FOREWORD

This publication is the outcome of 3 years of planning, development, fieldwork, and analysis made possible through a successful multi-sectoral collaboration between the Fiji Government, non-Government agencies and donor agencies.

This report presents the nutritional status of Fiji’s population from a broad public health perspective and the underlying contributing factors superceding the 1980-1981 and 1993 surveys.

The survey indicates Government’s commitment to investment in nutritional health and information. This is particularly critical at a time of rapid transitional change that Fiji’s societies are undergoing. Urbanization trends, changes in food supply systems, and lifestyle changes as a result of development, modernization and the global trade have far reaching effects on the health of populations, even in small island states like Fiji.

For the first time, detailed quantitative food and nutrient information on Fiji’s population is presented. The information on the nutritional health of Fiji’s population based on food and nutrient intakes will enable the Fiji Government to determine whether its goal of improving the health of its people has been achieved.

Rather than the narrow approach which focuses on disease and cost containment, the 2004 survey adopted a broad approach to public health nutrition.

This broad approach will focus on a more long-term view of causes and solutions, addressing structural issues in society which make it difficult for individuals to make optimal choices. In other words, the overall policy goal must place greater emphasis on population health approaches through the promotion of healthier lifestyles and diets among other actions, using the settings approach with multi-sectoral partnerships.

Finally, this report contains the most up to date information about food and nutrition in Fiji and will provide Government direction with its nutritional health policy goals for the next decade.

I would like to congratulate all those involved in the survey and the production of this report.

Dr Lepani Waqatakirewa
Permanent Secretary for Health
ACKNOWLEDGEMENTS

The National Food and Nutrition Centre (NFNC) is grateful to the Fiji Government, to Australian Aid for International Development (AusAID), and to UNICEF for their financial assistance to the survey project. Without their financial support, the 2004 National Nutrition Survey would not have been conducted.

Support from NZAID, in the form of technical consultants from the Otago University and the work experience placements provided to three of the Centre staff to visit the LINZ Centre, is acknowledged with appreciation.

The survey was a result of multi-sectoral collaboration and mutual interests amongst many agencies and individuals. The NFNC is indebted to the NNS Survey Task Force and wishes to acknowledge its technical guidance throughout the planning and development of the survey. The Task Force was chaired by Dr. Sala Saketa and then by Dr Margaret Cornelius, both of the Ministry of Health. Members of the Survey Task Force included representatives from the various Public Sectors, UNICEF, World Health Organisation, Fiji School of Medicine, University of the South Pacific, and Partners in Community Development Fiji.

Appreciation also goes to the field survey team. We are indebted to the Ministry of Health for providing public health nurses, dietitians, and laboratory technicians to participate in the data collection. We would also like to thank the many individuals who agreed and took part in the survey. Without them we could not have achieved what we did.

A number of individuals need special mention regarding their valuable contribution to the writing and development of this report.

Dr. Roland Schultz of the University of the South Pacific and Mrs Ilisapeci Movono are acknowledged for their contribution. The NFNC staff are also acknowledged for their role in the conduct of the survey and assistance in reviewing several drafts of this survey report. In particular, Mrs. Pushpa Wati Khan, Senior Nutritionist; Ms Lindsey L. Peck, Peace Corps Volunteer and Mr Mohammed Asim, Acting Manager.

Authors
This report was compiled by Jimaima T. Schultz, Strategic Interventions Pacifika; Penina Vatucawaqa, Research Officer, NFNC; and Jessie Tuivaga, Information Officer, NFNC.
# LIST OF ACRONYMS AND ABBREVIATIONS

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<thead>
<tr>
<th>Acronym</th>
<th>Description</th>
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<tbody>
<tr>
<td>ACIAR</td>
<td>Australian Centre for International Agriculture Research</td>
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<td>AusAID</td>
<td>Australian Aid for International Development</td>
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<td>β</td>
<td>Beta</td>
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<tr>
<td>BMI</td>
<td>Body Mass Index</td>
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<td>cm</td>
<td>centimeter(s)</td>
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<td>CPI</td>
<td>Consumer Price Index</td>
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<tr>
<td>DBP</td>
<td>diastolic blood pressure</td>
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<td>DMI</td>
<td>Daily Median Intake</td>
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<td>DRI</td>
<td>Daily Recommended Intake</td>
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<tr>
<td>EAR</td>
<td>Estimated Average Requirement</td>
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<td>e.g.</td>
<td>Example</td>
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<tr>
<td>FiBOS</td>
<td>Fiji Islands Bureau of Statistics</td>
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<td>FFAN</td>
<td>Fiji Plan of Action for Nutrition</td>
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<td>FSM</td>
<td>Fiji School of Medicine</td>
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<tr>
<td>g</td>
<td>gram(s)</td>
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<td>g/day</td>
<td>grams per day</td>
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<td>GDP</td>
<td>Gross Domestic Product</td>
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<td>Hb</td>
<td>Haemoglobin</td>
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<td>HBW</td>
<td>high birth weight</td>
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<td>hr</td>
<td>hour(s)</td>
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<td>i.e.</td>
<td>that is</td>
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<td>IDD</td>
<td>iodine deficiency disease</td>
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<td>kg</td>
<td>kilogram(s)</td>
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<tr>
<td>LBW</td>
<td>Low birth weight</td>
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<tr>
<td>LINZ</td>
<td>Life in New Zealand Activity &amp; Health Research Unit of Otago University</td>
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<td>m</td>
<td>month(s)</td>
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<tr>
<td>MCH</td>
<td>Maternal Child Health</td>
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<tr>
<td>Mg</td>
<td>Milligram</td>
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<td>Mg/day</td>
<td>Milligrams per day</td>
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<td>MI</td>
<td>millilitre(s)</td>
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<td>MJ</td>
<td>Mega Joule</td>
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<td>mm</td>
<td>millimetre(s)</td>
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<td>mmHg</td>
<td>millimetres of mercury</td>
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<tr>
<td>MOH</td>
<td>Ministry of Health</td>
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<tr>
<td>n</td>
<td>number in sub-sample</td>
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<tr>
<td>N</td>
<td>total in sub-sample or sample</td>
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<td>NCDs</td>
<td>non-communicable diseases</td>
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<td>NFNC</td>
<td>National Food and Nutrition Centre</td>
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<td>NGO</td>
<td>non-government organisation</td>
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<td>NNS</td>
<td>National Nutrition Survey</td>
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<td>NZAID</td>
<td>New Zealand’s International Aid &amp; Development Agency</td>
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<td>ORS</td>
<td>Oral rehydration solution</td>
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<td>PCDF</td>
<td>Partners in Community Development Fiji</td>
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<td>PEM</td>
<td>Protein-energy malnutrition</td>
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<td>PICs</td>
<td>Pacific Island countries</td>
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<td>PPS</td>
<td>probability proportionate to size</td>
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<td>RDAs</td>
<td>Recommended Dietary Allowance(s)</td>
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<td>SBP</td>
<td>Systolic blood pressure</td>
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<td>U5MR</td>
<td>under 5-years mortality rate</td>
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<td>UNDP</td>
<td>United Nations Development Programme</td>
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<td>UNICEF</td>
<td>United Nations Children’s Fund</td>
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<td>USDRI</td>
<td>United States Daily Recommended Intake</td>
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<td>USP</td>
<td>University of the South Pacific</td>
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<td>USRDA</td>
<td>United States Recommended Dietary Allowance</td>
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<td>vs</td>
<td>Versus</td>
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<td>WHO</td>
<td>World Health Organisation</td>
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EXECUTIVE SUMMARY

The third Fiji National Nutrition Survey was conducted by the National Food and Nutrition Centre (NFNC) of the Ministry of Health (MOH) with funding and technical support from Fiji Government, AusAID, UNICEF, NZAID and LINZ Centre of Otago University.

The purpose of the survey was to determine the current nutritional status of Fiji’s population and re-assess the food and nutrition situation in the country; evaluate the effect of Fiji’s National Plan of Action for Nutrition (FPAN) based on the findings; and recommend ways to address food and nutrition-related issues to the Ministry of Health through the re-assessment and re-formulation of an appropriate Food and Nutrition Policy and Fiji Plan of Action for Nutrition.

Field data collection was carried out between May to September 2004 by six teams of four members comprising of a dietitian, a public health nurse, and two interviewers (enumerators) with logistics support provided by the NFNC.

The survey sample was made up a total of 7,372 individuals from 1,696 households representing the three major ethnic groups from 45 randomly selected enumeration areas as survey sites. The data collected includes anthropometric measurements (weight, height and waist), haemoglobin (Hb) levels and blood pressure. Qualitative data on infant feeding of children less than 2 years of age, exercise, smoking, alcohol and kava intakes of adults were also collected in addition to food security and socio-economic information. For the first time, quantitative data on nutrient intake using 24-hour dietary recall was collected.

Selected key results of the 2004 survey showed the following:

(NOTE: The data used in the analysis is un-weighted.)

Survey demographic and sample characteristics:
• 7,372 individuals drawn from 1,696 households were interviewed; this represented just-under 1% of the 2004 population.
• Composition of the sampled households showed 57.7% Fijians, 39.8% Indo-Fijians, and 2.5 % ‘Others’. The urban and rural distribution showed 45% were classified as urban and 55% as rural.
• 39% of respondents aged 18 years and over “were earning some money for a living” while 61% were not. An ethnic breakdown indicated 33% of Fijians, 46% of Indo-Fijians and 46% of ‘Others’ earned an income.

Young children less than 2 years
• Overall, 79.3% of children in this cohort were born with standard weight for age.
• 10.2% were born with low birth weight (LBW).
• 10.5% were born with high birth weight (HBW).
• 57% of mothers initiated breastfeeding in less than 1 hour after giving birth.
• Only 39.8% of children aged less than 6 months were exclusively breastfed.
• Overall, mean duration of breastfeeding was 7.9 months.
• ‘No breast milk’ was the most common reason for not breastfeeding.
• Fever was the most common illness reported (36.8%), with cough/colds as the second (33.7%).
• Only 17 % of children with diarrhoea were treated with ORS.
• 89.2% of mothers reported using the Health Centre when children were ill.
Children under 18 years

- Growth pattern of Fijian children under 5 years on average was 2.5% above the NCHS reference, whereas the growth pattern of Indo-Fijian children of the same age group was below the NCHS reference by an average of 7.5%.
- 75.2% of all males and 70.2% of all females were healthy by weight for age; by height for age 92.5% males and 93% females were healthy, and 89.4% males and 90% females were healthy by weight for height.
- Indo-Fijian children consistently showed higher rates of underweight by weight for age, underweight by weight for height, and stunting (height for age).
- The proportion of overweight (using weight for age, height for age and height for weight) in both ethnic groups had more than tripled in 2004 compared to the 1993 survey.
- Overall, 14.5% of all children were overweight and 12.8% were underweight by weight for age.

Adults 18 years and over

- Overall, adults surveyed in 2004 were heavier by between 4.5kg-5.2kg than those surveyed in 1993.
- Using BMI, the 2004 survey showed only 37.6% were healthy (within the normal BMI range); 32.3% were overweight; 23.9% obese and 6.1% underweight.
- Females showed a peak increase in BMI at 25 years while males showed a peak increase in BMI at 35 years of age.
- Indo-Fijians had lower BMI (23.8) compared to Fijians (27.9).
- The proportions of those found overweight amongst rural and urban dwellers were similar (33% and 32% respectively). However, the rate of obesity in urban area was higher (28%) than in rural area (22%).
- More females (50.8%) than males (14.5%) had increased risk of developing NCDs when waist circumference was used to assess the risks.

Haemoglobin level and anaemia

- Rates of anaemia in 2004 were:
  49.9% for 6 months to less than 5 years, (53% males and 46.1% females);
  25.9% for 5-11 years, (27.5% males and 24.2% females);
  29.1% for 12-14 years, (25.4% in males and 32.9% in females);
  30.9% for 15-44 years, (19.6% in males and 40.9% in females); and
  33.2% for 45 years and over, (30.6% in males and 35.4% in females).
- The mean Hb for pregnant women in 2004 and 1993 were similar (11.0 g/dl and 11.1g/dl respectively).
- The rate of anaemic pregnant women in 2004 was 43.5% compared to 55.6% found in 1993.
- In general the rates of anaemia were relatively high amongst Indo-Fijians (37.5%) compared to Fijians (28.8%) – a consistent trend over the past years.
- Overall, the rates of anaemia in urban areas were 31.0% and 33.5% in rural areas.
- The overall rates of anaemia amongst the population surveyed had increased from 27.2% in 1993 to 32.4% in 2004.

Nutrient intake of adults (15 years and above) and food sources

Energy

- Daily median intake of energy was 8.1MJ.
- Only 39.2% of the population surveyed met the United States' Daily Recommended Intake (USDRI) for energy (9.8MJ).
The major sources of energy were cereal (bread and flour products, rice and roti - 34%), and root crops (20%).

The recommended energy contributions from the macronutrients were 15% from protein, 27.8% from fat and 53.4% from carbohydrates. Based on the WHO/FAO recommended energy intake levels, the energy contributed by protein (10-15%) was at the upper limit of 15% whereas the percent energy contributed by fat was 27.8% which is at the upper level recommended (20-30%). The energy contribution of carbohydrate was just below the minimum level of the recommendation (55-70%).

**Protein**
- Daily median intake of protein was 62.9g/day.
- Overall 60.8% of the population surveyed met the USDRI for protein (50g/day).
- The three major sources of protein in the diet were fish (35.5%) and from plant sources (bread, roti, traditional staples etc) at 33.3% and meat 11%.

**Fat**
- Daily median fat intake was 48.3g/day.
- 37.2% of the population surveyed met the USDRI for fat (65g/day).
- The three major sources of fat in the diet were vegetable fat (24.9%), meat (14.1%), fish and sea food (11.4%).

**Cholesterol**
- Daily median intake of cholesterol was 108.8mg/day.
- 24% of the population surveyed met the USDRI for cholesterol (300mg/day).
- The three major sources of dietary cholesterols were fish and other sea foods (46.9%), poultry (27.9%) and meat (12.6%).

**Carbohydrate**
- Daily median intake of carbohydrate was 278.5g/day.
- 88.7% of the population surveyed met the USDRI for carbohydrate (130g/day).
- The three principal sources of carbohydrates were traditional staples (31.2%), rice (19.5%), and bread (18.2%).

**Dietary fibre**
- Daily median intake of dietary fibre was 17.4g/day.
- Only 19.9% of the population surveyed met the USDRI for dietary fibre (31.7g/day).
- The three major sources of dietary fibre in the diet were traditional staples (26%); bread, roti and flour products (18.8%); nuts and legumes (15.8%).

**Vitamin A (total)**
- Daily median intake of total Vitamin A was 255µg.
- Overall, only 20.3% of the population surveyed met the USDRI for total Vitamin A (800µg).
- The three major sources of total Vitamin A were green leaves (39%), hot beverages (12.4%), fish and sea foods (7.9%).

**Retinol**
- Daily median intake for retinol was 87µg/day.
- Only 6.5% of the population surveyed met the USDRI for retinol (650µg/day).
- The three major sources of retinol in the diet were poultry (26%), hot beverages (24.3%), fish and other sea foods (16.1%).

**Beta carotene**
- Daily median intake of beta carotene was 1393.6mg/day.
- Only 57.2% of the population surveyed met the USDRI for beta carotene of 1,000mg/day.
- The three major sources of beta carotene were green leaves (59.6%), roti (10.7%) and yellow vegetables (10.6%).
Thiamin
- Daily median intake of thiamin was 0.8mg.
- Overall, only 34.1% of the population surveyed met the USDRI for thiamin of 1.1mg/day.
- The three major sources of thiamin in the diet were bread and flour (17.3%), nuts and legumes (17.1%) and starchy staples (16.8%).

Riboflavin
- Daily median intake of riboflavin was 0.7mg/day.
- Only 26.1% of the population surveyed met the USDRI for riboflavin (1.2mg/d).
- The three main food sources were fish and other sea food (15%), green leaves (13.5%), hot beverages (13.4%).

Niacin
- Daily median intake of niacin was 15.6mg/day.
- Only 52.5% of the population surveyed met the USDRI for niacin of 15mg/day.
- The three major sources of niacin in the diet were green leaves (37.2%), fish and other sea foods (19.6%) and poultry (8.3%).

Ascorbic acid (Vitamin C)
- Daily median intake of ascorbic acid was 89.8mg/day.
- Only 53.5% of the population surveyed met the USRDI for ascorbic acid of 76mg/day.
- The three main sources of ascorbic acid in the diet were traditional staples (43.3%), fruits (17.3%) and other vegetables (13.4%).

Iron
- Daily median iron intake was 10.3mg/day.
- Only 41% of the population surveyed met the USDRI for iron of 13mg/day.
- The three main sources of iron in the diet were fish and other sea food (21.8%), hot beverages (13.1%) and traditional staples (9.8%).

Calcium
- Daily median intake of calcium was 345.8m/day.
- Only 13.3% of the population surveyed met the USDRI for calcium of 1,150mg/day.
- The three main sources of calcium in the diet were green leaves (22.4%), fish and other sea foods (16.1%) and dairy (12.5%).

Potassium
- Daily median intake of potassium was 2,421.1mg/day.
- Only 17.1% of the population surveyed met the USDRI for potassium of 4,700mg/day.
- The three main sources of potassium in the diet were traditional staples (36%) and fish and other sea foods (16.8%), and other vegetables (5.5%).

Zinc
- Daily median intake of zinc was 7.6mg/day.
- Only 38% of the population surveyed met the USDRI for zinc of 9.8mg/day.
- The three major sources of zinc in the diet were traditional staples (20.1%), meat (17.6%) and rice (13.4%).

Food and Dietary Patterns
- Overall, rice was the most commonly consumed staple by more than 50% of all households surveyed.
- Citrus was the most frequently consumed fruit (once or twice a day) by 34% of all households.
• More Indo-Fijians (74.4%) consumed white meat such as chicken compared with Fijians (51.7%). Red meat was consumed by similar proportions of Fijian and Indo-Fijian households (95.9% and 92.3% respectively).
• Approximately 50% of all households surveyed reported consuming between 3-5 or more eggs per week.
• Overall, 66% of the households surveyed consumed fresh fish once or twice a week. The proportion of households that reportedly consumed canned fish was also high (70.8% Fijian and 72.8% Indo-Fijian).
• Milk was reportedly consumed daily by both Indo-Fijian households (47.3%) and Fijian households (44.2%).
• Both ethnic groups reported weekly consumption of cabin crackers (61.7% Fijian and 61% Indo-Fijian), and bread (53.1% Fijian and 71.1% Indo-Fijian).
• Daily consumption of vegetables once or twice a day was reported by only 25% of all households.
• Less than a third of all households consumed green leafy vegetables (31.3% rourou and 21% bele) daily.
• The most common yellow/orange vegetable consumed by both ethnic groups was tomato.
• Sugar was frequently consumed - more than 2 times a day.
• Daily consumption of fat spread (butter) was 65.4% amongst Fijians and 60% for Indo-Fijians. Only 37.6% of Indo-Fijians and 29.2% of Fijians used margarine.

**Household food security**

- Overall 78.9% of households grew some food for home consumption, compared to 84.6% in 1993.
- 61% of Fijians obtained most of their root crops from their garden compared to Indo-Fijians (8.6%).
- A higher proportion of Indo-Fijian households (63.5%) obtained their green leafy vegetables from their garden compared to Fijians (25.6%).
- More households in rural areas (61.8% Fijian and 44.5% Indo Fijian) reported getting all food needs from their garden compared to urban households (17.6% Fijian and 18.8% Indo-Fijian).
- More households in rural areas reported keeping livestock and birds for home use (59.6% Fijian and 77.6% Indo-Fijian) compared to households in urban areas (12% Fijian and 28.4% Indo-Fijian).
- Overall 86.8% of households used most of the fish catch for home use.
- A higher proportion of Indo-Fijians (88.6%) than Fijians (53.5%) preserved foods.
- In general, women or wives planned and prepared food in 71.7% households.
- All households considered they were able to feed their families.
- A small number of households (10%) reported not having enough food to eat properly on occasions. Under those circumstances, the mother usually went without food.
- Indo-Fijians reported spending an average weekly income of $60.37 on food whereas Fijians spent $41.30 on food weekly.
- The most important sources of information on nutrition were health personnel and radio.

**NCD Risk factors**

**Hypertension**

Slightly more female (19.2%) than males (14.4%) had hypertension.
• Indo-Fijian males had slightly higher rates of hypertension than Fijian males (15.3% and 13.8%, respectively).
• A high proportion of Fijians (7.7%) and Indo-Fijians (6.2%) aged 20-44 years have borderline hypertension.
• There was an overall increase in the rates of hypertension in all ethnic groups and gender from 9.8% in 1993 to 17.1% in 2004.

Smoking
• A quarter of Fiji’s population smoked (29.3% Fijians and 17.5% Indo-Fijians).
• More males (37.7%) than females (12.9%) smoked.
• About 5% of 12-17 years of age surveyed smoked.
• Of those who smoked, 50% smoked up to 4 cigarettes a day.
• 23.5% of Indo-Fijians and 20.9% of Fijians smoked 5-9 cigarettes a day.
• Higher proportions of Indo-Fijians (34.8%) than Fijians (29.4%) smoked more than 10 cigarettes a day.
• There has been an overall increase of 1.4% in the number of smokers since 1993.
• There has also been an increase in the number of adolescent smokers (12-17 years old) from 0.7% in 1993 to 4.7% in 2004.
• The number of males who smoked up to four cigarettes daily had increased in 2004 by 4.8% compared to 1993, but had decreased in males who smoked 5-9 cigarettes a day.

Alcohol
• 51.1% report drinking alcohol.
• More males (58%) than females (32%) reported drinking alcohol.
• Overall 38.7% of adolescents (12-17 years) reported drinking.
• 49.9% reported binge drinking with higher proportions of Fijians (62.7%) than Indo-Fijians (38.4%).
• There was a reduction in those who reported drinking in more than 5 days a week, in 2004 (4%) compared to 7.2% in 1993.
• There was a slight increase in those who reported drinking in less than 5 days a week in 2004 (96%) compared to 1993 (92.8%).

Kava consumption
• More males (63.9%) than females (31.2%) and more Fijians than Indo-Fijians drank kava.
• Only 11.2% drank kava daily, while 69.1% drank kava on 2-6 days in a week.
• More adult males (18-44 years) drank kava daily (15.8%) compared to 1.9% females.
• 89.9% of adolescents reported drinking kava in up to two days a week.
• There has been an increase in the proportion of kava drinkers since 1993. 63.9% males and 31.2% females reported drinking kava in 2004 compared to 55.7% males and 15.7% females in 1993.

Physical activity
• A majority (65.4%) of those surveyed reported doing light physical activity, while less than a third did moderate physical activity and only 3.3% engage in vigorous physical activity.
• More Indo-Fijians (71.6%) did light physical activity compared to Fijians (60.6%).
• More males than females tended to be active.
• The level of physical activity decreases with age.
• Overall, there was an increase of 19.6% in those who did light physical activity in 2004, compared with 1993.
• Overall, there was a general decline in those who engage in vigorous physical activity since 1993 in both the Fijian and Indo-Fijian populations.
Accomplishments since 1993 survey

1. Elimination of iodine deficiency diseases
   Although the problem has not been eliminated, the data indicated improvements. Hospital records indicated that the number of cases showed a decline since 1999 from 40 cases to around 20 in 2004. No systematic study has been conducted to determine the effect of iodized salt which was legislated in 1996.

2. Reduce the total incidence of anaemia by 25% of the 1993 level
   Anaemia continued to be a problem in children and women. The 2004 survey results show that rates in pregnant women have decreased compared to the 1993 results. However there had been an increase in anaemia in young children.

3. Reduce the prevalence of diarrhoeal diseases in the community by 50% of the 1990 level
   Hospital data showed that there has been a reduction of 53% in the rates of diarrhoeal cases in 2004 (3,202) compared to the number of cases in 1990 (6,115). In general, the decline has not been gradual but instead has peaked at certain periods. For example, there were 5,736 cases in 1995, which peaked in 1998 at 12,278. Data showed that a general decline in the number of reported cases has been observed since 2001, with the lowest rates reported recently at 3,202 cases (in 2004).

4. Reduce mortality due to diarrhoeal diseases by 50% of the 1990 level.
   No clear picture can be found because of inconsistent data reporting. However, mortality due to diarrhoea has been steady, at an average of just above 30 deaths per year. Compared to 23 deaths in 1995, the rates have increased since 1999, to just above 30.

5. Reduce maternal mortality to <20 per 100,000
   There have been fluctuations in the trend of maternal mortality ratio (MMR) over the years. The MMR remained at above 20 per 100,000 over the past 20 years.

6. Reduce the prevalence of low birth weight (LBW) babies (<2500g) by 25% of the 1993 level
   A slight decrease in prevalence rates of LBW babies of 11.4% in 1993 to 10.2% in 2004 has been observed. However, there was an increase in the rate of LBW babies in the Fijian population (from 4.2% in 1993 to 7.7% in 2004); while only a slight improvement was noted in the rate of LBW babies in the Indo-Fijian population (from 21.2% in 1993 to 18.8% in 2004). (Note: the number of children under 2 years in the sample was relatively small).

7 Reduce the prevalence of underweight and Protein-Energy Malnutrition by 25% of the 1993 level
   The overall prevalence of underweight by weight for age amongst children under 18 years of age in 2004 was 12.8%, an improvement from the 16.3% found in 1993. The results showed an increase in underweight for age amongst the 5-9 year-age group (11.5%) compared to the 0-4 year-age group (7.0%). The rate of underweight by weight for age in the Indo-Fijian population (27%) continued to be higher when compared to the Fijian population (5.9%).

8. Reduce the prevalence of overweight and obesity by 10% of the 1993 level
   The prevalence of overweight and obesity in both children and adults continued to increase. Overweight and obesity in children under 10 years of age (using weight for age, height for age and weight for height), as well as in children 10-17 years of age, showed increased rates in 2004.
In adults, the prevalence rates of overweight have also increased (from 22.9% in 1993 to 32.3% in 2004). Obesity rates have increased from 9.8% in 1993 to 23.9% in 2004, an increase of over 23% overweight and obesity over a decade. Consistent with the MOH STEPs survey, obesity increased with age, females had higher rates than males, and Fijians had higher rates than Indo-Fijians.

9. Reduce the prevalence of raised blood pressure in adults (SBP greater or the same as 160 mmHg and/or DBP greater or the same as 95 mmHg) by 2% per year, i.e. 8% by the year 2000
There has been a general increase in rates of hypertension. In 1993, 10% of adults surveyed had hypertension, whereas 17.1% had hypertension in 2004. The 2004 survey results were similar to the 2002 STEPs survey, which shows that 19.1% of those surveyed had hypertension.

10. Reduce the death rate from non-communicable diseases by 2% per year, i.e. 8% by the year 2000
The 1990 MOH Annual report showed that 40.7% of all deaths were due to diseases of the circulatory system. In 2002, 82% of all deaths were due to non-communicable diseases. Based on these figures, the death rates attributed to non-communicable diseases doubled between 1990 and 2002.

11. Reduce the per capita consumption of tobacco by 2% per year, i.e. 8% by the year 2000
The prevalence rates of smoking amongst those 12 years and older in 1993 and 2004 were similar (23.1% and 24.5%, respectively). However, there was an increase of 4.8% in males who smoked up to 4 cigarettes a day in 2004, compared to 1993. In addition, the rates of smokers in the adolescent category (12-17 year olds) have increased in 2004. Prevalence of female smokers also increased in 2004 by 13.3%.

Recommendations
Based on the findings of this survey as well as other available data, the following have been recommended for action.

1. Further reduce the prevalence of anaemia.
2. Reduce the prevalence of overweight and obesity in children and adults.
3. Reduce the incidence rates of LBW babies.
5. Reduce prevalence of high birth weight (HBW) in children.
6. Further reduce the incidence rates of diarrhoea, skin infections, parasitic infestation and other infections.
7. Reduce prevalence rates of NCD risk factors.
8. Improve food consumption patterns.
9. Improve family food production and household food security.
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1.0 INTRODUCTION

1.1 Background to 2004 Survey
The third Fiji National Nutrition Survey was conducted in 2004.

The first NNS was undertaken during 1980/81 by the National Food and Nutrition Committee as part of a National Food and Nutrition Development Program. Its purpose was to provide basic information to assist in the development of a food and nutrition policy for Fiji. This survey used a cross-sectional community sample (N = 4,964; approximately 1% of the population), to gather information on anthropometry, income, sanitation, food consumption, breastfeeding practices and prevalence of anaemia. Three major nutritional problems were identified: under-nutrition in children, anaemia and obesity in adults. Following this survey, policy goals were identified and developed including a National Food and Nutrition Policy and a National Food and Nutrition Surveillance System. These were subsequently translated into a number of intervention programs: the Malnutrition Rehabilitation and Prevention Project; Family Food Production Project; Boarding School Meals Project; and Feed Fiji First Project. At the time, it was also agreed that a national nutrition survey be conducted every decade.

In 1993 the second NNS was conducted by the National Food and Nutrition Committee (NFNC) using a similar sampling strategy (N = 4,606). This survey indicated a high proportion of low birth weight babies, skin diseases in children, anaemia, obesity and changes in dietary habits in both adults and children. These findings assisted in the formulation of a Fiji Plan of Action for Nutrition (FPAN), a School Nutrition Improvement Program (SNIP) and iron fortification as a ‘requirement’ for all flour sold in Fiji.

During 2003, the Fiji National Research Ethics Review Committee approved the third NNS to be conducted by the NFNC between May and September 2004. This aimed “to reassess the food and nutrition situation and nutritional status of Fiji’s population for the appropriate formulation of food and nutrition policies and intervention programs.” The survey saw a doubling of sample size (7,372 in 2004 compared to 4,606 in 1993), and a three-fold increase in the amount of data collected compared to 1993. Included was an examination of the nutritional status of children and adults; feeding practices for infants and young children under two years of age; food consumption patterns in households; household food production; physical activity; smoking and drinking patterns; prevalence of diabetes and high blood pressure; plus a quantitative dietary intake survey using a 24-hour Dietary Recall. Blood samples for micronutrient analysis were drawn from women of child-bearing age. (The results are presented in a separate report, entitled “The Micronutrient Status of Women in Fiji”.)

1.2 Funding
The NNS (2004) was funded by the Fiji Government and the Australian Government through an AusAID grant, UNICEF Fiji, NZAID, and the University of Otago.

The above institutions’ financial and technical support is gratefully acknowledged.

1.3 Country profile
This section provides contextual information in the form of a brief profile of the country. Beginning with geography and climate and a description of the people, the profile concludes with some economic information and selected socio-economic characteristics relevant to a survey of this nature.
1.3.1 Geography and climate
The Republic of Fiji consists of approximately three hundred and thirty islands situated in the South Pacific between latitudes 15 and 22 degrees south and longitudes 174 degrees east to 177 degrees west. This provides Fiji with a large commercial fishing zone.

Most islands are of volcanic origin with around 16% of total land area suitable for sustainable agriculture - mainly in coastal plains, river valleys and deltas (Kamikamica, 1997). The two largest islands (Viti Levu and Vanua Levu) account for 57% and 30% respectively of the total land area (i.e., 87%), and 76% and 18% respectively of the total population (i.e., 94% of the population) (Fiji Bureau of Statistics, 1998).

The climate is tropical maritime with mean monthly temperatures of between 22 to 30 degrees Celsius. The climate produces variable rainfall of approximately 1800mm on the leeward side of the main islands to 3200mm on the windward side. A 'dry season' occurs between May and October. The 'wet season' (November to April) is typically marked by ten to twelve destructive hurricanes/cyclones per decade.

1.3.2 People
Fiji is a multi-racial, multi-cultural country with a total population of a little over 800,000 at the time of this survey. Approximately 51% are indigenous Fijian, 44% are of Indo-Fijian origin (referred to as “Indo-Fijian(s)” in this report), and 5% are considered as ‘Others’. Although the English language is widely used in education, administration, and in business and commerce, many living in rural areas rely on the Fijian or Hindi languages for daily discourse. Approximately 80% of indigenous Fijians and 89% of Indo-Fijians are regarded as literate in English. The average household size is 5.3 persons (Fijian = 5.8; Indo-Fijian = 4.9) as of 1 July 2004 (Fiji Islands Bureau of Statistics).

By 2004, urban centres accounted for approximately 49% of the total population. While the capital city of Suva is ethnically mixed and reasonably cosmopolitan, some areas are predominantly (i.e., over two-thirds) Fijian (e.g., Lami, Vatukoula and Korovou), while ‘Others’ are mainly Indo-Fijian (e.g., Nausori, Lautoka, Ba and Navua) (Chandra & Mason, 1998).

From a health perspective, mean life expectancy is between 64 and 69 years (Fijian: men 64.8 years, women 68.1 years; Indo-Fijian: men 64 years, women 69 years). Fiji has an under-5 mortality rate (U5MR) of 22.7 per 1,000 live births (Ministry of Health Annual Report, 2003).

1.3.3 Economy and socio-economic characteristics
During 2003/04, Fiji’s exports totaled F$1,200.5 (million), while imports were valued at F$2,501.6 (million) of which food accounted for just over F$350 (million), or approximately 14% of goods imported. In 2002, agriculture (especially sugar, the traditional backbone of the economy) contributed 16.3% of GDP, and in 2004, the four largest export earners were garments (24.6%), sugar (20.4%), gold (9.6%) and fish (8.9%) (Key Statistics, FIBOS, September, 2005). Although not classified separately, ‘tourism’ contributed a little over 16% of earnings during that year (FIBOS, 2005). However, with the sugar industry in a state of turmoil pending removal of ‘guaranteed’ export prices and land lease uncertainties, overseas and domestic demand saw other agricultural products increase in quantity and value: these include coconuts, taro, yaqona, ginger and timber.

Average household income was more difficult to determine. In 1999 (the year for which most recent data were available), workers were reported to earn an average weekly wage of F$107 and those on a salary earning F$274 per week (FIBOS, Dec. 2004).
breakdown of the urban labour force in 2002 (n = 279,381) indicated 59% (n = 164,309) were classified as 'economically active' (FIBOS, 2002). Of the economically active, 55% were in full-time money work; 3.5% were part-time money workers; 16% combined money work with subsistence farming; 12% were purely subsistence farming; and 14% were unemployed (FIBOS, 2002, p.5). Women made up approximately one-third of the economically active population but two-thirds of all persons engaged in subsistence activities without a cash income (FIBOS, 2002, p.5). The same FIBOS report indicated slightly more than one-third of the urban-unemployed were engaged in subsistence production.

Overall, an urban unemployment rate of 14% was reported. However, this varied from 23% in 'urban villages'; 20% in 'squatter settlements'; 18% in 'housing/public rental board flats'; down to 10% in 'high class housing areas' (p.8). At the time of writing this report, the national data for rural household income and unemployment were not available.

Estimates of families living below the poverty line (defined as households headed by a person in paid employment who earns insufficient cash to fulfill household needs: UNDP, 1996) are problematic, with a figure of between 25-30% generally given. Overall, it appeared that approximately two-thirds of the community might be regarded as economically 'comfortable', while around one-third struggled for survival in a cash-based economy leaning increasingly toward tourism as an income earner.

1.4 Survey Goals and Objectives

The main purpose of the 2004 NNS is to reassess the food situation and nutritional status of the population and to provide information relevant to the development of informed food and nutrition policies and appropriate intervention programs. It was also anticipated that the third NNS would permit identification of national trends, if any, over the past decade.

In more specific terms, the objectives of the Third NNS are to:

1. Determine the prevalence of nutritional and diet related problems such as underweight, overweight, obesity, hypertension and diabetes among various population groups by age, gender, ethnicity, area type and division.

2. Determine baseline information on nutrient intake and adequacy of nutrient intakes in different population groups by age, gender, ethnicity and area type.

3. Determine the current food consumption patterns in households by ethnicity, area type and division.

4. Determine feeding patterns and practices (including complementary feeding) amongst infants and young children (0 – 2 years old) by ethnicity, division and area type.

5. Establish trends in the prevalence of underweight, overweight, obesity, hypertension, diabetes and eating patterns of the different population groups by division, age group and area type.

6. Gather information on demographic, socio-economic, environmental, food security and non-communicable disease risk-factors (i.e. physical activity, smoking, and kava and alcohol consumption) that will have an impact on the nutritional status of the population amongst the different population groups by ethnicity, age group, area type and division.
7. Identify nutritional and dietary intake indicators for the development of a regular nutrition surveillance program for the country.

8. Determine the prevalence of specific micronutrient deficiencies and establish baseline data for specified micronutrients.

### 1.5 Survey Personnel
Membership of the Third National Nutrition Survey Taskforce and associated staff included the following:

**Task Force**

<table>
<thead>
<tr>
<th>Chairperson</th>
<th>Director Health Service Improvement</th>
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<td>Dr Margaret Cornelius</td>
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**Members**

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<tr>
<td>Dr Sala Saketa</td>
<td>Epidemiologist, MOH</td>
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<tr>
<td>Mrs Sneh Chand</td>
<td>Manager, NFNC (Jan. 2004 - Jan. 2005)</td>
</tr>
<tr>
<td>Mr Mosese Salusalu</td>
<td>Manager, NFNC (Feb. 2005 – Feb 2006)</td>
</tr>
<tr>
<td>Mrs Nisha Khan</td>
<td>National Advisor Nutrition &amp; Dietetics, MOH</td>
</tr>
<tr>
<td>Dr Johnny Kyao-Mint</td>
<td>UNICEF</td>
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<tr>
<td>Dr Ajesh Ishri</td>
<td>UNICEF</td>
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<tr>
<td>Dr Kamrul Islam</td>
<td>UNICEF</td>
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<tr>
<td>Mrs Asenaca Vakacegu</td>
<td>UNICEF</td>
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<tr>
<td>Dr Rosa Sa’Aga Banuve</td>
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<tr>
<td>Dr Max de Courten</td>
<td>WHO</td>
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<tr>
<td>Dr Jan Pryor</td>
<td>Fiji School of Medicine</td>
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<tr>
<td>Dr Temo Waqanivalu</td>
<td>National Advisor NCDs, MOH</td>
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<tr>
<td>Ms Penina Vatucawaqa</td>
<td>Research Officer, NFNC</td>
</tr>
<tr>
<td>Ms Pushpa Wati</td>
<td>Senior Nutritionist, NFNC (Aug.2005, onward)</td>
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<tr>
<td>Mr Permal Deo</td>
<td>Food Technologist, USP</td>
</tr>
<tr>
<td>Mr Arun Deo</td>
<td>Fiji School of Medicine</td>
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<tr>
<td>Mrs Verona Lucas</td>
<td>PCDF, Taskforce</td>
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<tr>
<td>Ms Arti Pillay</td>
<td>Nutritionist, NFNC</td>
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<tr>
<td>Ms Shirly Narayan</td>
<td>Nutritionist, NFNC</td>
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<td>Ms Ashweena Rai</td>
<td>Nutritionist, NFNC</td>
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**Survey Secretariat**

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<th>Survey Coordinators</th>
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<tr>
<td>Mrs Nirmala Nand</td>
<td>NFNC, Planning component (2003)</td>
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<tr>
<td>Mrs Sneh Chand</td>
<td>NFNC, Field implementation (2004)</td>
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<tr>
<td>Dr Mosese Salusalu</td>
<td>NFNC, Data analysis, report preparation (2005)</td>
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<th>Statisticians</th>
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<td>Mr Jagdish Singh</td>
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<th>Information Officer</th>
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<td>Ms Jessie Tuivaga</td>
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<th>Project Assistants</th>
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<td>Ms Ashika Nandani</td>
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<td>Ms Ranjini Singh</td>
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<th>Database Managers</th>
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<tr>
<td>Mr Shalvindra Raj</td>
<td>(2002 – 2005)</td>
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The report is divided into six main sections.

The first provides background information to the 2004 survey, including country profile, survey goals and personnel. The second section outlines a summary of pre-survey nutritional and health status. The third provides the methodology, which includes limitations of the study.

The fourth section, and the largest, is the result section which is sub-divided into nine separate chapters:

- Survey sample characteristics
- Young children less than 2 years
- Children Under 18 years
- Adults 18 years and Over
- Haemoglobin levels and Anaemia
- Nutrients and Dietary Sources
- Eating Patterns
- Household Food Security
- Non-communicable Disease Risk Factors

The last three sections of the report cover the current situation in relation to FPAN, an overall conclusion and recommendations. References and limitations of the survey are also included.

All questionnaires, details of procedures used to obtain anthropometric data and biochemical measurements, as well as relevant tables for each result, are included in the appendices.

Generally, the 2004 results are presented first, followed by a comparison with the 1993 findings, which are then followed by discussions. Because the data is unweighted, only simple descriptive statistics will be used focusing mainly on ethnicity, gender, age/age groups and area type.
2.0 PRE-SURVEY NUTRITIONAL AND HEALTH STATUS

This chapter outlines what was known about the nutritional and health status of the community prior to 2004. It begins with a brief summary of findings from the Second NNS (1993), then identifies a number of trends (1980/81 to 1993) and finally cites nutritional and health developments reported during the inter-survey period (1993 to 2004).

2.1 Summary of second NNS (1993) Findings

2.1.1 Nutritional Status of Young Children

- 21% of Indo-Fijian and 4% of Fijian babies were born with low birth weight, LBW, (below 2,500g). Overall, 11% of babies delivered were classified as LBW infants.

- 19% of Indo-Fijian and 5% of Fijian children under 5 years were underweight for their age. 32% of Indo-Fijian and 4% of Fijian children aged 5 to 9 years were also underweight. The national rate was 11% for under 5 years and 16% for children aged 5-9 years.

- Although most Fijian infants were born with above average weight, their growth slowed after 3 to 5 months.

2.1.2 Clinical signs of Nutritional Deficiencies and Infections

- No child in the survey had Bitot's spots (an indicator of vitamin A deficiency), and very few children had angular somatitis (a sign of general under-nutrition).

- 44% of Fijian children and 12% of Indo-Fijian children under 5 years suffered from infected wounds or scabies, particularly in the rural areas. The national rate was 30%.

2.1.3 Diarrhoea episodes

- 19% of infants in urban areas and 7% in rural areas had diarrhoea in the two weeks preceding the survey. Among children aged 12 to 23 months, 7% in urban areas and 14% in rural areas had diarrhoea. Overall, 11% of children under 2 years had diarrhoea during this period.

2.1.4 Anaemia

- 40% of children under 5 years and 32% of women over 15 years were anaemic in comparison to 16% of men. Indo-Fijian women had a higher rate (38%) than Fijian women (26%). Overall, the national rate for anaemia was 27%.

- Overall, 55.6% of pregnant women were anaemic (61.5% were Indo-Fijians and 52% Fijians).

2.1.5 Nutritional Status of Adults by Body Mass Index (BMI)

- Overall, 33% of persons aged 18 years and over were overweight and obese. More women than men were overweight and obese (41% women and 24% men). The highest rate was among Fijian women at 47%.

- Although fewer Indo-Fijian women were overweight and obese compared to Fijian women, Indo-Fijian women showed the greatest increase in BMI with increasing age.
2.1.6 Diabetes and Hypertension
• Estimated prevalence rate for diabetes (from known cases) was 7 - 9% of persons aged 18 years and over. 10% of persons aged 20 years and over suffered from hypertension. Both diseases were more common amongst those aged over 45 years.

2.1.7 Water Supply and Sanitation
• 5% of rural households relied on a river or creek for drinking water. 8% of households in rural areas had no toilet.

2.1.8 Infant Feeding Patterns
• 95% of children less than 2 years were breastfed; 88% were given colostrums. However, almost half stopped breastfeeding within the first three months.

• Bottle feeding was more common amongst Indo-Fijians and higher in rural areas compared to those in urban areas.

• Fijian mothers breastfed for a longer duration. However, they were late in introducing their infants to solid foods, used poorer quality weaning food and had a shorter weaning process than Indo-Fijians.

2.1.9 Dietary Patterns and Food Source
• The diet of each major ethnic group included a high proportion of cereals, animal fat and sugar in both urban and rural areas.

• Based on the ‘Three Food Groups’ concept, 92% of those surveyed reported eating food from each of the three food groups (energy; body building; health) during the previous 24 hours.

