity) rather than the normal range;
- recognize that they are overweight or obese - 74.3 percent of young women with high BMIs (> 25 kg/m²) stated that they considered themselves to be overweight, compared with 61.7 percent of older women with high BMIs;
- have a lower percentage of energy intake from protein, and a higher percentage from carbohydrates;

- consume greater quantities of cereals, as well as foods and beverages containing calories only - sugar, carbonated beverages;
- consume smaller quantities of starchy roots and tubers, meats and vegetables;
- recognize that they are consuming inadequate amounts of fruits and vegetables;
- have lower micronutrient adequacy scores.

Young women were less likely than older women to:

- be diabetic (4 percent compared with 11.4 percent) or hypertensive (9.7 percent compared with 22.4 percent). This is not surprising.

YOUNG MEN COMPARED WITH OLDER MEN

The prevalence of overweight and obesity among young men (< 30 years), although lower than that among young women, was by no means negligible, at nearly 30 percent (see Figure 2). Young men also exhibited a low prevalence of underweight, at just over 8 percent (see Figure 3). However, no moderate or severe undernutrition was found, and most of the undernutrition fell into the 17 to 18.5 kg/m² range (mild undernutrition).

Young men (< 30 years) were more likely than older men (30 to 59 years) to:

- achieve a higher education level - secondary as opposed to primary school only;
- be unemployed;
- consume meals outside the home, especially at fast-food outlets;
- use dietary supplements (such as Supligen);
- have lower mean BMIs (23.6 kg/m² compared with 26.7 kg/m²);
- have a lower percentage of their energy intake from protein;
- consume more cereals and items containing mostly calories: sugar, carbonated beverages;
- consume smaller quantities of starchy roots and tubers, meats and vegetables;
- recognize that they are consuming insufficient fruit and vegetables.

Young men were less likely than older men to:

- consume alcohol;
- suffer from hypertension (5.2 percent compared with 15.8 percent);
- be on a diet (this is probably related to the fact that CNCD prevalence is lower in younger men).

YOUNG WOMEN COMPARED WITH YOUNG MEN

Young women were more likely than young men to:

- have inadequate intakes of calcium and iron;
- have lower micronutrient adequacy scores;
- suffer from a CNCD;
- correctly perceive themselves as overweight.

Young men were more likely than young women to:

- have a lower BMI;

- consume meals outside the home;
- consume legumes and foods and beverages containing only calories: sugar, carbonated beverages and alcohol.

SUMMARY

Unless preventive action is taken soon, a generation of Barbadians is emerging that will enter middle age and old age already overweight or obese and with poor dietary practices, such as high consumption of high-calorie fast foods, sugars and carbonated beverages, and low consumption of vegetables. On the positive side, younger Barbadians are educated to a higher level and may show some awareness of their own dietary deficiencies (such as having better recognition of inadequate intakes of fruit and vegetables). These findings emphasize the importance of an early start to health and nutrition promotion, during adolescence, and the need for collaboration across government sectors, non-governmental agencies and the private sector.

^[23] There is an assumption that iron-deficiency anaemia is no longer an issue for women after the menopause. A study from India indicates that high levels of anaemia (> 50 percent prevalence) exist among poor elderly women. However, poverty levels were extreme in the study sample, and diets were almost exclusively vegetarian, so included iron of poor bioavailability only.

^[24] If the same criteria are applied as in the 1969 survey, the prevalence in 1981 was 18.8 percent among women, which is almost identical to the 1969 figure. Hence no change is apparent between the survey periods.

^[25] The Caribbean RDA for iron assumes a 15 percent absorption of dietary iron, which is the absorption level estimated by FAO/WHO for a diet of high iron bioavailability, i.e. one with high meat consumption.

^[26] An alternative explanation is that more people are now being tested for diabetes.

^[27] Only diabetics and hypertensives were profiled, because numbers for the other two disorders (coronary heart disease and cancer) were too low to allow meaningful analysis.

^[28] The analysis compared respondents with diagnosed diabetes and/or hypertension with those with no diagnosed CNCD.

^[29] Multiple regression techniques could not be used, so it was not possible to control for all factors.