• Although 94% of rural and 70% of urban households grew some food for home consumption, no household depended entirely on their own produce.

• 34% of rural Fijian households depended on sea/river food (mainly fish) and 36% of rural Indo-Fijian households depended on their raised animals as a source of animal protein.

2.1.10 Physical Activity Level, Smoking and Drinking
• 63% of men in rural areas compared to 27% in urban areas did heavy physical work. No marked urban/rural difference was observed among women.

• 46% of men and 12% of women aged 18 years and over smoked tobacco. More men in rural areas than in urban areas smoked tobacco (49% and 39%, respectively). Smoking often accompanied kava drinking.

• 46% of persons in rural areas consumed kava compared to 38% in urban areas.

• 35% of men in urban areas drank alcohol compared to 20% in rural areas.

2.2 Identified Trends
The 1993 NNS also identified a number of trends between 1980/81 and 1993. These are briefly summarized below.
The average height and weight of adults increased and this was attributed to better diet and a reduction of infectious diseases in Fiji. For example, the average height of Fijians increased from 167.8cm in 1980 (Johnson and Lambert, 1982) to 171cm in 1993. A similar trend was observed with Indo-Fijians.

The proportion of underweight in 1-5 year olds had decreased by almost half in both Indo-Fijian and Fijian children. In 1980, the proportion of underweight in 1-5 year olds was 33% in Indo-Fijians and 10.8% in Fijians. In 1993, the proportions were 18.5% amongst Indo-Fijians and 4.6% amongst Fijians. However, the proportion of underweight Indo-Fijian children in the 5-9 year age group found in 1993 remained ‘high’, at over 30%.

Anaemia remained widespread among women and young children. Previous studies indicated the average proportion of anaemia in the under 5 year olds was 33.3% while the 1993 survey indicated 39%. The 1993 survey showed that pregnant women had high rates of anaemia (Indo-Fijians at 61.5% and Fijians at 52%). The proportion of anaemia among Indo-Fijian men and Fijian men had increased at least three-fold between a study conducted in 1979 (Buchanan et al, 1979) and 1993 with rates of 6.5% to 22.1% respectively.

Skin infections among rural Fijian children (a long-standing problem), remained common. The 1993 survey showed that 68.8% of children under 2 years had skin problems.

Reported cases of diarrhoea had decreased; this was considered a reflection of better management at home using oral re-hydration solution. The 1993 survey reported an overall proportion of 11% of children under 2 years old having had diarrhoea during the two weeks prior to the survey.

The proportion of mothers who initiated breastfeeding increased from 82% in 1980/81 to 95% in 1993, with fewer mothers combining bottle and breastfeeding. In contrast, bottle feeding among Indo-Fijian women and among urban area women in general remained around 30%.

The rate of overweight and obesity in communities had not improved since 1980/81 and remained especially high among women. The proportion of overweight and obese women (BMI>=25) was 49% in 1980 and 64.8% in 1993.

The survey found no marked increase in the prevalence rates of hypertension between 1980/81 (8.5%) and 1993 (9.8%). However, as the population aged, the rate increased; the rate of hypertension in the 1980s was 30% in the 45 year olds and 33% in the 50 year olds.

The consumption of traditional foods has decreased over a decade: starchy foods such as cassava decreased from about 80% in 1980/81 to 40% in 1993; dalo decreased from 30% to 26%; and green leafy vegetables decreased from 50% to 30%. Conversely, the consumption of rice increased from 25% in 1980 to 55% in 1993, and bread from 19% in 1980 to 30% in 1993.

The consumption of milk (protein) increased from 22% in 1980 to 42% in 1993, while butter (animal fat) consumption increased from 20% in 1980 to 39% in 1993.
The second NNS (1993) concluded that despite efforts over the years to improve the nutritional status of the community, the situation had not changed much in that few of the 1982 Food and Nutrition Policy goals had been reached. The 1993 survey also recommended a review of the food and nutrition policy, the formulation of a National Plan of Action in Nutrition, the establishment of a nutrition surveillance system to monitor the food and nutrition situation on a regular basis and a review of the structure and function of the NFNC. However, the review of the food and nutrition policy and the establishment of a nutrition surveillance system were not implemented.

2.3 The Inter-survey Context
During the inter-survey period (1994 through 2003), a number of nutritional and health developments were reported.

2.3.1 Morbidity and Mortality Rates
- Infant mortality rates remained steady between 1995 and 2000 and varied from 15 to 17 per 1,000 live births. However, some evidence suggested more Fijian children aged 1-5 years died during this period compared to Indo-Fijian children. This was attributed to poor complementary feeding practices (MOH, 2000).
  - Adult mortality caused by diseases of the circulatory system in 2000 was at the highest rate, totaling 567.

2.3.2 Diarrhoea
- Cases of diarrhoea varied from year to year, with cases peaking in 1998 (12,276 reported cases) (MOH 2000), notably in the Western Division (Nadi and Ba). Fijian children aged 1-4 years and males were more commonly affected.

2.3.3 Non-Communicable Diseases (NCDs)
- NCDs accounted for 82% of all deaths, with coronary heart diseases and stroke responsible for a third of all deaths in the 40-59 age groups (MOH, 2002).
  - Fijians were reported as being more hypertensive (20.7%) than Indo-Fijians (16.3%) (MOH, 2002).
  - There was a 16% prevalence rate in Diabetes Mellitus amongst the 25-64 year-age groups, with significantly higher proportions in urban areas (24.7%) compared to rural areas (12.8%). More Indo-Fijians (21.2%) than Fijians (11.5%) and more females (33%) than males (23.6%) reported having this disease (MOH, 2002).

2.3.4 Infant and Child Feeding Practices
- An increase in mortality rates amongst Fijian children was noted and attributed to poor complementary feeding (MOH, 2000).
  - A UNICEF study conducted in two sub-divisions (Suva and Macuata) indicated that infants were missing out on energy-dense foods, which put them at heightened risk for nutritional deficiencies (FAO, 2001).

2.3.5 Low Birth Weight (LBW)
- LBW in infants was mainly attributed to anaemia in the mother during pregnancy, poor eating habits by the mother, low socio-economic status and the mother smoking whilst pregnant (FAO, 2001).
2.3.6 **Obesity and overweight**

- Data from Pacific Island Countries (PICs) indicated a general increase in obesity, which increases the risks of hypertension, cardiovascular diseases and diabetes (Coyne, 2000).

- The Fiji NCD STEPS survey in 2002 found that 29% of Fiji’s population aged 15-64 yrs were overweight and 18% were obese (MOH, 2002). The same survey reported that generally, more females than males were obese. It also found that the rate of obesity in Fijians was almost double when compared to that of Indo-Fijians.

- Increased obesity in children and adults was more prevalent in urban areas and amongst women. In some areas, between 20-30% of children less than 5 years of age were classified as overweight and obese, while 20-25% in the same age group was classified as mild to moderately undernourished (SPC, 2002).

2.3.7 **Changes in Food Consumption Patterns and Dietary Habits**

- A review of dietary changes in PICs over approximately four decades indicated major changes in urban areas. Urban food consumption was typically made up of a moderate to high intake of energy foods, fat, protein, sugar and salt. These diets were also low in complex carbohydrates and fibre and probably low in antioxidants, potassium and trace minerals (Coyne, 2000).

- A project on Determinants of Food Choices in Fiji (ACIAR, 2002), reported little change in the consumption of staples and protein sources for both major ethnic groups (Fijian and Indo-Fijian) between 1993 and 2002.

- While protein intake for Indo-Fijians remained unchanged, minor changes were noted, with urban Fijians consuming more cassava and bread and rural Fijians consuming more cassava, dalo, rice and dhal. Changes in Fijian food choice were attributed to economics and ease of preparation; while changes amongst Indo-Fijians were a consequence of economics and personal preference.

- The Fiji NCD STEPS survey 2002 reported low consumption of fruits and vegetables. 65.9% ate less than one serving of fruit a day. More Fijians (32.4%) than Indo-Fijians (16.2%) ate less than one serve of vegetables a day.

2.3.8 **Micronutrient Deficiencies**

- Although no national representative survey has been conducted, small studies have shown evidence suggesting that Iodine Deficiency Disease (IDD) may be more prevalent. IDD is prevalent in some parts of Fiji where less sea foods are consumed. A survey of 15-45 year old females conducted in Suva and Sigatoka in 1994 found the prevalence of goiter was 25% and 29%, respectively (Gutekunst, 1994). The proportions in school children who were 6-12 yrs of age in Ba, Sigatoka valley, and Sigatoka Town were 39% (Gutekunst, 1994). In 1996, legislation on exclusive import of iodized salt was introduced to improve the situation.

- Iron Deficiency Anaemia (IDA) remains a public health problem. Chand (1995) found the proportions of the under 5 year old Fijian and Indo-Fijian were 29% and 36%, respectively. Another study conducted in the Central and Western Division (Chand, 1995) showed approximately 80% of pregnant women surveyed were anaemic, with haemoglobin levels below 11g/dl. In 1998, an anaemia report by the Ministry of Health, Ba Sub-division showed that 34% of women of child-bearing age were anaemic (FAO, 2001).
2.4  Fiji Food and Nutrition Policy and National Plan of Action for Nutrition (NPAN)

As an outcome of the first nutrition survey in 1980/81 and the DP8 (National Development Plan 8), in which nutrition was given paramount importance, a Fiji Food and Nutrition Policy was adopted by cabinet in 1982 (NFNC, 1982).

The 13 goals of the Policy were outlined in the second Fiji National Nutrition Survey Report in 1993 (pp 4-5) (Saito 1995).

Around the same period that the second nutrition survey was being planned and conducted, Fiji took another bold step by endorsing the World Declaration and Plan of Action for Nutrition. Through these actions, Fiji pledged to prepare a National Plan of Action for Nutrition in accordance with the recommendations of the International Conference on Nutrition (ICN) (Rome, 1992).

The then National Food and Nutrition Committee, by virtue of its mandate, undertook the development of the draft of the Fiji Plan of Action for Nutrition in the mid 1990s, in collaboration with partner agencies. The Fiji Plan of Action for Nutrition (FPAN) was endorsed by Cabinet in 1998 (NFNC, 1997).

The Objectives of FPAN were:

• improvement in overall nutritional status of the population;
• improved eating habits through the population, especially amongst high risk groups;
• improvement and availability of and access to food;
• further improvement in living conditions;
• increased production and consumption of local food;
• increase in acreage of agricultural land devoted to food crops;
• establishment of a system for estimating subsistence;
• establishment of agricultural research to improve the post-harvest quality of locally produced food and for disaster preparedness;
• establishment of food and nutrition policy for schools;
• active participation of NGOs in the delivery of food and nutrition programmes and activities;
• active participation of the private sector in support of the nutrition programmes and activities;
• establishment of food and nutrition monitoring surveillance system to periodically assess the nutrition situation in the country;
• routine incorporation of food and nutrition objectives into development policies and programmes;
• legislation and implementation of Fiji’s Code of marketing Breast Milk Substitutes;
• legislation of the revised Pure Foods Act and improved enforcement, including legislation of nutritional labeling for processed foods;

The short term (by the year 2000) targets of the FPAN were to:

• eliminate iodine deficiency diseases;
• reduce the total incidence of anaemia by 25% of the 1993 level;
• reduce the prevalence of diarrhoeal diseases in the community by 50% of the 1990 level *;
• reduce the mortality rate due to diarrhoeal diseases by 50% of the 1990*;
• reduce the number of hospitalized cases with severe pneumonia in children under 5 years of age by 50% of the 1990 level*;
• reduce the number of deaths from pneumonia in children under 5 years by 50% of the 1990 level*;
• reduce the maternal mortality to <20 per 100,000*;
• reduce the prevalence of low birth weight babies by 25% of the 1993 level;
• reduce the prevalence of underweight and protein energy malnutrition (PEM) by 25% of the 1993 level;
• reduce the prevalence of overweight and obesity by 10% of the 1993 level;
• reduce the prevalence of raised blood pressure in adults (SDP greater or the same as 160mmHg and/or DDP greater or the same as 95mmHg) by 2% per year, i.e. 8% by the year 2000*;
• reduce the death rate from non-communicable diseases by 2% per year, i.e. 8% by the year 2000*;
• reduce the per capita consumption of tobacco by 2% per year, i.e. 8% by the year 2000*;

* Targets of the Ministry of Health and Social Welfare (NFNC, 1997).

The results of this survey may indicate whether or not some of the short term targets of FPAN had been achieved.

The circumstances outlined above provided the context in which the third NNS (2004) was undertaken.
3.0 METHODOLOGY

3.1 Introduction
In some respects, orientation and methodology were similar to that of the Second NNS (1993). However, in 2004, participants were a random sample of 1,696 households containing 7,372 persons interviewed between May and September in English, Fijian or Hindi (see Appendix 1). There was also a substantial increase (approximately three-fold) in the amount of information collected. In addition to basic demographic data, five separate questionnaires were administered (vs three in 1993), including quantitative nutrient intake using a 24-hour dietary recall procedure as well as a micronutrient component.

3.2 Survey area
This survey was conducted across the four Administrative Divisions within the Republic of the Fiji Islands. Each Division consists of a number of characteristics as outlined below.

3.2.1 Central Division – includes the sub-divisions of Suva, Nausori, Tailevu, Naitasiri and Navua on the main island of Viti Levu. The Suva sub-division contains administrative, commercial and educational centres for the country and hosts manufacturing and light industry. The other sub-divisions contain dairying, rice growing, vegetable and poultry farming areas. The greater Suva area accounts for almost 25% of Fiji’s total population and is a cosmopolitan mix of ethnic Fijians, Indo-Fijians, other Pacific Islanders, Chinese, Europeans and those of mixed parentage. This division contains approximately 39% of the total population of the country.

3.2.2 Eastern Division – includes the Lomaiviti group of islands, Lau islands, Kadavu and Rotuma. With a population of predominantly indigenous Fijian, this division represents approximately 5% of the total population and relies on fishing, copra production and other forms of agriculture for income and food supply. Survey participants were drawn from the islands of Gau (Lomaiviti Group) and Kadavu.

3.2.3 Western Division – includes Sigatoka, Nadi, Lautoka, Ba, Tavua, Rakiraki and the Yasawa and Mamanuca islands. It relies on tourism, sugar cane farming, manufacturing, gold mining, some forestry and vegetable farming for income. The Division accounts for 38% of the total population, is predominantly Indo-Fijian (approximately 70%), and is drier and less humid than other divisions.

3.2.4 Northern Division – includes the second and third largest islands (Vanua Levu and Taveuni), smaller surrounding islands and Rabi. This division relies on sugar cane, yaqona, dalo, copra and fishing for income and supports a growing tourism industry. It accounts for approximately 18% of the total population and is predominantly Fijian, but it also contains a substantial Indo-Fijian population, some Chinese and ‘Others’.

3.3 Sampling strategy
Pre-survey sampling, as in 1993, used a two-stage cluster procedure (to sample Enumeration Areas (EAs) and then households) involving a probability proportionate to size (PPS) approach based on population estimates for 1999 (Fiji Bureau of Statistics, 2002). However, the sample was not stratified by ethnicity, gender, age or urban/rural location. A sample of $N = 8,465$ was planned (approximately 1% of the estimated 1999 population of 806,000, plus allowance for a non-response rate of 5%) to provide a design effect multiplier of 2 and a precision level of 95%, as calculated by WHO (Appendix 2 indicates NNS Sample Size Calculations).
Cost and logistical considerations reduced the number of EAs surveyed by 25% compared to 1993: from 60 or 4.3% of 1,405 EAs in 1993, to 45 EAs or 3.3% of 1,346 EAs in 2004. The size of the planned survey sample (N = 8,465) determined the size of the household sample (n = 1,693) and was based on an estimated average household of 5 persons (Key Stats, FIBOS, 2004) (i.e., 8,465 persons divided by 5 = 1,693 households).

3.3.1 Procedure
Systematic cluster sampling was carried out in two stages.

Stage 1 Selection of Census Enumeration Areas (EAs)
Selection of the 45 EAs (Appendix 3, Survey Sites) included in this study was based on 1996 census data (population with the cluster sampling procedure).

To select EAs, the total population of 775,077 (based on the 1996 census) was divided by total EAs to be surveyed (45) to obtain a sampling interval of 17,224. Population totals for each EA were progressively added, beginning with EAs in the Central Division to provide cumulative population totals. A random number between one and 775,077 was selected (in this instance, the number was 35,462), and this was used to identify the first EA based on a cumulative population total. The remaining 44 EAs were selected using cumulative population totals by adding the sampling interval (17,223.9) to the randomly selected number [i.e. 35,642 + 17223.9 = 52,685.9 (for 2nd EA); 52,685.9 + 17,223.9 = 69,909.8 (for 3rd EA, etc.)] until all 45 EAs were selected.

Stage 2 Selection of Households per EA
Of the households surveyed (n = 1,693, or 2.5% of all households), thirty-eight were initially identified per EA (i.e. 1,693/45 = 38) to provide a national sample of 8,465 individuals. The numbers of households per EA were subsequently supplemented to compensate for location error and survey attrition. Sampling of households was either carried out as part of preliminary preparation, or where this had not occurred, it was undertaken in the field prior to actual visits.

(i) The Fiji Islands Bureau of Statistics (FIBOS) prepared maps for each of the 45 EA survey areas, each of which contained approximately 120 households.
(ii) Each household in a particular EA was allocated a number using a household listing form. Proceeding in a predetermined direction, a table of random numbers was used to identify 38 plus approximately 10 additional households. Household numbers that reappeared after selection were excluded.
(iii) Where households agreed to participate, and where the Household List had not been prepared, a list of Household Members was constructed.

A total of 1,696 households were surveyed. All household members 12 years and over were personally interviewed while mothers or primary caregivers responded on behalf of infants and young children below the age of 12 years.

3.4 Pilot survey and other preliminaries

3.4.1 Pilot survey
A pilot survey (n = 311) was conducted during November-December, 2003 in Vatuwaqa (an urban area) and Vuda (a rural area), both of which were excluded from the main survey. All questionnaires were translated into Fijian and Hindi, pre-tested on staff and acquaintances and then field-tested during the pilot survey. The stated purpose of the pilot study was to organize and refine methods and instruments, determine the appropriateness
of variables to be investigated, test comprehension of questionnaires and trial data entry procedures and some forms of analysis.

Modifications and amendments were made and survey questionnaires were finalized. A 10 day pre-survey training period for survey staff was recommended.

### 3.4.2 Pre-Survey visits

NFNC staff with an area zone nurse visited all 45 EAs to identify the boundaries of each EA, and to explain the purpose of the survey to potential participants and make necessary logistical arrangements.

### 3.4.3 Training of Zone Nurses and preparation of Household Lists

Separate three-hour training sessions were conducted in Suva, Lautoka and Labasa to familiarize EA zone nurses with the Survey and the construction of Household Lists for each EA. Household Lists (see Appendix 4) identified the exact location and all household members, including their ages. Ideally, these were to be completed and returned by zone nurses to NFNC within one month; the nurses received payment for this procedure. However, where tasks were not adequately carried out, Household Lists were prepared in the field before households were selected (Stage 2, above, refers).

### 3.4.4 Survey Training Manual

A Training Manual for the 2004 Survey was prepared and distributed to survey staff. The Manual contained detailed protocols for all procedures and it provided the basis for pre-survey training.

### 3.4.5 Survey team training

Training of survey teams was conducted by NFNC staff (senior nutritionist; research officer; consultant nutritionist; and statistician) at the Divisional level to standardize data collection. Training covered all survey procedures in the Training Manual for the 2004 National Nutrition Survey (including: aims and objectives of the survey, time-frame, survey sites, organization for data collection, survey team composition and their duties, interview procedures, how to use or administer survey instruments, calibration of instruments, data quality control and other administrative matters).

A 5 day intensive training session for all hired enumerators and survey team members was conducted in the Central and Eastern Divisions covering all survey procedures in the 2004 Training Manual. This was followed by classroom based practical exercises to test understanding and skill level.

Separate training sessions for the divisional survey personnel (nurses and dietitians) were conducted over three consecutive days in the North (Labasa), followed by the same in the West (Lautoka). Special training for the 24-hour Dietary Recall was also conducted.

### 3.4.6 Pre-survey schedule

<table>
<thead>
<tr>
<th>Activity</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pilot survey</td>
<td>November—December 2003</td>
</tr>
<tr>
<td>Pre-survey site visit &amp; zone nurse, dietitian training</td>
<td>February—March 2004</td>
</tr>
<tr>
<td>Recruitment and training enumerators, nurses, dietitians</td>
<td>April—July 2004</td>
</tr>
</tbody>
</table>
3.4.7 Field survey schedule:

<table>
<thead>
<tr>
<th>Division</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Northern</td>
<td>May 2004</td>
</tr>
<tr>
<td>Western</td>
<td>June—July 2004</td>
</tr>
<tr>
<td>Eastern/Central</td>
<td>August—September 2004</td>
</tr>
</tbody>
</table>

Note:
Data collection in the Central and Northern Divisions was swapped because of heavy rain and flooding in the Central Division at the scheduled time. Data collection in the Northern Division was re-scheduled to May and the Central Division to August/September.

3.4.8 Post survey schedule

<table>
<thead>
<tr>
<th>Activity</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data Entry</td>
<td>June—December 2004</td>
</tr>
<tr>
<td>Data cleaning</td>
<td>January 2005</td>
</tr>
<tr>
<td>Data analysis</td>
<td>April 2005—February 2006</td>
</tr>
</tbody>
</table>

3.5 Conduct of the Survey

3.5.1 Survey Teams
Six survey teams of four members (a dietitian, public health nurse, and two enumerators or interviewers fluent in Fijian or Hindi and English) conducted the survey. The dietitian was the team coordinator/supervisor; the nurse was responsible for anthropometric measurements and blood sampling; and enumerators administered questionnaires.

All six survey teams worked in one Division at a time. Each team spent two weeks in a particular EA before proceeding to the next EA. Upon completion of the surveys in a Division, a 'break' of one week occurred to allow the survey teams to prepare materials for the next Division.

3.5.2 Ethical considerations
All appropriate traditional social protocols were observed before a survey team entered a Fijian village or settlement. Potential households were given the option to withdraw from the survey and individuals were assured of confidentiality (see Appendix 5).

3.6 Data collection: Techniques and procedures
Survey questionnaires were designed to collect six categories of information: (i) demographic data; (ii) anthropometric measures; (iii) biochemical data; (iv) food production and storage; (v) dietary intake and (vi) NCD risk factor data which included physical activity, alcohol and kava consumption and smoking.

3.6.1 General procedure
Each household survey began with the Household Members Listing Form, either prepared previously or completed at the beginning of each household visit. This form identified household members by age plus other basic information (e.g. household type: urban/rural). The following steps were followed:
i. A Participant Information Sheet was read in English, Fijian or Hindi. This assured participants of confidentiality and requested each household member’s consent to participate in the survey.

ii. If an individual agreed to undertake all survey requirements, a Consent Form was completed and signed by that individual. For persons 21 years of age and under, either a parent or guardian signed the consent form. An appointment date and time for the survey teams’ next visit were given to those that had agreed to participate.

iii. Questionnaires were then administered to respondents in the following order: #6 Food Frequency Questionnaires; #7 Food Intake Questionnaires (24 Hour Dietary Recall); #3 Household Questionnaires; #5 Questionnaire for persons 12 years and over; and #4 Children under 12 years Questionnaires.

iv. Anthropometric measurements (height, weight, waist circumference) were taken followed by blood pressure and biochemical tests (haemoglobin and random blood sugar) using the finger-prick method.

v. Venous non-fasting blood samples for the micronutrient survey were taken between the hours of 9:00am and 1:00pm at the hospital, health centre, nursing station or in village community halls.

vi. Results from anthropometric measurements, blood pressure and biochemical tests were given to individual participants immediately after testing (Appendix 6, Form 8 a & b). Participants with abnormal results for blood pressure, haemoglobin and random blood sugar were referred to the nearest health facility (a health centre, hospital or nursing station) for further action (Appendix 6, Form 10). Where appropriate, nutrition and dietary counseling were given to participants.

Completed data sheets and questionnaires were checked by the Team Supervisor and the NFNC Field Supervisor before leaving the survey site (Appendix 6, Form 9). All questionnaires were transported to the NFNC in Suva by the Field Supervisor, and questionnaires were re-checked at the NFNC before data entry commenced.

### 3.6.2 Questionnaires

Five questionnaires were administered (in the order indicated in iii, above) to the head of each household, and/or an adult who had knowledge of that household, by enumerators in each team. (Numbers ‘#1’ and ‘#2’ were reserved for collection of basic information.) Each questionnaire indicated EA and area type (urban/rural), and the Food Intake Questionnaire (#7) also identified the community of each respondent. (Appendix 7, Form 1-7 for copies of questionnaires).

#### #3 Household Questionnaire (45 items)

This requested information on area type, household information, storage, preservation and cooking methods, home food production, household food expenditure, food security, intra-household food distribution and sources of information on health and nutrition (Appendix 7, Form 3).

#### #4 Children (aged below 12 years) Questionnaire (32 items)

Information was provided by the mother or primary caregiver of a child in regard to basic information about the child, including feeding practices, education, employment, and general health and nutrition condition. In addition, physical and
biochemical data (weight; height and haemoglobin) was collected at this time (Appendix 7, Form 4).

#5 **Questionnaire for persons aged 12 years and over** (46 items)
This collected information on area type; socioeconomic status and other demographic data; physical activity; smoking; kava use; hypertension and diabetes; anthropometric measurements (weight, waist and height); haemoglobin and random blood sugar (Appendix 7, Form 5).

#6 **Food Frequency Questionnaire** (24 items eliciting up to 92 additional responses)
This requested extensive information on the frequency with which ninety-seven different types of foods were consumed (daily, weekly, monthly, rarely or never). It was designed to obtain qualitative and descriptive data on food intake over a longer period of time. Despite its length, it is quick to administer, has a low respondent burden and a high response rate. However, its accuracy is considered to be lower than a weighted food record or a 24-hour dietary recall survey (Appendix 7, Form 6).

#7 **Food Intake Questionnaire (24 hour Dietary Recall)** (7 items, with 2 permitting up to 68 open responses)
This gathered information on area type, weight, age, height and food/drink items consumed during a 24-hour period. Respondents were required to provide a ‘quick list’ of twenty-six food/drink items and to use this list to detail their consumption (for up to forty-two items) in terms of time of day, occasion, description of food/drink consumed, and the quantity consumed. Recipe information was also collected in addition to an indication of how typical the food/drink consumption for the described 24-hour period appeared to be, including possible reasons for under or over consumption (Appendix 7, Form 7).

### 3.6.3 Equipment
Biometric measurements were obtained using the following listed equipment:

#### 3.6.3.1 Anthropometric measures
- Portable electronic (digital) weighing scales (Heine)
- Length measuring devices (infantometer)
- Bodymeter
- Height rod
- Tension tape

#### 3.6.3.2 Biochemical data
- Hemocue Haemoglobinometer
- Glucometer
- Vacutainer or disposable needles and syringes

#### 3.6.3.3 Blood Pressure
- OMRON Digital Automatic Blood Pressure Monitor

### 3.6.4 Procedures for collecting biometric measures

#### 3.6.4.1 Age
The age of Children (less than 2 years) was obtained from the Maternal Child Health (MCH) card of the child. When the MCH card was not available, the mother or caregiver
was asked for the child’s age in completed months (e.g. 1 year, 2 months and 14 days = 14 months). Adult ages were determined by date of birth.

3.6.4.2 Weight (Appendix 8)
An accurately calibrated digital scale was used and was charged 7 hours before use. It was positioned on a hard, flat surface; an adaptor was connected. (Detailed operational procedures are set out on page 30, 2004 NNS Training Manual). Each person was asked to remove their shoes and any other heavy or bulky clothing, empty their pockets, and stand on the middle of the scale looking straight ahead. Weight was recorded to the nearest 0.1 kg. Weight was measured and recorded twice, and the average of the two readings was taken as the final weight for the person.

If a child was unable to stand on the scale on their own, the mother was weighed alone and then with the child, and the difference was recorded (taken to the nearest 0.1 kg) as the weight of the child.

3.6.4.3 Length of children under 2 years (Appendix 9)
The infantometer, used to measure the recumbent length (crown to heel) of all children under 24 months, was placed on a flat surface. The child was laid on the infantometer with the child’s head positioned firmly against the fixed headboard and with eyes looking vertically upwards. The knees of the child were extended by an interviewer using firm pressure, and the feet were flexed at right angles to the lower legs. The upright foot piece was brought in firm contact with the child’s heel, at which point the measurement was taken.

3.6.4.4 Height of adults and children two years and over (Appendix 9)
A bodymeter mounted on a rod was used to measure height. The rod was extended vertically against a straight wall on a flat floor with the bodymeter facing the measurer or examiner. Participants without shoes, socks, slippers or any headgear were asked to stand under the bodymeter with heels together, shoulders relaxed, and looking straight ahead. The measuring tongue was lowered onto the head, and the height measurement that appeared in the read-off area of the bodymeter was read to the nearest 0.1 cm, and then recorded. Two measurements were taken and the average was recorded as the final height.

3.6.4.5 Waist circumference (Appendix 10)
The measurement of adults aged 20 years and over was taken at the level of the mid-point between the inferior margin of the last rib and at the crest of the ilium in the mid-axillary plane. Measurement was taken over light clothing; excess clothing having been removed prior to this. The tape was applied over the ‘marked’ mid-point and the tape wound horizontally around the back. With the participant keeping his feet together, hands by his side, palms facing inwards and breathing out, his waist measurement was read out to the nearest 0.1 cm, and then the reading was recorded. The same process was repeated for a second reading. If the difference between the first and second reading was 2 cm or more, a third measurement was taken, and then an average was taken as the final waist measurement.

3.6.4.6 Blood pressure (Appendix 11)
Participants were advised to sit quietly for five minutes with legs uncrossed. The right arm was used for the blood pressure measurement. Blood pressure was measured using the OMRON Digital Automatic Blood pressure Monitor (DABPM) protocol (pages 35 and 36 2004 NNS Training Manual).
3.6.4.7 Haemoglobin (Hb) level (Appendix 12)
A haemoglobinometer was used to measure haemoglobin levels of those aged 6 months and over. A capillary blood sample was drawn by pricking a finger of the participant and filling the accompanying cuvette completely in one continuous process. A cuvette which was filled with blood was placed into the cuvette holder immediately and pushed into position. The result displayed on the screen within 15-45 seconds and was recorded as the participant’s Hb level.

3.6.4.8 Blood sugar (Appendix 13)
A drop of blood from a participant’s pricked finger tip was placed on a glucose strip inserted in the glucometer. The reading that appeared on the screen was recorded.

3.6.4.9 Blood sample for Micronutrient analysis
Venous non-fasting blood sample (10ml) was collected from child bearing age women (15-44 years old) using vacutainer or disposable needles or syringes. Samples were collected from participants at Health Centres, were stored in cold boxes and were transported to the main hospital in the area (Suva, Lautoka and Labasa). The samples were then centrifuged and stored at −20°C. Serum samples were then sent to the national Virology and Vector Borne Disease Laboratory (at Mataika House in Suva) where they were stored at −40°C. The consignment of all the samples in their frozen state was exported to Wellington, New Zealand for analysis.

Note: Detailed protocols for all measurements are contained in the 2004 NNS Training Manual which is available at the National Food and Nutrition Centre in Suva.

3.6.5 Dietary intake information
Food consumption patterns of households and individuals were collected using the Food Frequency Questionnaire and a one-day 24-Hour Dietary Recall.

3.6.5.1 The Food Frequency Questionnaire (#6)
This obtained qualitative descriptive data on usual food intake over the past six months for the whole household, and it helped to identify eating patterns associated with inadequate nutrient intake.

Sample:
The questionnaire was administered to someone in the household who had knowledge of food consumption by each household member (usually the head of the household or the person who prepared the food for the family). Detailed procedures and protocol followed are contained in the 2004 NNS Manual.

3.6.5.2 24-Hour Dietary Recall (#7)
This instrument was designed to focus on a 24-hour period of consecutive time and is a useful tool for assessing community food intake provided samples are taken across all days of the week. However, because it relies on memory, it has two major weaknesses: frequently consumed foods are often omitted and, sometimes it is unsatisfactory for use with the elderly and young children.

Sample:
Women of childbearing age (15-44yrs of age) plus one man per household (of the same age group as the female) were asked to recall their food intake for the previous 24 hours. (Women in this age group were selected to permit later correlation with micronutrient
results). Where a household had two or more possible participants, subjects were randomly selected. To ensure representative sampling across all days of the week, the days on which Dietary Recalls were conducted differed from household to household.


Because one 24-hour Dietary Recall is not typical of an individual’s intake, a second 24-hour Dietary Recall was also conducted on 10% of randomly selected participants (7 participants per EA) at least three days after the first recall was conducted. The purpose of taking a second 24-hour Dietary Recall was to check for intra-household variability and consistency.

The Training Manual indicates how, when and by whom field procedures were monitored for standardization and quality control.

3.6.5.3 Infant and Young Child Feeding Practices (#4)
This was administered in association with Questionnaire #5.

Sample: Household members between the ages of 0 to less than 12 years.


3.7 Data processing and analysis

3.7.1 Non-Dietary Data
Before data entry, response forms were checked for completeness at NFNC. Responses were pre-coded to facilitate entry using Epi Data 3.0. Data were ‘cleaned’ and entered twice using Epi 6.0 to ensure consistency and accuracy.

The Statistical Package for Social Sciences (SPSS) Version 12 & 13, NZ was used to calculate frequencies and means. Nut-Stat from Epi-info version 2002 was used to analyze the nutritional status of children (weight for height, weight for age, and height for age) using the NCHS percentage of the median reference data and z-scores. Post-survey analyses were carried out by and confined to ethnicity, gender, age and area type (urban/rural) (see, Limitations) to facilitate the completion of the report.

3.7.2 Dietary Data
The 24-Hour Dietary Recall data were entered using Microsoft Access 2000, and all computer printouts were manually checked with the original records; where necessary, changes were made. Dietary analysis included seventeen selected nutrients (energy, protein, total fat, carbohydrate, dietary fibre, cholesterol, potassium, calcium, iron, zinc, total vitamin A, retinol, Beta-carotene, thiamin, riboflavin, niacin and vitamin C). Food and beverages consumed from the 24-Hour Dietary Recall were merged with food composition data to enable analysis of nutrients from food intake data.

Other relevant information (food density and standard recipes) was derived from food composition information in the Pacific Islands Food Composition Tables (2nd edition, 2004), and merged into the database. Where necessary, this information was supplemented by material from other sources [The Concise New Zealand Food Composition Tables (5th edition), Food Composition Table for use in East Asia (1972), and Food Composition Tables, Caribbean Food and Nutrition Institute (1995)]. All data were checked manually, corrections made and the data cleaned.
SPSS was used to analyse food nutrients and to calculate frequencies and mean/median nutrient intake. Adequacy of nutrient intake was assessed using the United States Recommended Dietary Allowances (USRDA) (Appendix 14), which included Estimated Average Requirements (EAR) since no EAR equivalent was available for the Pacific. Mean/median intakes by the survey sample were determined for 17 individual nutrients and compared with recommended USRDA.

The various indices used in this survey and the assessment cut-off points applied are shown in Table 3.1.

**NOTE:** The data used in the analysis is un-weighted data.

<table>
<thead>
<tr>
<th>Measurement</th>
<th>Criteria</th>
<th>Cut-off point</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ANTHROPOMETRY</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BMI (&gt;18years)</td>
<td>Underweight</td>
<td>&lt; 18.5</td>
<td>WHO</td>
</tr>
<tr>
<td></td>
<td>Healthy Weight</td>
<td>≥ 18.5-&lt;24.9</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Overweight</td>
<td>≥ 25 - &lt; 30</td>
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</tr>
<tr>
<td></td>
<td>Obese</td>
<td>&gt;30</td>
<td></td>
</tr>
<tr>
<td>Weight for Age and</td>
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<td>≥ 60 - &lt; 80%</td>
<td>NCHS</td>
</tr>
<tr>
<td>Weight for Height</td>
<td>Healthy Weight</td>
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</tr>
<tr>
<td></td>
<td>Overweight</td>
<td>≥ 120%</td>
<td></td>
</tr>
<tr>
<td>Height For Age (&lt;17years)</td>
<td>Short for Age</td>
<td>&lt; 90%</td>
<td>NCHS</td>
</tr>
<tr>
<td></td>
<td>Normal Height for age</td>
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<td></td>
</tr>
<tr>
<td></td>
<td>Tall for age</td>
<td>&gt;110%</td>
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</tr>
<tr>
<td>Waist circumference (&gt;20years)</td>
<td>Overweight and obese Male</td>
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</tr>
<tr>
<td></td>
<td>Female</td>
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<td>Low Birth Weight (LBW) (&lt;2years)</td>
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<td>≤ 2500g</td>
<td>WHO</td>
</tr>
<tr>
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<td>&gt;4000g</td>
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</tr>
<tr>
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<td>Borderline</td>
<td>Diastolic &lt;90mmHg</td>
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</tr>
<tr>
<td></td>
<td>High Blood Pressure</td>
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</tr>
<tr>
<td></td>
<td></td>
<td>Diastolic 90 – 95 mmHg</td>
<td></td>
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<tr>
<td>BIOCHEMICAL</td>
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<td>Systolic &gt; 160 mmHg</td>
<td>WHO</td>
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<tr>
<td>Haemoglobin</td>
<td><strong>CHILDREN</strong></td>
<td>Diastolic &gt; 95 mmHg</td>
<td></td>
</tr>
<tr>
<td></td>
<td>6months to &lt;5 years</td>
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<td></td>
</tr>
<tr>
<td></td>
<td>5 - 11 years</td>
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<td></td>
<td>12 - 14 years</td>
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<td></td>
<td><strong>ADULT &gt;15YEARS</strong></td>
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</tr>
<tr>
<td></td>
<td>Males</td>
<td>&lt;13g/dl</td>
<td>WHO</td>
</tr>
<tr>
<td></td>
<td>Females(non pregnant)</td>
<td>&lt;12g/dl</td>
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<tr>
<td></td>
<td>Females (pregnant)</td>
<td>&lt;11g/dl</td>
<td></td>
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</tbody>
</table>
4.0 RESULTS: Part 1: Survey Sample Characteristics

National survey sample characteristics should proportionally represent the wider population to permit valid generalizations of the findings to the wider community. It was therefore necessary to examine the sample characteristics to determine whether major demographic groups were proportionately represented and that the sample was representative of the wider community. In order to compare the 2004 and the 1993 NNS results it was also necessary to determine whether the samples for the two surveys were comparable demographically. Relevant demographics are summarized first followed by other indicators and characteristics.

Key Findings

2004 survey demographics:

- 7,372 individuals drawn from 1,696 households were interviewed. This represented just-under 1% of the 2004 population estimate. Almost 12% of the total number approached (N = 8,357) declined to participate vs less than 5% in the 1993 NNS.
- The sample was gender balanced. However, its ethnic and age profile plus the area type (urban/rural) makeup differed significantly (at .0001 level of confidence) from that of the community at large therefore not representative of the wider community.
- The 2004 NNS sample was significantly different (also at the .0001 level of confidence) from the 1993 NNS sample with respect to its ethnic and age profile and area type (urban/rural) makeup. Using these criteria, the 2004 survey sample was not directly comparable to the 1993 survey without appropriate statistical adjustments.

Other general indicators and characteristics of the 2004 sample:

- Water supply - 90% of those surveyed had access to individual or communal piped water.
- Sanitation – the three most common types of human waste disposal were flush toilets (60% of survey sample), followed by water-sealed toilets (22%) and pit latrines (17%).
- Housing – 81% of the survey sample owned their own homes, 6% were renting and 12% were “not paying” for their accommodation. The larger Suva area had the lowest rate of home ownership (67%).
- Education background - 35% of the adult sample had primary schooling; 25% secondary schooling (up to Form 4); 24% had attended Forms 5-7; and almost 12% had some form of post-secondary education or training.
- Occupational profile – 45% of the adult sample were urban residents of whom 21% were engaged as ‘service and shop/market workers’; 14% were in ‘elementary’ occupations; 13% were ‘plant and machinery operators’; 11% ‘craft and related workers'; 10% ‘professionals'; and 10% ‘clerks’. Of the 55% who lived in rural areas, the majority (55%) were engaged in ‘agriculture, fishing and forestry’.
- Employment and income status – of the 4,515 respondents aged 18 years and over, 39% “were earning some money for a living” while 61% were not earning any money. An ethnic breakdown of the 39% who earned an income showed 33% of ethnic Fijians, 46% of Indo-Fijians and 46% of ‘Others’ had a paid job.
Of those “not working in paid employment”, 53% of Fijians and 67% of Indo-Fijians were “housewives/homemakers”, while 16% of Fijians and 12% of Indo-Fijians were “unemployed”.

- **Household income and food expenditure** – mean weekly *urban income* was $175 (Indo-Fijians), $180 (Fijians) and $215 (Others). Mean weekly *urban food expenditure* as a percentage of weekly income was 39% (Indo-Fijian), 37% (Fijians), and 41% (Others) (i.e., percentage spent on food was approximately similar across all ethnic groups). Mean weekly *rural income* for Fijians was $77, $89 for Others, and for Indo-Fijians, $106. Mean weekly *food expenditure* as a percentage of income was Fijians at 38%, Others at 39%, and Indo-Fijians at 48% (i.e., percentage spent on food was considerably greater among Indo-Fijians).

### 4.1 Introduction

Every effort has been made to verify the accuracy of all results reported. However, because of the volume and complexity of data collected and the manner of its entry and analysis, most results are reported in an abbreviated form. Since detailed appendices in this report have been kept to a minimum, those interested in a more comprehensive set of results are advised to contact the National Food and Nutrition Centre.

Initial analysis of the 2004 NNS focused on selected demographic characteristics for three main reasons. First, despite their pivotal role in post-survey data analysis, the characteristics of ethnicity, gender, age and area type (urban/rural location) were not controlled by stratification during sample selection. Should these variables be disproportionately represented in the sample, and in the absence of appropriate statistical weighting, they would confound with dietary intake and related behaviours. This would make interpretation of results from the 2004 NNS especially problematic.

Second, it was assumed that the 2004 sampling strategy would result in a sample which was demographically representative of the Fiji population. This assumption required verification.

Third, since it was proposed to identify national nutrition and health trends by comparing 2004 survey results with those from the 1993 NNS, it was assumed the two samples were demographically comparable - an assumption also requiring verification.

Should one or more of these assumptions be violated (i.e., proportionate representation, comparability with the national population, and demographic comparability with the 1993 sample), and in the absence of appropriate statistical weighting, any such comparisons would most likely be compromised (Endnote1 refers).

### 4.2 Composition of the 2004 NNS sample

A total of 7,372 individuals participated in the 2004 NNS. Table 4.1 shows the sample characteristics. More detail results are included in Appendix 15, Table 4.1.
Table 4.1:
Distribution of the study sample by ethnicity, gender and area type, 2004

<table>
<thead>
<tr>
<th>Variables</th>
<th>Population</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ethnicity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fijians</td>
<td>4,333</td>
<td>59</td>
</tr>
<tr>
<td>Indo-Fijians</td>
<td>2,816</td>
<td>38</td>
</tr>
<tr>
<td>‘Others’</td>
<td>223</td>
<td>3</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>7,372</strong></td>
<td></td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>3,558</td>
<td>48</td>
</tr>
<tr>
<td>Female</td>
<td>3,814</td>
<td>52</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>7,372</strong></td>
<td></td>
</tr>
<tr>
<td>Area Type</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Urban</td>
<td>3,327</td>
<td>45</td>
</tr>
<tr>
<td>Rural</td>
<td>4,045</td>
<td>55</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>7,372</strong></td>
<td></td>
</tr>
</tbody>
</table>

Five characteristics were examined to establish whether the 2004 sample represented the national demographic profile. An examination of ethnicity; age by ethnicity; and urban/rural composition involved comparison with national estimates for 2002 (Key Stats, FIBOS, 2004) while an ‘urban/rural’ comparison was based on national estimates for 2004 (FIBOS, 2005). Use of information for different years was determined by data availability.