^[30] Of special concern is the high prevalence of overweight and obesity among young women.

6: POLICIES AND PROGRAMMES: ISSUES AND ACTIONS

Achieving good nutrition is a crucial step towards achieving a healthy population. Research repeatedly highlights the links between diet and health, the best recognized of which are those between diet and diabetes, hypertension, heart disease and certain cancers. Other links include calcium with osteoporosis, salt with hypertension, and folate with birth defects, to name but a few.

The cost of diet-related disease is high both to a country's health system and economy and to its people, in human and financial terms. In common with many of its Caribbean neighbours, Barbados has experienced changes that may have had a negative impact on lifestyles and health and that include socio-economic development, changed patterns of food acquisition and consumption, and increasingly sedentary lifestyles. The survey results highlight a number of key nutritional (and nutrition-related) problems that merit urgent attention. The survey report contains a wealth of information to guide the choice and design of appropriate policies and programmes. This chapter proposes some broad areas for action, in the context of an overall nutrition strategy, and the operational strategies needed to achieve successful programmes. The overarching goal of such a nutrition strategy is clear, and reflects the goals of Barbados' National Plan of Action on Nutrition (approved by Cabinet in 1998) and the mission of NNC: the improvement of the nutrition and health of all sections of the population - and the maintenance of such improvement - through information, access to a safe, affordable food supply, and the promotion of healthy lifestyles.

The primary food and nutrition-related problems and issues identified by the survey are:

- a high prevalence of obesity;
- a high prevalence of CNCDS;
- a need to improve the dietary management of CNCDS;
- the limited action taken to prevent the development of CNCDS;
- the need for programmes targeted to:
 - women of childbearing age (especially in relation to iron intakes);
 - older adults;
 - younger adults (and schoolchildren).

This chapter proposes some policies, programmes and actions to address these issues.

Making informed choices

Creating an informed consumer is an essential first step towards changing lifestyles. Barbados has clear advantages in this regard: its food supply is plentiful, it has an educated population, and most Barbadians enjoy a high standard of living. To make informed choices, the consumer needs the following:

- **Nutrition knowledge.** To develop an understanding of what constitutes a balanced diet, to gain knowledge on the richest food sources of nutrients, and to learn to make realistic assessments of the quantities of foods needed to achieve healthy eating. The development of simple food-based guidelines is essential. Innovative techniques are needed to impart nutrition knowledge. One possibility is to focus on one food, or one group of foods, at a time (such as fish, fruits, vegetables and low-fat dairy products), and to create a mini-campaign around the item(s).
- **Food labelling.** Clear, simple information is needed on both imported and local foods. Labelling should be limited to information on key nutrients and ingredients. Supportive legislation is needed to achieve this, and to avoid unsubstantiated or false health and nutrition claims and advertising.
- **Ready access to safe, cheap, healthy foods.** The survey found that dietary diversity and micronutrient adequacy are limited among certain vulnerable groups. Access to a varied supply of affordable foods, especially fresh fruits and vegetables, will enable all Barbadians, particularly those from lower-income households, to make healthy

choices. Here there is a clear role for supermarkets: not simply to ensure that these foods are readily available, but also to spotlight healthy choices through special offers, promotions and recipes, as well as the use of marketing strategies such as aisle arrangements and advertising inside and outside the supermarket.

Taking preventive action

While the dietary management of CNCDs receives commendable attention from NNC, the survey found that the prevention of obesity and CNCDs appears not to be adequately addressed. Preventive action could include the following elements:

- ***A public awareness campaign.*** To create an understanding and recognition of risk factors, by the individual and by health professionals.
- ***The targeting of high-risk individuals.*** Health professionals need to determine the risk status of the individuals in their care, and recommend early preventive action. Key risk factors are a family history of CNCDs, obesity (and pre-obesity), and smoking. Medical practitioners (or nurses) should assess BMI routinely, with the aid of a BMI chart; alternatively a "girth tape" can be used for the self-assessment of obesity. With coloured zones (green, yellow and red) the tape is easy to use and understand. Because much weight gain is associated with pregnancy, urging lactating mothers to lose excess weight gained in pregnancy will always prove useful.
- ***The promotion of healthy lifestyles,*** including:
 - healthy eating - in addition to ensuring access to an affordable healthy diet, preventive action could include the micronutrient fortification of a key food, such as crackers (which are an important part of the Barbadian diet);
 - legislation and taxation to reduce smoking and alcohol consumption;
 - promoting exercise, and providing opportunities and facilities - including the provision of subsidized membership to health clubs, for example, by businesses and industries for their workforce, or by the health system for high-risk individuals; the creation of public spaces for walking and jogging; the granting of time off work for exercise; and the improvement of sports and gym facilities in schools, together with the scheduling of more time for physical education. Encouraging home gardens would serve the dual purpose of providing exercise and improving dietary diversity (as well as reducing food costs).

Improving dietary management

Current practices in the dietary management of CNCDs should be examined to find ways of increasing the diversity of the foods in diet plans. When providing dietary counselling, health professionals need to stress foods that the client can eat, or should eat more of, and not just those to be avoided. Moreover, every effort should be made to reach clients who are overweight but not suffering from a CNCD, in order to encourage weight reduction before a chronic disorder such as diabetes or hypertension develops. Individual weight reduction plans, including those for CNCD sufferers, should be comprehensive and include all aspects of a healthy lifestyle, especially an exercise programme.

Special targeted programmes

- **Women of childbearing age.** Using the survey results and other information, nutritionists need to find ways to improve dietary folate and iron intakes, and the bioavailability of the latter, without increasing the intake of energy. Compliance with iron supplementation programmes can be problematic, so alternative forms of supplementation and dosage (such as weekly supplementation) could be examined. ^[31]
- **Schoolchildren.** The finding that substantial obesity exists among young adults highlights the need to start action at an early age. Imaginative approaches are needed to make nutrition exciting to schoolchildren, and to strengthen further the existing school food, nutrition and home economics programmes. It would be possible to include nutrition in the physical education programme to encourage boys to become involved. Other techniques include: developing an interactive computer tool enabling students to assess their own diets and how they can be improved; emphasizing the "science" of nutrition, and teaching nutrition in the broader context of national (and international) development; and promoting healthy lifestyles through competitive group work and more exercise. ^[32]
- **Young adults.** Most of the actions recommended for schoolchildren will also have an impact on young adults. However, what young adults need most is awareness of their own nutritional status, of the risks associated with obesity, and of the importance of early action. Given that it is unrealistic to imagine that the trend towards eating out can be reversed, collaboration with the private sector, especially with the major fast-food chains, becomes imperative. Much is possible: extending the range of foods on offer to include attractively presented, flavourful and reasonably priced healthier choices; working with a nutritionist to find ways to reduce the fat and sugar content of foods currently available; and displaying nutrition information prominently.
- **Older people.** The survey found that older Barbadians were, on the whole, coping well nutritionally. Moreover, many of the actions described for other age groups can be adapted to encourage the participation of active older people. However, special attention could be paid to older people's dietary needs: meals with high fibre content and high micronutrient density; more frequent, smaller meals; and improving dietary diversity while accommodating food preferences. The emphasis must be on improving the quality of life, and on enabling older people to remain independent and living at home for as long as possible. Support and training is needed for the care givers of frail, older people and the staff of residential and nursing homes. A special effort is required to reach older people who live alone. These, and all other related actions, should be carried out in cooperation with the National Committee on Ageing and other groups and agencies, both national and community-based.

Strategies

- **Political commitment.** An essential precondition for action is demonstrated political commitment that translates into financial support and the willingness to engage all relevant sectors to address problems. NNC alone cannot undertake the actions described in the previous section.
- **Strategic use of NNC resources.** It is recommended that NNC re-examine its approach to addressing the nutrition problems that are prevalent in Barbados. The individual dietary counselling currently offered by the technical staff of NNC can be carried out in collaboration with other health professionals with suitable training, and group counselling activities can be maintained. In addition, community nutrition programmes should be targeted not only to the traditional vulnerable groups, but also

to specific groups such as young people who, as the survey shows, do not perceive themselves to be at risk for the development of CNCDS. The data that have been collected provide community-based nutrition programmes with the much needed tools to develop effectively targeted interventions at the community level.