4.2.1 Spatial distribution
The geographic distribution of the 45 survey sites (EAs) was examined for evidence of reasonable spatial (geographic) distribution using Divisional maps (see Figure 1). Inspection of these maps indicated that sampled EAs appeared to provide a representative cross-section of three of the four major geographic areas or Divisions.

The assumption of geographic representation appeared justified for three of the four divisions (Western, Central and possibly, Northern), but not for the thinly populated Eastern Division. From this point on, there will be no discussion by divisions.

4.2.2 Gender balance
Gender balance was tested across the three ethnic communities using chi-square. Although more women than men were surveyed (men = 3,558; women = 3,814), this apparent ‘feminization’ of the sample (Appendix 15 Table 4.2) was not statistically significant ($p < 0.363$). It was concluded that the 2004 survey sample was gender balanced.

4.2.3 Ethnicity
Although the ethnic distribution of individuals interviewed was very similar to the ethnic proportion of households surveyed, it was unclear whether the ethnic distribution of the survey sample reflected the national ethnic mix, especially in view of Fiji’s recent population mobility. National estimates for 2002 (Fijian 53%; Indo-Fijian 40%; ‘Others’ 7%) were compared with ethnic proportions sampled in the 2004 survey sample (Fijian 59%; Indo-Fijian 38%; ‘Others’ 3%). Examination of raw data for the 2004 survey suggested Fijians were over-represented, Indo-Fijians slightly under-represented and ‘Others’ considerably under-represented.

These differences were tested for statistical significance using chi-square on raw frequencies. The results indicated a highly significant ($p < 0.0001$) ethnic difference between the composition of the survey sample and the national profile. Without
statistical adjustment for disproportionate representation, caution should be used when attempting to generalize from the 2004 survey to the national population whenever ethnicity was an important consideration.

4.2.4 Age by Ethnicity
While the age distribution of respondents appeared to approximate the national profile (BOS, 2002), an age breakdown by ethnic group indicated considerable differences between each group. Separate chi-squares were calculated by ethnicity for each of the four main age groups surveyed (0-4 years; 5-19; 20-44; and 45+ years) to determine whether the ethnic proportion within each age group was comparable to that of the wider population.

A significant difference between the 2004 survey sample and the national profile (2002 estimates) emerged for all age groups: 0-4 year-olds ($p < 0.03$); 5-19 year-olds ($p < 0.0001$); 20-44 year-olds ($p < 0.0001$); 45+ year-olds ($p < 0.0001$). In the absence of statistical adjustment for these differences, caution should be used when attempting to generalize the findings from the 2004 survey to the wider population whenever age by ethnicity was a consideration.

4.2.5 Urban/rural Distribution
It should be noted that an ‘urban/rural’ distinction in Fiji is especially problematic (see Chapter 3), and any analysis of survey data based on this distinction needs to be treated with caution. In this instance, an urban/rural breakdown of the 2004 sample indicated 45% ($n = 3,327$) were classified ‘urban’ and 55% ($n = 4,045$) ‘rural’.

A comparison of the 2004 survey sample with the 2004 national estimate (49% ‘urban’ and 51% ‘rural’) was tested for significant difference. This revealed a highly significant ($p < 0.0001$) difference. Therefore caution should be used when attempting to generalize from the survey sample to the wider community where and when ‘urban/rural’ comparisons were carried out.

4.2.6 Overall Conclusion
Although the authors of this report acknowledge that weighted data offered a superior product, in the absence of this, it is argued that the unweighted data on which this report was based provide useful information. The results of the 2004 survey identified similar nutritional problems consistent with those reported in the 2002 STEPs survey and supported by other national data lend support to the usefulness of the results for policy development. Based on the above, and in the absence of statistically weighted data the results of the 2004 survey can be used for policy development.

It should be stated that 1993 NNS report was based on unweighted data which was used for developing the 1998 Fiji Plan of Action for Nutrition.

4.3 Comparability with the Second NNS (1993) Sample
The assumption that important demographic characteristics of the 2004 survey were similar to those of the 1993 survey was also examined and tested for statistical significance using chi-square. Appendix 15, Table 4.2 provides more detailed results of this comparison. All statistical comparisons used raw frequencies when calculating chi-square.
4.3.1 Ethnic makeup, gender and age group
Ethnic, gender by ethnicity and age by ethnicity comparisons between the two surveys (1993 and 2004) revealed highly significant differences. This meant apparent nutritional and health differences between the two surveys could not be directly attributed to variables such as the food intake patterns of the respondents. Instead, it was highly probable that a complex interaction between variables like gender, ethnicity, age, income and food intake patterns were occurring, making interpretation of these results extremely problematic.

4.3.2 Urban/rural composition
Despite problems inherent in urban/rural comparisons, comparison between the 1993 and 2004 surveys revealed proportional differences that were highly significant ($p < 0.0001$) making any comparison problematic when an urban/rural distinction was an important consideration.

4.3.3 Overall conclusion
Significant differences between the 1993 and 2004 surveys with respect to gender by ethnicity, age by ethnicity, and urban/rural distribution, meant that without appropriate statistical weighting, these differences were likely to confound with other factors (income, nutritional intake; lifestyle differences, etc.). Consequently, without appropriate statistical control for initial differences, any determination of temporal change and its likely ‘causes’ or ‘sources’ remains extremely speculative and therefore may be inappropriate as a basis for policy formulation. Consequently, the survey results will only report simple descriptive statistics without determining statistical differences or associations between variables where comparisons have been attempted.

4.4 Non-Participation
The non-participation rate (Footnote 1) for this survey was 11.8%, more than double that of 4.6% in 1993. This left an effective survey sample of N = 7,372 for 2004. Of those approached who did not participate, 40% were “not available” after three visits, 34% were “absent from home”, and 18% were “outright refusals”. However, generally speaking, non-participation rates for this survey were considerably less than those reported for similar surveys overseas where rates of 20% to 30% are commonly reported.

Physical and biochemical components of the survey experienced additional ‘resistance’ from those agreeing to otherwise participate (Footnote 2). While non-participation rates varied from Fijian 0.5 - 3%, Indo-Fijian from 0.5 - 3.6%, and ‘Others’ 0 – 2.2% (Footnote 3), the micronutrient survey of women of child-bearing age (i.e., 15-44 years) returned the highest non-participation rate of 13.2%. An ethnic breakdown revealed a non-participation rate for Fijians of 13.3%, Indo-Fijians 13.8% and ‘Others’ 1.8%.

Conclusion: Despite non-participation rates more than doubling from 1993 to 2004, and despite additional resistance by consenting participants in the taking of blood samples for biochemical tests, non-participation rates remained within reasonable limits.

Footnotes:
1. Non-participation rate was calculated by dividing the total for individuals who did not participate (n = 985) by the total number who were approached (n = 8,357) and expressed as a percentage.
2. It was initially planned to include children as well as women of child-bearing age (15 – 44 years) to examine micronutrient components of their diet (Vitamin A, zinc, iron, folate and protein deficiencies), but difficulties associated with obtaining blood samples from children meant that only women of child-bearing age participated in this survey.

3. Venous blood samples were taken at Hospitals or Health Centres. All travel costs that were incurred by participants were reimbursed. However, because participants were required to travel for a blood test, the non-response rate was relatively high.

4.5 Household characteristics
Of the 1,696 households surveyed, 58% were Fijian (n = 979), 40% Indo-Fijian (n = 674), and approximately 2% ‘Others’ (n = 43). Seven household characteristics are included: (a) water supply; (b) sanitation; (c) housing type; (d) education background; (e) occupational profile; (f) household income and food expenditure; and (g) employment status. As a general rule, 2004 results are summarized first, followed by comparison with 1993 findings. Detailed results are contained in Appendix 16 & 17.

4.5.1 Water Supply
Since piped water from municipal and communal sources is ‘treated’, it might be assumed that this represents a ‘safe’ water supply. The 2004 survey indicated 90% of the survey sample had access to safe water (individual piped - 77.5%; communal piped - 12.6%). A breakdown of potable water sources reported by the survey sample is shown in Figure 4.1. This indicates that roof tanks, boreholes, wells, rivers or creeks and other sources collectively supplied a relatively minor 10% of all households surveyed (see Appendix 16 for more details).

Table 4.2 compares household water supply sources in 1993 and 2004. At a superficial level, there has been an improvement in water supply since the 1993 survey. However, limitations associated with this cross-survey comparison remained.
### Table 4.2  
**Household water supply, 1993 and 2004**  

<table>
<thead>
<tr>
<th>Type of Supply</th>
<th>1993</th>
<th>2004</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n = 927 (%)</td>
<td>n = 1,696 (%)</td>
</tr>
<tr>
<td>Piped water</td>
<td>62.7</td>
<td>77.5</td>
</tr>
<tr>
<td>Communal pipe</td>
<td>19.5</td>
<td>12.6</td>
</tr>
<tr>
<td>Roof tank</td>
<td>4.3</td>
<td>0.5</td>
</tr>
<tr>
<td>Borehole</td>
<td>1.1</td>
<td>3.7</td>
</tr>
<tr>
<td>Well</td>
<td>8.3</td>
<td>3.1</td>
</tr>
<tr>
<td>River/creek</td>
<td>2.7</td>
<td>1.7</td>
</tr>
<tr>
<td>Other</td>
<td>1.4</td>
<td>0.8</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>100.0</strong></td>
<td><strong>100.0</strong></td>
</tr>
</tbody>
</table>

#### 4.5.2 Sanitation

The 2004 survey indicated that the three most common types of human waste disposal were flush toilets (60%), water–sealed toilets (22%), and pit latrines (17%), with ‘other forms’ an inconsequential 1% (see Appendix 17).

Comparison of 2004 with 1993 survey data provided a crude indication of change in sanitation as shown in Figure 4.2. These data suggest a substantial change with the majority of those surveyed in 2004 possessing flush or water sealed toilets (82%) compared to 61% in 1993. Similarly in 1993, 34% possessed pit latrines while this number had halved to 17% in 2004; in 1993, 5% of those surveyed had no toilets while this had been reduced to 0.5% by 2004.

![Figure 4.2 (Major forms of sanitation, 1993 and 2004)](image)

Although these changes in human waste disposal might be linked to availability of piped water, no relationship was investigated and any linkage remains speculative. Assuming these data are accurate and representative of the wider community, this finding suggests positive changes related to community health.

#### 4.5.3 Housing

The 2004 survey indicated that 81.2% of the sample owned their houses, 6.4% were renting and 12.4% were regarded as ‘not paying’ for their accommodation (i.e., lived with relatives or friends without paying, or were ‘squatting’). An interesting point to note here
is that the greater Suva area showed the lowest home ownership rate overall (67.4%), with almost one-in-five (19.9%) surveyed being ‘non-paying’ residents. These findings are consistent with the common trend of individuals moving from rural areas into urban centres in search of paid employment, a better education for their children and/or the lure of urban ‘excitement’.

An ethnic breakdown indicated that proportionately, more Indo-Fijians owned their homes (88%) than Fijians (77%), while more Fijians overall (17.5%) did not pay for their accommodation compared to Indo-Fijians (5.9%). Another research in the Suva urban area has shown that households with ‘non-paying’ members are also typically ‘overcrowded’, more likely to contain unemployed members and more likely to spend money on non-food items (e.g., cigarettes, kava, beer, etc.) (Tunidau, 1983). Consequently, the percentage of households with ‘non-paying’ individuals might be used as a predictive indicator of households at greatest risk of inadequate nutrition. Extrapolating from earlier research, the 2004 survey showing the percentage of households with ‘non-paying’ members might be interpreted as an indirect indicator of overcrowding, poor nutrition and associated negative health outcomes.

### 4.5.4 Education Background

Research typically links better family nutrition with higher levels of achieved education among adult caregivers. This relationship justified an examination of the educational level of adult caregivers in this survey.

Table 4.3 indicates that one-third of the survey sample (35%) had received primary schooling, almost 26% had received secondary schooling (up to Form 4) while another one-quarter (24%) had achieved Forms 5-7. Almost 12% had experienced some form of tertiary education. Of the small group who had never attended formal schooling (3.8% overall), the largest single group were Indo-Fijian females (10.2%) compared to Fijian females (1.2%), the smallest single group.

<table>
<thead>
<tr>
<th>Ethnicity</th>
<th>Gender</th>
<th>Never been to school (N=163)</th>
<th>Primary N=1475</th>
<th>Secondary up to form 4 N=1084</th>
<th>Secondary up to form 5-7 N=1006</th>
<th>Tertiary N=506 (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fijians</td>
<td>Male</td>
<td>1.4</td>
<td>38.4</td>
<td>28.7</td>
<td>19.2</td>
<td>12.2</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>1.2</td>
<td>33.4</td>
<td>27.7</td>
<td>27.3</td>
<td>10.2</td>
</tr>
<tr>
<td>Indo-Fijians</td>
<td>Male</td>
<td>3.9</td>
<td>38.2</td>
<td>21.6</td>
<td>21.7</td>
<td>14.5</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>10.2</td>
<td>32.2</td>
<td>23.2</td>
<td>24.5</td>
<td>9.8</td>
</tr>
<tr>
<td>‘Others’</td>
<td>Male</td>
<td>4.5</td>
<td>15.9</td>
<td>25.0</td>
<td>27.3</td>
<td>27.3</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>1.4</td>
<td>14.5</td>
<td>17.4</td>
<td>37.7</td>
<td>29.0</td>
</tr>
<tr>
<td>All</td>
<td>Male</td>
<td>2.5</td>
<td>37.9</td>
<td>25.6</td>
<td>20.5</td>
<td>13.5</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>4.9</td>
<td>32.4</td>
<td>25.6</td>
<td>26.5</td>
<td>10.6</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>3.8</td>
<td>34.9</td>
<td>25.6</td>
<td>23.8</td>
<td>11.9</td>
</tr>
</tbody>
</table>

Overall, approximately 63% of adult women and 60% of adult men had received some form of secondary or post-secondary education. Proportionally more females reached Forms 5-7 (males 20.5% vs females 26.5%) while the reverse applied in tertiary institutions (males 13.5% vs females 10.6%).
An intriguing issue was whether the nutritional status of children with ‘well-educated female care-givers’ (i.e., with a minimum of secondary level schooling) would be substantially better than that of children whose primary female caregivers had not attended school or had not proceeded beyond primary schooling. However, this matter was not examined during data analysis.

A comparison of education backgrounds of participants in the 2004 survey with those in the 1993 sample indicated marginally fewer individuals in 2004 had not received education (3.8% in 2004 vs 6.5% in 1993), but slightly more had primary education (34.9% vs 28.3% in 1993). In 2004, considerably fewer had Junior Secondary (25.6% vs 42.4% in 1993). However, more participants in 2004 had reached senior secondary levels (23.8% vs 17.4%) and tertiary education (11.9% in 2004 vs 5.4% in 1993). Overall, 63% of women had attended secondary school or above in 2004 vs 64% in 1993, while 60% of men in 2004 vs 66% in 1993 had done so.

4.5.5 Occupational Profile
The stated occupations of participants were used to provide an indirect indication of income levels. However, it should be noted that an individual might have an ‘occupation’ but be unemployed. Further, compared to wage and salary-based ‘urban’ occupations, rural incomes are more difficult to estimate. This applies especially to those in agriculture and fishing because of fluctuations in production, prices, the weather, pests and diseases, etc. Consequently, ‘occupation’ provides only a very crude indication of income. An abbreviated summary of occupational data for adults (aged 18+ years) by ethnicity and then urban/rural residency follows.

Major occupations for Fijians (Figure 4.3) were 28% in ‘agriculture and fisheries’; 16% ‘service workers’; 13% ‘elementary occupations’; 11% ‘professionals’; and 7% in each of ‘craft and related workers’ and ‘plant and machine operators and assemblers’. Together, these accounted for 82% of the Fijian sample. Among Indo-Fijians (Figure 4.4), the major occupations were: 22% in ‘agriculture and fisheries’; 19% ‘service workers’; 14% ‘plant and machine operators and assemblers’; 12% ‘elementary occupations’; 11% ‘craft and related workers’; and 7% were ‘professionals’. Together, these accounted for 85% of the Indo-Fijian sample.

**Figure 4.3**
Major occupations for adult Fijian survey sample, 2004
An overall urban/rural breakdown (Fijian and Indo-Fijian combined) for the same adult sample is shown in Figures 4.5 (urban) and 4.6 (rural).

Apart from 'service, shop & market sales workers' (21%), the most frequently indicated urban occupations were ‘elementary occupations’ (14%), ‘plant & machine operators’ (13%), ‘craft and related workers’ (11%) followed by ‘professionals’ and ‘clerks’ (both 10%) (Figure 4.5). These six accounted for 79% of all urban occupations. An ethnic breakdown indicated that a majority of ‘service, shop & market sales workers’ are Indo-Fijians (58%) (Fijians 36%; ‘Others’ 7%), while ‘elementary occupations’ are dominated by Fijians (54%) (Indo-Fijians 44%; ‘Others’ 2%).

In rural areas (Figure 4.6), five occupations were dominant: ‘agriculture & fishing’ (47%), distantly followed by ‘service, shop & market sales workers’ (13%), ‘elementary occupations’ (10%) and then ‘professionals' and 'plant & machine operators' (both 8%). Together, these five occupations accounted for 86% of all rural workers. The ethnicity of the largest proportion of rural workers engaged in ‘agriculture and fisheries’ were Fijians
at 59% (with Indo-Fijians at 41%), while ‘service, shop and market sales workers’ were 57% Fijians and 42% Indo-Fijians.

**Figure 4.6**
Major rural occupations: Fijian and Indo-Fijian combined, 2004

These data indicated at least three things. First, the preeminence of agriculture & fishing in rural areas coupled with a relatively restricted occupational choice (five occupations accounted for 86% of all rural workers vs six occupations accounting for 79% in urban areas). Second, although ‘service, shop & market sales workers’ represented the single largest urban occupational group, the other five were more evenly distributed (between 10 - 14%) with another 21% in ‘other’ occupations. Third, some occupations were ‘dominated’ by one or the other ethnic group. In urban areas more Indo-Fijians (58%) were ‘service workers, shop and market sales workers’ (with Fijians at 36%); ‘plant & machine operators’ (Indo-Fijians 67%; Fijians 27%); and ‘craft and related workers’ (Indo-Fijians 65%; Fijians 32%). More Fijians were in ‘elementary occupation’ (Fijian 54%; Indo-Fijian 44%) and ‘professionals’ (Fijian 48%; Indo-Fijian 38%; ‘Others’ 14%). In rural areas, more Fijians were in the two largest occupational categories: ‘agricultural & fishing’ (Fijians 59%; Indo-Fijians 41%) and ‘service workers, shop & market sales’ (Fijians 57%; Indo-Fijians 42%).

It is relevant to note that changes in the classification of occupations between 1993 and 2004 (FBOS, 1995), made direct comparison with earlier surveys difficult and a more detailed analysis problematic. Consequently, no further analysis was undertaken.

### 4.5.6 Employment and Income Status for Survey Sample

In addition to the occupational data indicated above, information on personal economic status was gathered from respondents aged 18 years and over in the form of four questions. These were: (i) whether a respondent was earning “some money” for a living; (ii) whether stated occupation was the only source of income; (iii) if not, what other sources were involved; and (iv) for respondents not currently working at a paid job, the main reason(s) for this.

Table 4.4 shows that of the 4,515 respondents aged 18 years and over, 1,754 (39%) indicated that they were “earning some money for a living”, while 2,761 (61%) said they were not; i.e., almost two-out-of-every-three persons (61%) had no cash income. In other words, approximately one-third of this age group were income ‘earners’ who ‘supported’ the other two-thirds of ‘potential earners’ (i.e., those without an income), plus
those under 18 years of age not earning as well as those who had retired from the workforce.

This basically indicated that 1,754 individuals (24%) provided income for the survival of the other 5,618 persons (76%) in the total survey sample (N = 7,372). If the majority of those aged 18 years and under were students receiving a nil or negligible income, only around one-quarter of those surveyed supported the remaining three-quarters, suggesting an economic dependency ratio of approximately one earner for every three ‘non-earning dependents’ in this sample.

### Table 4.4

<table>
<thead>
<tr>
<th>Ethnicity</th>
<th>Earning an income</th>
<th>No cash income</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>%</td>
<td>n</td>
</tr>
<tr>
<td>Fijian</td>
<td>838</td>
<td>48</td>
<td>1,684</td>
</tr>
<tr>
<td>Indo-Fijian</td>
<td>860</td>
<td>49</td>
<td>1,011</td>
</tr>
<tr>
<td>‘Others’</td>
<td>56</td>
<td>3</td>
<td>66</td>
</tr>
<tr>
<td>Sub total</td>
<td>1,754</td>
<td>100</td>
<td>2,761</td>
</tr>
<tr>
<td>TOTAL</td>
<td>1,754</td>
<td>39</td>
<td>2,761</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Urban dwellers</th>
<th>Earning an income</th>
<th>No cash income</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fijian</td>
<td>409</td>
<td>43</td>
<td>507</td>
</tr>
<tr>
<td>Indo-Fijian</td>
<td>503</td>
<td>52</td>
<td>540</td>
</tr>
<tr>
<td>‘Others’</td>
<td>51</td>
<td>5</td>
<td>54</td>
</tr>
<tr>
<td>TOTAL urban</td>
<td>963</td>
<td>100</td>
<td>1,101</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Rural dwellers</th>
<th>Earning an income</th>
<th>No cash income</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fijian</td>
<td>429</td>
<td>54</td>
<td>1,177</td>
</tr>
<tr>
<td>Indo-Fijian</td>
<td>357</td>
<td>45</td>
<td>471</td>
</tr>
<tr>
<td>‘Others’</td>
<td>5</td>
<td>1</td>
<td>12</td>
</tr>
<tr>
<td>TOTAL rural</td>
<td>791</td>
<td>100</td>
<td>1,660</td>
</tr>
</tbody>
</table>

A simple between-group comparison of these data without appropriate weighting is misleading because the three ethnic groups were represented disproportionately in this survey: i.e., 59% if the sample were Fijian; 38% Indo-Fijian; and 3% ‘Others’.

Using un-weighted raw data, of the 1,754 who earned “some money for a living” (Table 4.4), 48% were Fijians (vs 59% of the total sample), 49% Indo-Fijians (vs 38% of the total sample) and 3% were ‘Others’ (vs 3% of the total sample). On the whole, this means that Fijians appeared to be underrepresented among the income earners, Indo-Fijians overrepresented, while ‘Others’ were consistent with their representation in the survey sample.

Of the 2,761 who received ‘no money’, 61% were Fijians (similar to their 59% representation in the survey sample), 37% Indo-Fijians (vs 38% in the sample) and 2% ‘Others’ (vs 3% in the sample). In other words, the ethnic makeup of those without an income appeared consistent with the overall ethnic makeup of the survey sample. When nil income earners were classified as either urban or rural, 40% of urban dwellers were without a cash income, while in rural areas it was 60%.

A comparison of income status within each ethnic community in terms of “earning an income” vs “no cash income” is shown in Table 4.5.
Table 4.5

Income status of respondents aged 18 years and over: A within-group comparison, 2004

<table>
<thead>
<tr>
<th>Ethnicity</th>
<th>Earning an income</th>
<th>No cash income</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>%</td>
<td>n</td>
</tr>
<tr>
<td>Fijian</td>
<td>838</td>
<td>33</td>
<td>1,684</td>
</tr>
<tr>
<td>Indo-Fijian</td>
<td>860</td>
<td>46</td>
<td>1,011</td>
</tr>
<tr>
<td>'Others'</td>
<td>56</td>
<td>46</td>
<td>66</td>
</tr>
<tr>
<td>Totals</td>
<td>1,754</td>
<td>39</td>
<td>2,761</td>
</tr>
</tbody>
</table>

Urban dwellers
- Fijian: 409, 45% of 907, 55% of 1,043
- Indo-Fijian: 503, 48% of 1,011, 52% of 1,043
- 'Others': 51, 49% of 102, 51% of 106

Rural dwellers
- Fijian: 429, 27% of 1,571
- Indo-Fijian: 357, 43% of 829
- 'Others': 5, 29% of 50

Table 4.5 indicates two-thirds of Fijians (67%) in this survey were not in receipt of a cash income, compared to just over half (54%) of Indo-Fijians and a similar percentage of ‘Others’ (54%). When urban and rural dwellers were considered separately, there appeared to be little difference between the three urban ethnic groups (55%, 52% and 51%, respectively). However, in rural areas, the situation was markedly different within each ethnic community. Substantially fewer Fijians (27%) and ‘Others’ (29%) received an income compared to 43% of Indo-Fijians. In other words, many more Fijians (73%) and ‘Others’ (71%) had no cash income compared to 57% of Indo-Fijians.

In relation to whether the stated occupation was the only source of income, raw frequencies plus within-group response percentages are shown in Table 4.6.

Table 4.6

Occupation vs ‘Other Sources’ of income: Aged 18 years and over, 2004

<table>
<thead>
<tr>
<th>Ethnicity</th>
<th>Only source</th>
<th>Other source</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>%</td>
<td>n</td>
</tr>
<tr>
<td>Fijians</td>
<td>747</td>
<td>90</td>
<td>82</td>
</tr>
<tr>
<td>Indo-Fijians</td>
<td>772</td>
<td>93</td>
<td>62</td>
</tr>
<tr>
<td>‘Others’</td>
<td>52</td>
<td>95</td>
<td>3</td>
</tr>
<tr>
<td>Total</td>
<td>1,571</td>
<td>91</td>
<td>147</td>
</tr>
</tbody>
</table>

Urban dwellers
- Fijians: 381, 94% of 407
- Indo-Fijians: 476, 96% of 497
- ‘Others’: 48, 96% of 50

Rural dwellers
- Fijians: 366, 87% of 422
- Indo-Fijians: 296, 88% of 337
- ‘Others’: 4, 1% of 5

* 36 participants who indicated their occupation failed to answer this question.
** Numbers too small to be meaningful.

Overall, over 91% of all three ethnic groups stated that their occupation was the major source of income. An urban/rural breakdown indicated only between 4% and 6% of urban dwellers from each ethnic community reported “other sources of income”. Rural respondents were marginally less dependent on their stated occupation with 12% to
13% reporting “other sources” of income. This result was consistent with a number of possibilities: (a) Fijian land ownership provided some individuals with rental income; (b) extended family living overseas repatriated funds to relatives in Fiji; and (c) some individuals sold produce ‘surplus’ to family need, to supplement other income.

Where relevant, a third question sought to identify “other sources of income” in terms of five categories (business; self-employment; farming, fishing etc., employment; and other). Of the 147 participants (9%) who reported “other sources”, 127 responded to the question (Table 4.7).

<table>
<thead>
<tr>
<th>Additional sources of income (beside present occupation) by ethnicity, 2004</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ethnicity</td>
</tr>
<tr>
<td>n</td>
</tr>
<tr>
<td>---</td>
</tr>
<tr>
<td>Fijians</td>
</tr>
<tr>
<td>Indo-Fijians</td>
</tr>
<tr>
<td>Others*</td>
</tr>
<tr>
<td>TOTAL</td>
</tr>
</tbody>
</table>

* Numbers too small to be meaningful

Results in Table 4.7 indicate that additional sources of income were primarily from fishing and farming for both main ethnic groups (Fijians 51%; Indo-Fijians 39%) followed by ‘Other sources’ (Fijians 23%; Indo-Fijians 16%) which included remittances and rent. These were followed by ‘business’ (Fijians 10%; Indo-Fijians 18%) and other ‘employment’ (Fijians 11%; Indo-Fijians 14%).

Two comments are relevant. First, the 9% who acknowledged supplementary sources of income might represent an underreporting of this phenomenon. Second, given the small numbers involved, these results are suggestive rather than indicative.

The last source of data on income status relates to the 67% of Fijians (n = 1,684) and 54% of Indo-Fijians (n = 1,011) without a cash income (see Table 4.5). Respondents were given six options to best describe why they were “not currently working at a paid job”. Results for respondents aged 18 years and over are summarized in Table 4.8.

<table>
<thead>
<tr>
<th>Reasons for not working at a paid job: aged 18 years and over, 2004</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ethnicity</td>
</tr>
<tr>
<td>n</td>
</tr>
<tr>
<td>---</td>
</tr>
<tr>
<td>Unemployed but looking for job</td>
</tr>
<tr>
<td>Unemployed, unable to work</td>
</tr>
<tr>
<td>Retired</td>
</tr>
<tr>
<td>Housewife/homemaker</td>
</tr>
<tr>
<td>Student</td>
</tr>
<tr>
<td>Other</td>
</tr>
<tr>
<td>TOTAL</td>
</tr>
</tbody>
</table>
Of those aged 18 years and over without an income, the single largest group were ‘housewife/homemaker’ which accounted for 67% of Indo-Fijians, 53% of Fijians and 47% of ‘Others’ (Table 4.8). The next largest group was the self-professed ‘unemployed’ (those ‘looking for work’ plus those ‘unable to work’) of which 17% were ‘Others’, 16% Fijians and 12% Indo-Fijians. Students made up a relatively small 8% of both Fijian and Indo-Fijian respondents in this age group but a substantial 20% of ‘Others’. Retirees accounted for 9% of Fijians, 10% of Indo-Fijians and 12% of ‘Others’.

4.5.7 Household Income and Food Expenditure
Mean weekly household income and food expenditure (to the nearest dollar) by area type (urban/rural) and ethnicity is shown in Table 4.9.

Table 4.9
Average weekly household income and food expenditure by area type and ethnicity, 2004

<table>
<thead>
<tr>
<th>Area type</th>
<th>Ethnicity</th>
<th>Sample Size</th>
<th>Mean Weekly Income $</th>
<th>Mean Weekly Food Expenditure $</th>
<th>Food Expenditure as % of Income</th>
</tr>
</thead>
<tbody>
<tr>
<td>Urban</td>
<td>Fijians</td>
<td>337</td>
<td>180</td>
<td>67</td>
<td>37</td>
</tr>
<tr>
<td></td>
<td>Indo-Fijians</td>
<td>378</td>
<td>175</td>
<td>69</td>
<td>39</td>
</tr>
<tr>
<td></td>
<td>‘Others’</td>
<td>35</td>
<td>215</td>
<td>89</td>
<td>41</td>
</tr>
<tr>
<td>Combined mean</td>
<td></td>
<td>750</td>
<td>179</td>
<td>69</td>
<td>39</td>
</tr>
<tr>
<td>Rural</td>
<td>Fijians</td>
<td>613</td>
<td>77</td>
<td>29</td>
<td>38</td>
</tr>
<tr>
<td></td>
<td>Indo-Fijians</td>
<td>286</td>
<td>106</td>
<td>51</td>
<td>48</td>
</tr>
<tr>
<td></td>
<td>‘Others’</td>
<td>8</td>
<td>89</td>
<td>35</td>
<td>39</td>
</tr>
<tr>
<td>Combined mean</td>
<td></td>
<td>907</td>
<td>86</td>
<td>36</td>
<td>49</td>
</tr>
<tr>
<td>Combined urban/rural mean</td>
<td>Fijians</td>
<td>947</td>
<td>112</td>
<td>41</td>
<td>37</td>
</tr>
<tr>
<td></td>
<td>Indo-Fijians</td>
<td>664</td>
<td>145</td>
<td>60</td>
<td>41</td>
</tr>
<tr>
<td></td>
<td>‘Others’</td>
<td>43</td>
<td>192</td>
<td>79</td>
<td>41</td>
</tr>
<tr>
<td>Total households mean</td>
<td></td>
<td>1,654*</td>
<td>127</td>
<td>51</td>
<td>39</td>
</tr>
</tbody>
</table>

* Insufficient information precluded 42 households from this analysis.

Table 4.9 indicates little difference in mean weekly urban incomes for Fijian ($180 per week) and Indo-Fijian ($175 per week) respondents, while ‘Others’ earned an average of $215 per week. Mean weekly rural incomes were substantially less: Indo-Fijians earned the most ($106 per week), followed by ‘Others’ ($89), and Fijians ($77).

Weekly food expenditure (column 5, Table 4.9) indicated that urban weekly food expenditure was highest among ‘Others’ ($89) followed by Indo-Fijians ($69) and Fijians ($66) who spent similar amounts. In rural areas, Indo-Fijians spent the most on food ($51 per week), followed by ‘Others’ ($35) and Fijians ($29).

When weekly food expenditure was expressed as a percentage of average weekly income (Table 4.9), the overall pattern in urban areas was similar between the three ethnic groups: ‘Others’ spent marginally more of their weekly income on food (41%) closely followed by Indo-Fijians (39%) and Fijians (37%). In rural areas, the pattern was somewhat different with Indo-Fijians spending almost half their average weekly income on food (48%), while ‘Others’ (39%) and Fijians (38%) spent a similar but smaller proportion of their weekly income on food. When the average proportion of weekly income spent on food was calculated for urban and rural residents separately, urban dwellers spent 39% of their weekly income on food while their rural equivalents spent a substantially higher 49%.
At face value, this indicated that urban residents spent proportionately less of their income on food than rural inhabitants. This finding is contrary to what might be expected because rural inhabitants are assumed to spend less on food because of access to land for home gardens, yet the opposite occurred. A possible explanation is that there are more spending options for the weekly pay packet in urban areas. In towns, the food bill has to compete with recreational and entertainment activities, non-food-item shopping and the weekly cost of transport and other utilities. Whether these competing urban ‘needs’ translate into a qualitatively poorer urban diet compared to rural eating habits could not be determined from these data (Endnote #2 refers).

It is relevant to note that the concept of ‘disposable income’ (i.e., money available after ‘normal’ economic and social obligations had been met) as distinct from ‘gross weekly income’ might be a more informative statistic, but was not considered in this survey. It might be presumed that despite similar levels of income between urban Fijians and urban Indo-Fijians, numerous traditional Fijian socio-cultural responsibilities substantially reduces Fijian disposable income compared to that of their Indo-Fijian counterparts. Further, the extent to which members of either community engage in subsistence agriculture and sell produce (vegetables, fruit, chickens, fish, etc) ‘surplus’ to family need to supplement household income (especially in rural areas), is a relevant but unknown statistic.

No direct information on sale of ‘surplus’ produce was gathered. However, data showing a mean rural income for Indo-Fijians of $106 vs Fijians $77 and ‘Others’ $89 (see Table 4.9), plus anecdotal evidence, suggested that rural Indo-Fijians most probably supplemented a wage income in this manner. Likely effects on family food and nutrition for either community remained unclear.

Although rural Indo-Fijians reportedly spent a higher percentage of weekly income on food (48%, vs 38% by Fijians and 39% by ‘Others’), the type of food purchased was not known. It is possible that cash ‘poorer’ rural Fijians depended to a greater extent on ‘home-grown’ or ‘bush food’ and/or might be engaged in a form of ‘food bartering’ to maintain traditional socio-cultural relationships. This issue was not investigated by the 2004 survey. Data on food security and reported eating patterns specifically linked to a lack of money are presented in a later section.

4.6 Conclusions
Overall, the following conclusions were drawn:

Comparability of survey sample
a) Significant demographic differences (at the .0001 level) between the 2004 NNS sample and the general community, with respect to ethnicity, age and urban/rural distribution, indicated that the survey sample was not representative of the wider community.

b) Similar significant demographic differences (at the .0001 level) between the 2004 NNS and the 1993 NNS samples were found making direct comparison problematic unless appropriate statistical adjustments were made.)
Housing, water and sanitation

c) At a superficial level, there had been an improvement in water supply sources since the 1993 survey.

d) The percentage of households possessing flush and water-sealed toilets appeared to have increased substantially between 1993 and 2004 while the percentage of pit latrines was halved.

e) Almost one-in-five (19.9%) urban households in the Suva area appeared to be non-paying resident and at risk of nutritional and health-related problems in 2004. Nationally, one in ten households would be at risk of nutrition-related health problems. No comparable data was collected by the 1993 survey.

Education level

f) Education level achieved by adult men and women in the 2004 sample were similar to that reported for 1993.

Occupation

g) Service, shop and market sales workers were the most frequently indicated occupation in urban areas while agriculture and fisheries was the most common in rural areas. Changes in the classification of occupation between 1993 ns 2004 make direct comparison with earlier survey difficult.

Economic status

h) Of the 4,515 participants aged 18 years and over, 39% overall earned some money for a living while 61% did not. Considered at a macro level, and when students and retirees were added, approximately one-quarter of the survey sample supported the other three-quarters.

i) The overall proportion of respondents aged 18 years and over without cash income was similar for urban (60%) and rural (61%) dwellers. An ethnic breakdown in urban areas indicated that 45-49% of each community earned an income (i.e. just over half received no cash income). In rural areas, 43% of Indo-Fijians earned an income compared to only 27% of Fijians and 29% of ‘Others’. In other words, in rural areas substantially more Fijians (73%) and ‘Others’ (71%) were without a cash income compared to Indo-Fijians (57%).

j) By ethnicity, 90% to 95% of the total survey sample depended solely on their indicated occupation for an income. This dependency was only marginally higher in urban areas (94-96%) compared to 87-88% in rural areas.

k) Of the small percentage with a supplementary source of income (generally less than 10% of the sample), almost half derived additional income from farming or fishing (45%), followed by ‘a business’ (13%), a second job (13%) and/or ‘self-employment’ (9%).

l) The majority of respondents aged 18 years and over without paid employment (n = 2,761 or 61% of those surveyed) were ‘housewives/homemakers’ (Fijians 53%; Indo-Fijians 67%; ‘Others’ 47%), followed by the ‘unemployed’ (Fijians 16%; Indo-Fijians 12%; ‘Others’ 17%) and finally those who had retired (Fijians 9%; Indo-Fijians 10%; ‘Others’ 12%).

Weekly household food expenditure

m) Mean weekly income for ‘rural’ participants was substantially less than comparable income received by their ‘urban’ counterparts (approximately $100/week less for rural Fijians; approximately $70/week less for rural Indo-Fijians; and approximately $126/week less for rural ‘Others’).
n) Average weekly food expenditure as a percentage of mean weekly income was approximately the same for ‘rural’ and ‘urban’ Fijian participants (38% and 37% respectively). However, rural Indo-Fijians spent more on food (48% vs urban 39% per week), while rural ‘Others’ spent 39% on food vs 41% by their urban equivalents.

o) Overall, urban participants earned substantially more than their rural counterparts (urban mean income $179 vs rural mean income $86), but spent proportionately less on food (39% of their weekly income compared to 49% by their rural counterparts).

Endnote 1 and 2

1. Should one or more of the three assumptions identified in 4.1 (first page of this chapter) be unsustainable, a number of consequences follow.

First, if ethnicity, gender, age and urban/rural residency were not proportionately represented, observed differences in outcomes due to these factors would confound with other factors being investigated. Therefore, in the absence of appropriate statistical weighting to compensate for these initial differences, interpretation of these data would be problematic.

Second, if selected demographic characteristics of the 2004 survey sample (ethnicity, gender, age and ‘urban/rural’ location) differed significantly from the national profile, it would not be appropriate to regard this as a national survey (i.e., as representative of the wider community). This would make it inappropriate to extrapolate these findings to the wider community.

Third, if the demographic characteristics of the 1993 NNS sample were significantly different from those in the 2004 NNS, lack of demographic comparability would introduce intervening variables making it inappropriate to compare 2004 with 1993. i.e., it would not be legitimate to refer to alleged ‘trends’ over time and/or to any ‘improvement’ or ‘deterioration’ in nutrition or health status between the two surveys.

2. These data might be best understood considered alongside ‘daily mean wages’ and the consumer price index (CPI) for Fiji (for the years 1994 to 2004) (FIBOS, 2006). During this period, the CPI increased by an average of 2.7% per year with annual increases of between 0.6% in 1994 to 5.7% in 1998 (FIBOS, 2006, pp.65-66).

However, during 1993 to 1999 (the only years for which these data were published), the daily mean wage of wage earners rose from $16.08 in 1993 to $18.73 in 1996, then dropped to $17.52 (1997) and $17.36 (1998), before rising again to $18.13 in 1999 (FIBOS, 2006). The evidence available also indicated the total number of wage and salary earners between 1993 and 1999 increased between 8-9% (from 102,041 to 111,133) which was approximately the same percentage increase as that for the total population (FIBOS, 2006). This suggests that employment was roughly in line with population growth.
5.0 RESULTS PART II: Young Children Less Than Two Years

One in every ten infants was born with low birth weight. This remains a problem amongst both Fijian and Indo-Fijians. On the other hand, one in every 9 infants was born with high birth weight. This is an emerging issue that needs to be closely monitored.

Key Findings

• Mean birth weight of children in this cohort was 3,287g (3400g Fijian; 2,938g Indo-Fijian).
• Male infants were born heavier than females, at 3,393g and 3,137g, respectively.
• There was a general improvement in birth weight of male infants but a decrease in birth weight of female infants in 2004 compared to 1993.
• Over 75% of children in this group were born with standard weight for age.
• 10.2% were of low birth weight (LBW), a majority of whom were Indo-Fijians.
• 10.5% were born with high birth weight (HBW), a majority of whom were Fijians.
• Overall, there was a 1% improvement in the proportion of infants with LBW in 2004 over 1993.
• However, the proportion of LBW in Fijian children had worsened by 3.3% in 2004 compared to 1993, while there was a 2.4% improvement within the same period for Indo-Fijian.
• Slightly more LBW was found in rural areas (54.8%) compared to urban (45%).
• Growth patterns of children in 2004 followed similar trends found in 1993, but there was a 5% improvement observed in 2004.
• Overall 85.1% of mothers initiated breastfeeding within 24 hours after giving birth, with higher rates in Fijians than in Indo-Fijians.
• Only 11.5% of children less than 2 years were reportedly exclusively breastfed. Of these, 83.8% were Fijians and only 10.8% were Indo-Fijians.
• Mean duration of exclusive breastfeeding in 2004 was 9 months amongst Fijians and 6.8 months in Indo-Fijian.
• The most common reason given for not breastfeeding was ‘no breast milk’.
• By 6 months of age, 43.5% Fijian and 56.5% Indo-Fijian children were already receiving breast-milk substitute; 79.6% of all children were given other types of fluid including sweetened water; 30.8% were given fruits, 43.6% were receiving solid food and 25% were given solid/mushy food.
• A majority of caregivers were mothers (79.1%).
• Fewer diarrhoeal episodes and skin infection were reported compared to 1993.
• ORS as a means of treating diarrhoea was still relatively low at 17%.
• Health Centres remained the most important service provider when children were ill, with 89% reported using it.

5.1 Introduction

An infant’s growth and development is determined in large measure by the food it is given during the first five years of its life.

In developing countries, infants generally grow well for the first four to six months when exclusive breastfeeding was practised (Rowland, 1985). However, growth usually started
to falter at around six months. A well known contributing factor to this was the failure to complement breast milk appropriately and at the right time.

With modernization, development and opportunities or out of necessity, mothers often work for wages outside the home leaving their infants in the care of a paid caregiver or a relative. This has created additional challenges to mothers, families and the health authorities.

A total of 341 children less than 2 years made up of 240 Fijian (70%), 88 Indo-Fijian (26%) and 13 ‘Others’ (4%) were included in this survey. This chapter will present data on birth weight and infant feeding practices of the two major ethnic groups, Fijian and Indo-Fijian. Although data on the ethnic group ‘Others’ may be included within the tables of results, this group will not be singled out for discussion due to the very small sample size.

5.2 Birth weight

Birth weights of 305 out of 341 children less than 2 years of age in the 2004 survey sample were collected from the Maternal and Child Health Cards (Table 5.2.1) and also included in the analysis for birth weight section. Mean birth weight of all children was 3,287g. Birth weight of Fijian infants was generally higher (3,400g) than Indo-Fijian infants (2,938g). Fijian males were 461g heavier than Indo-Fijian males while Fijian females were 485g heavier than Indo-Fijian females.

Overall male infant birth weight was higher (3,393g) than females (3,137g).