- **Strategic alliances.** Virtually all the actions proposed here require the forging of strategic alliances, and the forming of often unconventional partnerships. At the very least, the collaboration of other government departments and ministries (such as those of agriculture and education) and the cooperation of the private sector (especially the food sector through food industry, supermarket and fast-food chains) are crucial to the success of an overall nutrition strategy. A National Coordination Committee on Food and Nutrition already exists, but there is still a need for specific strategic alliances to address specific actions, rather than a large, all-encompassing committee.
- **Monitoring the food and nutrition situation.** A simple, cost-effective system should be established to monitor progress in the implementation of a nutrition strategy and the achievement of its goals. Frequent food consumption surveys are costly and unrealistic. What is needed instead is the routine gathering of simple data on food patterns, nutritional status and CNCDS. There are a number of possibilities for doing this:
 - the routine weighing and measuring of schoolchildren of a specific age;
 - the use of data from duplicate supermarket checkout slips to monitor food expenditure patterns;
 - the monitoring of simple food frequency data (perhaps limited to a few key foods, such as sugar, fruits and vegetables, oil and butter) and nutritional status (weights and heights of young adults) at a few representative sentinel sites.^[33]

Other data can be accessed to provide relevant information:

- data on the number of people diagnosed with diabetes, hypertension and other selected chronic disorders;
- haemoglobin data from antenatal clinics;
- sales data from selected fast-food chains

^[31] Guyana will shortly be assessing pregnant women's compliance with the use of "sprinkles", an iron and folate supplement packaged in daily dose sachets, which is sprinkled over food. Other micronutrients can be included in the sachets.

^[32] In addition to increasing physical education, schools can promote exercise in classes through, for example, breaking classes for a brief ten-minute exercise regimen, and encouraging a daily exercise plan of walking a mile a day in school. These are being tried out in the United States, and could also be explored in Barbados.

^[33] Sentinel sites are specific geographic areas of limited size that are selected to represent larger areas. They can include rural and urban sites with different socio-economic populations.

ANNEXES

I. References

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II. Table A.1: Frequency of consumption of 84 foods

<i>Food group</i>	<i>Food</i>	<i>None</i>	<i>Monthly</i>	<i>Weekly</i>	<i>Daily</i>
Cereals	White bread	36.0%	10.2%	41.1%	12.7%
	Whole wheat bread	28.8%	6.9%	42.4%	22.0%
	Crackers	12.6%	8.7%	59.6%	19.1%
	Cornmeal	41.2%	23.1%	35.2%	0.5%
	Porridge	42.4%	20.1%	34.4%	3.0%
	Dried cereal	49.0%	14.0%	31.2%	5.8%
	Parboiled rice	49.3%	8.0%	41.3%	1.4%
	Rice and peas	5.3%	4.7%	86.7%	3.2%
	Pasta	18.0%	19.9%	61.4%	0.8%
	Cakes	36.2%	32.1%	30.2%	1.4%
	Popcorn	82.1%	10.5%	6.9%	0.5%
Starchy fruits, roots and tubers	Snacks	83.3%	6.9%	8.9%	0.9%
	Irish potato	8.7%	14.6%	74.4%	2.3%
	Sweet potato	23.6%	23.1%	51.9%	1.4%
	Yam	48.3%	23.8%	27.6%	0.4%