Table 5.2.1
Mean birth weight (g) of children under 2 years
By ethnicity and gender, 2004

<table>
<thead>
<tr>
<th>Ethnicity</th>
<th>Gender</th>
<th>n</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fijians</td>
<td>Male</td>
<td>123</td>
<td>3,515</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>91</td>
<td>3,245</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td>214</td>
<td><strong>3,400</strong></td>
</tr>
<tr>
<td>Indo-Fijians</td>
<td>Male</td>
<td>49</td>
<td>3,054</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>31</td>
<td>2,760</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td>80</td>
<td><strong>2,938</strong></td>
</tr>
<tr>
<td>‘Others’</td>
<td>Male</td>
<td>5</td>
<td>3,760</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>6</td>
<td>3,550</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td>11</td>
<td><strong>3,646</strong></td>
</tr>
</tbody>
</table>

5.2.1 Comparison of birth weight between 1993 and 2004 Surveys

Birth weight for Fijian males in 1993 was 3,440g whereas the 2004 survey reported a mean of 3,515g (Table 5.2.2). Fijian female birth weight reported a mean of 3,400g in 1993 while in 2004, it was 3,241g. These figures are consistent with birth weights of Fijian children in Fiji. Although there was a small reduction in birth weight of Fijian female children, the figure is still well above the WHO recommended normal minimum birth weight of 2,500g. Indo-Fijian males reported a mean of 2,930g in 1993 and 3,054g in 2004. Mean birth weight for Indo-Fijian females was similar in the two surveys.
Mean birth weight of males reported in 2004 had improved over 1993 by 2.2% amongst Fijians and 4.2% in Indo-Fijian. However, mean birth weight of females was lower in 2004 compared to 1993 by 4.6% amongst Fijian and 0.4% in Indo-Fijian. The results show that although mean birth weight of Fijian and Indo-Fijian male infants reported in 2004 had improved, the relative percentage improvement in Indo-Fijian doubled that of Fijian.

Mean birth weight of female infants in both ethnic groups appeared to have worsened; Fijians were worse off than Indo-Fijians by 4.3%. The possible worsening situation with Fijian children could be due to poor complementary feeding, and children born of adolescent mothers to name a few.

5.3 Nutritional status of infants

5.3.1 Normal birth weight
Over three quarters of the children surveyed were of normal birth weight (78.3% Fijian and 80% Indo-Fijian) (Table 5.3.1). By ethnicity and gender, more Indo-Fijian males were born with normal weight (83.7%) compared with Fijians (75.6%). More Fijian females had normal birth weight than Indo-Fijian females (83.5% and 74.2%, respectively).

5.3.2 Low birth weight (LBW) and High birth weight (HBW)
While the majority (78.3%) of all children were born with standard weight for age (i.e. 2,500g – 4,000g) as stated above, both low birth weight (LBW) (at < 2,500g) and high birth weight (HBW) (at > 4,000g) were also found (Table 5.3.1).
### Table 5.3.1
Mean birth weight categories of children under 2 years
By ethnicity and gender (as percent of total responses), 2004

<table>
<thead>
<tr>
<th>Ethnicity &amp; Gender</th>
<th>Low birth weight &lt; 2,500g</th>
<th>Normal 2,500g-4,000g</th>
<th>High birth weight * &gt; 4,000g</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>%</td>
<td>n</td>
</tr>
<tr>
<td>Fijians</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>8</td>
<td>6.5</td>
<td>93</td>
</tr>
<tr>
<td>Female</td>
<td>8</td>
<td>8.8</td>
<td>76</td>
</tr>
<tr>
<td>Indo-Fijians</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>7</td>
<td>14.3</td>
<td>41</td>
</tr>
<tr>
<td>Female</td>
<td>8</td>
<td>25.8</td>
<td>23</td>
</tr>
<tr>
<td>‘Others’</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>0</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>Female</td>
<td>0</td>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td>All</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>15</td>
<td>8.5</td>
<td>138</td>
</tr>
<tr>
<td>Female</td>
<td>16</td>
<td>12.5</td>
<td>104</td>
</tr>
</tbody>
</table>

* (Source: Surkan et al 2004)

#### 5.3.2.1 Low birth weight
Among the group studied, 31 children (10.2%) were classified as LBW (Table 5.3.1 refers). Of these, 7.7% were Fijian and 18.8% were Indo-Fijian. The results also showed that for every one Fijian infant born with LBW, there were at least 2 Indo-Fijian infants who were born with LBW.

By ethnic group and gender, substantially higher proportions of LBW children were Indo-Fijian (females 25.8% and males 14.3%) compared to Fijian (females 8.8% and males 6.5%). Overall by gender, more females were born with LBW compared to males.

Birth weight is a predictor of not only child survival, but of subsequent development. LBW may be due to a number of factors. Some of the possible contributing factors previously identified include poor maternal health in general, inadequate maternal diet, inadequate pre-natal care services available, and a low level of use of services by pregnant women.

#### 5.3.2.2 High birth weight (HBW)
High birth weight was defined as children born with weight > 4000g (Surkan, et al 2004). The proportion of infants reportedly born with HBW was 32 children (10.5%), almost identical with LBW. The HBW trend was the reverse of the LBW trend in that substantially more Fijians had HBW (males 17.9% and females 7.7%) compared to Indo-Fijians (2.0% males and no females). Overall, for every ten children born, at least 1 was born with HBW.

#### 5.3.3 Comparison of 1993 and 2004 surveys
Although the sample size was small, it may be prudent to have LBW on the radar screen for future monitoring purposes. The overall proportion of LBW children had decreased slightly from 11.4% in 1993 to 10.2% in 2004. However, the difference was not significant (p>0.05).
Closer examination of the data showed there was a slight increase in LBW with Fijians by 3.5% (from 4.2% in 1993 to 7.7% in 2004) but a decrease in LBW by 2.4% with Indo-Fijian children (from 21.2% in 1993 to 18.8% in 2004) (Figure 5.3.1).

Among the children born with LBW, higher proportions (54.8%) were from rural areas than urban areas (45%).

![Figure 5.3.1](image)

**Incidence of LBW by ethnicity, 1993 and 2004**

The 1993 survey focused on under nutrition; hence incidence rates of high birth weight (HBW) were not reported. Consequently, no comparison of 1993 and 2004 could be made.

5.3.4 Growth of children compared to National Centre for Health Statistics (NCHS) Standards

The growth pattern of children under 2 years of age is illustrated in Figure 5.3.2 to provide a contextual perspective.

The differences in growth patterns of Fijian and Indo-Fijian children observed in 1993 is similar to that found in 2004. Both surveys showed that Fijian infants grew well from birth until 2 months of age (Figure 5.3.2). However, thereafter growth steadily fell to below the NCHS standard at around six months of age in 1993, while it stayed just above the NCHS standard in 2004. The decline in growth appeared to coincide with the age of introduction of complementary feeding (around 6 months).

On the other hand, Indo-Fijian children started below the NCHS standard, peaking at 3-5 months in both 1993 and 2004. It is noted, however, that the peak in 2004 was much higher (15%) above the NCHS reference standard, whereas growth peak in 1993 was still 5% below the NCHS reference standard. The growth of Indo-Fijian children remained consistently below the NCHS standard.
While the growth of children generally indicated some improvement, the rate of decline after growth peak (at 2 months with Fijians and 3-5 months with Indo-Fijians) indicated a steeper fall in 2004 compared to the 1993 survey results.

The growth pattern observed in 2004 showed approximately a 5% improvement over 1993. It is unclear whether the improvement in growth pattern seen in 2004 is a result of effective infant feeding programmes or some other unidentified factor. Without hard evidence, reasons provided remain speculative.

**Figure 5.3.2**
Growth patterns of Fijian and Indo-fijian children from birth to 5 years
Compared to NCHS standard, 1993 and 2004

5.4 Feeding Practices for Children 0-2 years
Of a total of 341 children included in this part of the survey, only 322 were included in the analysis (19 children were excluded due to missing values). Because of the relatively small number of children in this cohort, it was necessary to re-categorize the age group.

The previous part of this chapter briefly discussed growth in infancy as a complex phenomenon resulting from the interaction between the effect of several factors such as maternal and other outside environmental factors.

This section looks at one of these factors, i.e. feeding practices. Dobbing (1985) stated that proper growth of infants can only be achieved if factors that control infant growth, such as nutritionally adequate diets, are promoted as best as circumstances can allow.
Breast milk is the preferred source of nutrition for all babies. It is also acknowledged that in certain circumstances, breastfeeding may not be possible. In these incidences, the infant has to be fed formula milk or breast milk substitute. An examination of the types of infant feeding practices\textsuperscript{1} during the first two years of infancy will provide useful information/explanation about the situation in Fiji.

5.4.1 Breastfeeding

Exclusive breastfeeding has been advocated by WHO and UNICEF as the best method of feeding infants (WHO 2003) from birth to six months of age. The advantages of breastfeeding are well documented.

5.4.1.1 Breastfeeding initiation

Overall, 85.1\% of mothers initiated breastfeeding within the first 24 hours after giving birth (combined <1hr-24hrs) (Table 5.4.1). Only 5.8\% of participants reported initiating breastfeeding after 24 hours.

<table>
<thead>
<tr>
<th>Time of initiation of breastfeeding</th>
<th>Fijians &amp; Indo-Fijians Total</th>
<th>Fijians</th>
<th>Indo-Fijians</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>%</td>
<td>n</td>
</tr>
<tr>
<td>Less than 1 hour</td>
<td>169</td>
<td>57.3</td>
<td>133</td>
</tr>
<tr>
<td>1-24 hours</td>
<td>82</td>
<td>27.8</td>
<td>55</td>
</tr>
<tr>
<td>&gt;24hours</td>
<td>17</td>
<td>5.8</td>
<td>7</td>
</tr>
<tr>
<td>Don’t remember</td>
<td>27</td>
<td>9.1</td>
<td>21</td>
</tr>
</tbody>
</table>

The results showed that more Fijian mothers initiated breastfeeding within the first hour compared to Indo-Fijian. Initiation of breastfeeding after the first hour was higher amongst Indo-Fijian mothers (34.2\%). Only a very small proportion of mothers initiated breastfeeding after 24 hours.

The importance of initiating breastfeeding within the first hour has been well documented (IBFAN, 2003). The reasons include the fact that: (i) babies are most active during the first 30-60 minutes; (ii) suckling reflex is most active at birth and increases success for exclusive breastfeeding; (iii) it ensures intake of colostrums, the first feed and the first immunization of the infant; (iv) it promotes emotional development between the mother and infant; (v) it helps in developing a loving relationship between the mother and infant; and the fact that (vi) it prevents the problem of breasts engorgement, postpartum bleeding and uterine involution in mothers.

\textsuperscript{1}Definitions:

- Exclusively breastfed: infants and children are fed with breast milk only, without any other fluids.
- Breast milk and infant formula: infant or child is given milk substitute such as SMA, Lactogen, and cow’s milk together with breast milk.
- Breast milk and food: child was also given food while breastfeeding.
- Food only: child is given food only and milk was not given at all.
- Breastfed or breastfeeding: child is either exclusively or non-exclusively breastfed.
- Ever breastfed: child is breastfed at some occasion during their lifetime.
5.4.1.2 Exclusive Breastfeeding

Among children less than 2 years of age, 10.9% (n = 37) were reported to be exclusively breastfed. Of the exclusively breastfed, 12.9% (n = 31) were Fijian and 4.5% (n = 4) Indo-Fijian. Examined by three age categories shown below, the following results were found (Figure 5.4.1).

### Figure 5.4.1
Rate of exclusive breastfeeding in children under 2 years
By ethnicity and age group, 2004

In children aged 6 months or less, 39.8% (n = 35) were exclusively breastfed (Figure 5.4.1). Of these, 78.4% (n = 29) were Fijians compared with 10.8% (n = 4) Indo-Fijians. Only 2.3% (n = 2) of children 7 - 12 months were still being exclusively breastfed. None of the children were reported to have been still exclusively breastfed at aged 12 months and above. Exclusive breastfeeding declined with age.

Exclusive breastfeeding in this survey has been defined previously as “infants fed with only breast milk for the first six months without any other fluid (not even water)”. The benefits are:

(i) exclusively breastfed babies grow normally;
(ii) breast milk quantity increases;
(iii) water or other fluid supplementation, which can be a source of infection, is unnecessary;
(iv) exclusively breastfed babies have less infections, allergies and eczema than those babies who are not breastfed at all;
(v) protects both infants and mothers from major illnesses;
(vi) helps in birth spacing;
(vii) contributes to better intelligence development in infants;
(viii) reduces the risk of breast and ovarian cancer and anaemia in mothers (IBFAN, 2003).

5.4.1.3 Duration of breastfeeding (for children who were no longer breastfed)

The mean duration of breastfeeding with Fijians tended to be longer (9 months) compared with Indo-Fijians (6.7 months) (Figure 5.4.2). Infants in rural areas were breastfed for shorter periods (mean duration of 6.8 months) compared with those in urban areas (9.8 months).

The duration of breastfeeding in Indo-Fijians had improved in 2004 compared to 1993.
5.4.1.4 Reasons for Discontinuing Breastfeeding
The most common reasons reported (Table 5.4.2) were ‘not enough breast milk’ (33.3%), ‘other reasons’ (25.3%), ‘back to work’ (14.7%), ‘complications’ (12.0%), and 6.7% believed that ‘infant formula was superior to breast milk’.

<table>
<thead>
<tr>
<th>Reasons</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>No more breast milk</td>
<td>25</td>
<td>33.3</td>
</tr>
<tr>
<td>Other reasons</td>
<td>19</td>
<td>25.3</td>
</tr>
<tr>
<td>Back to work</td>
<td>11</td>
<td>14.7</td>
</tr>
<tr>
<td>Complications</td>
<td>9</td>
<td>12.0</td>
</tr>
<tr>
<td>Bottle feeding better</td>
<td>5</td>
<td>6.7</td>
</tr>
<tr>
<td>Mother died/left</td>
<td>4</td>
<td>5.3</td>
</tr>
<tr>
<td>Advised to use milk substitute</td>
<td>2</td>
<td>2.7</td>
</tr>
<tr>
<td>TOTAL</td>
<td>75</td>
<td>100</td>
</tr>
</tbody>
</table>

5.4.2 Introduction of other foods
5.4.2.1 Breast milk substitute (SMA, follow-on-milk, fresh cow’s milk) or bottle-fed
Table 5.4.3 shows the proportion of children less than 2 years reported to have been given breast milk substitutes. In children aged 6 months or less, 43.5% of Fijian and 56.5% of Indo-Fijian infants were already on breast milk substitutes. For children 7-12 months old, more than two thirds (67.4%) of Fijians were given a breast milk substitute compared with 26.1% of Indo-Fijians (Figure 5.4.3).

The proportion of Fijian children given breast milk substitutes after 12 months of age was still higher than in Indo-Fijians (59.8% and 37.1%, respectively). It was noted that Fijian children who were given breast milk substitutes had declined from 67.4% at 7-12 months to 59.8% after 12 months of age, whereas the reverse trend was found with Indo-Fijians where an increase had been noted (26.1% at 7-12 months of age to 37.1% after 12 months of age).
Table 5.4.3
Proportion of children under 2 years given breast milk substitute
(as percent of all children within age category)
By age group and ethnicity, 2004

<table>
<thead>
<tr>
<th>Age category</th>
<th>Ethnicity</th>
<th>Yes</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>%</td>
<td>---</td>
</tr>
<tr>
<td>≤ 6 months (n = 88)</td>
<td>Fijians</td>
<td>10</td>
<td>43.5</td>
</tr>
<tr>
<td></td>
<td>Indo-Fijians</td>
<td>13</td>
<td>56.5</td>
</tr>
<tr>
<td></td>
<td>‘Others’</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>All</td>
<td>23</td>
<td>100</td>
</tr>
<tr>
<td>7-12 months (n = 89)</td>
<td>Fijians</td>
<td>31</td>
<td>67.4</td>
</tr>
<tr>
<td></td>
<td>Indo-Fijians</td>
<td>12</td>
<td>26.1</td>
</tr>
<tr>
<td></td>
<td>‘Others’</td>
<td>3</td>
<td>6.5</td>
</tr>
<tr>
<td></td>
<td>All</td>
<td>46</td>
<td>100</td>
</tr>
<tr>
<td>&gt; 12 months (n = 145)</td>
<td>Fijians</td>
<td>58</td>
<td>59.8</td>
</tr>
<tr>
<td></td>
<td>Indo-Fijians</td>
<td>36</td>
<td>37.1</td>
</tr>
<tr>
<td></td>
<td>‘Others’</td>
<td>3</td>
<td>3.1</td>
</tr>
<tr>
<td></td>
<td>All</td>
<td>97</td>
<td>100</td>
</tr>
</tbody>
</table>

Figure 5.4.3
Proportion of children under 2 years given breast milk substitute
By age group and ethnicity, 2004

The data indicates that the use of breast milk substitute generally increased with age. Although the data shows that more Fijian compared to Indo-Fijian children were given breast milk substitutes, a relatively higher proportion of Indo-Fijians continued to receive breast milk substitutes with increasing age, compared to Fijian children. A possible explanation is that milk is part of the Indo-Fijian traditional diet, whereas it is not within the Fijian traditional diet.
5.4.2.2 Other Fluids

Three types of other fluids (plain water; sweetened water, i.e. fruit juice; and fizzy drinks) were reportedly given to children less than 2 years of age (Table 5.4.4).

A large proportion of children aged 6 months or less (79.6%) were given water (85.3% Fijian and 68.4% Indo-Fijian). Sweetened drinks were already given to infants at this age.

In children aged 7-12 months, 51.3% were given plain water (52.6% Fijian and 47.1% Indo-Fijian), 39.1% were given sweetened water (40.4% Fijian and 38.2% Indo-Fijian), and 9.6% were given fizzy drinks (7.0% Fijian and 14.7% Indo-Fijian).

The results showed that a relatively high proportion of infants were given other types of fluid before 6 months. Data also showed that more Fijian children compared to Indo-Fijian children were given other fluids throughout infancy and more sweetened drinks were given with increased age.

The introduction of fluid supplementation before 6 months and sweetened drinks at an early age is not only unnecessary, it can be a dangerous source of infection or the cause of tooth decay. It also interferes with proper feeding of infants as well as lowers the chances of breastfeeding success, as sweetened drinks are likely to replace milk during the infant’s feeding processes.

Table 5.4.4
Proportion of children under 2 years given fluid
By ethnicity and age group, 2004

<table>
<thead>
<tr>
<th>Ethnicity</th>
<th>Area type</th>
<th>Plain water</th>
<th>Sweetened water</th>
<th>Fizzy drinks</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>%</td>
<td>n</td>
<td>%</td>
</tr>
<tr>
<td>≤ 6 months (n = 88)</td>
<td>Fijians</td>
<td>29</td>
<td>85.3</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>Indo-Fijians</td>
<td>13</td>
<td>68.4</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>‘Others’</td>
<td>1</td>
<td>100</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>All</td>
<td>43</td>
<td>79.6</td>
<td>11</td>
</tr>
<tr>
<td>7-12 months (n = 89)</td>
<td>Fijians</td>
<td>60</td>
<td>52.6</td>
<td>46</td>
</tr>
<tr>
<td></td>
<td>Indo-Fijians</td>
<td>16</td>
<td>47.1</td>
<td>13</td>
</tr>
<tr>
<td></td>
<td>‘Others’</td>
<td>4</td>
<td>50.0</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>All</td>
<td>80</td>
<td>51.3</td>
<td>61</td>
</tr>
<tr>
<td>&gt; 12 months (n = 145)</td>
<td>Fijians</td>
<td>87</td>
<td>45.3</td>
<td>75</td>
</tr>
<tr>
<td></td>
<td>Indo-Fijians</td>
<td>42</td>
<td>40.4</td>
<td>42</td>
</tr>
<tr>
<td></td>
<td>‘Others’</td>
<td>4</td>
<td>50.0</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>All</td>
<td>133</td>
<td>43.7</td>
<td>120</td>
</tr>
</tbody>
</table>

5.4.3 Introduction of solid foods

The three types reported were fruits, semi-solid foods (cereal, dhal soup, broth, porridge and Cerelac) and solid/mushy forms of foods (meat, fish, rice, potatoes, eggs and dhal) (Table 5.4.5).

Similarly, a small proportion of Fijian and Indo-Fijian infants aged 6 months or less were given fruits (30.8%), semi-solid foods (43.6%) and solid/mushy foods (25.6%) (Figure 5.4.6). By around 7-12 months of age, more than 3 times the number of Fijian infants as Indo-Fijians were given all three types of solid foods. Almost twice as many Fijian infants as Indo-Fijian were given all three types of solid foods at 12 months of age.
One conclusion that can be made from this data is that in general, more Fijian children than Indo-Fijian children in all three age categories were given solid food.

Table 5.4.5
Proportion of children under 2 years given solid food
(as percent of children within age category)
By age group and ethnicity, 2004

<table>
<thead>
<tr>
<th>Age category</th>
<th>Ethnicity</th>
<th>Fruits</th>
<th>Semi solid food</th>
<th>Solid/mushy food</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>n</td>
<td>%</td>
<td>n</td>
</tr>
<tr>
<td>≤ 6 months (n = 88)</td>
<td>Fijians</td>
<td>7</td>
<td>30.4</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>Indo-Fijians</td>
<td>5</td>
<td>31.2</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>‘Others’</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>All</td>
<td>12</td>
<td>30.8</td>
<td>17</td>
</tr>
<tr>
<td>7-12 months (n = 89)</td>
<td>Fijians</td>
<td>48</td>
<td>31.2</td>
<td>53</td>
</tr>
<tr>
<td></td>
<td>Indo-Fijians</td>
<td>13</td>
<td>30.2</td>
<td>17</td>
</tr>
<tr>
<td></td>
<td>‘Others’</td>
<td>4</td>
<td>33.3</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>All</td>
<td>65</td>
<td>31.1</td>
<td>74</td>
</tr>
<tr>
<td>&gt; 12 months (n = 145)</td>
<td>Fijians</td>
<td>82</td>
<td>33.5</td>
<td>77</td>
</tr>
<tr>
<td></td>
<td>Indo-Fijians</td>
<td>41</td>
<td>33.1</td>
<td>40</td>
</tr>
<tr>
<td></td>
<td>‘Others’</td>
<td>4</td>
<td>33.3</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>All</td>
<td>127</td>
<td>33.3</td>
<td>121</td>
</tr>
</tbody>
</table>

5.4.4 Mixed feeding
The concept of mixed feeding has been around for many years. This concept advocated the principles of a mixed diet or the use of a variety of appropriate foods from the three food groups as part of the weaning process.

The 2004 survey also asked mothers about combinations of foods that infants were given; mothers reported a number of combinations.

5.4.4.1 Breast milk, breast milk substitute (bottle) and food
While continuing to breastfeed their infants, a number of mothers reported introducing other foods. Children aged about 6 months (17%, n = 15) were already given breast milk substitutes (bottle) and food. Within the Fijian group, 7.8% (n = 5) reported using this combination. Within the Indo-Fijian group, 47.6% (n = 10) used this feeding combination. This data showed that more Indo-Fijian children were given breast milk substitute than Fijian children.

In children aged 7-12 months, 34.9% (n = 30) were reported to be using this combination. A higher proportion of Indo-Fijians (52.9%) used this combination compared to Fijians (30.8%).

In children aged 12 months and over, 37% were reported to be fed with this combination (breast milk, breast milk substitute [bottle] and food). This was made up of 31.8% Fijians and 48.8% Indo-Fijians.

The proportion of children fed with this food combination increased with age. A higher proportion of Indo-Fijians used the three in combination compared to Fijians. The reason for the use of the combination could not be given because the questionnaire did not ask for this information.
5.4.4.2 Breast-milk and food
Mothers reported feeding their children with food while continuing to breastfeed. The breakdown by age group showed the following:

- In children aged 6 months or less, 34% were fed a combination of breast milk and food. Of these, 39% (n = 25) were Fijians and 19% (n= 4) were Indo-Fijians (Figure 5.4.4).
- In children aged 7-12 months of age, 40.7% were fed combinations of breast milk and food: (44.6% Fijians; Indo-Fijian 29.4%).
- In children aged 12 months and over, 16.3% were given breast milk and food (17% Fijians and 14% Indo-Fijians).
- These results appear to be consistent with the other data, which showed smaller proportions of Indo-Fijian children having been breastfed.

![Figure 5.4.4](image)

**Proportion of children given breast milk with food**
*By ethnicity and age category, 2004*

5.4.4.4 Breast milk substitute and Food
In children aged ≤ 6 Months, the proportion who were given breast milk substitute (bottle) and food was 4.6%. Fijians made up 3.1% and Indo-Fijians 9.5% (Figure 5.4.5).

In children aged 7-12 Months, 18.6% were given breast milk substitute and food. This percentage was made up of 16.9% Fijians and 17.6% Indo-Fijians.
In children aged 12 Months and above, 34.8% were given breast milk substitute and food. Of these, 34.1% were Fijians and 34.9% Indo-Fijians.

The trend with children being given a combination of breast milk substitute and food increased with age.
5.4.4.5 Food only

The proportion of children given ‘food only’ at various age categories is illustrated in Figure 5.4.6.

None of the children aged six months or less were fed food only. This appeared consistent with infant feeding advice. The use of solid food only increased with age (3.5% in the 7-12 month-age group and 11.9% in the 1-2 year-old age group were reported to be given food only).
5.4.5 Comparison of infant feeding practices between 1993 and 2004

Although the general trends in infant feeding practices were similar in both surveys, some differences were observed.

5.4.5.1 Initiation and duration of breastfeeding

The proportion of mothers initiating breastfeeding within the first 24 hours was slightly higher in 1993 (88%) than in 2004 (85.1%).

The duration of breastfeeding amongst Fijians was similar in 1993 and 2004 (9 months), but data for Indo-Fijians in 2004 showed some improvement (6.7 months) compared to 1993 (4.1 months). Fijian children were breastfed 5 months longer than the average Indo-Fijian child in 1993, but the 2004 report showed that a Fijian child was breastfed only 3 months longer than an Indo-Fijian child.

By 6 months of age, 39.8% of children were still being exclusively breastfed in 2004, but in 1993, only 25% were being exclusively breastfed, with higher rates amongst Fijians.

The duration of breastfeeding in rural areas in 1993 was longer (7.3 months), while 2004 reported a shorter period of 6.8 months. The duration of breastfeeding in urban areas in 1993 was shorter (5.8 months), while 2004 showed a longer duration of 9 months. The reasons for this difference were not clear but possible reasons could be the success of the ‘baby-friendly hospital initiative’ and the exclusive breastfeeding programme.

The most common reason for discontinuing breastfeeding in both surveys (30% in 1993 and 33.3% in 2004) was ‘no breast milk’. ‘Mothers returning to work’ was the third most common reason in 2004 but was the second most common reason in 1993.

5.4.5.2 Introduction of other foods and mixed feeding

By age 6 months, the 2004 data showed that the majority of children were already being given breast milk substitutes (43.5% Fijians and 56.5% Indo-Fijians), other fluids (85.3% Fijians and 68.4% Indo-Fijians) and other solids (33.0% Fijians and 33.3% Indo-Fijian) in 2004. In the 1993 survey, it was shown that 55.5% were given solid food by this age, with more Indo-Fijians (69.3%) reporting than Fijians (45%).

The trend increased with age. By 12 months, a small proportion (11.9%) was taking ‘solid food only’ in 2004. This meant that in 2004, 88.1% of children were still being given ‘mixed feeding’ with breast milk, breast milk substitute and solid food (or combinations of the three) at this age, while in 1993, 91.5% children in this age group were taking solid foods only.

5.5 Inter-relationship of nutritional health of very young children, and other factors

The 2004 survey participants were asked a number of questions relating to general health and nutrition conditions of children aged 0-2 years. These factors are known to impact on the growth and development (and health) of the child. Four of these factors will be summarized here.
5.5.1 Caregiver
Survey participants were asked who the child’s main care giver was. The results showed that the main caregivers were mothers (79.1%), followed by grandparents (7.2%) and others (6.3%).

In the traditional Fijian and Indo-Fijian societies, caring for children is a female’s responsibility, as it is socially unacceptable for males to be seen caring for small children. Anecdotal information indicated that Indo-Fijian fathers generally do not care for their children, especially female children, regardless of whether they lived in rural or urban areas. This may be culturally determined. Both urban Fijian and Indo-Fijian families reported using grandparents and “others” to care for children as mothers joined the workforce out of necessity. In this case, “others” are often non-relative paid house helpers.

A study conducted in urban areas in Fiji (Tunidau, 1991) indicated that children who had older caregivers (>40yrs) were more strongly associated with malnutrition when compared to children who had younger caregivers (between 20-30 yrs).

5.5.2 Illness during the past month
Overall, only 27.9% of participants reported that their children had been sick during the 4 weeks prior to the survey. Of these, 25.4% were Fijians and 34.8% were Indo-Fijians.

Table 5.5.1 shows the types of illnesses recorded for children in the survey population. Around 12.1% of Fijian families reported that their children suffered from skin infection and 6.1% suffered from diarrhoea. Around 4.5% of Indo-Fijian families reported that their children suffered from skin infection and 2.5% suffered from diarrhoea.

There were more cases of fever, diarrhoea, skin infection and other unspecified types of illness in rural areas than in urban areas (Table 5.5.2).

<table>
<thead>
<tr>
<th>Ethnicity</th>
<th>Fever</th>
<th>Diarrhoea</th>
<th>Cough/cold</th>
<th>Skin infections</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No</td>
<td>%</td>
<td>No</td>
<td>%</td>
<td>No</td>
</tr>
<tr>
<td>Fijians</td>
<td>106</td>
<td>32.1</td>
<td>20</td>
<td>6.1</td>
<td>111</td>
</tr>
<tr>
<td>Indo-Fijians</td>
<td>90</td>
<td>44.6</td>
<td>5</td>
<td>2.5</td>
<td>68</td>
</tr>
<tr>
<td>‘Others’</td>
<td>5</td>
<td>35.7</td>
<td>1</td>
<td>7.1</td>
<td>5</td>
</tr>
<tr>
<td>All</td>
<td>201</td>
<td>36.8</td>
<td>26</td>
<td>4.8</td>
<td>184</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Area type</th>
<th>Fever</th>
<th>Diarrhoea</th>
<th>Cough/cold</th>
<th>Skin infections</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No</td>
<td>%</td>
<td>No</td>
<td>%</td>
<td>No</td>
</tr>
<tr>
<td>Urban</td>
<td>87</td>
<td>32.3</td>
<td>9</td>
<td>3.3</td>
<td>109</td>
</tr>
<tr>
<td>Rural</td>
<td>114</td>
<td>41.2</td>
<td>17</td>
<td>6.1</td>
<td>75</td>
</tr>
<tr>
<td>All</td>
<td>201</td>
<td>36.8</td>
<td>26</td>
<td>4.8</td>
<td>184</td>
</tr>
</tbody>
</table>
5.5.3 Services sought
The most common service reportedly used when children are sick is government health care, with 91.5% Fijians, 85.4% Indo-Fijians and 80.5% ‘Others’ reporting using it. A small proportion of respondents reported using a private physician: 5.7% Fijians, and 14.4% Indo-Fijians (Table 5.5.3).

There was also a high proportion of use of government health care in both urban and rural areas (83.2% and 93.7%, respectively).

Table 5.5.3:
Types of assistance sought when children are sick by area type, 2004

<table>
<thead>
<tr>
<th>Area Type</th>
<th>Government Health care</th>
<th>Private/Physician</th>
<th>Relative/Friend</th>
<th>Self prescription</th>
<th>Traditional healers</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No</td>
<td>%</td>
<td>No</td>
<td>%</td>
<td>No</td>
<td>%</td>
</tr>
<tr>
<td>Urban</td>
<td>691</td>
<td>83.2</td>
<td>128</td>
<td>15.4</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Rural</td>
<td>1044</td>
<td>93.7</td>
<td>40</td>
<td>3.6</td>
<td>2</td>
<td>0.2</td>
</tr>
<tr>
<td>All</td>
<td>1735</td>
<td>89.2</td>
<td>168</td>
<td>8.6</td>
<td>2</td>
<td>0.1</td>
</tr>
</tbody>
</table>

Table 5.5.3 clearly shows the importance of government medical services, particularly in rural areas where fewer private practitioners are available and where, even if there were some, fewer families would be able to afford their services. Although traditional healers were used in rural Fijian communities, the proportion of use by families was not significant. It is noted that rural Indo-Fijians also prescribed remedies for their children.

5.5.4 Diarrhoea treatment
Overall, only 17% used oral rehydration salts (ORS), which is the preferred treatment for diarrhoea in children (Figure 5.5.1). The majority (45%) used ‘other treatments’ as the common method of treatment, with the rest using ‘boiled water’ (25%) and ‘home remedies’ (13%).

Figure 5.5.1
Types of treatment given to children for diarrhoea, 2004

5.5.5 Comparison between 1993 and 2004
In 1993, 30.2% of children were reported to be suffering from skin problems that were (generally) associated with having a poor water supply and the lack of basic hygiene practices. Furthermore, the 1993 findings recorded 7.8% had episodes of diarrhoea,
which is almost twice the incidence found in 2004. These results appeared to indicate an improvement in water and sanitation, as reported in Chapter 4. While the overall results showed a marked improvement, it is noted that there is still a strong urban/rural disparity and Fijian/Indo-Fijian difference. Fijian children had higher rates of skin disease that appear to be worse in rural areas compared to their Indo-Fijian counterparts. Rural children had more fevers but urban children had more coughs and colds.

5.6 Discussions and conclusions

5.6.1 Birth weight
Data indicate that within the group studied, most infants were generally born with normal weight. However, the mean weights of ‘population’ often mask real problems if closer examination is not carried out.

The differences in mean birth weight reported in 1993 and 2004 by Fijians and Indo-Fijians are similar to the national trends in that Fijian infants are substantially heavier than Indo-Fijian infants and males are generally heavier than females. Mean birth weight for males (Fijian and Indo-Fijian) had improved slightly since the 1993 survey, while the mean birth weight for females did the opposite.

Birth weight is an outcome of a combination of a number of factors, which include a woman’s health in general, teenage pregnancy, pre-natal care services (health promotion, preventive care and primary care), and the level of use of these services by mothers (Lu, Bragonier et al 2001; Marshall, Leatherman, et al 2004; Wymelenberg, 1990; Yu, Alexander, et al 2006).

Of special interest regarding the 2004 survey is the worsening situation of the mean birth weight of Fijian female infants compared to Indo-Fijian female infants. This (apparent) worsening situation amongst Fijian infants could possibly be due to one or more of the following: teenage pregnancy, poor use of pre-natal services, poor quality of women’s health, anaemia in women, or a low level of use of pre-natal care services.

On the other hand, the increase in birth weight overall could be due to better education of mothers, high literacy, obesity in women, and an improved or better use of pre-natal health care services.

5.6.2 Growth pattern
Birth weight is a direct result of the length of gestational and foetal health, which is intricately related to maternal risk factors. These risk factors include pre-pregnancy BMI status, weight gain during pregnancy, multiparity, the mother’s own birth weight, diabetes, haemoglobin status, ethnicity, diet, smoking while pregnant and taking other drugs (Skjaerven, et al, 1997; Orskou, et al, 2003; Ehrenberg, et al, 2004; Clausen, et al, 2005).

In the past, developing countries have focused on LBW while little attention has been given to HBW infants. It was assumed that “big babies” were healthy babies. In recent years, however, experts have documented mounting evidence to show that both infants with LBW as well as those with HBW have an increased risk of obesity and other non-communicable diseases (NCDs) in later life (Surkan, et al, 2004; Stettler, et al, 2002).
Mothers' health (such as having high blood pressure, heart, kidney and lung problems, or an abnormal uterus), as well as her lifestyle choices (such as smoking and having a poor diet, including an inadequate energy and folic acid intake), influences the birth weight of her baby. The 2004 survey results demonstrated that both LBW and HBW exist in Fiji. The factors contributing to this problem need to be identified in order for well-targeted programmes to be put into place which address this double burden.

One proposed explanation for Fijian infants having lower birth weights than previously recorded is that the health of women of child-bearing age has worsened. Furthermore, the cultural practice of favouring men and heads of the household at meal times over all others may deprive pregnant women of required nutrients they need in order to give birth to a healthy child. Socio-economic factors also play a significant contribution to the current health situation.

Having a regular clinic or medical check-up is one of the best ways to get help. Unfortunately, attitudes of local women towards seeking help from health professionals, having no time to attend clinics, and one’s economic status (no bus fare to travel to the clinics for regular check up) are some of the barriers. Also, in some areas, adequate services may not be available. However, sometimes where services are available, mothers do not make use of them as well as might be expected.

In developing countries, child development has focused mainly on health and physical growth (Wachs, 1999). Furthermore, available data indicates that in developing countries, physical growth of infants almost universally begins to lag behind by the middle of the first year and continues to do so for the ensuing years. This is consistent with the 2004 survey findings. Studies in developing countries (Roland, 1985) reported that the growth curves of infants compared to the fiftieth percentile on the NCHS standard tend to flatten between six months and two years of age. This growth curve may resume on a parallel course later on, but it is still at a lower level than the starting point.

Many non-dietary factors play an important role in determining the growth of infants in a developing country like Fiji. Evidence indicates that the most important factor is the socio-economic status of families, particularly in relation to food availability and generally poor-hygiene related infections.

Case control studies examining factors that differ between adequately nourished and malnourished infants in the second and six months of life have found significant association between certain non-dietary factors and growth failure. These include low mean maternal age, infection (e.g. severe or repeated diarrhoea, measles, etc.), a greater mean number of children less than 5 years old at home, death of either parent, or broken homes. The complex interactions between non-nutritional and nutritional factors make interpretation of growth difficult. Although non-nutritional factors may play a part, inadequate food intake is an important indicator in growth failure.

The next section examines selected aspects of infant feeding practices.

5.6.3 Infant Feeding Trends
Initiation of breastfeeding within the first 24 hours is relatively high (88% in 1993 and 85.1% in 2004). However, exclusive breastfeeding had declined to 39.8% by the time the children were 6 months old.
The difference in trends observed between Fijians and Indo-Fijians in relation to exclusive breastfeeding, is unclear. In-depth focus group discussions may reveal the root of the practice.

The introduction of breast milk substitutes to children at 6 months old or less appeared consistent with the decline in breastfeeding (43.5% Fijians and 56.5% Indo-Fijians). First, exclusive breastfeeding advocacy by WHO and UNICEF has had minimal effect for some reason. Second, anecdotal evidence showed that the drop in breastfeeding coincides with the public service maternity leave regulation – working mothers are required to return to work 3 months after confinement.

The early introductions of other fluids and complementary food have been an issue for decades. Although exclusive breastfeeding advocated that exclusively breastfed children do not require other fluids, a sizable proportion of infants are still given fluids in the form of plain and sweetened water during their first 6 months.

Additionally, a small proportion of children less than 6 months old were reportedly given fruits, semi-solid foods and solid or mushy foods. These practices are of concern because a child’s digestive system would not be sufficiently developed to cope with these foods, and the practice could lead to other health problems.

Early medical records showed that malnutrition started to occur at around 6 months of age. This could be attributed to insufficient protein food during the early process of weaning or to the introduction of complementary feeding, particularly amongst Fijian infants (Tunidau, 1991). Based on the pattern of growth, the problem still requires addressing.

5.6.4 Challenges
Infant feeding patterns have evolved as a result of economic development. Two major contributing factors have been the changing role of women (as wage earners outside the home, as well as maintaining their traditional role as mother, nurturer, caregiver and housekeeper) and the availability of a wider variety of processed food that mothers can choose from.

Females account for a significant percentage of workers in manufacturing (38.1%), services (37.6%), finance (36.3%), and wholesale and retail trade (36.1%). In other words, more than one third of those engaged in the industries listed above are females (FIBOS, 2003). Women in the workforce who have young infants are forced to take the child off the breast at the age of 3 months. Breast milk is substituted with infant formula, placing an additional economic burden on the family or on the mother (women receive much less pay than men; however, the income women earn is almost entirely used for family expenses).

5.6.5 Other related factors
A child caregiver is one who provides the child with all its needs to ensure that he/she develops properly and grows well physically, emotionally and mentally. While mothers were identified as the main caregivers in this survey 20.1% of main caregivers were identified as being someone “other than the mother.” Although the survey did not specifically ask for the age of the caregiver, it is also known that a caregiver’s age is an important factor in terms of a child’s nutritional health –
younger persons are better able to provide a higher level of care than older caregivers, particularly older grandparents. Since the young child is totally dependent on the caregiver, the caregiver must have some understanding of the child’s nutritional needs, how these needs could be met and when to provide them.

The most common services sought when children are sick are from Health Centres. As the major provider of health services, Health Centres must be supported and strengthened to enable them to provide effective services to the public. Services provided by the Health Centres should include ‘how to care for the child properly at home’, as well as ‘how to prepare nutritious complementary foods in a hygienic environment’.

Despite years of educating mothers about the use of ORS as the most effective method to treat diarrhoea, only 17% of mothers of children under 2 years used ORS while 45% of mothers use other means. These results indicate that a strengthening of the follow-up education programme to re-emphasize the use of ORS is needed.
6.0 RESULTS PART III: Children Under 18 Years

The rates of underweight amongst Indo-Fijian children are consistently high while at the same time the rates of overweight in both ethnic groups had more than tripled in the last decade. A slight increase in the rates of stunted children was also observed. This needs to be closely monitored. Similar to that of children less than 2 years old, the growth pattern of Fijian children was above the NCHS reference while that of Indo-Fijian children was generally below the reference.

Key Findings

• The mean weight of children at 5 years of age was 19kg. Boys were heavier than girls at this age (20.4kg for boys and 17.6kg for girls). At 10 years of age, males were also heavier than girls (mean weight of 34.4kg for boys and 32.7kg for girls). However, at 15 years of age, girls were heavier than boys with a mean weight of 55.1kg for girls and 55.3kg for boys.
• At 17 years of age, boys were heavier than girls with a mean weight of 63.9kg for boys and 59.7kg for girls. Fijian boys were heavier than Fijian girls by 0.3kg whereas Indo-Fijian boys were heavier than Indo-Fijian girls by 8kg.
• The mean height of girls and boys were almost identical at 5 years of age (112.3cm for boys and 112.2cm for girls). At 10 years of age, girls were taller than boys with a mean height of 140cm for girls and 138.5cm for boys. However, at 15 years of age, boys were taller than girls with a mean height of 167.8cm for boys and 159.8cm for girls.
• At 17 years of age, boys continued to be taller than girls with a mean height of 172.5cm for boys and 161.7cm for girls. Fijian males were taller than females by 8.3cm while Indo-Fijian males were 13.2cm taller than their female counterparts.
• Growth patterns of Fijian children were on average 2.5% above the NCHS reference whereas the growth pattern of Indo-Fijian children was below the NCHS reference by an average of 7.5%.
• 75.2% of all males and 70.2% of all females were healthy by weight for age; 92.5% males and 93% females were healthy by height for age and 89.4% males and 90% females were healthy by weight for height.
• Indo-Fijian children consistently showed higher rates of underweight by weight for age and stunting. However, there were some improvements compared to the 1993 results.
• There had been a slight increase in rates of stunted children in both ethnic groups since 1993: e.g. there was an increase of 3.6% in Fijian children 0-4 years of age and 2.2% in Indo-Fijian of the same age group.
• The trend of higher rates of underweight in Indo-Fijian was also observed by area type.
• The proportion of overweight (using weight for age, height for age and height for weight) in both ethnic groups had more than tripled in 2004 compared to the 1993 survey.
• The rates of overweight in urban area were higher than in rural area.

6.1 Introduction

The important relationship between nutritional status and health has been well documented. Nutritional status refers to the health of an individual or population as a result of intake of the right combination and amount of food and the use of food nutrients by the body (Smolin and Grosvenor, 1997).
Anthropometric and clinical measurements, biochemical assessment of Fiji’s population were collected during the 2004 survey. The procedures are described in Chapter 3: Methodology.

Generally the age groups used for analysis originate from (i) well established population sub-groups such as children under 5 years, and (ii) those used in nutrition surveys. Results of the anthropometric measurements (weight and height) will be presented first followed by nutritional status.

Mean weight and height of children in this survey have been re-analyzed and are reported according to specific ages such as under 1 year, 5 year, 10 year etc. rather than grouped age-categories e.g. 0-4yrs, 5-9yrs etc. Age specific results are more sensitive to changes over time whereas grouped age-categories are averages of averages and as such, far less sensitive and effective as an indicator because it masks the true picture.

6.2 Weight and Height
Different anthropometric indices are used to measure different aspects of growth and development at specified ages where weight and height are the most commonly used. For children, weight is the most significant indicator as it reflects the level of food intake more so than height. The mean weight (kg) and height (cm) of children less than 18 years are shown in Appendix 18, Tables 6.1-6.4.

6.2.1 Mean weight of children
Mean weight of 5 year old Fijian and Indo-Fijian boys and girls were almost identical (Table 6.2.1) However, by 10 years of age Fijian boys were 1.3kg heavier than Fijian girls while Indo-Fijian boys were 2.0kg heavier than Indo-Fijian girls: a finding opposite to that reported for height (Table 6.2.2).

<table>
<thead>
<tr>
<th>Specific Age (years)</th>
<th>Fijians</th>
<th>Indo-Fijians</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Male</td>
<td>Female</td>
</tr>
<tr>
<td></td>
<td>Mean n</td>
<td>Mean n</td>
</tr>
<tr>
<td>Under 1</td>
<td>8.6 69</td>
<td>7.0 47</td>
</tr>
<tr>
<td>5</td>
<td>20.5 63</td>
<td>20.2 52</td>
</tr>
<tr>
<td>10</td>
<td>35.0 52</td>
<td>33.7 59</td>
</tr>
<tr>
<td>15</td>
<td>55.2 45</td>
<td>60.2 23</td>
</tr>
<tr>
<td>17</td>
<td>66.0 45</td>
<td>65.7 51</td>
</tr>
</tbody>
</table>

By 15 years of age, Fijian girls were 5.0kg heavier than Fijian boys – a reversal of that reported for 10 year olds. However, Indo-Fijian boys remained 1.5kg heavier than their female counterparts. By 17 years of age a gender reversal in weight was reported for Fijians with males marginally exceeding females by 0.7kg; Indo-Fijian males remained heavier than their female counterparts by a considerable 8.0kg.

The differences in weight between the two ethnic groups reported at birth continue through childhood and adolescence. While the representation of the survey sample remains an issue, the phenomenon of heavier Fijian girls at age 15 (mean weight 60.2kg
vs 55.2kg for Fijian boys) is consistent with early post-pubescent weight gain among females, which generally disappears during the later teenage years.

However, the contrary trend among early post-pubescent Indo-Fijian females at age 15 years (females 50.0kg vs males 51.5kg) suggests the possible intervention of socio-cultural factors along similar lines in relation to height. While some evidence suggests 15 year old Indo-Fijian boys appear to positively value an increase in size (with weight and muscular development possibly equated with masculinity), the opposite appears to occur among Indo-Fijian females where ‘thinness’ appears to be associated with ‘attractiveness’ and femininity. This interpretation is consistent with the screen models seen in Indian films, TV and print media commonly available in Fiji. It might be additionally speculated that, generally speaking, there is a lack of slim indigenous Fijian role models with whom Fijian adolescent females might identify.

6.2.2 Mean height of children
Virtually identical mean heights for males and females aged 5 years from both ethnic communities were reported (Table 6.2.2).

<table>
<thead>
<tr>
<th>Specific Age (years)</th>
<th>Mean height (cm)</th>
<th>Male n</th>
<th>Female n</th>
<th>Mean height (cm)</th>
<th>Male n</th>
<th>Female n</th>
</tr>
</thead>
<tbody>
<tr>
<td>Under 1</td>
<td>70.7</td>
<td>69</td>
<td>66.2</td>
<td>47</td>
<td>68.4</td>
<td>22</td>
</tr>
<tr>
<td>5</td>
<td>113.1</td>
<td>63</td>
<td>113.8</td>
<td>52</td>
<td>111.5</td>
<td>26</td>
</tr>
<tr>
<td>10</td>
<td>139.4</td>
<td>52</td>
<td>140.0</td>
<td>59</td>
<td>137.6</td>
<td>24</td>
</tr>
<tr>
<td>15</td>
<td>167.2</td>
<td>45</td>
<td>163.1</td>
<td>23</td>
<td>168.4</td>
<td>25</td>
</tr>
<tr>
<td>17</td>
<td>173.1</td>
<td>45</td>
<td>164.8</td>
<td>51</td>
<td>171.9</td>
<td>27</td>
</tr>
</tbody>
</table>

However, by age 10 years, females from both ethnic communities were marginally taller than their male counterparts. This finding indicates an early growth spurt coinciding with the onset of menarche in females and is also consistent with a secular trend in height increase over the past century noted in international studies (Meredith, 1981).

By age 15 years, the mean heights of boys from both ethnic communities exceeded those of girls by 4.1cm among Fijians and 11.9cm among Indo-Fijians. By age 17 years, the 2004 survey indicated indigenous Fijian males were taller than females by 8.3cm while Indo-Fijian males were 13.2cm taller than their female counterparts.

Difference in mean heights of boys from both ethnic communities exceeded those of girls by 4.1cm among Fijians and 11.9cm among Indo-Fijians. In general terms, this is consistent with a differential increase in height between male and female adolescents noted in international studies. However, what is of interest is the degree of difference (almost 12 cm) evident among Indo-Fijian males and females – an increase almost three times greater than that reported for indigenous Fijians. Accounting for this substantially larger gender difference among Indo-Fijian adolescents is problematic in view of the relatively small sample sizes (Table 6.2.2 refers). Three possibilities are noted. First, the samples might be idiosyncratic and unrepresentative of the larger population – a limitation noted in chapter 3 Methodology. Second, it might be attributed to food intake and nutritional differences between the two genders. It is reasonable to speculate that a socio-cultural status difference between Indo-Fijian adolescent males and females might
have translated into a difference in food intake patterns with boys being nutritionally ‘favoured’ by parents over girls. Third, it is also possible that during adolescence, Indo-Fijian females voluntarily limit their food and nutrition intake in an attempt to emulate the physically slim role models commonly seen in Bollywood films. This explanation is consistent with close identification by Indo-Fijian adolescent girls with these popular exemplars of Indo-Fijian beauty seen on film, DVD and video in Fiji.

6.2.3 Growth pattern of children under 18 years
In comparison to the NCHS reference (Figure 6.2.1), growth patterns of Fijian and Indo-Fijian children found in the 2004 survey are consistent with other developing countries where physical growth of infants almost universally begins to lag behind by the middle of the first year and continues to do so for the ensuing years.

The major difference observed between the two ethnic groups is that growth of Fijian children is parallel to and above the NCHS reference by an average of 2.5% whereas growth of Indo-Fijian children runs parallel to but below the NHS reference by an average of 7.5%. These differences in growth patterns could be due to food intake and differences in dietary patterns of the two culturally different ethnic groups.

6.2.4 Comparison of 1993 and 2004 Surveys
The trend in weight and height increase for children under 18 years found in 2004 is similar to that reported in 1993.

Both surveys reported that females and males below 10 years of age were similar in weight and height with females slightly heavier than males. However, by 17 years, males
have outgrown females in both weight and height. This showed that growth patterns of adolescents in Fiji are consistent with the worldwide growth patterns of adolescents.

Growth patterns in 1993 and 2004 appeared also similar with Fijian children’s growth just above the NCHS reference while Indo-Fijian below the reference.

6.2.5 Discussion and conclusion
In general growth patterns appear to be consistent with those reported in other developing countries where growth begins to falter after the first year of life. These are generally very closely associated with weaning foods. There appears to be some slight improvement in the patterns of growth in both Fijian and Indo-Fijian in 2004 compared to the 1993 finding. However, the differences reported in both surveys i.e. Fijian (growth pattern is above the international standard) and Indo-Fijian (below the reference standard) are consistent with observations found in previous years.

6.3 Nutritional Status of Children Under 18 years
Nutritional status refers to the health of an individual or population resulting from (food) nutrient intake and use in the body. The results of 2004 survey showed that the majority of children were healthy based on conventional indicators (weight for age (W/A), height for age (H/A), and weight for height (W/H). Using the NCHS reference as a bench mark the data showed the proportion of children who were normal or healthy as follows:
- 75.2% of all males and 70.2% of all females were healthy by weight for age
- 92.5% males and 93% females were healthy by height for age
- 89.4% males and 90.3% were healthy by weight for height

6.3.1 Under-nutrition –Weight for Age
Under-nutrition (underweight, stunted and wasted as a consequence of poor (food) nutrient intake below that which meets nutrient needs) in children under 18 years are presented in Appendix 18, Table 6.5-6.7).

6.3.2 Underweight by weight for age
Using NCHS reference as a bench mark (W/A <60%-<80%), the 2004 data showed that the overall rate (all children combined) of underweight by weight for age in the 2004 survey was 12.8%.

More Indo-Fijian children in all age groups were underweight (Fig. 6.3.1). Amongst the under 5 years, the rates were 17.5 % for males and 14.1% for females; in the 5-9 year old children, the rates were 27.5% in males and 30.3% females (Fig. 6.3.2). The proportions of underweight amongst the 10-14 year olds were 28.8% in males and 26.5% in females (Fig. 6.3.3) while the 15-17 year old age group recorded the rates of 36.8% in males and 38.3% in females (Fig. 6.3.4).

Underweight was also seen amongst Fijians. The proportions of underweight Fijian children were 4.2% in males and 3.5% females aged less than 5 years (Fig.6.3.1). Amongst the 5-9 year old children, the rates were 2.9% in males and 4.7% in females (Fig.6.3.2). With the 10-14 year old children the rates were 10.5% in males and 9.8% in females (Fig. 6.3.3). Underweight by weight for age in children 15-<18 years was 12.5% in male and 0.9% female (Fig. 6.3.4).
The relatively higher rates of underweight in Indo-Fijians were also observed by area type. More underweight was found amongst Indo-Fijians compared to Fijians. In the rural areas, 28.7% of Indo-Fijian children were underweight compared to only 6.3% Fijian. In urban areas, 25.6% Indo-Fijian children and only 5.5% Fijian were underweight.

In summary, significant differences in rates of underweight by weight for age were found between the two major ethnic groups and gender overall. Higher rates were found in females compared to male children.
6.3.3 Stunting by height for age
Prolonged under-nutrition causes growth retardation in both height and weight. Impaired height gain is called “stunting”. Height gain is most affected by long-standing environmental and socio-economic factors - a reflection of general socio-economic conditions. Height for age was assessed as a percent of NCHS median.

The overall rate of short for age (H/A <90%) was 3.4%. Ethnic and age group differences existed.
The rates of Indo-Fijian children under 5 years who were short for age (Fig. 6.3.5) were similar in both genders (5.3% males, and 3.9% females). Amongst the 5-9 year olds, there were 2.9% males and 2.5% females (Fig. 6.3.6); with the 10-14 year olds, there were 3% males and 4.7% females (Fig. 6.3.7), while with the 15-17 year olds, the rates were 5.4% males and 5.3% females (Fig. 6.3.8).

Amongst Fijian children, the rates for the under 5 years of age were 4.3% in males and 3.5% in females (Fig. 6.3.5). For the 5-9 year olds, the rates were 1.8% in males and 1.6% in females (Fig. 6.3.6). The 10-14 year age group showed a rate of 0.4% in males and 3.4% in females (Fig. 6.3.7), while the 15-17 year age group recorded 5.5% in males and 1.9% in females (Fig. 6.3.8).

There was little difference in nutritional status of children (measured by height for age) living in rural and urban areas.

Using NCHS weight for age reference, more Indo-Fijian children were underweight in all age categories compared to Fijians. There were higher rates on underweight for age amongst females than in males, except at 15-17 years of age when a reverse appeared to have occurred with a relatively higher rate recorded amongst males.

**Figure 6.3.5**

*Height for age of children < 5 years by ethnicity and gender (as percentage of NCHS Median), 2004*
Figure 6.3.6
Height for age of children 5-9 years by ethnicity and gender (as percentage of the NCHS Median), 2004

Figure 6.3.7
Height for age of children 10-14 years by ethnicity and gender (as percentage of the NCHS Median), 2004
6.3.4 Wasting by weight for height
This parameter is a measure of acute under-nutrition or wasting in extremely
undernourished people who have had inadequate dietary intakes or an acute infection
within recent weeks. A decline in body weight is rapid but height changes very slowly in
children. For reporting purposes categories severe and underweight have been
combined and will be referred to as underweight (W/H <60% -<80%).

The proportion of all children found underweight by weight for height was 4.4%. Ethnic
differences were observed.

More Indo-Fijian children were underweight by weight for height. The proportions of
underweight by weight for height for Indo-Fijians less than 5 years of age were 7.1% in
males and 6.8% in females (Fig. 6.3.9); 12.3% in males and 11.2% in females aged 5-9
years (Fig. 6.3.10); and underweight by weight for height for the 10-14 years of age group was
found only in females (12%) (Fig.6.3.11). There was no reference data for the 15-17
years of age.

The proportion of underweight by weight for height amongst Fijians was lower generally.
For the under 5 years, the rates were 1.6% in male and 4.8% in female (Fig. 6.3.9); 2.2% in males and 1.4% in females aged 5-9 years (Fig. 6.3.10). There was underweight
found in the 10-14 year age group (Fig.6.3.11). No reference data was available for 15-
17 year old adolescents.
Figure 6.3.9
Weight for height of children < 5 years by ethnicity and gender (as percentage of NCHS Median), 2004

Figure 6.3.10
Weight for height of children 5-9 years by ethnicity and gender (as percent of NCHS Median), 2004
6.3.5 Over-nutrition

Over-nutrition children as a percentage of the NCHS median included those classified overweight by weight for age (≥120% W/A), tall for age by height for age (≥110% H/A) and overweight by weight for height (≥120% W/H) (Table 6.3.1 and Figure 6.3.12 refers).

The 2004 data showed overweight by weight for age (≥120% W/A) was 14.5%. When height for age was used, the rate of 'overweight' or tall for age (≥110% H/A) was 3.5%. Weight for height (≥120% W/H) showed an overall rate of 5.8%. It is noted that the results from the three criteria are different. The highest rate was recorded when weight for age was applied and the least was found when height for age was used as the criteria for assessment.

Table 6.3.1
Percentages of overweight children under 18 years
Using weight for age, height for age and weight for height, 2004

<table>
<thead>
<tr>
<th>Ethnicity</th>
<th>Age Group (years)</th>
<th>Overweight for Age ≥120% W/A</th>
<th>Tall for Age ≥110% H/A</th>
<th>Overweight for Height ≥120% W/H</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No</td>
<td>%</td>
<td>No</td>
<td>%</td>
</tr>
<tr>
<td>Fijians</td>
<td>0-4</td>
<td>539</td>
<td>14.3</td>
<td>538</td>
</tr>
<tr>
<td></td>
<td>5-9</td>
<td>534</td>
<td>16.5</td>
<td>532</td>
</tr>
<tr>
<td></td>
<td>10-14</td>
<td>471</td>
<td>15.2</td>
<td>471</td>
</tr>
<tr>
<td></td>
<td>15-17</td>
<td>236</td>
<td>18.2</td>
<td>236</td>
</tr>
<tr>
<td>Indo-Fijians</td>
<td>0-4</td>
<td>220</td>
<td>9.1</td>
<td>216</td>
</tr>
<tr>
<td></td>
<td>5-9</td>
<td>257</td>
<td>9.7</td>
<td>257</td>
</tr>
<tr>
<td></td>
<td>10-14</td>
<td>283</td>
<td>13.8</td>
<td>282</td>
</tr>
<tr>
<td></td>
<td>15-17</td>
<td>170</td>
<td>7.6</td>
<td>170</td>
</tr>
<tr>
<td>‘Others’</td>
<td>0-4</td>
<td>32</td>
<td>15.6</td>
<td>32</td>
</tr>
<tr>
<td></td>
<td>5-9</td>
<td>34</td>
<td>38.2</td>
<td>33</td>
</tr>
<tr>
<td></td>
<td>10-14</td>
<td>27</td>
<td>18.5</td>
<td>26</td>
</tr>
<tr>
<td></td>
<td>15-17</td>
<td>9</td>
<td>55.5</td>
<td>9</td>
</tr>
<tr>
<td>All</td>
<td>0-4</td>
<td>791</td>
<td>12.9</td>
<td>786</td>
</tr>
<tr>
<td></td>
<td>5-9</td>
<td>825</td>
<td>15.3</td>
<td>822</td>
</tr>
<tr>
<td></td>
<td>10-14</td>
<td>781</td>
<td>14.9</td>
<td>779</td>
</tr>
<tr>
<td></td>
<td>15-17</td>
<td>415</td>
<td>14.7</td>
<td>415</td>
</tr>
</tbody>
</table>
Relatively high proportions of Fijian children in all age groups were overweight by weight for age: 14.3% amongst the 0-4 years of age and 18.2% amongst 15-17 years of age. Overweight by W/A in Indo-Fijian children was lowest amongst the 15-17 year age group and appeared contrary to the trend found in Fijians. While both Fijians and Others appeared to show that rates of overweight increased with age, Indo-Fijians showed the opposite – overweight generally indicated a decrease with age when weight for age was used as an assessment tool, except for the 10-14 year age group.

The proportions of tall for age (by H/A) was generally lower compared to the results for weight for age. Children aged 0-4 years had the highest proportions of tall for age in all three ethnic groups (Fijian 10.6%, ‘Others’ 9.4% Indo-Fijian 4.6%). The pattern indicated that the proportion of tall for age decreased with age contrary to the trend in the proportion of weight for age.

Some differences were observed in the proportion of over-nutrition (overweight) in urban and rural areas. The proportions of over-weight in urban Fijian and Indo-Fijian children were 23.8% and 13.3% respectively compared to children in rural area (12.7% Fijian and 4.7% Indo-Fijian).

In summary, both under and over-nutrition exist in children in Fiji. Fijian children recorded the highest proportion of overweight in all age categories with rates appearing to be increasing with age (14.3% amongst 0-4 years of age and 18.2% with 15-17 year olds). Rates of overweight for age with Indo-Fijian children were below 10% (9.1% amongst 0-4 years of age and 7.6% amongst 15-17 year olds).

When height for age was applied, Fijians 0-4 yrs recorded higher rates (10.6%) but the rates appeared to decline with increased age (0.4% at 15-17 yrs). Indo-Fijian children showed similar trend with 4.6% at 0-4 years of age and 0.6% at 15-17 years of age. Using weight for height as criteria, the results showed that overweight increased with age in both Fijians and Indo-Fijians. The rate of overweight amongst Fijian children increased from 4.5% amongst 0-4 years of age to 11.6% with 10-14 year olds (more
than double) compared to 4.2% at 0-4 years of age to 13.8% with 10-14 year old Indo-Fijian children.

Although the rates differed amongst the three assessment criteria used, the overall results consistently indicated that overweight in children is an emerging issue in Fiji.

6.4 Comparison of 1993 and 2004 surveys

6.4.1 Underweight by Weight for Age
A comparison of underweight between 1993 and 2004 in the under 10 year old children by ethnicity is shown in Table 6.4.1

<table>
<thead>
<tr>
<th>Ethnicity</th>
<th>Sample Size</th>
<th>1993 (%)</th>
<th>2004 (%)</th>
<th>1993 (%)</th>
<th>2004 (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fijians</td>
<td>1020</td>
<td>4.0</td>
<td>3.8</td>
<td>7.0</td>
<td>15.4</td>
</tr>
<tr>
<td>Indo-Fijians</td>
<td>897</td>
<td>22.9</td>
<td>22.9</td>
<td>1.9</td>
<td>9.4</td>
</tr>
</tbody>
</table>

Overall, there has been a slight reduction in the rates of underweight in children less than 10 years of age in both ethnic groups with slightly better improvement in the rates amongst Indo-Fijians.

Both 1993 and 2004 results showed higher proportions of underweight for age at 5-9 years of age compared to 0-4 years of age. Both Fijian and Indo-Fijian 0-4 years of age recorded less than 5% whereas at 5-9 years of age, Fijian had 18.5% overweight for age in 1993 and 16.0% in 2004. The 5-9 year old Indo-Fijian recorded 32.8% in 1993 and 28.8% in 2004. There was a small decrease in the proportions of underweight for age for both Fijian and Indo-Fijian 0-4 years and 5-9 year old in 2004 compared to 1993. However, the trend remained that underweight by weight for age increased with age.

Data for 10-17 year old children (Table 6.4.2) showed that in general, the rates of underweight by weight for age (<80% W/A) and stunting (<90% H/A) have decreased between 1993 and 2004. A closer examination revealed the ethnic trend observed in the younger age groups with Indo-Fijian having higher rates compared to Fijian. For example, in 1993, the proportion of 10-17 year old underweight Indo-Fijian males was 57.6% whereas the 2004 data showed a rate of 31.8%. In contrast male Fijians of the same age group (10-17 years) showed a rate of 18.5% in 1993 and 11.3% in 2004. Similarly, Indo-Fijian females showed a rate of 45.4% in 1993 and 31% in 2004 whereas Fijian females’ rate was 12% in 1993 and 7% in 2004.

6.4.2 Stunted by Height for Age
Data showed a slight increase in rates of stunted children by height for age in 2004 compared to that of 1993. The rate for Fijians aged 0-4 years of age was 0.3% in 1993 and increased to 3.9% in 2004, a significant increase of 3.6%. A similar trend was found amongst Indo-Fijian 0-4 years of age which had increased from 2.4% in 1993 to 4.6% in 2004. Stunting in the 5-9 year age group for Fijians also increased slightly from 0.7% in 1993 to 1.7% in 2004. The rates for the 5-9 years of age Indo-Fijians however
decreased from 3.7% in 1993 to 2.7% in 2004. A small reduction in rates with age was observed in 2004.

The proportion of stunted children amongst the 10-17 years of age was much lower compared to the results of weight for age. Stunting in Indo-Fijian male children was 9.8% in 1993 but had decreased to 3.8% in 2004. Female Indo-Fijians showed similar results with 4.0% in 1993 and 4.9% in 2004. The proportion of stunted Fijian males was 5.3% in 1993 and 4.1% in 2004 while rates for Fijian females were similar in the two surveys (2.4% in 1993 and 2.9% in 2004).

### 6.4.3 Wasted by Weight for Height

No clear trend was found when comparing the 1993 and 2004 findings. The rate amongst the 0-4 year age group for Fijian was 2.1% in 1993 and 3.2% in 2004. Rates for Indo-Fijian 0-4 year age group was similar in the two surveys (7.2% in 1993 and 7% in 2004). However, data showed an increase in rates for the 5-9 year age group. For Fijian, the rate increased from 0% in 1993 to 1.8% in 2004 while the Indo-Fijian rate increased from 8.2% in 1993 to 11.8% in 2004 (Table 6.4.2). Indo-Fijian children had higher rates of wasted by weight for height and appeared to increase with age compared to Fijian.

### Table 6.4.2

<table>
<thead>
<tr>
<th>Ethnicity</th>
<th>Age Group (Years)</th>
<th>Year</th>
<th>Underweight (Weight for Age&lt;80% of the NCHS Median)</th>
<th>Stunted (Height for Age&lt;90% of the NCHS Median)</th>
<th>Wasted (Weight for Height &lt;80% of the NCHS Median)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Sample Size</td>
<td>No.</td>
<td>%</td>
</tr>
<tr>
<td>Fijians</td>
<td>0-4</td>
<td>1993</td>
<td>327</td>
<td>15</td>
<td>4.6</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2004</td>
<td>539</td>
<td>21</td>
<td>3.9</td>
</tr>
<tr>
<td></td>
<td>5-9</td>
<td>1993</td>
<td>278</td>
<td>11</td>
<td>4.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2004</td>
<td>534</td>
<td>20</td>
<td>3.7</td>
</tr>
<tr>
<td>Indo-</td>
<td>0-4</td>
<td>1993</td>
<td>254</td>
<td>47</td>
<td>18.5</td>
</tr>
<tr>
<td>Fijians</td>
<td></td>
<td>2004</td>
<td>220</td>
<td>35</td>
<td>15.9</td>
</tr>
<tr>
<td></td>
<td>5-9</td>
<td>1993</td>
<td>242</td>
<td>78</td>
<td>32.2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2004</td>
<td>257</td>
<td>74</td>
<td>28.8</td>
</tr>
<tr>
<td>Others</td>
<td>0-4</td>
<td>1993</td>
<td>37</td>
<td>3</td>
<td>8.1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2004</td>
<td>32</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td></td>
<td>5-9</td>
<td>1993</td>
<td>25</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2004</td>
<td>34</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>All</td>
<td>0-4</td>
<td>1993</td>
<td>618</td>
<td>65</td>
<td>10.5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2004</td>
<td>791</td>
<td>56</td>
<td>7.1</td>
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<tr>
<td></td>
<td>5-9</td>
<td>1993</td>
<td>545</td>
<td>89</td>
<td>16.3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2004</td>
<td>825</td>
<td>94</td>
<td>11.5</td>
</tr>
</tbody>
</table>
6.4.4 Waterlow Classification

According to the Waterlow classification, the majority of children under 10 years of age were found normal in both 1993 (95%) and 2004 (93%).

Among Fijians and ‘Others’, 94.1% of the children under 5 years of age and 96.8% of those aged between 5 and 9 years were normal. In 1993 the figures stood at 97% and 100% respectively. Similarly the proportion of Indo-Fijian children in the normal category also declined in 2004. Amongst the under 5 year old, 88.8% were classified normal as well as 85% among those aged 5-9 years of age compared to 92.2% and 89.3% respectively, in 1993.

There was a slight increase in prevalence of acute malnutrition and stunting among both Fijian and Indo-Fijian children under 5 years of age. However the rates in Indo-Fijian children were higher compared to Fijian children. In 2004 the prevalence of acute malnutrition was 3% and 7% for Fijian and Indo-Fijian children respectively compared to 2.1% and 6.3% in 1993. The prevalence of stunting was 2.8% and 4.2% in Fijians and Indo-Fijian in 2004 compared to 0.3% and 0.8% in 1993.

Of the malnourished cases identified amongst the 5-9 year categories, more Indo-Fijian children were acutely malnourished and stunted compared to Fijian children. In 1993 there were no Fijians affected in this age group but in 2004 1.6% was acutely malnourished, 1.6% was stunted and 0.2% chronically malnourished. The proportion of Indo-Fijian children affected in 2004 was 11.8% and 2.9% for acute malnutrition and stunting whereas in 1993 1.6% was acutely malnourished, 1.6% was stunted and 0.2% was chronically malnourished.

6.4.5 Overweight

Results for over-nutrition seen as overweight either by W/A (≥120%), H/A (≥110%) or W/H (≥120%) are shown in Table 6.4.3 (under 10 years of age) and Table 6.4.2 (10-17 year old). The 1993 and 2004 data clearly indicated that overweight in children had increased since 1993. For the 0-4 year age group, overweight by weigh for age had increased from 4.5% in 1993 to 12.9% in 2004; tall for age increased from 1.6% in 1993 to 8.9% in 2004 and overweight for height had increased from 1.6% in 1993 to 4.5% in 2004.

For the 5-9 year age group, overweight had also increased from 5.9% in 1993 to 15.3% in 2004; tall for age increased from 1.5% in 1993 to 3.2% in 2004 and overweight for height increased from 3.1% in 1993 to 6.2% in 2004. Corresponding increases were also found between 1993 and 2004 when examined by ethnic groups, gender and age groups.

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2 The classification is a functional one aimed at helping to decide on the interventions to be undertaken to address child malnutrition. It separates acute malnutrition from those with chronic malnutrition. The acutely malnourished children are those with adequate height for age but inadequate weight for height (wasted). The stunted children are those with inadequate height for age. The chronically malnourished children are those with inadequate height for age (stunted) and weight for height (wasted).
Table 6.4.3
Comparison of overweight rates in children less than 10 years, 1993 & 2004

<table>
<thead>
<tr>
<th>Ethnicity</th>
<th>Age Group (Yrs)</th>
<th>Year</th>
<th>Overweight (Weight for Age)</th>
<th>Tall for Age (H/A)</th>
<th>Overweight (Weight for Height)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>No</td>
<td>%</td>
<td>No</td>
</tr>
<tr>
<td>Fijians</td>
<td>0-4</td>
<td>1993</td>
<td>327</td>
<td>5.8</td>
<td>539</td>
</tr>
<tr>
<td></td>
<td>2004</td>
<td></td>
<td>538</td>
<td>10.6</td>
<td>531</td>
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<tr>
<td></td>
<td>5-9</td>
<td>1993</td>
<td>278</td>
<td>7.2</td>
<td>534</td>
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<td>2004</td>
<td></td>
<td>532</td>
<td>4.1</td>
<td>498</td>
</tr>
<tr>
<td>Indo-Fijians</td>
<td>0-4</td>
<td>1993</td>
<td>254</td>
<td>1.6</td>
<td>220</td>
</tr>
<tr>
<td></td>
<td>2004</td>
<td></td>
<td>216</td>
<td>4.6</td>
<td>215</td>
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<tr>
<td></td>
<td>5-9</td>
<td>1993</td>
<td>242</td>
<td>3.7</td>
<td>257</td>
</tr>
<tr>
<td></td>
<td>2004</td>
<td></td>
<td>257</td>
<td>0.8</td>
<td>245</td>
</tr>
<tr>
<td>‘Others’</td>
<td>0-4</td>
<td>1993</td>
<td>37</td>
<td>13.6</td>
<td>32</td>
</tr>
<tr>
<td></td>
<td>2004</td>
<td></td>
<td>32</td>
<td>9.4</td>
<td>32</td>
</tr>
<tr>
<td></td>
<td>5-9</td>
<td>1993</td>
<td>25</td>
<td>12.0</td>
<td>34</td>
</tr>
<tr>
<td></td>
<td>2004</td>
<td></td>
<td>33</td>
<td>6.1</td>
<td>28</td>
</tr>
<tr>
<td>All</td>
<td>0-4</td>
<td>1993</td>
<td>618</td>
<td>4.5</td>
<td>791</td>
</tr>
<tr>
<td></td>
<td>2004</td>
<td></td>
<td>786</td>
<td>8.9</td>
<td>778</td>
</tr>
<tr>
<td></td>
<td>5-9</td>
<td>1993</td>
<td>545</td>
<td>5.9</td>
<td>825</td>
</tr>
<tr>
<td></td>
<td>2004</td>
<td></td>
<td>822</td>
<td>3.2</td>
<td>771</td>
</tr>
</tbody>
</table>

Data for the 10-17 year age group (Table 6.4.4) showed that overweight in 2004 had also increased since 1993. The rate for male Fijian had increased by 3.7% over 1993 (7.3% in 1993 and 11% in 2004), female Fijian had increased by 8.5% (13.4% in 1993 and 21.9% in 2004), overweight in Indo-Fijian male increased by 10% (2.9% in 1993 and 13% in 2004), while overweight in Indo-Fijian female increased by 6.2% (4% in 1993 and 10.2% in 2004).

Table 6.4.4
Nutritional status of children 10 to 17 years by ethnicity and gender, 1993 and 2004

<table>
<thead>
<tr>
<th>Ethnicity</th>
<th>Gender</th>
<th>Year</th>
<th>n</th>
<th>Weight For Age</th>
<th>Height for Age</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Underweight</td>
<td>Stunted</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>&lt;80%</td>
<td>&lt;2 SD</td>
</tr>
<tr>
<td>Fijians</td>
<td>Male</td>
<td>1993</td>
<td>205</td>
<td>18.5</td>
<td>4.4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2004</td>
<td>365</td>
<td>11.3</td>
<td>2.2</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>1993</td>
<td>209</td>
<td>12.0</td>
<td>0.4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2004</td>
<td>342</td>
<td>7.0</td>
<td>0.9</td>
</tr>
<tr>
<td>Indo-Fijians</td>
<td>Male</td>
<td>1993</td>
<td>205</td>
<td>57.6</td>
<td>28.3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2004</td>
<td>208</td>
<td>31.8</td>
<td>11.6</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>1993</td>
<td>196</td>
<td>45.4</td>
<td>13.8</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2004</td>
<td>245</td>
<td>31.0</td>
<td>11.0</td>
</tr>
<tr>
<td>Others</td>
<td>Male</td>
<td>1993</td>
<td>17</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2004</td>
<td>20</td>
<td>15.0</td>
<td>5.0</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>1993</td>
<td>23</td>
<td>21.7</td>
<td>0.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2004</td>
<td>16</td>
<td>6.3</td>
<td>0.0</td>
</tr>
</tbody>
</table>

Using height for age, the proportion of Fijian males that were tall for age increased from none in 1993 to 1.1% in 2004 and the proportion of tall for age Indo-Fijian male
increased from 0.5% in 1993 to 2.4% in 2004. Proportions of tall for age in Fijian and Indo-Fijian females were similar for both 1993 and 2004.

In summary, the data shows that there has been a decline in the proportion of underweight for age children and a corresponding increase in overweight. Likewise there has been a decrease in ‘stunted’ and an increase in ‘tall for age’ children in both Fijian and Indo-Fijian. The increasing trend in overweight in children appears to be a worldwide phenomenon that has prompted international organizations such as WHO and the International Obesity Society to call for action member countries to address the problem. Fiji needs to begin to plan to address the issue. Appropriate intervention strategies need to identified and implemented.

6.5 Discussion and conclusion
- 75.2% of all males and 70.2% of all females were found to be of appropriate weight for age representing a combination of both linear growth and body proportions.
- 92.5% males and 93% females were healthy by height for age.
- 89.4% males and 90.3% were healthy by weight for height.

Overall, under-weight for age had decreased from 16.3% in 1993 to 12.8% in 2004. Stunting and wasting rates were similar for the two years. However, the overall results mask important ethnic and age group differences.

There was a slight increase in the proportion of acute malnutrition and stunting among both Fijian and Indo-Fijian. The proportion of under-nutrition was higher in Indo-Fijian compared to Fijian. This trend has been observed and well documented over the past decades. It has been attributed to cultural differences in dietary patterns between the two ethnic groups.

Childhood under-nutrition is characterized by growth failure in body weight and height that are less ideal than the child’s age especially for children under 5 years. Inadequate food intake or severe and repeated infections or a combination of both invariably affect child’s growth. Growth patterns observed in both Fijian and Indo-Fijian appeared to reflect a decline in growth curve between 2-3 months of age, signifying a problem that requires addressing.

The survey showed that both under-nutrition and over-nutrition co-exist amongst children in Fiji. While under-nutrition is still a problem, increasing rates in overweight have been observed. It is not clear whether the increase in overweight is a result of improvement in living standard, sanitation, and water supply or whether it is a function of inappropriate food choices or a combination of some or all of the above.

6.6 Social factors that affect nutrition and health
The inter-relationships of nutritional status and a number of social factors such as occupation, education, sanitation and household size are well documented.

6.6.1 Education level and employment
More detailed results of these two factors have been presented in Chapter 4. Only the key findings will be included here.
Education background
Education background of mothers is positively associated with improved nutritional status of children. The survey did not specifically ask for the mother’s education level but rather the question was directed to the general adult population in the survey. 35% of the adult sample had primary schooling; 26% secondary schooling up to Form 4; 24% had attended Forms 5-7; and almost 12% had some form of post-secondary education or training. Of the 4% who had never attended school, the largest group was Indo-Fijian females.

Occupational profile
Of the adult sample, 45% were urban residents of whom 21% were engaged as ‘service and shop/market workers’; 14% were in ‘elementary’ occupations; 13% were ‘plant and machinery operators’; 11% ‘craft and related workers’; 10% professionals; and 10% ‘clerks’. Of the 55% who lived in rural areas, 55% were engaged in ‘agriculture, fishing and forestry’; 11% were ‘service workers and sales assistants’; and 8% were in ‘elementary occupations’.

Employment and income status
Of the 4,515 respondents aged 18 years and over, 39% “were earning some money for a living” while 61% were not. An ethnic breakdown indicated that 33% of Fijians interviewed earned an income compared to 46% of Indo-Fijians and 46% of ‘Others’. An urban/rural breakdown indicated 45% of urban Fijians earned an income, 48% of Indo-Fijians and 49% of ‘Others’. In rural areas, 27% of Fijians, 43% of Indo-Fijians and 29% of ‘Others’ earned an income.

Overall, stated occupation was the only source of income for over 90% of all respondents (Fijians 90%; Indo-Fijians 93%; ‘Others’ 95%). Marginally more rural residents indicated alternative income source(s): Fijian 13%; Indo-Fijians 12%, with less than half (45%) deriving additional income from farming and fishing. Of those not working in paid employment, 53% of Fijians and 67% of Indo-Fijians were ‘housewives/homemakers’. 16% of Fijians and 12% of Indo-Fijians were ‘unemployed’.

Household income and food expenditure
Mean weekly income and food expenditure varied by ethnicity and urban/rural location. Mean weekly urban income was $175 (Indo-Fijian), $180 (Fijian) and $215 (‘Others’). Mean weekly urban food expenditure as a percentage of weekly income was 37% (Fijian), 39% (Indo-Fijian) and 41% (‘Others’).

In rural areas, mean weekly income for Fijians was $77, for ‘Others’ $89, and for Indo-Fijians $106, while mean weekly food expenditure as a percentage of income was 38% Fijians, 48% Indo-Fijians, and 39% ‘Others’.

6.6.2 Malnutrition-infection complex
The 2004 Nutrition survey collected information on only three factors which are known to relate to malnutrition-infection complex namely sanitation, water supply and child weight for age. These factors have already been presented in Chapters 4 and 5. Only key findings of two of the critical areas will be presented as part of this section.
Sanitation
The three most common types of human waste disposal were flush toilets (60% of survey sample), followed by water-sealed toilets (22%) and pit latrines (17%).

Sources of water supply
90% of those surveyed had access to either individual or communal piped water. Dependency on well water appeared to have declined from approximately 15% in 1993 to around 5% in 2004.

6.6.3 Discussion and conclusions
Protein Energy Malnutrition (PEM) was the focus of discussion for the 1993 report with its clinical consequences and concerns. While this issue will remain a matter for intervention on a one on one basis, socioeconomic problems are largely responsible for the problem. Overall the issue of overweight and its clinical consequences have now been added to the issue of under-nutrition.

Overweight
The issue of overweight at an international level has reached such proportions that it is considered an epidemic and WHO has declared obesity as a disease in its own right. Fiji is following this trend.

The gravest concern is for the children who are obese in many countries. Type 2 diabetes is now being reported in children, a matter that was never considered possible in the past. As a lifestyle issue it afflicts urban populations more than rural populations, and this survey has clearly shown that children in urban areas are more likely to be overweight than their rural counterparts. International authorities indicate that as much as food choices including fast food and fatty, sugary foods are contributing to this epidemic, it is the lack of exercise, as when children spend their time in front of computers, electronic games and television rather than being outside playing, which has more impact on obesity. Unfortunately, this is now part of the lifestyle of the Fiji-born child. Health authorities need to start planning now to address the issue as part of preventive strategies.

Growth Monitoring
Based on the results of the survey there is a need for proper growth monitoring to be undertaken, not only during infancy but also during primary school age. Monitoring enables authorities not only to watch out for the undernourished child, but to watch for the overweight children as well in order to detect and address the problem early. This needs to be done within the whole family context.

A new alert is now needed to assist the health and medical professionals to monitor the weight and exercise patterns of children in order to prevent any further increase in the incidence of child overweight and obesity.
7.0 RESULTS PART IV: Nutritional Status Of Adults 18 Years And Over

There has been a worldwide trend in increases in adult overweight and obesity. What was once regarded as a problem for developed countries only has now reached the Pacific, and Fiji has not been spared. This chapter presents the findings of the 2004 survey on this issue.

Key Results

- Differences in weight and height between Fijians and Indo-Fijians observed in early years continued into adulthood with Fijians being heavier and taller than Indo-Fijians.
- The mean weight at 18 years of age was 61.7kg and this increased to 70.5kg at 25 years of age, 76kg at 35 years of age, and 77kg at 55 years of age.
- The maximum peak weight in males was recorded at 35 years of age amongst Fijians and at 55 years for Indo-Fijians.
- There had been a general increase in weight in 2004 compared to 1993: Fijian males were heavier by 5.2kg, Indo-Fijians males were heavier by 5kg, Fijian females were 4.8kg heavier, and Indo-Fijian females were 4.5kg heavier.
- Mean heights of adults found in 2004 was similar to the 1993 findings.
- Both 2004 and 1993 surveys showed that Fijian males on average were taller by 6cm than Indo-Fijians males and Fijian females were taller by 8cm than Indo-Fijian female counterparts.
- By BMI, the 2004 survey showed only 37.6% were within the normal BMI; 32.3% were overweight; 23.9 obese and 6.1 were underweight. The majority of those in the normal BMI range were Indo-Fijians; the majority of those in the overweight and obese categories were Fijians and the majority of those in the underweight category were Indo-Fijians.
- BMI increased with age with highest mean at 55 years of age: Female Fijians recorded 31; male Fijians was 30; Indo-Fijian males and females recorded similar figures at 27.6 and 27.5 respectively.
- Females showed peak increase in BMI at 25 years (by 4.7 points in Fijians and by 3.5 points in Indo-Fijians) while males showed peak increase in BMI at 35 years of age by 3.6 points in Fijians and 3.3 points in Indo-Fijians.
- Indo-Fijians consistently had lower BMI compared to Fijians.
- The proportion of those found overweight and obese were similar between rural and urban dwellers.
- Mean waist circumference of Fijians was higher compared to Indo-Fijians.
- Peak waist measures were recorded at age 55 years of age for both ethnic groups and gender (Fijian males 98.5cm, Fijian females 100cm; Indo-Fijian males 98.3cm, and Indo-Fijian females 90.2cm).
- By waist circumference, more females (50.8%) than males (14.5%) had increased risk of developing NCDs.

7.1 Introduction

Body Mass Index (BMI) (Weight (kg) /Height m²) and waist circumference were used to assess the nutritional status of adult population in this survey. Although the 1993 survey had applied the recommended BMI cutoff-points for the Pacific to assess nutritional status of adults, this survey will only apply the WHO cut-points to allow for comparisons
with other countries. Waist circumference was an additional indicator used in the 2004 survey because it better correlates to abdominal fat content (Gibson, 2005). Related table of results on mean weight and height of adults are presented in Appendix 18, Tables 6.1-6.4).

Mean weight, height, BMI and waist circumference for adults in this survey have been re-analyzed and are reported according to specific ages such as 18yrs, 25yrs, etc, rather than grouped age-categories e.g. 18-24yrs, 25-34yrs etc. Age specific results are more sensitive to temporal changes over time whereas grouped age-categories are averages of averages and as such are far less sensitive and effective as indicators because they mask the true picture.

“Others” have been excluded from the discussion of results because the numbers were far too small.

7.2 Mean weight and height

7.2.1 Mean weight of adults 18-55 years

Fijians
A comparison of mean weight for indigenous Fijians between 18 – 55 years of age indicated adult males were generally heavier than adult females with the exception of those aged 25 years. While Fijian men aged 18 years were 4.5kg heavier than women, and 35 year old men were 7.6kg heavier, 25 year old men were reported to be 2.3kg lighter than their female counterparts (Table 7.2.1). This result may be partly explained by the fact that young Fijian men at this age often focus on training for team sports like rugby or soccer. The hard training regime may be a factor in maintaining weight and preventing weight gain.

Indo-Fijians
Within the Indo-Fijian community, males between 18 – 55 years of age were consistently heavier than women by 8.4kg at 18 years, 5.4kg at age 25 years, 7.5kg at 35 years, 2.4kg at 45 years and 11.4kg at 55 years (Table 7.2.1).

In summary, Fijian and Indo-Fijian males appeared to have gained maximum weight at 35 years of age. Although Fijians were generally heavier than Indo-Fijians and males were heavier than females, the differences in weight between genders were greater within the Indo-Fijian community compared to within the Fijian community. Indo-Fijian females were the lightest compared to the Fijian females and males of both ethnic group.

<table>
<thead>
<tr>
<th>Specific Age (years)</th>
<th>Fijians</th>
<th>Indo-Fijians</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Male</td>
<td>Female</td>
</tr>
<tr>
<td></td>
<td>mean</td>
<td>n</td>
</tr>
<tr>
<td>18</td>
<td>70.9</td>
<td>35</td>
</tr>
<tr>
<td>25</td>
<td>78.9</td>
<td>22</td>
</tr>
<tr>
<td>35</td>
<td>89.3</td>
<td>31</td>
</tr>
<tr>
<td>45</td>
<td>88.4</td>
<td>18</td>
</tr>
<tr>
<td>55</td>
<td>86.3</td>
<td>19</td>
</tr>
</tbody>
</table>

* Difference in weight between males and female
By area type, mean weight of total adult population was higher in urban area (74.8kg) than rural dwellers (70.9kg). In other words, urban dwellers were heavier by 3.9kg than rural dwellers (Appendix 18, Table 6.2).