	Breadfruit	30.7%	27.9%	40.5%	0.8%
	Green banana	50.5%	23.5%	25.4%	0.6%
	Plantain	36.8%	21.0%	40.0%	2.1%
	Other	61.1%	22.1%	16.5%	0.3%
Legumes, nuts and seeds	Beans, fresh	40.0%	12.1%	44.1%	3.8%
	Peas, dried	16.2%	8.3%	72.4%	3.0%
	Nuts	38.3%	22.9%	34.6%	4.2%
Meat, poultry, fish and shellfish	Fresh meat	29.9%	16.8%	51.3%	2.0%
	Offal	80.4%	10.0%	9.3%	0.3%
	Poultry	9.2%	2.8%	81.8%	6.2%
	Fresh fish	9.2%	16.9%	68.7%	5.2%
	Shellfish	93.6%	4.9%	1.4%	0.1%
	Dried fish	25.7%	30.1%	43.6%	0.6%
	Canned meat	38.3%	25.2%	35.7%	0.8%
	Canned fish	17.8%	22.9%	56.8%	2.5%
	Processed meat	63.0%	17.8%	18.2%	1.0%
	Salted meat	65.5%	6.2%	25.4%	2.9%
Dairy products, eggs	Eggs	24.8%	21.7%	50.2%	3.4%
	Whole milk	73.3%	4.7%	16.9%	5.1%
	2%-fat milk	78.3%	2.9%	11.7%	7.1%
	Evaporated milk	34.1%	2.5%	19.5%	43.9%
	Milk powder	92.2%	1.4%	3.8%	2.6%
	Condensed milk	81.1%	2.7%	7.8%	8.4%
	Natural yoghurt	91.0%	3.8%	4.6%	0.6%
	Fruit yoghurt	84.1%	7.5%	7.7%	0.7%
	Ice cream	38.0%	37.4%	22.9%	1.7%
	Cheddar	32.1%	11.9%	52.1%	3.8%
	Processed cheese	69.8%	6.7%	22.4%	1.1%
	Cream cheese.	96.0%	2.3%	1.5%	0.2%
	Cottage cheese.	98.0%	0.8%	1.0%	0.2%
	Milo/ovaltine.	59.6%	5.4%	21.7%	13.2%
	Cocoa/chocolate	75.5%	4.4%	14.8%	5.2%
Vegetables	Green, leafy vegetables	9.8%	10.3%	67.7%	12.2%
	Yellow vegetables	15.9%	13.7%	63.1%	7.3%
	Other vegetables	9.9%	9.8%	71.3%	9.0%
	Onions	5.6%	0.4%	22.6%	71.5%
	Avocado	51.0%	23.6%	22.3%	3.0%
	Seasoning	7.1%	1.4%	32.3%	59.2%

	Garlic	13.0%	1.0%	28.6%	57.4%
	Tomato	15.3%	5.8%	47.1%	31.8%
Fruit	Citrus fruit	14.4%	9.8%	59.0%	16.8%
	Yellow fruit	51.2%	20.1%	24.1%	4.7%
	Imported fruit	18.7%	14.4%	54.5%	12.4%
	Other fruit	40.8%	17.5%	35.8%	5.9%
	Dried fruit	60.2%	19.0%	17.3%	3.6%
	Canned fruit	66.6%	20.0%	12.4%	1.0%
	Citrus juice	26.3%	8.5%	49.7%	15.4%
	Fruit drink	43.6%	10.5%	36.5%	9.4%
Fats and oils	Margarine	23.5%	3.0%	40.0%	33.6%
	Butter	57.6%	1.6%	25.5%	15.3%
	Peanut butter	67.6%	11.5%	19.2%	1.7%
	Shortening	91.4%	5.0%	3.1%	0.5%
	Lard	95.6%	2.9%	1.1%	0.4%
	Oils	14.7%	7.8%	52.7%	24.8%
	Salad dressing	63.6%	5.9%	28.6%	1.9%
	Lo-cal dressing	86.5%	2.3%	9.7%	1.6%
Sodas, alcohol, sugars	Sodas	23.9%	9.5%	43.1%	23.5%
	Spirits	71.8%	10.1%	14.7%	3.4%
	Sugar in milk	86.6%	1.7%	6.3%	5.4%
	Sugar in cocoa, etc.	77.8%	2.4%	12.2%	7.6%
	Sugar in tea, coffee	47.4%	3.0%	15.5%	34.1%
	Sugar in cereal	70.4%	4.9%	20.0%	4.7%
	Sugar in fruit drink	39.1%	5.9%	41.8%	13.1%
	Jams	77.7%	8.9%	12.6%	0.7%
	Jellies	85.5%	5.7%	8.3%	0.5%
	Marmalade	87.4%	4.6%	7.7%	0.3%
	Candy, chocolate	65.9%	16.2%	15.4%	2.5%
	Candy, mints	50.3%	11.2%	27.2%	11.3%
	Honey	78.1%	10.2%	8.6%	3.2%