Fijian urban dwellers were 19kg heavier than their Indo-Fijian counterpart (84.3kg, and 65.3kg respectively). Amongst rural dwellers, Fijians were heavier by 15.8kg than their Indo-Fijian counterpart (78.8kg and 63kg respectively).

Urban dwellers were heavier than rural dwellers, Fijians were heavier than Indo-Fijians and adults in the age range 35-44yrs in both urban and rural areas were the heaviest age-group.

Assuming certain biological and metabolic similarities within the samples from both ethnic communities, these results lend tentative support to the notion that socio-cultural factors play an important role in body weight patterns. In other words, socio-cultural factors and lifestyle preferences appear to account for weight differences when the two ethnic communities are compared. The substantial difference between indigenous Fijian men and women at age 25 years appears to indicate a combination of socio-cultural factors. However, in the absence of other data, the identity of these factors remains essentially speculative.

### 7.2.2 Mean height

In general, Fijians were taller than Indo-Fijians by 6.8cm. Male Fijians were taller by 6.2cm than Indo-Fijians. Female Fijians were taller by 7.3cm than their Indo-Fijian female counterpart. Males were generally taller than females (Table 7.2.2; Figure 7.2.1). It was difficult to see a clear pattern in height increase across ethnic groups and gender.

#### Table 7.2.2

<table>
<thead>
<tr>
<th>Specific Age (years)</th>
<th>Fijian</th>
<th>Indo-Fijian</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Male</td>
<td>Female</td>
</tr>
<tr>
<td><strong>18</strong></td>
<td>176.7</td>
<td>35</td>
</tr>
<tr>
<td><strong>25</strong></td>
<td>177.4</td>
<td>22</td>
</tr>
<tr>
<td><strong>35</strong></td>
<td>176.5</td>
<td>31</td>
</tr>
<tr>
<td><strong>45</strong></td>
<td>179.2</td>
<td>18</td>
</tr>
<tr>
<td><strong>55</strong></td>
<td>170.6</td>
<td>19</td>
</tr>
</tbody>
</table>

* Difference in height between males and females

Unlike weight, differences in height between males and females within ethnic groups appeared similar. Indo-Fijian females were the shortest out of all the groups.

By area type, mean height of urban dwellers and rural dwellers were similar (166.2cm and 166.4cm respectively).

Mean height of urban Fijians was 7.4cm more than Indo-Fijian urban dwellers (169.9cm in Fijian and 162.5cm in Indo-Fijian respectively). Amongst rural dwellers, mean height of Fijian was 6.4cm more than Indo-Fijians (169.6cm in Fijian and 163.2cm in Indo-Fijians).

In summary, the results showed that Ethnic Fijians were heavier (81.3kg) compared to Indo-Fijians (64.4kg). Fijians were taller (170cm).
Males on average were almost 4.8 kg heavier and nearly 13 cm taller than females. Weight was heaviest at 35yrs (male 84.3 kg and female 81 kg). The 25-34yr age-group category appeared to be the tallest (males 174.8 cm and females 162.5 cm).

Urban dwellers were generally heavier and taller than rural dwellers. Fijian urban dwellers tended to be heavier and taller than their Indo-Fijian counterparts in both urban and rural areas.

7.2.4 Comparison of weight and height between 1993 and 2004
Increases in weight were observed in 2004 compared to 1993 with both ethnic groups and gender (Figure 7.2.2)

Fijian males were heavier by 5.2 kg in 2004 compared to their 1993 counterparts. Fijian females also increased their weight by 4.8kg in 2004 over their 1993 counterparts. Similar increases in weight were observed within the Indo-Fijians. Males were heavier by 5kg in 2004 compared to their 1993 counterparts while Indo-Fijian females were heavier than their 1993 counterparts by 4.5kg.

Figure 7.2.2 shows relative weight gain curve from 10 – 65+ years. Of concern is the apparent steeper curve in weight gain observed between 10-24 years. The rate of weight gain during adolescents and early adulthood should be targeted for intervention programmes aimed at reducing obesity. It is also noted from the graph that maximum weight gained is around 35-54 years of age.

While the population had not gained in height during the last decade, they have grown heavier. The implications of these weight gain to health and NCD is course for concern.
A comparison of height of adults between 1993 and 2004 showed a similar trend in height increase between the two surveys (Figure 7.2.3). Males are generally taller than females. Fijian males were taller by 6 cm than Indo-Fijian males in both 1993 and 2004. Fijian females were taller by 8 cm than Indo-Fijian females in 1993 and 2004.
7.2.5 Discussion and conclusions
Differences in weight trend between Fijians and Indo-Fijians have persisted over the years with Fijians generally heavier than Indo-Fijians. Although there have been some increase in weight reported in 2004 in both ethnic groups compared to 1993, the differences could not be explained with certainty as real differences due to the study design.

Assuming certain biological and metabolic similarities within the samples from both ethnic communities, the weight and height results lend tentative support to the notion that socio-cultural factors play an important role in body weight and height patterns. In other words, socio-cultural factors and lifestyle preferences appear to account for weight and height differences when the two ethnic communities are compared. The substantial difference between indigenous Fijian men and women at age 25 years appears to indicate a combination of socio-cultural factors. However, in the absence of other data, the identity of these factors remains essentially speculative.
7.3 Body Mass Index (BMI)

7.3.1 Mean BMI
Overall results of mean BMI of adults by ethnicity, age group, gender and area type in 2004 are shown in Appendix 19, Table 7.1.

The mean BMI of all adults in this survey was 27. In general, Fijians had higher mean BMI (27.9) than Indo-Fijians (23.8). By ethnicity and gender, Fijian women had higher mean BMI (29), Fijian men recorded a mean BMI of 26.7, Indo-Fijian women had a mean BMI of 24.4 and Indo-Fijian men had the lowest mean BMI of 23.3. Fijian females consistently had higher BMI than males (by 2 points at 18 years, 35 years, 45 years) (Table 7.3.1). Indo-Fijians consistently had lower BMI than Fijians. BMI for Indo-Fijian males and females were similar – at mean BMI of 20 at 18 years increasing to 27.6 at 55 years.

Although females had higher mean BMI compared to males generally, a closer examination showed that females showed peak increase in BMI at 25 years (by 4.7 points in Fijians and by 3.5 points in Indo-Fijians). Males showed peak increase in BMI at 35 years of age by 3.6 points in Fijians and 3.3 points in Indo-Fijians. These peaks have important implications for targeted health communications programmes to prevent obesity.

There is a gradual increase in BMI with age which is consistent with the norm. The results confirm that in general, BMI is both age- and gender-related.

<table>
<thead>
<tr>
<th>Specific Age (years)</th>
<th>Fijians</th>
<th></th>
<th>Indo-Fijians</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Male</td>
<td>Female</td>
<td>Male</td>
<td>Female</td>
</tr>
<tr>
<td></td>
<td>mean</td>
<td>n</td>
<td>mean</td>
<td>n</td>
</tr>
<tr>
<td>18</td>
<td>22.7</td>
<td>35</td>
<td>24.6</td>
<td>35</td>
</tr>
<tr>
<td>25</td>
<td>25</td>
<td>22</td>
<td>29.3</td>
<td>34</td>
</tr>
<tr>
<td>35</td>
<td>28.6</td>
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<td>29.3</td>
<td>34</td>
</tr>
<tr>
<td>45</td>
<td>27.5</td>
<td>18</td>
<td>29.5</td>
<td>22</td>
</tr>
<tr>
<td>55</td>
<td>30</td>
<td>19</td>
<td>31.4</td>
<td>14</td>
</tr>
</tbody>
</table>

Overall by area type, mean BMI in urban areas was higher (28.9) compared to rural areas (25.8).

7.3.2 Health status assessed by BMI
Using WHO cutoffs as the criteria, 6.1% of the adult population was underweight (BMI < 18.5), 37.6% were within the normal or healthy range (BMI 18.5-24.9); 32.3% were in the overweight category (BMI 25-29.9); and 23.9% were obese (BMI ≥ 30) (Figure 7.3.1).
In other words, 56.2% of the population surveyed was overweight and obese. Combined with underweight, 62.3% of Fiji’s adult population was unhealthy. This is an alarming picture – that less than 40% of the adult population is healthy.

By gender, more males (46.2%) were within the normal/healthy range compared to females (29.0%). The proportion of overweight in females and males were similar (32.1% and 32.6% respectively). Twice as many females than males were obese (32.7% and 15.1%). At the opposite end of the scale, slightly more males than females (6.6% and 5.6%) were underweight (Appendix 19, Table 7.2).

By ethnic group and gender (Figure 7.3.2), Indo-Fijian males and females showed the highest percent of underweight (14.6% and 11.9% respectively), while Fijians had the lowest proportion.

Indo-Fijian males had the highest percent in the normal BMI range (55.3%) followed by Fijian males (39.8%), Indo-Fijian females (37.7%). ‘Others’ males showed lower percentages of ‘normal” (37.2%).

From highest to lowest, the proportion of overweight were: ‘Others’ males (38.8%), Fijian males (38.3%), Fijian females (34.1%), Indo-Fijian females (31.1%), Other females (26.5%) and Indo-Fijian males 23.6%.

On average, females showed the highest percentage of overweight (‘Others’ 26.5%, Fijians 34.1%). Indo-Fijian females recorded 31.1%.

The proportion of obese adults from highest to lowest was: ‘Others’ female (50%), Fijian females (41.7%), ‘Others’ males (24.5%), Fijian males (21.2%), Indo-Fijian females (19.3%) and Indo-Fijian males (6.5%).
Examined by area type (Fig. 7.3.3), the majority of adults (40.1%) living in rural areas were in the healthy weight range and relatively high proportions were in the overweight and obese range (33% overweight and 21.7% obese). Similar results were found amongst those living in urban areas with 33.2% within the healthy BMI range, 31.6% overweight and 28% obese. Underweight was also observed in both areas – 7.2% underweight in urban areas and 5.1% in rural areas.

To summarize, the 2004 results showed that only 37.6% of the adult population surveyed were healthy. About two thirds of the adult populations were unhealthy (56.2% overweight and obese, and 6% underweight) In other words, for every healthy adult, there were 1.5 unhealthy persons.
7.3.3 Comparison of Nutritional Status by BMI between 1993 and 2004
The 2004 data showed an increase of 6.4% in the proportion of adults with healthy BMI range (37.6% in 2004 and 44% in 1993). There was also some improvement in the proportion of under weight – 23.3% in 1993 and only 6.1% in 2004. However, the proportions of overweight and obesity have worsened (increased) since 1993 (overweight was 22.9% in 1993 and 32.3% in 2004; obesity was 9.8% in 1993 and 23.9% in 2004).

A detailed comparison of the 1993 and 2004 data, using the WHO criteria, indicated that rates have almost doubled in both ethnic groups, by gender and by all age categories in 2004 (Table 7.3.2). Similar to other studies in Fiji, Fijians and females have higher rates of overweight and obesity (Coyne, 2000). It is of interest to note that Table 7.3.2 showed that at 65 years of age the proportion of overweight and obesity appeared to have decreased. A number of factors may contribute to this. It could be a function of age.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1993 Male %</td>
<td>2004 Male %</td>
</tr>
<tr>
<td>18</td>
<td>5.9</td>
<td>14.3</td>
</tr>
<tr>
<td>25</td>
<td>40.9</td>
<td>16.7</td>
</tr>
<tr>
<td>35</td>
<td>38.5</td>
<td>61.3</td>
</tr>
<tr>
<td>45</td>
<td>50.0</td>
<td>77.8</td>
</tr>
<tr>
<td>55</td>
<td>44.4</td>
<td>63.2</td>
</tr>
<tr>
<td>65</td>
<td>0.0</td>
<td>78.5</td>
</tr>
</tbody>
</table>

7.3.4 The relationship between BMI and relative risk of NCD motility
The implications of the results of BMI and the relative risks of developing NCD such as diabetes, cardiovascular diseases, stroke etc. as well as the associated long term cost (economic and social) to the nation are enormous.

Those with BMI ≥ 18.5-24.9 have average risk; BMI 25.0-29.9 have moderate risk and those with BMI ≥ 30.0 have high risk of NCD mortality (WHO, 2000)
Based on the results shown on Table 7.3.2, it could be said that moderate and high risks of developing NCD (and mortality) in adult population have more than doubled since 1993.
7.4 Waist Circumference
Excess abdominal fat is recognized as a predictor of risk factors and mortality independent of total body fat (Deurenberg et al, 1991). Waist circumference alone measures the amount of abdominal fat with greater precision (Gibney et al, 2004). Cut-off points for waist circumference associated with increased risks are >102cm in male and 88cm in females (Gibney et al, 2004; Gibson, 2005).

7.4.1 Mean waist circumference
Fijian females showed the largest waist circumference at all ages followed by Fijian males. The greatest increase in waist for Fijian females was at 25yrs (12.3cm from 78.8cm at 18yrs) (Table 7.4.1). For Fijian males, the greatest increase in waist circumference was at 35yrs (by 9.7cm from 82.8cm at 25yrs). Indo-Fijian females showed the greatest increase in waist circumference at 25 yrs (by 8.5cm from 68.3cm at 18yrs of age).

Although females in both ethnic groups (Fijian and Indo-Fijian) showed the greatest increase in waist circumference at 25years (from 18 years), Fijians increased waist by 15.6% whereas increase was slightly less in Indo-Fijians (12.4%).

<table>
<thead>
<tr>
<th>Specific Age (years)</th>
<th>Mean waist (cm) circumference in adults</th>
<th>By specific age, ethnicity and gender, 2004</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Fijians</td>
<td>Indo-Fijians</td>
</tr>
<tr>
<td></td>
<td>Male</td>
<td>Female</td>
</tr>
<tr>
<td>18</td>
<td>Mean 78.8</td>
<td>n 32</td>
</tr>
<tr>
<td>25</td>
<td>Mean 82.8</td>
<td>n 22</td>
</tr>
<tr>
<td>35</td>
<td>Mean 92.5</td>
<td>n 31</td>
</tr>
<tr>
<td>45</td>
<td>Mean 93.4</td>
<td>n 18</td>
</tr>
<tr>
<td>55</td>
<td>Mean 98.5</td>
<td>n 19</td>
</tr>
</tbody>
</table>

The results suggest similar patterns of increases in waist measurement at 25 yrs in females and at 35 yrs in males, although the increments are slightly higher for Fijians than for Indo-Fijians. Mean waist circumference increased with age (see Appendix 19, Table 7.3 for more details).

Waist circumference was not measured in the 1993 survey therefore no comparison could be made between the two surveys.

7.4.2 Disease and mortality risks assessed by waist circumference
Results showed 85% of males and 49% of females had a low risk of developing NCDs. More females (50.8%) than males (14.5%) had increased risk.

By ethnicity and gender (Fig. 7.4.1), female Fijians and ‘Others’ (Fijians 60%, ‘Others’ 59.4%) had increased risk while Indo-Fijians was 37.4%. Male Fijians and ‘Others’ had lower risks with 18%. Indo-Fijian males had the lowest risk at 8.8% when waist circumference was used as criteria.
Just over 50% of females in both urban and rural areas had higher risks of mortality than their male counterparts (17.6% urban and 11.5% rural) (Fig. 7.4.2).

More details on the risks of mortality using waist circumference by ethnicity, age group, gender and area type can be found in Appendix 19, Table 7.4.
7.5 Discussion and conclusions

7.5.1 BMI
BMI is commonly used as an independent index of body fat at a given BMI (and the associated risks for developing NCD). Several factors have been found to confound the relationship between BMI and body fat (Gibson, 2005). These factors include, (i) the relationship being age-related and gender-related; (ii) the relationship appearing to differ among certain ethnic groups (WHO, 2004; Gibson, 2005).

The above has implications for the use of BMI as an index of body fatness in Fiji in view of the fact that Fiji has two major different ethnic groups, Fijians and Indo-Fijians, who are totally different physically. Studies have shown that Asian populations (including Indo-Fijians) have higher percent body fat at a low BMI (WHO, 2004).

Yajnik (2002) showed that a Caucasian and an Asian Indo-Fijian with the same BMI of 22.3, had very different percent body fat (Caucasian had 9.1% body fat while the Asian Indo-Fijian had 21.2% body fat. If this is the case, the 2004 results of the risks assessment noted above may be completely understating the real problem Fiji has in relation to its Indo-Fijian population.

Although BMI in adults is highly correlated with percent body fat, it has a relatively low correlation with height. This can result in a tendency to over-diagnose with short adults and diagnose with taller adults.

Given the above information, the results of the survey indicated that overweight and obesity has increased during the last decade. This needed to be addressed effectively because Fiji’s small economy would not be able to cope with the long-term cost of the problem in future.

7.5.2 Waist circumference
Tests conducted to determine the association between BMI and waist circumference showed that the two measurements were highly correlated.

Given the concerns about the confounding factors regarding the use of BMI, it would also be reasonable to read the results of the waist circumference assessment with caution especially in light of the fact that little research has been done to establish waist measurement data for the Fiji population.
8.0 RESULTS Part V: Haemoglobin Levels And Anaemia

Anaemia remains a major public health problem in Fiji affecting mostly children and women. Results suggest that rates of anaemia in Fiji have continued to increase over the years. In general, dietary factors have probably been the major contributing factor. In view of the persistent problem, it was prudent to examine other possible factors. This has been addressed in the “Micronutrient Status of Women in Fiji” special report.

Key Findings

- Mean haemoglobin (Hb) levels found in 1993 (12.2 g/dl) and 2004 (11.9g/dl) are similar.
- Mean Hb levels in 2004 were:
  - 11.0 g/dl for 6 months to 5 years, (10.9 g/dl in males and 11.0 g/dl females);
  - 11.7 g/dl for 5-11 years, (11.8 g/dl in males and 11.6 g/dl in females);
  - 12.1 g/dl for 12-14 years, (12.2 g/dl in males and 12.1 g/dl in females);
  - 12.5 g/dl for 15-44 years, (13.2 g/dl in males and 11.9 g/dl in females); and
  - 12.3 g/dl for 45 years and over, (12.6 g/dl in males and 11.9 g/dl in females);
- Rate of anaemia in 1993 was 27.2% and in 2004 was 32.4%.
- Rates of anaemia in 2004 were:
  - 49.9% for 6 months to under 5 years, (53% males and 46.1% females);
  - 25.9% for 5-11 years, (27.5% males and 24.2% females);
  - 29.1% for 12-14 years, (25.4% in males and 32.9% in females);
  - 30.9% for 15-44 years, (19.6% in males and 40.9% in females); and
  - 33.2% for 45 years and over, (30.6% in males and 35.4% in females).
- The mean Hb for pregnant women was 11.0 g/dl in 2004 and 11.1g/dl in 1993.
- The rate of anaemia in pregnant women was 43.5%, a reduction from the 1993 findings of 55.6%.
- In general, the rates of anaemia are relatively high amongst Indo-Fijians (37.5%) compared to Fijians (28.8%) – a consistent trend over the past years.
- Overall, there was little difference between the rates in urban (31.0%) and rural areas (33.5%).

8.1 Introduction

Iron deficiency anaemia is the most common form of anaemia. It has been a major problem within the Indo-Fijian female population for many years and has also remained a problem with children under 5 years. Worldwide, high risk groups are women of childbearing age, pregnant or lactating women who have an increased requirement for iron, infants, children, and adolescents in the rapid growth phases, as well as people with poor dietary intake of iron.

Lack of iron is known to impair the normal mental development of 40%-60% of the developing world’s infants (UNICEF, 1996). It also debilitates the health and energies of an estimated 500 million women, leading to 60,000 childbirth deaths a year (UNICEF, 1996).

Capillary blood samples were taken from 7,091 respondents aged 6 months and above (and 62 pregnant women) and assessed for haemoglobin level using a haemoglobinometer (Hemocue). Anaemia cases were determined using WHO definitions based on age (and gender for adults) (Refer to 3.0 Methodology).
This chapter focuses on and presents only the results of the haemoglobin (Hb) level. Anaemia results at national level will be provided, and then followed by the results for the two major ethnic groups.

In line with the “Micronutrient Status of Women in Fiji” report, the results will be presented in age groups as nutrient requirements are always calculated based on age categories rather than specific age.

### 8.2 Mean haemoglobin levels and Prevalence of Anaemia

The condition of anaemia is deemed to be present when haemoglobin levels fall below the certain levels prescribed for gender and different age groups. Mean haemoglobin levels will be presented first before the prevalence rates of anaemia. The results discussed in this section are tabulated in Appendix 20 and in categories of gender, age, ethnicity and area type. The group ‘Others’ will not be specifically discussed due to their small numbers even though they are included where national results are shown.

#### 8.2.1 National

A total of 7,091 respondents aged 6 months and above made up of 3,436 males, 3,655 non-pregnant females and a separate group of 62 pregnant women were assessed.

#### 8.2.1.1 Mean Hb level - National

The results of the 2004 mean Hb levels for males and females in different age groups are shown in Fig 8.1. It showed that the overall mean Hb levels for both genders was 11.9 g/dl (N = 7,091); 12.1 g/dl for males (n = 3,436) and 11.9 g/dl for females (n = 3,655).

By age group and gender, mean Hb levels showed:
- 11.0 g/dl for the 6 months to 5 years, (10.9 g/dl in males and 11.0 g/dl in females);
- 11.7 g/dl for the 5-11 years, (11.8 g/dl amongst males and 11.6 g/dl amongst females);
- 12.1 g/dl for the 12-14 years, (12.2 g/dl in males and 12.1 g/dl in females);
- 12.5 g/dl for the 15-44 years, (13.2 g/dl in males and 11.9 g/dl in females); and
- 12.3 g/dl in those 45 years and older, (12.6 g/dl in males and 11.9 g/dl in females).

The mean Hb levels for all pregnant women was 11.0 g/dl.

Except for the under 5 age group, females consistently recorded lower Hb levels than males at all age groups.
8.2.1.2 Prevalence of Anaemia – National

Fig 8.2 shows the rates of anaemia amongst males and females by age groups. The results showed that overall, 32.4% (N = 7,091) were anaemic. Of these, 27.4% for males (n = 3,436) and 37.1% for females (n = 3,655).

By gender and age group, the proportions of those found to be anaemic in 2004 were;
- 49.9% for 6 months to 5 years, (53.0% in males and 46.1% in females);
- 25.9% for 5-11 years, (27.5% in males and 24.2% in females);
- 29.1% for 12-14 years, (25.4% in males and 32.9% in females);
- 30.9% for 15-44 years, (20.9% in males and 40.9% in females);
- 33.2% for 45 years and over, (30.6% in males and 35.4% in females); and
- 43.5% for all pregnant women.

The anaemia rates were highest in the under 5 year age group. Prevalence rates for males are higher than females for the under twelve age categories, but for all other age categories, females have higher prevalence rates of anaemia compared to males.
8.2.1.3 Prevalence of Anaemia by Area Type - National

By area type, gender and age group (see Fig 8.3), anaemia prevalence rates for rural dwellers were 37.4% for males (from 22.3% for 15-44 years to 54.5% for under 5 years) and 33.5% for females (from 29.3% for 5-11 years to 50.6% for under 5 years).

Rates for urban dwellers were 29.6% for females (from 17.5% for 5-11 years to 41.2% for 15-44 years) and 24.4% for males (from 15.9% for 15-44 years to 50.8% for under 5 years).

8.2.2 Ethnic Group – Fijian

There were 4,184 Fijian respondents aged 6 months and above (2,053 males and 2,131 females) and a separate group of 37 pregnant women.

8.2.2.1 Mean Hb level – Fijian

The mean Hb levels for Fijian males and females in different age groups are shown in Fig 8.4. Overall, mean Hb level was 11.9 g/dl (N = 4,184). Mean Hb level for males was 12.0 g/dl (n = 2,053) and 11.8 g/dl for females (n = 2,131).

By age group, the mean Hb levels found for Fijians in 2004 were 10.9 g/dl for 6 months to 5 years, (10.7 g/dl in males and 11.0 g/dl in females); 11.7 g/dl for 5-11 years, (11.7 g/dl in males and 11.8 g/dl in females); 12.1 g/dl for 12-14 years, (12.2 g/dl in males and 12.1 g/dl in females); 12.6 g/dl for 15-44 years (13.2 g/dl in males and 12.0 in females) and 12.3g/dl for 45 years and above (12.4 g/dl in males and 12.1 g/dl in females). The mean Hb level for pregnant Fijian women was 11.5 g/dl.
Compared to the overall mean for Fijians (11.9 g/dl), the mean is lower for males and females below age twelve.

**Fig 8.3**
National prevalence (%) of anaemia by area type, gender and age group, 2004

**Fig 8.4**
Mean haemoglobin (g/dl) levels for Fijians by age group and gender, 2004
8.2.2.2 Prevalence of Anaemia in Fijians

The anaemia rates for Fijian males and females in different age groups are shown in Fig. 8.5. The results show that 32.4% of Fijians in this survey were anaemic (N = 4,184). By gender, 27.4% males (n = 2,053) and 37.1% females (n = 2,131) were anaemic.

The anaemia rates were the highest in the under 5 age group. Male prevalence rates were higher than that of females for the under twelve age categories, but females have higher prevalence rates for all other age categories compared to males.

The rates of anaemia found in 2004 were 49.9% in 6 months to 5 years (53.0% in males and 46.1% in females); 25.9% for 5-11 years age group, (27.5% in males and 24.2% in females); 29.1% for 12-14 years, (25.4% in males and 32.9% in females); 30.9% for 15-44 years, (20.9% in males and 40.9% in females)and 33.2% for 45 years and over, (30.6% in males and 35.4% in females). The rates for pregnant Fijian women were 32.4%.

8.2.2.3 Prevalence of Anaemia in Fijians by Area Type

By area type, gender and age group (see Fig 8.6), anaemia prevalence rates were:

- 30.3% in rural females (from 20.5% for 12-14 years to 43.7% for under 5 years);
- 30.2% in urban females (from 13.1% for 5-11 years to 37.2% for under 5 years);
- 30.2% in rural males (from 23.8% for 15-44 years to 51.8% for under 5 years);
- 22.0% in urban males (from 15.9% for 15-44 years to 50.8% for under 5 years).

There was a relatively high prevalence rate of anaemia amongst rural and urban males under 5 years (51.8% and 50.0%, respectively). Prevalence of anaemia in urban
females showed under 5 years was 37.2%, 15-44 years was 34.1%, and over 55 years was 31.3%; rural females 15-44 years was 31.9%.

**Fig 8.6**
Fijian Prevalence of anaemia (%) by area type, gender and age group, 2004

8.2.3 Ethnic Group – Indo-Fijians

There were 2,694 respondents aged 6 months and above (1,285 males and 1,409 females) and a separate group of 22 pregnant women.

8.2.3.1 Mean Hb level – Indo-Fijians

The mean Hb levels for Indo-Fijian males and females by different age groups are shown in Fig 8.7.

The mean Hb levels for all Indo-Fijians was 11.8 g/dl (N = 2,694). By gender, the rate for males was 12.0 g/dl (n = 1,285) and 11.6 g/dl for females (n = 1,409).

By age group, the mean Hb levels in 2004 for Indo-Fijians were found to be 10.8 g/dl for 6 months to 5 years, (10.7 g/dl in males and 10.9 g/dl in females); 11.7 g/dl for 5-11 years, (11.6 g/dl in males and 11.8 g/dl in females); 12.2 g/dl for 12-14 years, (12.4 g/dl in males and 12.1 g/dl in females); 12.4 g/dl for 15-44 years, (13.1 g/dl in males and 11.7 g/dl in females); and 12.0 g/dl for 45 years and over, (12.4 g/dl in males and 11.7 g/dl in females). The mean Hb levels for pregnant Indo-Fijian women was 10.2 g/dl.

Compared to the overall mean for Indo-Fijians (11.8 g/dl), the mean was lower for males and females below age twelve and for females 15 years and over.
8.2.3.2 Prevalence of Anaemia in Indo-Fijians

The anaemia rates for Indo-Fijian males and females in different age groups are shown in Fig. 8.8. The rates of anaemia found in 2004 were 37.5% for all Indo-Fijians in this survey (N = 2694). For males, it was 26.9% for males (n = 1,285) and 47.2% for females (n = 1,409).

By age group and gender, the results show that 57.0% of the 6 months to 5 years, (57.0% males and 57.0% females) were anaemic. For the 5-11 years age, 27.7% were anaemic (31.1% males and 24.2% females); 36.9% for the 12-14 years (29.2% males and 44.4% females); 35.9% for 15-44 years (17.7% in males and 52.0% in females); and 40.7% for 45 years and over (33.9% and 46.6%). Rates for pregnant Indo-Fijian women were 59.1%.

The anaemia rates were highest in the under 5 age group. Prevalence rates for males were higher than females for the 5 to under 12 year age category. However, females had higher prevalence rates of anaemia for all other age groups, compared to males.
8.2.3.3 Prevalence of Anaemia in Indo-Fijians by Area Type

By area type and gender (see Fig 8.9), anaemia prevalence rates for rural females were at 52.1% (28.6% for 5-11 years to 69.0% for under 5 years); urban females at 30.2% (21.1% for 5-11 years to 48.6% for the 15-44 years); rural males had 28.2%; (17.7% for 15-44 years to 67.6% for under 5 years) and urban males at 22.0% (16.3% for 15-44 years to 50.0% for under 5 years).

Prevalence rates of over 60% were recorded by rural children under 5 years (69.0% for females and 67.6% for males).

Prevalence rates of rural women of child bearing age (15 to 44 years) were 52.0%. Women over 45 years recorded 50.7%. Urban males under 5 years had 50.0%. Prevalence rates of over 40% to 50% were recorded amongst rural females 12-14 years (48.9%), urban females of child bearing age (15-44 years) had 48.6%, urban females under 5 years at 45.5% and urban females 45 years and over at 43.8%.
8.3 Comparison of between 1993 and 2004

8.3.1 Mean Hb level
It is important to note that the international community has made some changes in the age categories and Hb level cut-off since the last survey. The cut-off used in 1993 for the age group 5-14 years has been changed into two age groups: 5-11 years (Hb ≥ 11.5 g/dl, normal) and 12-14 years (Hb ≥ 12 g/dl, normal). This makes comparison problematic.

Results for 1993 and 2004 were similar. The mean Hb level amongst children under 5 years of age was 11.1 g/dl in 1993, whereas in it 2004 the mean Hb level was 11.0 g/dl.

The 1993 survey found the mean Hb level amongst children 5-14 years of age was 12.3 g/dl whereas the 2004 survey showed a mean Hb level amongst children 5-11 years of 11.7 g/dl. The 2004 survey also found a mean Hb level amongst 12-14 year old children of 12.1 g/dl. Adults over 15 years in 1993 recorded a mean Hb level of 14.2 g/dl in males and 12.2 g/dl in females. The 2004 survey found that adults 15-44 years had a mean Hb level of 13.2 g/dl in males and 11.9 g/dl in females.

Mean Hb level in 2004 for older adults 45 years and above was 12.6 g/dl in males and 12.4 g/dl in females while the mean level in 1993 was around 13 g/dl.

Mean Hb level for all pregnant women in 2004 was 11.0 g/dl while in 1993 it was 11.1 g/dl. Indo-Fijian pregnant women showed a mean of 10.2 g/dl in 2004 whereas it was 10.7 g/dl in 1993. Mean Hb amongst Fijian pregnant women was 11.5 g/dl in 2004 whereas it was 11.6 g/dl in 1993.
In summary, there were differences in haemoglobin levels found between genders with levels in females lower than in males, and between Fijian and Indo-Fijians with higher rates of normal levels amongst Fijians compared to Indo-Fijians.

8.3.2 Prevalence of Anaemia
Any comparisons between the 1993 and the 2004 survey results on anaemia is problematic due to the different classifications used in the 2004. It would be correct to say that overall, relatively high proportions of the population were found anaemic in 2004. Prevalence rates of anaemia amongst pregnant women in 2004 are 43.5% of which 32.4% were Fijians and 59.1%, Indo-Fijians. This is a little lower than the rates found in 1993 (55.6%)

8.4 Discussion
Iron deficiency is a condition where one has inadequate amounts of iron to meet body demands during periods of growth and pregnancy. Most at risk are young children whose growth demands are great, pregnant women and women of child bearing age, the elderly whose diets may lack iron.

Iron deficiency in this report focuses only on deficiency related to diet.

Iron deficiency anaemia has been a national concern for many years in Fiji. The 2004 survey showed that it still is prevalent amongst children as well as women of child bearing age.

Anaemia has been a serious problem with Indo-Fijians for a long time. The results of the 2004 survey confirmed this. Of concern however are the increasing rates of the problem amongst the Fijian women. In addition, rates of anaemia in males appear to be increasing also. Children under 5 years are another at risk group. The 2004 results indicate relatively high rates of anaemia amongst this group, in both ethnic groups.

Iron deficiency anaemia in young children is of concern because it affects their mental development and physical development (growth spurts). In adults, anaemia affects pregnancy negatively. When levels are seriously low, the heart is particularly vulnerable. Amongst working adults, it affects productivity.

8.5 Conclusions
Anaemia remains a major public health problem in Fiji. It affects young children, females and males. The Indo-Fijian communities have been particularly affected. Younger children appear to be most vulnerable and this is of concern as anaemia can affect their growth negatively.

The cycle of anaemia can be perpetuated when women of child bearing age have anaemia which continues through to pregnancy and is likely to affect the infant and so on.

The major contributing factor to anaemia is probably diet. This should be explored further by examining the data from the 24 hr diet recall to find out how diet can be used to improve the situation. In addition, the results of the Micronutrient survey report would also shed more light on this issue. Hookworm infestation is another possible contributing factor.
9.0 RESULTS Part VI: Nutrients And Dietary Sources

This is the first quantitative dietary survey undertaken in Fiji at national level. It attempts to quantify the amount of nutrient intake of Fiji’s population. The report also attempts to identify the major sources of the selected nutrients. The US Recommended Nutrient Intakes have been used as reference to compare the Fiji results with. Caution must be made when reading the results in view of the fact that the US reference might be far too high (being a highly developed country) compared with Fiji, a developing country. However, in the absence of local and or Australian and New Zealand data, it was recommended that the US nutrient data is used for comparative purposes.

Interpreting the results should take into account the fact that the nutrient data set has not been adjusted for intra-individual variations.

‘Energy’ nutrient is reported in Mega Joules (MJ) with kilocalories equivalent in brackets.

Key Findings

Energy

- Overall daily median intake of energy was 8.1MJ with male adolescents at 9.7MJ, female adolescents at 7.5MJ, male adults at 9.4MJ and adult females at 6.9MJ.
- Intake of energy by Fijians was higher (9.1MJ) than Indo-Fijians (6.6MJ)
- Only 39.2% of the population surveyed met the US energy recommendation (9.8MJ). The two major sources of energy nationally were cereal (bread, flour products, rice and roti) - 34% and root crop - 20%. The three major food sources of energy in the Fijian diet were root crops (starchy staples), bread and fish whereas for Indo-Fijians these were rice, roti and vegetable fat.
- Total energy contributed in the Fiji diet from the macronutrients was 15% from protein, 27.8% from fat and 53.4% from carbohydrates. The WHO/FAO recommended energy intake levels are 10-15% from protein, 20-30% from fat and 55-70% from carbohydrates.

Protein

- Overall median intake of protein was 62.9g/day with male adolescents at 71g/day, female adolescents at higher 56.2g/day, male adults at 72.5g/day and female adults at 55g/day.
- Fijian daily median intake was 72.5g/day and intake of Indo-Fijians was 51g/day respectively.
- 60.8% of the population surveyed met the US recommended amount (50g./day).
- The two major sources of protein was fish (35.5%) and plant sources (bread, roti, traditional staples etc) - 33.3%.
- The three major sources of protein in the Fijian diet were fish and seafood, bread and meat while fish and seafood, poultry and roti were the three major sources for Indo-Fijians.

Fat

- Overall daily median fat intake was 48.3g/day with male adolescents at 69.3g/day, female adolescents at 52.2g/day, male adults at 63.4g/day, and female adults at 36.0g/day.
- Fijian intake was 51.4g/day while intake for Indo-Fijians was 43.5g/day.
Overall, 37.2% of the population surveyed (15 years and above) met the US recommended amount (65g/day).
Overall the three major sources of fat in the diet were vegetable fat (24.9%), meat (14.1%), fish and sea food (11.4%).
Three major sources of fat in the Fijian diet were vegetable fat, meat and coconut product. For the indo-Fijians these were vegetable fat, roti and meat.

**Cholesterol**
- Overall daily median intake was 108.8mg/day with male adolescents at 113.7mg/day, female adolescents at 96.9mg/day, male adults at 144.1mg/day and adult females at 86.9mg/day.
- Daily median intake of Fijians was 144.9mg/day and 69.7mg/day for Indo-Fijians.
- Overall, 24% of the population surveyed met the US recommended amount (300mg/day).
- Overall three major sources of dietary cholesterols were fish and other sea foods (46.9%), poultry (27.9%) and meat (12.6%).
- Three major dietary sources of cholesterol in the Fijian diet were seafood, poultry and meat. For the Indo-Fijian diet these were poultry, fish and meat.

**Carbohydrate**
- Overall daily median intake was 278.5g/day with male adolescents at 304.2g/day, female adolescents at 230.6g/day, adult males at 301.3g/day, and adult females at 254.3g/day.
- Fijian intake was 321.4g/day and intake of Indo-Fijians was 224.6g/day.
- Overall, 88.7% of the population surveyed (15 years and above) met the US recommended amount (130g/day).
- Overall the three principal sources of carbohydrates were traditional staples (31.2%); rice (19.5%); bread (18.2%).
- Three major sources of carbohydrate in the Fijian diet were starchy staples, bread and rice. For the Indo-Fijian diet these were rice, roti and bread.

**Dietary fibre**
- Overall daily median intake of dietary fibre was 17.4g/day with male adolescents at 19g/day, female adolescents at 14.1g/day, adult males at 19.6g/day and adult females at 16.3g/day.
- Daily median intake for Fijians was 20.3g and 14.5g for Indo-Fijians.
- Overall, only 19.9% of the population surveyed met the US recommended amount (31.7g/day).
- Three major sources of dietary fibre in the Fiji diet were traditional staples (26%), bread, roti and flour products (18.8%), nuts and legumes (15.8%).
- Three major sources of dietary fibre in the Fijian diet were starchy staples, bread and green leaves. For the Indo-Fijian diet these were nuts and legumes, rice and roti.

**Vitamin A (total)**
- Daily median intake of total Vitamin A was $255\mu g$ with rates for male adolescents at $295.2\mu g$, female adolescents at $216.6\mu g$, male adults at $296.2\mu g$, and adult females at $230.8\mu g$.
- Daily median intake of Fijians was $258.1\mu g$ and Indo-Fijian intake was males $252.5\mu g$. 
Overall, only 20.3% of the population surveyed (15 years and above) met the USDRI (800µg).

Overall three major sources of total Vitamin A were green leaves (39%), hot beverages (12.4%), fish and sea foods (7.9%).

For the Fijian diet, three major sources were green leaves, fish and seafood, and hot beverages. For the Indo-Fijian diet these were green leaves, hot beverages and roti.

**Retinol**

- Daily median intake overall was 87µg/day with male adolescents at 121µg/day, female adolescents at 105µg/day, adult males at 102µg/day and adult females at 71.8µg/day.
- Intake of Fijians was 115µg/day while intake of Indo-Fijians was 44.4µg/day.
- Overall only 6.5% of the population surveyed (15 years and above) met the USDRI (650µg/day).
- Three of the major sources of retinol in the Fiji diet were poultry (26%), hot beverages (24.3%) and fish and other sea foods (16.1%).
- Three top dietary sources of retinol in the Fijian diet were fish and seafood, meat and hot beverages. For the Indo-Fijian diet these were poultry, hot beverages and dairy.

**Beta carotene**

- Daily median intake overall was 1393.6mg/day with adolescent males at 1341mg/day, adolescent females at 1086mg/day, adult males at 1799.7mg/day and adult females at 1224.6mg/day.
- Intake of Fijians was 614.8mg/day while intake of Indo-Fijians was 1854.4mg/day.
- Overall 57.2% of the population surveyed (15 years and above) met the US DRI of 1,000mg/day.
- Three major sources of Beta carotene in the Fiji diet were green leaves (59.6%), roti (10.7%) and yellow vegetables (10.6%).
- Three main food sources of dietary beta carotene in the Fijian diet were green leaves, other vegetables, yellow vegetables and fruits. Three main sources in the Indo-Fijian diet included green leaves, roti, yellow vegetables and other vegetables.

**Thiamin**

- Daily median intake of thiamin was 0.8mg with adolescent males (15-18 years) at 0.9mg/day and females at 0.8m/day; adult males’ intake was 0.9mg/day, and adult females was 0.8mg/day.
- Intake of Fijians was 1.0mg/day while Indo-Fijians was 0.7mg/day.
- Overall, only 34.1% of the population surveyed (15 years and above) met the US DRI (1.1mg/day).
- Three major sources of thiamin in the Fiji diet were bread and flour (17.3%), nuts and legumes (17.1%) and starchy staples (16.8%).
- Three major food sources of thiamin in the Fijian diet were bread, starchy staple and hot beverages. For the Indo-Fijian these were nut and legumes, hot beverages and bread.

**Riboflavin**

- Overall daily median intake was 0.7mg/day with adolescent males’ at 0.8mg/day and adolescent females’ at 0.6mg/day; adult males’ was 0.8mg/day and adult females’ at 0.6mg/day.
Intake of Fijians was 0.8mg/day and Indo-Fijians was 0.6mg/day.
Overall, only 26.1% of the population surveyed (15 years and above) met the US DRI.
Three main food sources in the Fiji diet were fish and other sea food (15%),
green leaves (13.5%), hot beverages (13.4%).
Three main food sources of riboflavin in the Fijian diet were green leaves,
seafood and meat. The three main food sources in the Indo-Fijian diet were
hot beverages, dairy and poultry.

Niacin
Overall daily median intake of niacin was 15.6mg/day with 17.2mg/day for
male adolescents, 13.6mg/day for female adolescents, 19.3mg/day for
male adults and 14.0mg/day for female adults.
Daily median intake of Fijians was 20.0mg/day, Indo-Fijians’ was
11.7mg/day.
Overall, 52.5% of the population surveyed (15 years and above) met the
US DRI (15mg/day).
Three major sources of niacin in the Fiji diet were green leaves (37.2%),
fish and other sea foods (19.6%) and poultry (8.3%).
Three main food sources of niacin in the Fijian diet were green leaves, fish
and seafood and starchy staple. The three main food sources in the Indo-
Fijian diet were fish, poultry and rice.

Ascorbic acid
Overall daily median intake was 89.8mg/day with adolescent males at
79.6mg/day, adolescent females at 82.0mg/day, adult males at 91.7mg/day
and adult females at 89.5mg/day.
Daily median intake for Fijians was 124.0mg/day and intake of Indo-Fijians
was 38.9mg/day.
Overall, 53.5% of the population surveyed (15 years and above) met the
US RDI (76mg/day).
Three main sources of ascorbic acid in the Fiji diet were traditional staples
(43.3%), fruits (17.3%) and other vegetables (13.4%).
Three main food sources of ascorbic acid in the Fijian diet were starchy
staples, fruits and other vegetables. For the Indo-Fijian these were other
vegetables, starchy staples and fruits.