III. Table A.2: Best food sources of nutrients, based on consumers only

Energy	N Protein	N Carbohydrates	N
Fresh meat	1 Poultry 139	1 Carbonated beverages 478	1 239
Crackers	1 Fresh fish 415	1 Whole wheat bread 475	1 158
Whole wheat bread	1 Fresh meat 158	1 White bread 139	1 040

White bread	1	Canned fish	1	Crackers	1
	040		335		415
Cake	1	Fresh beans/peas	981	Cake	1
	040				040
Carbonated beverages	1	Whole wheat bread	1	Citrus juices	1
	239		158		202
Fats	N	Saturated fats	N	Cholesterol	N
Fresh meat	1	Fresh meat	1	Eggs	1
	139		139		221
Cooking oil	1	Cheddar cheese	1	Fresh meat	1
	382		109		139
Canned fish	1	Ice cream	1	Condensed milk	303
	335		005		
Cheddar cheese	1	Evaporated milk	1	Ice cream	1
	109		074		005
Margarine	1	Butter	696	Poultry	1
	242				478
Ice cream	1	Margarine	1	Cheddar cheese	1
	005		242		109
Calcium	N	Zinc	N	Iron	N
Evaporated milk	1	Fresh meat	1	Fresh beans/peas	981
	074		139		
Cheddar cheese	1	Dried (breakfast) cereals	828	Dried (breakfast) cereals	828
	109				
Canned fish	1	Poultry	1	Whole wheat bread	1
	335		478		158
Whole wheat bread	1	Whole wheat bread	1	Canned fish	1
	158		158		335
Whole milk	431	Canned fish	1	Dried peas	1
			335		367
Skimmed milk (2%)	353	Evaporated milk	1	Fresh meat	1
			074		139
Vitamin A	N	Vitamin C	N	Folate	N
Sweet potatoes	1	Citrus juice	1	Dried peas	1
	241		202		367
Yellow vegetables	1	Citrus fruit	1	Green leafy vegetables	1
	373		395		468
Offal	322	Sweet potatoes	1	Dried (breakfast) cereals	828
			241		
Green leafy vegetables	1	Irish potatoes	1	Avocado	789
	468		488		
Dried (breakfast) cereals	828	Green leafy vegetables	1	Whole wheat bread	1
			129		158

Cheddar cheese	1	Breadfruit	807	Citrus fruit	1
	109				395
Thiamin	<i>N</i>	Niacin	<i>N</i>	Riboflavin	<i>N</i>
Irish potatoes	1	Poultry	1	Evaporated milk	1
	488		478		074
Fresh meat	1	Fresh fish	1	Offal	322
	139		475		
Citrus juice	1	Fresh meat	1	Dried (breakfast)	828
	202		139	cereals	
Hot beverages (Milo etc.)	653	Dried (breakfast) cereals	828	Fresh meat	1
					139
Whole wheat bread	1	Whole wheat bread	1	Poultry	1
	158		158		478
Dried (breakfast) cereals	828	Peanuts/other nuts	1	Cheddar cheese	1
			005		109

N = number of consumers.

IV. Table A.3: List of generic foods

<i>Code</i>	<i>Food</i>
01	Flour
02	Bread
03	Rice
04	Corn
05	Cereals (other)
06	Meat (fresh)
07	Offal
08	Meat (canned)
09	Fish (fresh)
10	Fish (canned)
11	Seafood
12	Poultry
13	Eggs
14	Legumes
15	Seed oils
16	Citrus fruit
17	Fruit (other)
18	Fruit (dried)
19	Fruit (canned)
20	Leafy vegetables
21	Non-leafy vegetables

22	Yellow vegetables
23	Canned vegetables
24	Ground provisions (starchy roots and tubers)
25	Milk
26	Cheese
27	Oil
28	Lard
29	Margarine
30	Butter
31	Sugar
32	Carbonated drinks
33	Diet drinks
34	Alcoholic drinks
35	Seasoning
36	Shortening
37	Condiments
38	Chocolate

V. List of participants: Barbados food consumption and anthropometric survey (2000)

* Denotes participants who attended the technical sessions.

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