Iron
Overall daily median intake was 10.3mg/day with male adolescents at
11.1mg/day, female adolescents at 9.1mg/day, male adults at 11.6mg/day
and female adults at 9.3mg/day.
Daily median intake of Fijians was 11.9mg/day while intake of indo-Fijians
was 8.9mg/day.
Overall, 41% of the population surveyed (15 years and above) met the US
DRI (13mg/day).
Three main sources of iron in the Fiji diet were fish and other sea food
(21.8%), hot beverages (13.1%) and traditional staples (9.8%).
Three main food sources of iron in the Fijian diet were fish and seafood,
starchy staple and bread. Three main food sources for Indo-Fijians were
fish and seafood, hot beverages and nuts and legumes.
Calcium
- Overall daily median intake was 345.8mg/day with male adolescents at 347.9mg/day, female adolescents at 269.6mg/day, male adults at 382.6mg/day and female adults at 318.1mg/day.
- Daily median intake of Fijians was 429.6mg/day and intake of Indo-Fijians was 242.4mg/day.
- Overall, only 13.3% of the population surveyed (15 years and above) met the US DRI (1150mg/day).
- Three main sources of calcium in the Fiji diet are green leaves (22.4%), fish and other sea foods (16.1%) and dairy (12.5%).
- Three main food sources of calcium in the Fijian diet were green leaves, fish and seafood and starchy staples. Three main food sources for the Indo-Fijians were dairy, green leaves and fish and seafood.

Potassium
- Overall daily median intake was 2421.1mg/day with male adolescents at 2452.2mg/day, female adolescents at 1985.3mg/day, male adults at 2644.3mg/day and female adults at 2336.4mg/day.
- Daily median intake of Fijians was 3159.6mg/day and Indo-Fijian intake was 1624.5mg/day.
- Overall, only 17.1% of the population surveyed (15 years and above) met the US DRI (4700mg/day).
- Two main sources of potassium in the Fiji diet were traditional staples (36%), and fish and other sea food (16.8%).
- Three main food sources of potassium in the Fijian diet were starchy staple, fish and seafood and bread. The three main food sources for Indo-Fijians were starchy staple, fish & seafood and nuts & legumes.

Zinc
- Overall daily median intake was 7.6mg/day with male adolescents at 9.0mg/day, female adolescents at 6.8mg/day, male adults at 9.0mg/day and female adults at 6.8mg/day.
- Daily median intake for Fijians was 8.4mg/day and 7.0mg/day for Indo-Fijians.
- Overall, 38% of the population surveyed (15 years and above) met the US DRI (9.8mg/day).
- Three major sources of zinc in the Fiji diet were traditional staples (20.1%), meat (17.6%), rice (13.4%).
- Three main food sources of zinc in the Fijian diet were starchy staple, meat and fish & seafood. For the Indo-Fijians these were rice, roti and meat.

9.1 Introduction
This is the first Fiji National Nutrition Survey (NNS04) that included a quantitative 24hour diet recall. In view of its limitations, the 24 hour recall was chosen both for financial reasons and ease of application.

A 24 hour diet recall was obtained from 2272 individuals aged 15 years and above, (excluding pregnant and lactating women). Of these, 248 were regarded as adolescents (15-18 years) and 2024 were adults (19 years and over) A repeat 24 hour recall on a sub-sample was obtained to verify intra-individual variation of usual intake. However, the
data has not been analyzed. Consequently, the nutrient intake presented here has not been adjusted to take into account the usual day to day variability in food intake.

It is acknowledged that a one day intake will not reflect what people usually eat. An individual’s intake of any nutrient varies on a daily basis – it may be excessively high or unusually low. Additionally, under-reporting of food intake (therefore nutrient intake) is common with dietary recall methodology. These should be borne in mind when interpreting nutrient data.

Food density data of commonly consumed foods were obtained from New Zealand and Fiji. Nutrient compositions of foods were obtained from a number of sources including the Australian, Caribbean, New Zealand and the Food Composition Tables for the South Pacific.

Information on 17 selected nutrients is presented in the text with proportions of these nutrients obtained from different food items.

Because there is no recommended level of nutrient intake for the Pacific, and in the absence of NZ/Australian equivalents at the time this report was put together, it was agreed that the US recommended nutrient intake be used as a reference for dietary adequacy. Thiamine and niacin requirements were calculated in relation to energy/caloric intake.

It needs to be noted that while the US recommended nutrient intake has been used as the reference (Appendix 14) for dietary adequacy, nutrient requirements are based on population requirements as per standard of living for that particular country and may not necessarily be suitable for other countries. However, it is important that some reference is used as a yardstick to assess the adequacy of the diet of Fiji’s population in providing sufficient nutrients to meet the body’s needs.

The results of the 24 hour diet recall analysis are reported as median (Appendix 21, Table 9.1) rather than the mean. This has been a deliberate decision in order to reduce the influence of extreme data points (outlier) which is the major drawback with the use of 'mean'.

9.2 Energy and Protein

9.2.1 Energy
Overall daily median energy intake was 8.1MJ. Intake of adolescent males (15-18 years) was 9.7MJ (2,332.8kcal) whereas the intake for females of the same age group was 7.5MJ (1,846.8kcal). For males aged 19 years and above, median intake was 9.4MJ/day (2,243.1kcal/day) and 6.9MJ/day (1,685kcal/day) for females of the same age group.

By ethnicity, gender and age group the results showed that daily median energy intake of male Fijian 15-18 years of age was 10MJ (2,463.3kcal) while median energy intake of Fijian females of the same age group was 9.7MJ (2,329.1kcal). Intake of male Indo-Fijian 15-18 years of age was 7.9MJ/day while intake of their female counterpart was 5.2MJ/day (1,252kcal/day). For the 19 years of age and over, Fijian males daily median intake of energy was 10.5MJ (2,522.5kcal); female Fijian intake was 8.2MJ (1,962kcal);
male Indo-Fijian intake was 7.9MJ (1894kcal); female Indo-Fijian intake was 5.5MJ (1,361.4kcal).

No clear trend in median intake was observed when the 19 years and above age group was further broken into age categories. The results showed that Indo-Fijian females consistently had lower energy intake, while Fijian male consistently showed higher energy intake.

Daily median energy intake of males was higher than females. Given that males have a greater proportion of lean body mass than females, as a group they generally consume more to maintain their body and to meet their requirements for physical activities.

The US Dietary Reference Intake (DRI) for energy for males 15-18 is 11.5MJ/day (2,755kcal/day) and for females of the same age group is 8.8MJ/day (2,110kcal/day) while energy DRI for males 19 years of age and over is 10.6MJ/day (2,550kcal.day) and for females of the same age group is 8.1MJ/day (1,940kcal/day).

Using the US dietary energy intake as a reference, only 39.2% of the total population surveyed met the recommended energy level (9.8MJ/day). Of those that met the recommended level, 27.8% were Fijians, 10.2% were Indo-Fijians while 1.3% were ‘Others’ (Appendix 21 Table 9.3.1).

By gender, only 17.3% males and 21.8% females met the recommended level.
By age group, only 4.2% of adolescents (15-18 yrs) met the recommended level, while 35% adults (19yrs +) did. By area type, 17.1% of urban dwellers and 22.1% rural dwellers in this survey met the recommended energy level.

Daily energy contributions from the macronutrients were 15% from protein, 27.8% from fat and 53.4% from carbohydrates. The results showed that protein level was at the top of the range (10-15%), fat was at the top end of the range (20-30%) while carbohydrate was below the minimum recommended level (55-70%).

Only 39.2% of the population surveyed met the US dietary recommended Intake (DRI) of 9.8MJ/day. Given the vast differences in the standards of living between the two countries (US and Fiji), it is not surprising that a majority of Fiji populations’ energy intake is lower than US DRI.

9.2.2 Sources of energy
Cereal as a group provided the most energy, 34% (bread & flour products 13.9%, rice 12.4% and roti 7.7%) (Figure 9.2.1) Root crops (traditional staples) were still an important source of energy in the diet (20%). Other foods that contribute relatively significant amounts of energy included fish and seafood (8.8%), meat (5.2%), poultry (3.4%); vegetable fat (6.9%), coconut products (3.4%), sugar and sweets contributed 4.9% (Appendix 21, Table 9.2).

Four major sources of energy in the Fijian diet were starchy staple, bread, fish and seafood, and rice. The four major sources of energy in the Indo-Fijian diet were rice, roti, vegetable fat and bread.
9.2.3 Protein
Overall median intake of protein was 62.9g/day with male adolescents at 71g/day, female adolescents at higher 56.2g/day, male adults at 72.5g/day and female adults at 55g/day. Fijian daily median intake was 72.5g/day and intake of Indo-Fijians was 51g/day respectively). Protein intake was slightly higher in rural areas (84.8g/day) compared to 80.4g/day in urban areas. The body requires around 45-56g protein per day. 60.8% of the population surveyed met the US recommended amount.

Protein contributed 15% of total energy. This is at the top end of the WHO recommended energy contribution.

Using the US recommended dietary level as a reference, 60.8% met the recommended level for protein (50g/day) while 39.2% did not. For the 60.8% that met the recommended level, 37.8% were Fijians, 21.1% Indo-Fijians and 1.9% ‘Others’ (Appendix 21 Table 9.3.1).

Amongst those who met the recommended level 7.1% were in the adolescent group and 53.7% were adults (19 years and above). Only 28.1% of urban dwellers and 32.7% of those who lived in rural areas met the recommended protein level.

9.2.4 Sources of protein
Fish (and seafood) was the principal source of protein, contributing over a third of the total protein intake (35.5%). Meat (11%) and poultry (9.8%) contributed 20.8% of total protein (Figure 9.2.2).

Combined plant sources of protein provided 33.3% of total protein in the diet (bread & flour products, 11%; rice, 6%; roti, 4.5%; traditional staples, 4.4%; green leaves, 2.4%;
and nuts & legumes, 5%) Dairy provided only 2.4% of total protein, which is equivalent to the amount provided by green leaves.

Figure 9.2.2
Major sources of protein in the diet of Fiji’s population, 2004

Four major sources of protein in the Fijian diet were fish and seafood, bread, meat and poultry. Indo-Fijian had fish and seafood, poultry, roti and rice as the top four sources of protein.

9.3 Fat and Cholesterol

9.3.1 Total fat
Overall DMI for fat was 48.3g/day. Intake for males was 63.8g/day - almost double that of females at 37.5g/day. By ethnic group, median intake was highest for ‘Others’ (65.9g) compared with 51.4g/day amongst Fijians and 43.5g/day for Indo-Fijians. DMI of adolescents was higher (63.8g/day) compared to 47.2g/day for adults. Those living in urban areas recorded 69.2g/day, while DMI for those in rural areas was slightly lower at 66.7g/day. The body’s fat requirement is 65g per day.

Trends showed that males have a higher DMI of fat compared to females. Females’ DMI for fat was highest at age 15-18 years and declined sharply and progressively in later years.

Fat contributed 27.8% of total daily energy intake.

Overall, 37.1% of the population surveyed (Appendix 21 Table 9.3.2) met the US recommended amount (65g/day). Of those who met the recommended amounts, only
48% were adolescents (22.6% in urban and 25.4% in rural) while 35.8% were adults (17.4% urban and 18.4% rural).

9.3.2 Sources of fat
Vegetable fat provided approximately a quarter (24.9%) of all fat consumed (Figure 9.3.1). These include vegetable oils and margarines. Meat provided 14.1%, fish and seafood provided 11.4% and poultry, 7.4%. Combined animal protein foods (meat, fish and seafood and poultry) were the principal source of fat in the diet (27.9%). Coconut products provided 10.7% of total fat, bread & flour products 6.3%, staple 4.2%, and roti 4%. Animal fat (butter etc.) provided only 3.7% and dairy 3% of total fat consumed.

![Figure 9.3.1](image)

Major sources of fat in the diet of Fiji’s population, 2004

Four main food sources of fat in the Fijian diet were vegetable fat, meat, coconut product and fish and seafood. For indo-Fijians these were vegetable fat, roti, meat and poultry.

9.3.3 Cholesterol
Overall DMI for cholesterol was 108.8mg/day. Male adolescents recorded 113.7mg/day, and female adolescents at 96.9mg/day. Male adults had 144.1mg/day and adult females had 86.9mg/day.

DMI for cholesterol in males showed ‘Others’ was 327.1mg/day, Fijians was 190.7mg/day, and Indo-Fijians was 91.7mg/day. Daily median intake of female ‘Others’ was 152mg, female Fijians was 113.9mg and female Indo-Fijian was 53.7mg.

DMI in urban areas (117.4mg/day) was higher than in rural areas (108.8mg/day). The high cholesterol intake in urban area may be due to easy availability of food high in cholesterol such as meat.
Overall, 24% of the population surveyed (Appendix 2 Table 9.3.6) met the US recommended amount (300mg/day). Of these, 25.8% were adolescents (12.5% in urban and 13.3% in rural areas) while 23.8% were adults (11.2% urban and 12.5% rural).

### 9.3.4 Sources of cholesterol

Fish and seafood were the principal sources (46.9%) of cholesterol (Figure 9.3.2). Poultry was the second major source (27.9%), while meat provided only 12.4% of the total cholesterol in the diet. Dairy and animal fat provided 3.8% and 3% respectively.

![Figure 9.3.2](image)

**Figure 9.3.2**

**Major sources of cholesterol in the diet of Fiji’s population, 2004**

Four main food sources of cholesterol in the Fijian diet were fish and seafood, poultry, meat and animal fat whereas the Indo-Fijians diet had poultry, fish and seafood, meat and dairy.

### 9.4 Carbohydrate and Dietary Fibre

#### 9.4.1 Total carbohydrate

Overall daily median intake of total carbohydrates was 278.5g/day with male adolescents at 304.2g/day, female adolescents at 230.6g/day, adult males at 301.3g/day, and adult females at 254.3g/day. Differences were found when the results were examined by age group, gender and ethnic group. Daily median intake for male was higher than females. Daily intake was highest for Fijians (321.4g) compared to 291.8g for ‘Others’ and 224.6g for Indo-Fijians.

Adolescent’s median daily intake was highest amongst Fijian (331.5g/day), ‘Others’ was 298.2g/day while Indo-Fijian had the least (214.5g/day). Amongst adults, median intake was highest with Fijians (320.5g/day), 291.8g/day with ‘Others’ and Indo-Fijians recorded the lowest intake of 225g/day.

DMI in urban areas was higher (293.8g/day) than in rural areas (329.1g/day).

Carbohydrates contributed 53.4% of total daily energy intake. This is at the lower end of the range (55%-75%) recommended by WHO (WHO, 2003).
A comparison of the US DRI and Fiji population intake showed that overall, 88.7% (Appendix 21 Table 9.3.1) of the population surveyed (15 years and above) met the US recommended amount (130g/day).

### 9.4.2 Sources of carbohydrates

There were five major sources of carbohydrates (Figure 9.4.1). These were traditional starchy staples (31.2%), rice (19.5%), bread & flour products (18.2%), roti (10.2%), sugar and sweets (8%).

Combined rice, bread & flour products and roti provided 47.9% of total carbohydrate, making cereal the principal source. Other minor sources not included in the discussion were made up of those with percent contributions of between 0.01%-2%.

![Figure 9.4.1](image)

**Figure 9.4.1**

Major sources of carbohydrates in the diet of Fiji’s population, 2004

The four main food sources of carbohydrate in the Fijian diet were starchy staple, bread, rice and sugar and sweets. For Indo-Fijians, the four main food sources of carbohydrate were rice, roti, bread and sugar and sweets.

### 9.4.3 Total dietary fibre

Overall daily median intake of dietary fibre was 17.4g/day with male adolescents at 19g/day, female adolescents at 14.1g/day, adult males at 19.6g/day and adult females at 16.3g/day. Fijians had the highest daily median intake (20.3g/day) compared to ‘Others’ (16.5g/day) and Indo-Fijians (14.5g/day). DMI for adults was similar to that of adolescents (17.5g/day and 16.9g/day respectively). DMI in urban areas was 19.1g/day, while it was 22.7g/day in rural areas.

Overall, only 19.9% of the population surveyed (Appendix 21 Table 9.3.2) met the US recommended amount (31.7g/day).
9.4.4 Sources of dietary fibre
There were 4 sources of dietary fibre that provided above 10% of total fibre (Figure 9.4.2): Staple foods (26%), nuts and legumes (15.8%), bread & flour products (12.6%) and other vegetables (10.4%). Other sources that provided significant amounts included green leaves (9.2%), rice (8.7%), roti (6.2%), and fruits (4.5%).

Four main food sources of dietary fibre in the Fijian diet were starchy staple, bread, green leaves and nuts and legumes. Amongst the Indo-Fijians the four main food sources were nuts and legumes, rice, roti and other vegetables.

9.5 Vitamins

9.5.1 Fat soluble

9.5.1.1 Total Vitamin A
Vitamin A is found in two forms: as retinol in foods from animal sources and as carotenoid in foods from plant sources (beta carotene being the most common carotenoid).

Daily median intake of total Vitamin A was 255µg with rates for male adolescents at 295.2µg, female adolescents at 216.6µg, male adults at 296.2µg, and adult females at 230.8µg. Overall intake was slightly higher in males (296.2µg) compared to females (230µg).
Daily median intake of Fijians was 258.1µg and Indo-Fijian intake was 252.5µg. DMI in urban areas (579.4µg) was lower than that in rural areas (650.5µg).

Overall, only 20.3% of the population surveyed (15 years and above) met the USDRI of 800µg (Appendix 21 Table 9.3.4).

9.5.1.2 Sources of Vitamin A
Over one third (39%) of total Vitamin A in the Fiji diet is obtained from green leaves (Figure 9.5.1), while hot beverages contributed 12.4%. Fish and sea foods provided 7.9%, roti 7.1%, vegetables 5.8%, and yellow vegetables, 5.8%. Dairy, animal fat and poultry contributed 4.10%, 4.10% and 3.5% respectively. Fruit provided only 2.3%.

![Figure 9.5.1](image)

Major sources of Vitamin A in the diet of Fiji’s population, 2004

Four main food sources of Vitamin A in the Fijian diet were green leaves, fish and seafood, hot beverages and other vegetables while food sources of Vitamin A in the Indo-Fijian diet were green leaves, hot beverages, roti and yellow vegetables.

9.5.1.3 Retinol (form of Vitamin A found in animal food)
Overall, daily median intake of retinol was 87µg. Adolescent males recorded DMI of 121µg, adolescent females had 105µg, adult males had a DMI of 103µg, and adult females had 71.8µg.

DMI for Fijians was higher (115.2µg) than Indo-Fijians (44.4µg), while ‘Others’ was the highest (174µg). DMI in urban areas was lower than in rural areas (381.9µg and 444.6µg respectively).

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Overall, only 6.5% of the population surveyed (15 years and above) met the US DRI of 650µg/day (Appendix 21 Table 9.3.4). Out of these, 7.7% were adolescents (4.8% urban and 2.8% rural) and 6.3% were adults (3.2% urban and 3.1% rural).

9.5.1.4 Sources of retinol
The major sources of retinol were poultry (26%) and hot beverages (24.3%). Other sources included fish and sea foods (16.1%), meat (12.26%), dairy (7.8%), animal fat (7.8%), and vegetable fat (2.1%) (Refer Figure 9.5.2).

![Figure 9.5.2 Major sources of retinol in the diet of Fiji's population, 2004](image)

Four main food sources of retinol in the Fijian diet were fish and seafood, meat, hot beverages and poultry. The four main sources in the Indo-Fijian diet were poultry, hot beverages, dairy and fish and seafood.

9.5.1.5 Beta -carotene (β-carotene - form of Vitamin A found in plant food)
Beta-carotene DMI for overall population surveyed was 1393.6mg.

Beta-carotene intake of adolescent males (1342mg/day) was higher than that of adolescent females (1086mg/day). DMI for male adults was higher (1799.7mg) than adult females (1224.6mg). Indo-Fijians had the highest DMI (1854.4mg) compared to Fijians (614.8mg) and ‘Others’ (455.5mg). Intake in urban areas (4027.7mg) was lower than intake in rural areas (5593.8mg/day).

Overall, 57.2% of the population surveyed (15 years and above) met the US DRI of 1000mg/day (Appendix 21 Table 9.3.4). 55.2% of adolescents met the recommended amount (23.4% urban and 31.9% rural). For adults, 57.4% met the recommended amount (27.5% urban and 30% rural).
9.5.1.6 Sources of β-carotene

The principal source of β-carotene (59.6%) was green leaves (Figure 9.5.3). The other three major sources were roti (10.7%), yellow vegetables (10.6%) and other vegetables (8.8%). Fruits contributed only 3.3%.

Four major sources in the Fijian diet were green leaves, other vegetables, yellow vegetables and fruits. For the Indo-Fijians, the four main sources were green leaves, roti, yellow vegetables and other vegetables.

![Figure 9.5.3](image.png)

Major sources of β-carotene in the diet of Fiji's population, 2004

9.5.2 Water Soluble Vitamins

9.5.2.1 Thiamin (Vitamin B1)

DMI of thiamin for the population surveyed was 0.8mg. Thiamin intake in male adolescents was 0.9mg/day and female was 0.8mg/day. Fijian DMI was 1.0mg; ‘Others’ was 0.9mg while Indo-Fijian had 0.7mg. DMI for adolescent was 0.9mg while adults recorded 0.8mg. DMI in urban areas was 1.3mg while in rural areas it was 1.7mg.

Overall, only 34.1% of the population surveyed (15 years and above) met the US DRI of 1.1mg/day (Appendix 21 Table 9.3.5). Of these, 30.4% were adolescents (15.4% urban and 15% rural). Adults who met the recommended amounts were 34.5% (15.5% urban and 19.1% rural).

9.5.2.2 Sources of thiamin

The four major sources of thiamin in the diet were bread & flour products (17.3%), nuts and legumes (17.1%), staple (16.8%), and hot beverages (14.4%). Other sources were Fish and sea foods (5.5%), rice (5.3%), meat (%), other vegetables (2.8%), mixed foods and green leaves (2.7% each, respectively) (Figure 9.5.4).
Four main dietary sources of thiamin in the Fijian diet were bread, starchy staple, hot beverages, fish and seafood. Four main food sources in the Indo-Fijian diet were nuts and legumes, hot beverages, bread and starchy staple.

![Major sources of thiamin in the diet of Fiji's population, 2004](image)

9.5.2.3 Riboflavin
Total DMI for riboflavin was 0.7mg. DMI for male adolescents was 0.8mg and 0.6mg for adolescent females. Fijians DMI was 0.8mg and 0.5mg for Indo-Fijians. ‘Others’ DMI was the highest with 1.2 mg. DMI for adolescent and adults were similar with 0.7mg. Intake in urban area was similar to that in rural area -1.0g/day.

Overall, only 26.1% of the population surveyed (15 years and above) met the US DRI of 1.2mg/day (Appendix 21 Table 9.3.5). Of these, 27.8% were adolescents (14.9% urban and 2.9% rural); while 25.9% were adults (12% urban and 14% rural).

9.5.2.4 Sources of riboflavin
Individual food sources that contributed more than 10% each were fish and sea foods (15%), green leaves (13.5%), hot beverages (13.4%), dairy (12.2%) and meat (10.1%) (Figure 9.5.5). The other four sources were poultry (8%), bread & flour products (5.9%), staple (4.8%), and other vegetables (3.7%).

Four main food sources of riboflavin in the Fijian diet were green leaves, fish and seafood, meat and hot beverages while for the Indo-Fijians the four were hot beverages, dairy, poultry and fish and seafood.
9.5.2.5 Niacin equivalents

Total DMI for niacin was 15.6mg. For adolescent males, DMI was 17.2mg/day and 13.6mg/day for adolescent females. Daily median intake for Fijians and ‘Others’ were similar (20.0mg and 21.3mg respectively) compared to intake of Indo-Fijians which was much lower (11.7mg). DMI in urban areas was lower (24.8mg) while rural areas were higher (32.8mg).

Overall, 52.5% of the population surveyed (15 years and above) met the US DRI for niacin of 15mg/day (Appendix 21 Table 9.3.5). Out of those that met the recommended amount, 51.6% were adolescents (23.8% urban and 27.8% rural) while 52.6% were adults (23.2% were urban and 29.4% were rural).

9.5.2.6 Sources of niacin

The principal source of niacin in the Fiji diet was green leaves (37.2%). Fish and seafood was the second important source (19.6%) (Figure 9.5.6). The other sources, which together provide a quarter of niacin in the diet were staple (6.6%), meat (6.4%), bread & flour products (5%), rice (4.9%), and hot beverages (2.9%).

Four main sources of niacin in the Fijian diet were green leaves, fish and seafood, starchy staple, and meat. For the Indo-Fijian diet the four main sources of niacin were Fish and seafood, poultry, rice, and green leaves.
9.5.2.7 Ascorbic acid (Vitamin C)
Overall DMI was 89.8mg. DMI for adolescent males was 79.6mg/day which was lower than the adolescent females’ intake 82mg/day. Adult intake of ascorbic acid was 91.7mg/day for males and 89.5mg/day for females. DMI for Fijians (124.0mg) was higher compared to ‘Others’ at 73.9mg and Indo-Fijians at 38.3mg. DMI in urban areas was 106.5mg whereas it was 145.5mg in rural areas.

Overall, 53.5% of the population surveyed (15 years and above) met the US DRI of 76.25mg/day (Appendix 21 Table 9.3.6). Of those who met the recommended level, 54.8% were adolescents (21.8% urban and 33.15 rural) while 53.3% were adults (20.2 urban and 33.1% rural).

9.5.2.8 Sources of ascorbic acid
Staple foods (43.3%) are major source of ascorbic acid (Figure 9.5.7). Fruit was the next important source (17.3%) and other vegetables provided 13.4%. Two other sources of significance were green leaves (7.6%) and hot beverages (6.6%)

The four major sources of ascorbic acid in the Fijian diet were starchy staples, fruits, other vegetables and green leaves. The four food sources of ascorbic acid in the Indo-Fijian diet were other vegetables, starchy staples, fruits and hot beverages.
9.6 Minerals

9.6.1 Iron

Overall the DMI was 10.3mg. DMI for adolescent males was 11.1mg and 9.1mg for adolescent females. Daily median intake for adult males was 11.6mg whereas intake for adult females was 9.3mg/day. DMI for Fijians was higher (11.9mg) than intake for Indo-Fijians (8.5mg). Intake of ‘Others’ was the highest at 12.6mg/day. DMI in urban areas was 15.6mg compared to 16.6mg for rural areas.

Overall, 41% of the population surveyed (15 years and above) met the US DRI of 13mg/day (Appendix 21 Table 9.3.3). Of those that met the recommended level of iron, 40.3% were adolescents (17.7% urban and 22.6% rural) and 41.1% were adults (17.4% urban and 23.6% rural).

9.6.2 Sources of iron

Food sources of iron were made up of many foods (Figure 9.6.1)

The major source was fish and seafood contributing 21.8% of total iron intake with hot beverages (Cocoa, Milo, Ovaltine) the next (13.1%). Other sources were staple (starchy root crops) which provided 9.8%, bread and other flour products (8.6%), green leaves (7.6%) and meat (6.1%). Foods that provided around 5% of total iron in the diet included nuts and legumes, other vegetables and poultry.

Four main sources of iron in the Fijian diet were fish and seafood, starchy staple, bread and green leaves. The four main sources in the Indo-Fijian diet were fish and seafood, hot beverages, nuts and legumes, and roti.
9.6.3 Calcium

Overall DMI was 345.8mg. DMI for adolescent males was higher (347.9mg) than for females (269.6mg). Intake of adult males was 382.6mg/day while adult females’ intake was 318.1mg/day. DMI was higher for Fijians (429.6mg) compared to Indo-Fijians (242.4mg) and ‘Others’ (358.6mg).

DMI in urban areas was lower (498mg) than in rural areas (595mg).

Overall, only 13.3% of the population surveyed (15 years and above) met the US DRI (1150mg/day). Of those that met the recommended level, 7.7% were adolescents and 14% were adults (Appendix 21 Table 9.3.3).

9.6.4 Sources of calcium

Green leaves appear to be the most important source of calcium providing 22.4% of daily intake (Figure 9.6.2). Fish and seafood was the next (16.1%), dairy (12.5%), staple (9.7%), sugar and sweet foods (7.2%), other vegetables (7%), hot beverages (6.6%) and bread & flour products (5.1%).

Four major sources of calcium in the Fijian diet were green leaves, fish and seafood, starchy staple, and dairy. The four main sources in the Indo-Fijian diet were dairy products, green leaves, fish and seafood, and hot beverages.
9.6.5 Potassium

DMI for population surveyed was 2421.1mg/day. Male adolescents had slightly higher intake (2452.2mg/day) than females (1985.3mg/day). Intake of potassium was higher for Fijians (3159.6mg/day) compared to Indo-Fijians (1624.5mg/day) and ‘Others’ (2674mg/day). DMI for adolescents was lower (2289.6mg/day) than adults’ intake (2409.5mg/day). DMI in rural areas (3230.7mg/day) was higher than in urban areas (2505.1mg/day).

Overall, only 17.1% of the population surveyed (15 years and above) met the US DRI (4700mg/day). Of those that met the recommended level, 1.5% were adolescents and 15.6% were adults (Appendix 21 Table 9.3.2).

9.6.6 Sources of potassium

Staple was a major source providing one third of DMI for potassium (36%) (Figure 9.6.3). Fish and seafood was the second major source (16.8%). Numerous other sources contribute between 2.6%-5.5% of daily intake.

Four major sources of potassium in the Fijian diet were starchy staple, fish and seafood, bread and green leaves. The four major food sources in the Indo-Fijian diet were starchy staples, fish and seafood, nuts and legumes and other vegetables.
9.6.7 Zinc
DMI of zinc was 7.6mg. DMI for adolescent males was 10.0mg and females had 7.3mg. Adult DMI for zinc was 8.8mg for males and 6.5mg for females. DMI for Fijians was higher (8.5mg) and for Indo-Fijians, 6.9mg. DMI in urban and rural areas were also similar (7.5mg and 7.9mg respectively).

Overall, only 38% of the population surveyed (15 years and above) met the US DRI (9.8mg/day). Of these, 34.3% were adolescents and 38.4% were adults (Appendix 21 Table 9.3.3).

Food sources for the Fijians were staples, meat and fish & seafood while for Indo-Fijians the sources were rice, roti and meat.

9.6.8 Sources of zinc
Staple was the major source of zinc in the diet (20.1%). The next main sources were meat (17.6%), rice (13.4%) and fish and sea foods (11%) (Figure 9.6.4). Other sources were mainly plant foods such as roti (7.3%), bread & flour products (6.3%) nuts and legumes (4.4%), green leaves (3.1%). Poultry provided 4.5% of the daily intake of zinc.

Four main food sources of zinc in the Fijian diet were starchy staple, meat, fish and seafood, and rice. The four main food sources in the Indo-Fijian diet were rice, roti, meat and nuts and legume.
9.7 Discussion and conclusions
Foods are the only major sources of nutrients for the body. Nutrition is a major modifiable factor in promoting health, preventing and managing diseases as well as improving quality of life (Gibney et al, 2002). In other words, optimal, balanced nutrition is a major determinant of health. Optimal nutrition is defined as the best possible intake that maximizes physiological and mental function and minimizes the development of degenerative diseases.

The results of the one-day 24 hour dietary recalls highlighted that all the 17 nutrients analyzed and compared against the US Recommended Nutrient Intake (RNI), showed that all except 5 (protein, carbohydrate, beta carotene, niacin and ascorbic acid) were below 50% of the US RNI.

At a superficial level, the results could be interpreted to mean that Fiji population dietary intake was inadequate. By implication, Fiji communities were not nutritionally healthy. A number of issues need to be stated.

Firstly, although the 24-hour diet recall is simple, cheaper and non-invasive methods of assessing nutrient intake, it has inherent problems with under-reporting of food intake. Secondly, the method required well trained interviewee to probe for responses. An examination of the quality of raw data indicated that there were problems in this area. Thirdly, a second 24-hour diet recall administered to a sub-sample of the population to validate intra and inter variation in nutrient intake was not used to validate the main results.

In terms of food sources of nutrients, the identification of the best food sources of these nutrients from the data would be a useful tool in the promotion of excellent sources of
nutrients to Fiji's population. These should also be used in the development of food and agricultural policies that promote food self-sufficiency in Fiji.

At a more general level, it is now recognized that there are several levels for considering optimal nutrition: (i) the level that prevents deficiency symptoms traditionally used to establish reference nutrient intakes; (ii) the level that optimizes body stores of nutrient; (iii) the level that optimizes some biochemical or physiological function; (iv) the level that optimizes a risk factor for some chronic disease; and (v) the level that minimizes the incidence of a disease (Gibney et al, 2002). For example, the reference value for calcium is based on optimizing bone calcium levels and not on preventing deficiency symptoms. Clearly this has been a departure from the traditional approach. The above example illustrated that the US DRI may be set at a level well beyond the reach of the majority of Fiji's population dietary intake. The DRI for iron is another example. While Fiji has usually used the WHO recommended level for iron (11g/dl), the US DRI for iron is 13mg/day.

The use of reference values to assess adequacy of the nutrient intake of a population has also been a subject of debate (Younger, 2002). While deficiency symptoms of many nutrients especially micronutrients are still an issue in many developing countries such as Fiji, any evolution of the concepts of desirable nutrient requirements will naturally lead to a revision of the estimate numbers of those with inadequate nutrition (Younger, 2002).

The recently revised US DRI set “tolerable upper intake” judged to be highest level of nutrient intake that is likely to pose no risk of adverse health effect (Younger, 2002) would also have contribute to the very high level of US DRI, thus making it almost impossible for anyone to achieve the level.
10.0 RESULTS PART VII: Food And Dietary Patterns

Food is more than purely for physiological reasons. Food and dietary patterns are culturally determined based on what was available. Although cultural groups have learnt and adopted other groups’ food eating habits, it is still used as a strong form of cultural identity. For example, when one invites guests to one’s home, generally the food one serves are one’s traditional dishes, a way of telling others who you are.

Studies have shown that when groups emigrate, food is the one aspect of their culture they will hang on to for as long as they can (Tunidau, 1983). These different dietary patterns can provide all the nutrients the body requires for optimum health.

Key Findings

- The most commonly consumed staple in Fiji was rice, which was consumed in more than 50% of the households. Cassava remains the main staple for Fijians and roti and rice for Indo-Fijians.

- The most frequently consumed type of fruit in Fiji was citrus, consumed in 34% of households, once or twice a day. The use of “wild” fruits has been minimal.

- Most Indo-Fijians consumed white meat such as chicken (74.4% for Indo-Fijians vs 51.7% for Fijians), while more Fijians (95.9%) consumed red meat than Indo-Fijians (92.3%).

- A large proportion of households consumed eggs, most consuming 1-2 eggs per week.

- More Fijians consumed fish. Overall 66% of the households consumed fish once or twice in a week.

- Fifteen percent (15%) of the households used cabin crackers and breads and 8% used breakfast cereals once or twice in a day.

- Overall 33% of the households consumed milk once or twice in a day. Milk was more often consumed in Indo-Fijian households than Fijian households.

- Yoghurt was consumed mainly in the Indo-Fijian households (24%) whereas cheese was consumed in Fijian households.

- About a quarter of all households consumed vegetables once or twice in a day. Onion was the most highly consumed vegetable, used in 90% of all households once or twice in a day. However, the purpose for which onion was used required only a relatively small amount. Other vegetables (green leafy vegetables) used were rourou (31.3%) and bele (21%).

- The most common yellow vegetable used by both ethnic groups was tomatoes.

- Sugar was consumed frequently (more than 2 times in a day).

- The reported daily consumption of spreads was relatively low: jam was used by 10% Fijians and 11.6% Indo-Fijians; peanut butter by 5.8% Fijians and 4.8% Indo-Fijians, and vegemite by 2.3% Fijians and 1.3% Indo-Fijians.

- Daily consumption of fat spread was 65.4% Fijians and 60% Indo-Fijians used butter while 37.6% Indo-Fijians and 29.2% Fijians used margarine.

10.1 Introduction

Eating is an enjoyable activity, a way of presenting ourselves to others and for some, a source of relief from daily stress. Our daily lives are structured around eating. It is part of our cultural identity. The food we eat and how they are prepared are influenced by our cultures, our taste preferences, what we are use to eating, whether it is available and accessible (affordability, whether we are allowed to eat it). Price of food is often the
tipping point when it comes to choice. Food choices however, affect health. The food people eat provides the body with the necessary materials for the maintenance of life and health. People's choices of food have enormous consequences on their health.

This part reports the results of the frequency of consumption of foods in the 2004 survey.

10.2 Food Frequency Survey
A total of 1693 households (970 Fijian (57%), 674 Indo-Fijian (40%) and 49 ‘Others’ (3%) were included in this part of the survey. The questionnaires were administered to the head of the household. Respondents were asked to describe frequencies of using foods in the last 6 months before the survey. A total of 97 foods were included in the food frequency questionnaires.

Because the total number of households of ‘Others’ is small, the discussion of results will focus mainly on the Fijian and Indo-Fijian ethnic groups. However, where the term “overall or all” is used, the data includes ‘Others’.

Only the mean daily and weekly usual food frequencies reported by households are reported. The rationale is that daily and weekly intakes are most likely to contribute significantly to family nutrient intakes. Although food consumed ‘monthly’ and ‘rarely’ would be shown in the graphs, they will not be discussed. In order to keep this section a reasonable length, only up to ten most commonly consumed or used foods in each food category will be reported.

Definitions of frequency used in this survey are:
(i) ‘daily’ means food are eaten up to twice or more times a day; (ii) ‘weekly’ means up to twice or more a week; (iii) ‘monthly’ means 1-3 times a month; and (iv) ‘rarely’ means seldom or never.

10.3 Staples
Staples are a group of foods that provide energy and needs to be available all year round (Wahlqvist, 1997). Foods included under this group refer to the traditional starchy crops (taro, yam, cassava, breadfruit, cooking banana or vudi, dalo-ni-tana, and sweet potato) for Fijians, as well as rice, and roti for Indo-Fijians.

10.3.1 Fijian households
Cassava was the most frequently consumed food on a daily basis by Fijians (59.2%). Rice was the second most frequently consumed (24.2%), breadfruit at 14.7%, roti at 12.5% and dalo at 10% (Figure 10.1).

On a weekly basis, foods reportedly eaten at least twice a week by Fijians were rice (66.3%), dalo (60.1%), roti (56.1%), breadfruit (48.2%), vudi (41.9%), and cassava (38.7%).

10.3.2 Indo-Fijian households
Rice and roti were the two prominent staples in the Indo-Fijian diet. Rice was used daily by 93.1% and roti by 94.8% households (Figure 10.2).

On a weekly basis, dalo was reported to be used by 40.9% of Indo-Fijian households, cassava by 31%, and breadfruit by 29.1%. Other traditional starchy foods were also reported to be used weekly: 11.9% ate vudi, 11.7% ate dalo-ni-tana and 9.6% ate
kumala. Although cereals such as rice and roti were eaten daily by the majority of Indo-Fijian families, a small proportion ate these staples on a weekly basis, 7.3% reported consuming roti and 6.4% ate rice.

Figure 10.1
Percent frequency of staple food consumption by Fijian households, 2004

Figure 10.2
Percent frequency of staple food consumption by Indo-Fijian households, 2004
10.3.3 Discussion
The other traditional starchy foods were not commonly consumed. The frequency of use of specific traditional starchy foods at any time would probably depend on whether they were in season. For example, breadfruit was in season during the survey period, hence it was available for consumption, whereas yam was not, and hence it was rarely consumed.

Cassava was consumed by nearly 60% of Fijian households daily. Although other starchy foods were still commonly consumed daily, the results clearly indicated a shift in the Fijians diet toward cereals (rice and roti) as part of their daily food pattern. The shift to cereal as a source of starchy food may be due to relatively cheaper cost and ease of storage. Popularity of cassava may be due to its ease of production, shorter period of maturity, availability, and lower cost for urban households compared to dalo. Dalo and other starchy food crops were eaten more on a weekly basis.

The results showed that the Indo-Fijian staple diet was cereal-based. Some traditional staples such as dalo, cassava and breadfruit were also consumed on weekly basis.

Although the daily use of noodles was reported by both Fijian and Indo-Fijian households, noodles were not as frequently consumed (10.4% and 8.6% respectively) as might have been expected. This was consistent with the results of the 24 hour diet recall where noodles did not figure as an energy source.

10.4 Fruits
Fruits included locally grown tropical fruits (banana, pawpaw, passionfruit, watermelon) pineapple, kavika, mango and green coconut), wild or bush fruits (guava, wi), and citrus (orange, mandarine, cumquat, lime and lemon) and imported fruits (such as apple, grape, pear, and kiwi fruit), dried fruits (date, sultana).

10.4.1 Fijian households
Fruits reported to be used daily by Fijian households are illustrated in Figure 10.3.

The fruits most frequently eaten daily by Fijian households were orange (42.9%), mango (36.2%) and pawpaw (29.9%). Guava was reported by 25.3% households, kavika by 24.6%, and banana by 20.8%, watermelon, bu (green coconut) and apple were also reported, but by less than 10% of households.

Weekly use of fruits reported by Fijians included apple (58%), banana (57.5%) and pawpaw (57.1%). Other fruits eaten on a weekly basis included orange (46.4%), bu (38.9%), bush fruits (guava 28.7%; kavika 28.2%), mango (28%), melon (21%), and pear (11.5%). Apart from the imported apple and pear, most of the fruits reported were locally grown and in season during the survey period.
10.4.2 Indo-Fijian households

Figure 10.4 shows the consumption frequency of fruits by Indo-Fijians. In general, daily consumption of fruits was relatively low with 24.8% for mango, 15.6% for pawpaw, 15.6% for pear, and 15% for guava. Only 8% of households ate orange, banana, kavika and apple daily.

Fruits were eaten more on a weekly basis by Indo-Fijians. For example, weekly consumption patterns showed 67.5% ate banana, 59.6% apple and orange, 57% pawpaw and pear, 43.7% mango, 43.5% bu, 35%, guava 35%. Other fruits eaten on weekly basis included melon (by 29.1% households) and kavika (by 25.2%).
10.4.3 Discussion
Relatively more Fijian households reported eating fruits daily compared to Indo-Fijians. In general, daily consumption of fruits by Indo-Fijian was lower compared to Fijian. Frequency of weekly consumption of fruits was similar for both ethnic groups. Although both groups did not consume sufficient fruit generally, this was particularly noticeable amongst Indo-Fijians. The consumption trend shown by these results is similar to global trends.

A number of factors might contribute to the low consumption of fruits by both groups. Fruits are not part of the main or formal meal traditionally but eaten as snack. This is also an indication of the status of fruit within the traditional food hierarchy – it is not as important as other foods. Availability is another important factor. Availability (in season and at home) has an influence on whether family members would select to eat it. Families need to access it in order to eat it. Accessibility includes cost i.e. whether families can afford it.

10.5 Fish and Other Seafoods
Foods included under this group were fresh fish, canned fish (tuna, salmon, sardines), shellfish (mussels, oysters, kai, kaikoso), octopus, prawns or shrimps, crabs, lobsters, and seaweed (nama and lumi).

10.5.1 Fijian Households
Daily consumption of fresh fish was 23.4%. Canned fish was eaten by only 8.3% on a daily basis (Figure 10.5).

A relatively higher proportion of Fijians consumed seafood on a weekly basis: fish by 67.5%, canned fish by 70.8%, shellfish by 38.2%, prawns by 15.3% crabs by 8.9% and seaweed by 24.7%.

Figure 10.5
Percent frequency of fish and seafood consumption by Fijian households, 2004
10.5.2 Indo-Fijian Households
Only 2.4% reported eating fish and 1.9% canned fish daily (Figure 10.6). However, similar to Fijians the frequency of weekly consumption of fresh fish and canned fish were relatively high (62.9% and 72.8% respectively).

![Figure 10.6](image)

**Figure 10.6**
Percent frequency of fish and seafood consumption
By Indo-Fijian households, 2004

10.5.3 Discussion
The results showed that generally Fijians consumed more fish and seafood daily: almost 10 times more than Indo-Fijians. Although Fijians reported consuming more fish and other seafood daily, the overall percentage was not as high as might have been expected.

The frequency of weekly consumption of fresh fish and canned fish by both groups were similar. Consumption of prawns, crabs, lobsters and seaweeds by both groups were not as frequent. Fijians tended to eat them more often compared to Indo-Fijians.

Cultural food eating patterns may be a factor, giving rise to these differences. Fijian traditional eating patterns are based on seafood whereas Indo-Fijian eating pattern are not. In addition, the availability of fish and seafood also affects consumption. With dwindling fish stock around our ocean, it has become more difficult to catch fish hence affects supply/availability and price.

10.6 Meats
‘Meat’, in this survey referred to beef, lamb, pork, goat, sausage (pork or lamb), chicken and duck.

10.6.1 Fijian households
Daily consumption of meat by Fijians is not common according to this survey – less than 1% (Figure 10.7).

More Fijians reported consuming meat weekly (1–≥2/wk). The most commonly consumed meats on a weekly basis were chicken (51.7%), sausages (32.5%), lamb/mutton (30.8%) beef (27.1%), and pork (4.7%).
Duck and goat meat appeared not to figure prominently in the Fijian diet.

**Figure 10.7**
Percent frequency of meat consumption by Fijian households, 2004

10.6.2 Indo-Fijian households
Less than 1% of Indo-Fijian households consumed meat on a daily basis (Figure 10.8). Weekly consumption of meat was higher and included chicken (74.4%), lamb/mutton (48.5%), sausages (27.6%) and duck (7.9%). Goat and pork were consumed by less than 1%.

**Figure 10.8**
Percent frequency of meat consumption by Indo-Fijian households, 2004
10.6.3 Discussion
The patterns that have emerged show that both the Fijian and Indo-Fijian ethnic groups consumed more meat weekly rather than daily. The three types of meat most frequently consumed by both ethnic groups were chicken, lamb/mutton, and sausages. Availability and cost may be the two major reasons for the more frequent consumption of these meats.

Fijians, in comparison to Indo-Fijians, consumed more fish than meat.

10.7 Eggs
Egg is probably the cheapest source of animal protein. Households were asked about weekly egg consumption.

Figure 10.9 show that about one third of all households surveyed consumed 1-2 eggs per week (31.7% Fijian and 36.1% Indo-Fijian). Approximately one quarter of households consumed 3-4 eggs per week (28.1% Fijian and 24% Indo-Fijian). Similar proportions of households consumed 5 or more eggs per week (23.4% Fijian and 25.1% Indo-Fijian). Less than 20% of households used 1 egg or less per week (16.8% Fijian and 14.5% Indo-Fijian).

The results show similar consumption patterns of eggs by both Fijian and Indo-Fijian. About a third of households consumed up to 2 eggs a week while only a quarter consumed up to 4 eggs a week. A small proportion of households either used one egg or none at all in a week.

10.8 Dairy Foods
Dairy foods in this survey included milk (all types), ice cream, yoghurt, and cheese.
10.8.1 Fijian households
Only 22.5% of Fijians reported daily use of milk (Figure 10.10). Other dairy products were also used daily, but by a very small proportion of Fijians (< 1%).

A slightly higher proportion reported weekly use of dairy foods: 44.2% consumed milk, 19.2% ate ice cream, 14% consumed yoghurt and only 3.5% used cheese.

![Figure 10.10](image.png)

**Figure 10.10**
Percent frequency of dairy food consumption by Fijian households, 2004

10.8.2 Indo-Fijian households
Majority of Indo-Fijians (47.3%) consumed milk daily (Figure 10.11). The other three dairy products were consumed by much smaller proportions of households (less than 2%). Weekly consumption of milk was similar to the daily pattern (46.7%). Consumption of ice cream was 36%, yoghurt was 30.4% and cheese by 7.6%.

![Figure 10.11](image.png)

**Figure 10.11**
Percent frequency of dairy food consumption by Indo-Fijian households, 2004
10.8.3 Discussion
The pattern of dairy consumption by Fijians that had emerged could be attributed to the fact that milk is not part of the traditional Fijian diet.

Compared to Fijians, Indo-Fijians consumed more dairy foods. The difference in consumption patterns could be attributed to the fact that milk is part of the Indo-Fijian traditional diet.

10.9 Breads and Cereals
Food items included under this group were bread, cabin/breakfast crackers, flour and home-made flour products such as topoi (dumpling), pancakes, and scones. Breakfast cereals included cornflakes and Weetbix.

10.9.1 Fijian households
Daily consumption of bread and cereal was reported by Fijians (Figure 10.12). Cabin crackers were most commonly consumed daily by 20.2% of Fijian households, bread by 14.5%, pancakes/topoi (home-made from flour), breakfast cereal and porridge by 5.8% and 5.3% respectively.

A relatively higher proportion of households reported consuming the following foods on a weekly basis: pancakes/topoi (65.5%), cabin crackers (61.7%), bread (53.1%), porridge (25.2%) and breakfast cereal (17.7%). Sweet biscuits were reported to be consumed weekly by 1% of Fijian households.

![Figure 10.12](image)

**Figure 10.12**
Percent frequency of bread and cereal consumption by Fijian households, 2004

10.9.2 Indo-Fijian households
Cabin cracker was the most commonly consumed item by Indo-Fijian households daily (13.8%) (Figure 10.13). This was followed by bread (11%), breakfast cereal (10.1%), porridge (8%) and sweet biscuits (6.4%).
Bread was most commonly consumed weekly (71.1%), followed by cabin crackers (61%), sweet biscuits (41.6%), porridge (34.9%), breakfast cereal (30.6%). The least eaten food item on a weekly basis was pancakes.

10.9.3 Discussion
Based on these findings, cabin crackers and bread were the most commonly consumed bread and cereal products daily and weekly. Other food products like porridge and breakfast cereal were increasingly consumed. It appeared that Indo-Fijian had increasingly adopted the use of these 'western food products' in a similar way Fijians have.

Home made flour products like pancake and ‘topoi’ were not consumed by Indo-Fijians.

10.10 Vegetables

10.10.1 Green leafy vegetables
Items under this group included tubua (chauraiya or amaranthus), bele (edible hibiscus), saijan (drumstick leaves), rourou (taro leaves), watercress, ota (fern leaves).

10.10.1.1 Fijian households
Figure 10.14 shows that rourou and bele were the most commonly consumed green leafy vegetables by Fijians on a daily basis (36%). Daily use of tubua, ota and watercress was also reported but it was less than 10% of households. Weekly consumption was higher for rourou (62.6%), bele (63.1%), tubua (49.9%) and ota (47%).
10.10.1.2 Indo-Fijian households
Indo-Fijian consumption pattern (Figure 10.15) shows that less than 5% of households used green leafy vegetables daily. However, weekly frequency of use was high (at least twice): 79% used tubua, 64.2% used rourou, 63.7% used bele, and 62.1% used saijan. Only 10.4% used ota and 8.6% used watercress.
10.10.1.3 Discussion
The results indicate that rourou, bele, and ota were the most commonly consumed items by Fijians daily and weekly. This is understandable in view of the fact that these green leafy vegetables are traditionally part of the Fijian diet. Data showed that Indo-Fijians had adopted the use of rourou, bele and tubua as part of their diet.

It could be deduced from the above patterns that the consumption of green leafy vegetables did not meet the recommended level of 5-7 serves a day (WHO, 2003).

10.10.2 Yellow and Other Bright Coloured Vegetables
This group included pumpkin, carrot, corn and tomato.

The frequency of consumption of yellow vegetables by both ethnic groups appeared similar (Figure 10.16 and Figure 10.17). A relatively smaller proportion ate them daily.

Tomato was used by 15.9% Fijian and 15% Indo-Fijian households. The vegetables were more commonly used on a weekly basis i.e. by more than 50% of households. Frequency of use by Fijian was 51.8% for pumpkin, 42.4% for carrot and 46.9% for tomato. Frequency of use by Indo-Fijian was slightly higher than Fijian (74.2% for pumpkin, 60% for carrot and 65.9% for tomato). More Indo-Fijians used these foods weekly compared to Fijians.

![Figure 10.16](image_url)

Percent frequency of yellow vegetable consumption by Fijian households, 2004
10.10.2.1 Discussion
The higher consumption of these vegetables by Indo-Fijians might be a result of their traditional vegetarian-based diet. It could also be deduced from the above results that the consumption of yellow vegetables did not meet the recommended level of 5-7 serves a day (WHO, 2003).

10.10.3 Pulse, Bean and Other Lentils
Food items included under this group were dried and fresh forms of beans, dhal (pulses - arhar, mung, urdi, and split peas), okra, and other: jackfruit, eggplant, lauki (bottle gourd), karela (bitter gourd), potatoes, and cucumber.

10.10.3.1 Fijian Households
In general, proportionally less Fijians used this group of food daily (Figure 10.18). Eggplant (13.9%), potato (11.3%), dhal (9%), cucumber (7.6%) and green bean (4.2%) were used daily to some degree by Fijians.

More Fijians used this group of foods on a weekly basis: green beans (44.2%), dhal (67.3%), potato (61.9%), eggplant (60.6%) and cucumber (40.5%).
10.10.3.2 Indo-Fijian households

Frequency of daily consumption of this group by Indo-Fijian (Figure 10.19) indicated that dhal was the most commonly used (32.5%) potato was second (22%) and cucumber came third (10.1%). A relatively small proportion of households consumed other food items daily.

Figure 10.19 also indicates that these foods were more commonly consumed weekly with two items consumed by over 80% (green bean by 80.7% and eggplant by 80.8%). Okra and potato were consumed by 76.4% and 72.7% respectively. Bora bean was used by 66.8% households, dhal by 63.5%, cucumber by 62.8%, karela by 47.5% jackfruit by 44.4% and lauki by only 18.6%.
10.10.3.3 Discussion
The pattern that appeared to have emerged indicated that Fijians had started to adopt and consume foods that were originally considered 'Indo-Fijian food' such as beans, dhal, and eggplant. The pattern remained that more Indo-Fijians reported consuming green beans, dhal, bora beans okra, eggplant and jackfruit. These are typically known as 'Indo-Fijian food'.

10.10.4 Other Vegetables
Food items under this group included Chinese and English cabbage, cauliflower, bean sprout, onion, frozen vegetables and capsicum.

10.10.4.1 Fijian Households
The two most frequently consumed foods by Fijians on a daily basis were onions (86.9%) and frozen vegetables, 2% (Figure 10.20). Other food items under this group were not eaten by many Fijians.
Figure 10.20
Percent frequency of other vegetable consumption by Fijian households, 2004

10.10.4.2 Indo-Fijian Households
Figure 10.21 showed onion was the most frequently consumed item (95.8%) by Indo-Fijians daily. Other foods under this group were not extensively used daily. Weekly consumption was highest for Chinese cabbage (72.7%), English cabbage (66.2%), frozen vegetable (53.9%), cauliflower (23.5%), bean sprout (14.9%) and capsicum (12.6%).

Figure 10.21
Percent frequency of other vegetable consumption
By Indo-Fijian households, 2004
10.10.4.3 Discussion
This group of vegetables is more commonly consumed weekly. Chinese cabbage, English cabbage and frozen vegetables are consumed more than ‘Others’. Both Fijians and Indo-Fijians have similar consumption patterns. This result could be attributed to the fact that these vegetables were originally not part of the traditional diet.

10.11 Miscellaneous
Items under this group included sugar and sweets, and spreads.

10.11.1 Sugar and Sweets
These include sugar and sweets which include sugar, Indo-Fijian sweets, lollie/candy, chocolates and cakes (cakes, scones or pikelets).

Sugar was the most frequently consumed food daily by both ethnic groups (95.8% Fijians and 98.4% Indo-Fijians) (Figure 10.22 and Figure 10.23). More Indo-Fijians reported daily consumption of lollies (11.2%) compared to Fijians (4.7%).

Figure 10.22
Percent frequency of sugar and sweets consumption by Fijian households, 2004

On a weekly basis, a higher proportion of Fijians consumed cakes (52.5%) compared to Indo-Fijians (24.4%). More Indo-Fijians consumed Indo-Fijian sweets (24.3%), lollies
(31.7%), and chocolates (27.7%) compared to Fijians who consumed Indo-Fijian-sweets 8.3%), lollies (23.6%), and 10.7% chocolate.

In summary, a high proportion of both Fijians and Indo-Fijians consumed sugar daily. However, Fijians consumed more cakes and other sweet foods weekly.

10.11.2 Snacks and High Fat Fast Foods
Food items included in this group are nuts, crisps, puffs (e.g. Twisties, Bongos), fish and chips, pizza and burgers.

Daily consumption of snacks was reported to be low by both Fijian and Indo-Fijian groups (Figure 10.24 and Figure 10.25). More households reported weekly consumption (For Fijians, 23.5% ate nuts, 33.5% consumed crisps/Twisties/Bongos, and 15.3% consumed chips. For Indo-Fijians, 33.2% consumed nuts, 52.4% ate crisps/Twisties/Bongos, 24.3% ate fish and chips, and 29.3% consumed pizza).
10.11.3 Spreads
The results (Figure 10.26 and Figure 10.27) show that the daily frequency of consumption of the three types of spread were relatively low with both Fijians and Indo-
Fijians (10% and 11.6% for jam, 5.8% and 4.8% peanut butter, 2.3% and 1.3% Vegemite), respectively. Weekly and monthly consumption were higher.

In response to the question asking householders about the type of fat spread used often 63.2% of the population indicated that they used butter and 32.4% used margarine.
Slightly more Fijians (65.4%) than Indo-Fijians (60%) used butter while margarine was used more by Indo-Fijians (37.6%) than Fijian (29.2%).

10.12 Comparison between 1993 and 2004
Food items reportedly consumed in both surveys were similar. This was expected as food patterns are slow to change. Differences in food items reported would most likely due to the fact that they were in season during the time of the surveys. For example, fruits reportedly consumed in 2004 were mangoes, guava and oranges which were in season.

10.13 Discussions and Conclusion
Although both groups by and large have maintained their cultural diet (Indo-Fijian diet - cereal-based while the Fijian’s diet - starchy root-based), eating patterns have changed more among indigenous Fijians than Indo-Fijians (ACIAR Report, 2002). On a day-to-day basis, urban and rural Fijians have shifted from the more traditional but expensive taro (dalo), to cheaper cassava and rice, followed (in order of importance) by bread and wheat flour biscuits. Intake of animal protein (red meat: fresh and tinned) has increased substantially compared to fish. Food choice for Fijians is determined mainly by value for money followed by ease of preparation; for Indo-Fijians, by value for money and personal preference (ACIAR Report, 2002). Cultural food patterns remain strong at festival and feast times (Tunidau, 1983).

The dietary changes observed in this survey typify the “nutrition transition” that included both quantitative and qualitative changes (WHO, 2003). The adverse changes include shifts in the diet towards a higher energy density with more fat and sugary foods; greater saturated fat (from animal sources); reduced consumption of complex carbohydrates and dietary fibre and reduced fruit and vegetable consumption. The dietary pattern found in the 2004 is consistent with the diet characteristic of nutrition transition.

Food balance sheets appear to confirm that Fiji is in nutrition transition. A relatively large percentage of major food groups that form the basis of the diet in Fiji are imported (NFNC, 2003). These include cereals, pulses, vegetable oil and fat, vegetables, meats, milk and animal fat which make up between 60-80% of imported foods. The percentages of energy supply on a per capita basis derived from imports as well as from locally grown food indicated a consistent pattern of just over half the dietary energy being supplied by imported food (NFNC, 2003).

In general terms, cost will play a significant role in food choice among both urban populations and rural dwellers.

In summary, over the past decade there has been:
(i) a general increase in the consumption of:
  • Animal protein which have a strong relationship to income;
  • Fat;
  • Sugar;
  • Cereals and
(ii) a general decrease in the consumption of:
  • Fruits;
  • Vegetables;
  • Traditional starchy roots as a source of energy.
11.0 RESULTS PART VIII: Household Food Security

Despite the fact that sufficient food is produced on a global level and the fact that Fiji’s climate is ideal for growing food, food insecurity particularly at household levels exists in the country. An outcome of food insecurity is that it invariably results in under-nutrition and related micronutrient deficiency diseases.

Key Findings

• There has been a reduction in the number of home food gardens in urban areas since 1993, and no change in the rural areas.
• 78.9% of households grew some food for home consumption compared to 84.6% in 1993.
• Unavailability of land was the most common reason for not growing foods in urban areas.
• More rural households than urban households raised animals for food.
• 11% of the surveyed population, most of whom were in rural areas, reported that they went fishing for home consumption.
• Indo-Fijians preserved foods more than Fijians. Rural people preserved food more than urban people.
• Few people in rural areas stored perishable foods.
• Urban households had higher cash incomes than rural households.
• Urban households spent more on food than rural households.
• More urban people spent money on ‘take away’ foods.
• Within the household, the head was given the most food.
• Wives planned and prepared the food, but husbands also did some shopping.
• No one conceded that they could not feed their families.
• A small number of households reported having insufficient food on occasions. In these instances, the mother went without eating.
• The most important sources of information on nutrition were the health personnel and radio in both urban and rural areas.

11.1 Introduction

Household food production is an essential component of food security. Food security for households is defined by FAO as having access to enough food for an active, healthy life by all members at all times. It includes at a minimum (i) the ready availability of nutritionally adequate and safe food, and (ii) an assured ability to acquire acceptable foods in socially acceptable ways without resorting to emergency food supplies, scavenging, stealing, or other coping strategies.

To obtain a general picture of household food security, 1338 household meal-providers (person who usually prepare food for the household) were asked questions about home food production, fishing, food storage and preservation, meal planning, food shopping, food preparation, household food expenditure and intra-household food distribution.
11.2 Food Production

11.2.1 Households with food garden
Participants were asked whether they have a food garden.

Overall, 78% of respondents reported they had food gardens (86.3% Fijians and 70.5% Indo-Fijians).

Relatively higher proportions of rural households had food gardens (96.2% Fijians and 85.5% Indo-Fijians) compared to urban households (67.7% Fijians and 59.2% Indo-Fijians).

The lack of land was the main reason given for not having food gardens. Sixty five percent (65%) gave this reason (70.5% Fijians and 60.4% Indo-Fijians). More urban households identified a lack of available land as the main reason for not having food gardens (82.1% Fijians and 66.4% Indo-Fijians). It was also the main reason given by rural respondents for not having food gardens (33.1%).

In summary, the results showed that more rural households had food gardens. Additionally, more Fijians (urban or rural) had food gardens compared to Indo-Fijian. The major reason for not having food gardens was a lack of available land.

11.2.2 Reasons for keeping food gardens
Participants were asked what the main purpose was for them having a food garden.

Overall, the most common reason for having food gardens was to supply household food needs (75.5%). Of those who gave these reasons, more were urban households (95.3%) compared to rural households (64%).

Higher proportion of Indo-Fijian households in rural areas (80.3%) had gardens to supply family food needs compared to Fijians (58.7%).

Very small proportions of households of both ethnic groups in urban and rural areas (1.1% and 1.3% respectively) had gardens for income purposes only.

The proportion of households that had food gardens to supply food and income for families was higher in rural areas (33.6%) compared to only 3.6% in urban areas. Of the rural families with gardens for both income and home use, 40% were Fijians compared to only 17.7% Indo-Fijians.

Of interest is the higher proportion of Fijian families with gardens for both family use and income in rural area. Anecdotal evidence indicated that Fijians often sell the best of their produce for cash, which afterwards was used to purchase food and household items. It is possible that Fijians in rural areas were selling most of and the best crops as a major, if not the only, source of income.

11.2.3 Weekly root crop needs supplied from gardens
Participants were asked to estimate how much of their weekly food needs of root crops, leafy vegetables, fruit and other vegetables were met from their gardens.
Of those who had their weekly food needs met, 44.8% had their root crop needs, 35% had their leafy vegetable needs, 13.9% had their other vegetables needs and only 6.4% had their fruit needs provided from their gardens.

More than half of Fijians in both urban and rural areas (64.3% and 58% respectively) obtained most root crops from their garden compared to Indo-Fijians (9.8% urban and 7.5% rural), as shown in Figure 11.1. The reverse was reported for green leafy vegetables where more Indo-Fijians (62.9% urban and 64.2% rural) obtained most of their leafy vegetables from their food garden compared to Fijians (26.8% urban and 22.5% rural). Very few Fijian and Indo-Fijian households in rural and urban areas obtained fruit from their food gardens. Slightly more Indo-Fijians in urban and rural areas (26.9% and 25.4%) reported that their weekly supply of other vegetables was provided by their garden compared to 6.1% urban Fijians and 9.7% rural Fijians.

To summarize, Fijians grew more root crops and less green leafy vegetables while Indo-Fijians grew more green leafy vegetables and other vegetables. Overall, a very small proportion of households obtained fruits from their garden.

11.2.4 Contribution of garden food to weekly household food supply
(It is assumed that ‘food needs’ means traditional root crops and vegetable).
More rural households in both ethnic groups reported getting all food needs from the garden (61.8% Fijian, 44.5% Indo-Fijian) compared to urban households (17.6% Fijian and 18.8% Indo-Fijian) (Figure 11.2). Over half the urban households in both ethnic groups reported that their food garden did not supply much of their weekly food needs (58.6% Fijian and 51.8% Indo-Fijian). Fewer families in rural families (28% Fijian, 41.6% Indo-Fijian) reported they did not get much from their garden. Slightly more families in urban areas (23.6% Fijian, 29.5% Indo-Fijian) reported getting very little from their garden compared to rural families (10.2% Fijian and 13.9% Indo-Fijian).
These results are expected in view of the unavailability of land in urban areas and are consistent with the reasons reported by urban families for not having gardens i.e. no land for gardening. Because rural families are more likely to have land for gardening, they can obtain most, if not all their food needs from their garden compared to urban dwellers. Urban families are less likely to have land for gardening and less time for gardening because of other employment opportunities.

### 11.2.5 Livestock and birds for household consumption

A greater proportion of urban Fijian and Indo-Fijian households surveyed did not keep livestock and birds for home use (Table 11.1). The reverse was reported by rural households. Of those rural households that kept livestock and birds, a higher proportion were Indo-Fijians (77.6%) compared to Fijians (59.6%). Only 12% urban Fijians and 28.4% of urban Indo-Fijians kept livestock and birds for household consumption.

<table>
<thead>
<tr>
<th>Area Type</th>
<th>Ethnicity</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
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<td>Urban</td>
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<td>88</td>
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<tr>
<td></td>
<td>Indo-Fijian</td>
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<td>71.6</td>
</tr>
<tr>
<td>Rural</td>
<td>Fijians</td>
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<tr>
<td></td>
<td>Indo-Fijian</td>
<td>77.6</td>
<td>22.4</td>
</tr>
</tbody>
</table>

The four main types of livestock and birds kept by most households were chicken/duck, cattle, goat and pigs. Majority of households reported using ‘most’ animals/birds for home consumption.
11.2.5.1 Contribution of domesticated livestock and birds to household food supply

Overall, 73.8% of households (66.6% Fijians, 82.7% Indo-Fijian and 80% ‘Others’) said that most of their needs were provided by the livestock and birds they had reared. Examined by area type and ethnic group, the results showed more Indo-Fijians (78.7% urban and 84.6% rural) than Fijians (61.5% urban and 67.1% rural) had most of their needs provided.

The relatively higher rate of Indo-Fijians that kept livestock and birds could probably be explained in part by their customary dietary habits. Indo-Fijian families usually keep cows for milk. It is also common for them to keep chickens for both eggs and meat. Goats are also kept for both milk and meat for special occasions. On the other hand, milk is not part of the Fijian traditional diet hence cows are not kept for that purpose. Fijians may keep livestock (pigs, cows) for traditional functions and not so much for family food.

11.2.6 Fishing for household-use

Less than 50% of respondents (46.5%) reported that they went fishing. Most of the people who did so went fishing 2 – 5 days a week (31.5%), once a week (26.8%) or once a month (23.4%). Fijians fished more frequently than Indo-Fijians.

Overall, 86.8% of households (86.8% Fijians, 88% Indo-Fijians and 69.2% ‘Others’) used most of the catch for home consumption. Figure 11.4 shows that a large proportion of Indo-Fijians and Fijians in urban areas reported using most of their catch for home consumption (92.1%, 90.2% respectively). The proportion of Indo-Fijians and Fijians in rural areas that reported using most of their catch for families was also similar (85.7%
and 86.0% respectively). A very small proportion of respondents reported using half or less of their catch for family use.

In summary, both major ethnic groups fish mostly for household use in both urban and rural areas.

**11.2.7 Income from garden produce and fishing**

The data showed the proportion of households selling garden produce and fish to earn income.

Overall, 32.2% of total households (48.9% Fijians and 38% Indo-Fijians) earned >$50.00 per month from the sale of garden produce. The proportion of urban Fijian and Indo-Fijian households that earned more than $50.00 per month were similar (57.1% Fijian and 57.1% Indo-Fijian). There was some difference amongst rural families where more Fijians (48.4%) than Indo-Fijians (38%) reported earning more than $50.00 per month from the sale of garden produce.

These results appeared consistent with the previous findings that more rural Fijians used garden produce for household food supply and for income.

Relatively smaller proportions of households (urban and rural) earn $10–<$50 per month from the sale of garden produce.

Although livestock and birds were also sold to supplement household income, only a small proportion of all households did this occasionally (22.4%). The majority did not (73.9%). Only 55.9% of all households that reportedly sold their livestock earned >$50.00 per month. This was made up of 50% urban and 56.9% rural households.
The proportion of households that derived an income from the sale of fish was also low. Of the 15.2% that sold their catch, 29.6% earned >$50.00 per month. More urban households (64.3%) than rural (24.8%) and more Indo-Fijians (60% urban and 40% rural) than Fijians (57.1% urban and 24.8% rural) earned more than $50.00 per month from the sale of fish. These results seemed to indicate that Fijians are less likely to sell their catch compared to Indo-Fijians.

The data indicated that households supplement their income by selling garden produce, livestock, and fish.

### 11.3 Methods of storing food

Proper food storage is essential to maintain food as fresh as possible for as long as possible. This improves household food supply. Storage of perishable and non-perishable foods was the focus of the questionnaire.

The major method of storing perishable and frozen foods is a fridge (Table 11.2). 81.2% Fijian and 88.9% Indo-Fijian households in urban areas reported using their own fridge for this purpose. A higher proportion of rural Indo-Fijians (63.6%) than Fijians (20%) stored perishable food in their own fridge. This implied that rural Fijians are less likely to own a fridge.

The use of a neighbour’s fridge was more common with Fijians in both urban (11.7%) and rural (18.7%) areas than Indo-Fijian households (4.7% urban and 7.8% rural). More Fijians in rural area do not store perishable food compared to urban households. Possible explanations for the higher rate of urban families compared to rural families that own fridges is that they can afford to own one and that there is electricity available to operate the fridge. The custom of ‘kerekere’ in the Fijian community probably explains the higher numbers of Fijians storing perishables in their neighbours’ fridges in addition to not being able to afford one.

**Table 11.2**

Ways of storing perishable foods by area type and ethnicity, 2004

<table>
<thead>
<tr>
<th>Area type</th>
<th>Ethnicity</th>
<th>Own fridge</th>
<th>Neighbour’s fridge</th>
<th>Don’t store</th>
<th>‘Others’</th>
</tr>
</thead>
<tbody>
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<td></td>
<td></td>
<td>No</td>
<td>%</td>
<td>No</td>
<td>%</td>
</tr>
<tr>
<td>Urban</td>
<td>Fijians</td>
<td>277</td>
<td>81.2</td>
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<td>Indo-Fijian</td>
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<td>88.9</td>
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<tr>
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<td>2.9</td>
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<tr>
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<td>Fijians</td>
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<td>117</td>
<td>18.4</td>
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<td>Indo-Fijian</td>
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<tr>
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<td>‘Others’</td>
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<td>0</td>
<td>0</td>
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</tbody>
</table>

Other common methods of storing food in both urban and rural areas were cupboards, food safes and open shelves (Table 11.3). These methods are suitable only for dry or canned food items but not for perishable foods. In many homes, a combination of these other methods and fridges would have been used.
Table 11.3
Other methods of food storage by area type, 2004

<table>
<thead>
<tr>
<th>Area Type</th>
<th>Cupboard</th>
<th></th>
<th>Food Safe</th>
<th></th>
<th>Shelves</th>
<th></th>
<th>'Others'</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No</td>
<td>%</td>
<td>No</td>
<td>%</td>
<td>No</td>
<td>%</td>
<td>No</td>
<td>%</td>
</tr>
<tr>
<td>Urban</td>
<td>487</td>
<td>64.5</td>
<td>85</td>
<td>11.3</td>
<td>111</td>
<td>14.7</td>
<td>72</td>
<td>9.5</td>
</tr>
<tr>
<td>Rural</td>
<td>647</td>
<td>69.1</td>
<td>106</td>
<td>11.3</td>
<td>124</td>
<td>13.2</td>
<td>60</td>
<td>6.4</td>
</tr>
</tbody>
</table>

11.4 Food preservation
Indo-Fijians (88.6%) preserve more food than Fijians (53.5%). Although rural households generally preserve more (92.2% Indo-Fijians and 56.0% Fijians), a relatively large proportion of urban Indo-Fijians (85.7%) also preserve food.

Home preserved foods contribute to the family food supply system. The Indo-Fijian diet and culture lends itself well to preservation particularly of food accompaniments. Although traditionally Fijians preserved food to a small extent, the skills have almost disappeared.

11.5 Household Food Expenditure
The findings showed that on average, Indo-Fijians spent more on food than Fijians and that urban communities spent more money on food than rural communities (Table 11.4).

Table 11.4
Weekly and monthly food expenditure by ethnicity and area type, 2004

<table>
<thead>
<tr>
<th>Ethnicity</th>
<th>Weekly</th>
<th>Monthly</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Average ($)</td>
<td>No</td>
</tr>
<tr>
<td>Fijians</td>
<td>41.30</td>
<td>979</td>
</tr>
<tr>
<td>Indo-Fijians</td>
<td>60.37</td>
<td>674</td>
</tr>
<tr>
<td>‘Others’</td>
<td>79.13</td>
<td>43</td>
</tr>
<tr>
<td>Area type</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Urban</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rural</td>
<td>34.85</td>
<td>940</td>
</tr>
<tr>
<td>Total</td>
<td>49.84</td>
<td>1696</td>
</tr>
</tbody>
</table>

Participants also reported spending about $10.00 on “fast foods” or takeaways. This is more common in urban areas where food outlets or restaurants are a common feature.

11.6 Intra household food distribution
Participants were asked about how food was shared in their households. Table 11.5 showed that the head of the household received the largest share. This was more likely to happen in rural than in urban communities (72.4% and 44.6%) and more in Fijian (73%) than Indo-Fijian families (35.7%). It appeared that a large proportion of Fijians still practise this custom. The implication of the custom is that those who need food most i.e. children and pregnant women, were likely to miss out.
Table 11.5
Food distribution in the family by ethnicity and area type, 2004

<table>
<thead>
<tr>
<th>Ethnicity</th>
<th>Area Type</th>
<th>Sample Size</th>
<th>Head (%)</th>
<th>Father (%)</th>
<th>Mother/wife (%)</th>
<th>Children (%)</th>
<th>Males (%)</th>
<th>Others (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fijians</td>
<td>Urban</td>
<td>49</td>
<td>55.1</td>
<td>16.3</td>
<td>8.2</td>
<td>10.2</td>
<td>8.2</td>
<td>2.0</td>
</tr>
<tr>
<td></td>
<td>Rural</td>
<td>161</td>
<td>78.3</td>
<td>2.5</td>
<td>2.5</td>
<td>9.3</td>
<td>5.0</td>
<td>2.5</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>210</td>
<td>73.0</td>
<td>5.7</td>
<td>3.8</td>
<td>9.5</td>
<td>5.7</td>
<td>2.4</td>
</tr>
<tr>
<td>Indo-Fijians</td>
<td>Urban</td>
<td>23</td>
<td>26.1</td>
<td>4.3</td>
<td>17.4</td>
<td>47.8</td>
<td>0.0</td>
<td>4.3</td>
</tr>
<tr>
<td></td>
<td>Rural</td>
<td>33</td>
<td>42.4</td>
<td>0.0</td>
<td>24.2</td>
<td>24.2</td>
<td>9.1</td>
<td>0.0</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>56</td>
<td>35.7</td>
<td>1.8</td>
<td>21.4</td>
<td>33.9</td>
<td>5.4</td>
<td>1.8</td>
</tr>
<tr>
<td>'Others'</td>
<td>Urban</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>100.0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Rural</td>
<td>2</td>
<td>100.0</td>
<td>0</td>
<td>0</td>
<td>.0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>4</td>
<td>50.0</td>
<td>0</td>
<td>0</td>
<td>50.0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>All</td>
<td>Urban</td>
<td>74</td>
<td>44.6</td>
<td>12.2</td>
<td>10.8</td>
<td>24.3</td>
<td>5.4</td>
<td>2.7</td>
</tr>
<tr>
<td></td>
<td>Rural</td>
<td>196</td>
<td>72.4</td>
<td>2.0</td>
<td>6.1</td>
<td>11.7</td>
<td>5.6</td>
<td>2.0</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>270</td>
<td>64.8</td>
<td>4.8</td>
<td>7.4</td>
<td>15.2</td>
<td>5.6</td>
<td>2.2</td>
</tr>
</tbody>
</table>

11.7 Meal planning, shopping and cooking
The wife (71.7%) was the major meal planner for households. This is consistent with the notion that it is the wife’s or woman’s role to prepare meals for the family. The husband and wife team, or husband or daughters were the other family groups who planned meals when the wife was not able to do it.

There was a shift in pattern where only 40.7% of wives shopped while 26.6% of husbands did. About 9.9% of husbands and wives shopped together but only 3.2% of daughters shopped.

The majority of wives (70%) prepared food for the family and only 8.7% of “Others” (other people in the household) were engaged in the activity. The role of “Others” in planning, purchasing and preparation of food was most noticeable in the urban areas. With many women or wives working the ‘Others’ in the household such as employed house-helpers often asked to cook meals as well as do housecleaning.

11.8 Other Food-related issues

11.8.1 Affordability to eat properly
Most respondents stated they could afford to eat properly, by ethnicity or area type. Only a small proportion (10%) of people considered that sometimes they could not afford to eat properly.

11.8.2 Who misses out if there is a food shortage?
When food was insufficient through a lack of money, both parents will skip the meal in both ethnic groups. A small number of children in rural communities will skip a meal. Between the mother and the father, it was the mother who was more likely to skip meals. There were little differences between urban and rural communities.

Only a few responded (n=74) stated they had not been able to eat through lack of money in the previous month. Rural people stated that they had to rely on other people to supply their regular food particularly Fijians (50%) compared to Indo-Fijians (42.9%)
11.8.3 Sources of Information on health and nutrition.

Figure 11.5 shows that radio and health workers are the two principal sources of information about health and nutrition issues to the majority of the population. 15.1% of families in urban areas identified Television as a source of health information.

**Figure 11.5**
Sources of health and nutrition information by area type, 2004

Newspapers and newsletters also provide information for urban people, but for rural people, health workers are the most important source. It is also notable that radio is as important a source of information to urban people as it is to rural people.

11.9 Comparison between 1993 and 2004

A comparison of results of the two surveys 1993 and 2004 show a decline in the proportion of households growing their own food (Table 11.6). The decline is greatest in the urban area from 70.4% to 61.8%. However, the interpretation of the difference needs to take into account the difference in sampling design between the two surveys.

**Table 11.6**
Comparison of households with food gardens by ethnicity and area type, 1993 and 2004

<table>
<thead>
<tr>
<th>Area Type</th>
<th>Survey year</th>
<th>Sample Size</th>
<th>%</th>
<th>Sample Size</th>
<th>%</th>
<th>Sample Size</th>
<th>%</th>
<th>Sample Size</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Urban</td>
<td>1993</td>
<td>145</td>
<td>74.5</td>
<td>163</td>
<td>68.1</td>
<td>47</td>
<td>66.0</td>
<td>355</td>
<td>70.4</td>
</tr>
<tr>
<td></td>
<td>2004</td>
<td>341</td>
<td>67.7</td>
<td>380</td>
<td>59.2</td>
<td>35</td>
<td>31.4</td>
<td>756</td>
<td>61.8</td>
</tr>
<tr>
<td>Rural</td>
<td>1993</td>
<td>285</td>
<td>96.5</td>
<td>263</td>
<td>90.5</td>
<td>9</td>
<td>100.0</td>
<td>557</td>
<td>93.7</td>
</tr>
<tr>
<td></td>
<td>2004</td>
<td>638</td>
<td>96.2</td>
<td>294</td>
<td>85.0</td>
<td>8</td>
<td>87.5</td>
<td>940</td>
<td>97.2</td>
</tr>
</tbody>
</table>
11.10 Discussion and conclusions
Household food security is an essential part of adequate nutritional health. Stunting and chronic nutritional deficiencies are experienced in countries where food shortages and distribution problems exist. While this chapter has attempted to highlight food security at household levels, the ultimate responsibility of ensuring adequate food supply and distribution within a country is a country’s political issue.

11.10.1 Food production
The higher proportion of rural households with gardens might be due to the availability of land and time, scarcity of other employment opportunities, and the need for food gardens to supply family food needs in rural areas.

The higher number of Fijians (urban and rural) with gardens could be attributed in part to the availability of land as well as the fact that traditional Fijian foods (starchy roots and green leafy vegetables) can be grown in small plots at any available land spaces whereas Indo-Fijian foods (cereals) are more labour-intensive and requires a lot more resource input.

The Fijian diet is based on root crops; hence they are more likely to grow more for their use. An interesting point to make is that although green leafy vegetables are part of the traditional Fijian diet and that Fijians also reported consuming leafy green vegetables frequently (Chapter 10), responses to this part of the survey indicated that only a quarter of families obtained their weekly supply from their garden. The Indo-Fijian diet on the other hand is vegetarian based hence they are more likely to grow a greater variety of vegetables for their own consumption. This is consistent with the findings.

Fruit was not a common garden crop for both ethnic groups. Fruits reported by rural Fijians are most likely to be bananas and pawpaw – two commonly grown fruit crops.

A possible contributing factor to the high rate of families in urban areas not keeping livestock and birds could be health by-laws that prohibit the rearing of livestock and birds in backyards. The overall lack of available land in urban areas could also be another contributing factor.

Although rural households theoretically have more available land for these farming activities, only about two thirds of Fijians surveyed kept livestock and birds compared to three quarters of Indo-Fijians. Availability and access to land as well as relevant agricultural knowledge are key issues for households to food production.

11.10.2 Stretching household food supply
Post harvest loss prevention is an area that urgently requires serious attention. Appropriate knowledge and technology are critical skills for the above to take effect.

As noted by the results, there are differences between urban and rural settings that affect the family’s ability to maintain a constant food supply. Modern technologies such as refrigerators have become a necessity in this modern age – enabling families to store food and making them last longer. Other appropriate technologies need to be developed for use in areas where there is no electricity.
11.10.3 Globalization and household food security
Increasing urbanization has generated the need for a reliable food supply. Once self-sufficient in food, Fiji has become increasingly reliant on imported processed foods. To a large extent semi-urban and rural areas have benefited by growing vegetables, and getting into milk and meat production. Distribution has been a growth industry with many small corner stores plus a rapid increase in larger shops and supermarkets. Fiji now has six identifiable food-store chains and approximately 70 supermarkets (Chaudhari, 2003).

An analysis of the urban food supply system in Fiji has identified a number of food marketing channels (Baxter, 1980) indicating the “flow of food commodities from the point of production to the final consumer”. This distribution pattern determines the cost and the food choices available to families. In general terms, the more complex the distribution chain and the further away the production point is from the population, the greater the cost to consumers, even though the food might be locally produced (Schultz, 1997). The food supply chain is an important part of the national food supply/food security system.

Irrespective of the dietary pattern, food variety is important. Some available evidence suggest that within a week, at least 20 to 30 different types of foods, with the emphasis on plant food, are required for a healthy diet (WHO, 2003). WHO also recommended an increase in the consumption of fruits and vegetable, an increase in the consumption of fish and a change in the type of fats and oils as well as the amount of sugars and starch consumed in developing countries.
12.0 RESULTS PART IX: Non-Communicable Disease (NCD) Risk Factors

The burden of chronic diseases has rapidly increased worldwide. The proportion of the burden of NCDs is expected to increase to 57% by 2023 from 46% in 2001 (WHO, 2003). Almost half of the total deaths from chronic diseases are attributed to cardiovascular diseases, obesity and diabetes which have started to appear at an early age. Contrary to beliefs, developing countries in transition such as Fiji are increasingly suffering from public health problems related to chronic diseases.

**Key Findings**

**Hypertension**
- There has been a general increase in rates of hypertension in all ethnic groups and gender in 2004 compared to 1993.
- More females than males had hypertension (19.2% and 14.4% respectively)
- Indo-Fijians males had slightly higher rates of hypertension than Fijian males (15.3% and 13.8% respectively).
- Hypertension rates had increased to 7.2% in 2004 compared to 2.9% in 1993.
- Rates for borderline hypertension had also increased in 2004 to 17.1% compared to 9.8% in 1993.
- A high proportion of Fijians and Indo-Fijians aged 20-44 years had borderline hypertension.

**Smoking**
- A quarter of Fiji’s population smoked – made up of 29.3% Fijians and 17.5% Indo-Fijians.
- More males than females smoked (37.7% and 12.9% respectively).
- 5% of 12-17 year olds smoked.
- Of those that smoked, 50% smoked up to 4 cigarettes a day.
- 23.5% Indo-Fijians and 20.9% Fijians smoked 5-9 cigarettes a day.
- High proportions of Indo-Fijians than Fijians smoked more than 10 cigarettes a day (34.8% and 29.4% respectively).
- There has been an overall increase of 1.4% in smokers since 1993.
- There has also been an increase of smokers amongst adolescents 12-17 year olds since 1993 (3.7% in males and 4.3% in females).
- An increase of 4.8% in males who smoked up to four cigarettes a day was found in 2004 compared to 1993 but a decrease in those who smoked 5-9 cigarettes.

**Alcohol**
- 51.1% reported drinking alcohol.
- More males (58%) than females (32%) reported drinking alcohol.
- Adolescents (12-17 years) reported drinking (45.6% males and 16.7% females).
- Fijians drank more (8.7 standard drinks) than Indo-Fijians (4.5 standard drinks).
- 49.9% reported binge drinking with more Fijians (62.7%) than Indo-Fijians (38.4%).
- There was a reduction in those who drank more than 5 days a week while those who drank less than 5 days increased in 2004 compared to 1993.
Kava consumption
- More males than females and more Fijians than Indo-Fijians drank kava.
- Only 11.2% drank kava daily while 69.1% drank kava on 2-6 days in a week.
- More adult males (18-44 years) drank kava daily (15.8%) compared to 1.9% females.
- Adolescents reported drinking kava in up to two days a week.
- There has been an increase in the proportion of kava drinkers since 1993.

Physical activity
- The majority (65.4%) of those surveyed reported doing light physical activity, less than a third did moderate physical activity and only 3.3% were engaged in vigorous physical activity.
- More Indo-Fijians (71.8%) did light physical activity compared to Fijians (60.6%).
- More males than females tended to be active.
- The level of physical activity decreased with age.
- Overall, there was an increase (19.6%) in those doing light physical activity in 2004 over 1993.
- Overall, there has been a general decline in those engaged in vigorous physical activity since 1993 in both Fijians and Indo-Fijians.

Note: The prevalence of diabetes through random blood sugar diagnosis will not be discussed in this report.

12.1 Introduction
The third NNS (2004) collected information from persons aged 12 years and over on 4 key non-communicable risk factors: smoking, alcohol consumption, kava drinking, and physical activity levels. These risk factors have been identified by WHO (2002) as among the top ten causes of death worldwide and are known to have an impact on nutritional status.

The results of each risk factor are presented in this chapter.

12.2 High Blood Pressure or Hypertension
High blood pressure has been identified as the number one leading contributing factor to all deaths in 2002 (WHO, 2003).

Blood pressure of 4190 respondents 20 years of age and above was measured following the protocol and classified using the WHO guideline as described in the methodology. Known hypertensive cases were cross-checked with medical notes and the medication they were taking.

12.2.1 Mean systolic and diastolic blood pressure
A fuller and more detailed table of results is appended (Appendix 23, Table 12.1).
<table>
<thead>
<tr>
<th>Ethnicity</th>
<th>Gender</th>
<th>n</th>
<th>Mean age (years)</th>
<th>Systolic (mmHg)</th>
<th>Diastolic (mmHg)</th>
<th>n</th>
<th>Mean age (years)</th>
<th>Systolic (mmHg)</th>
<th>Diastolic (mmHg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fijians</td>
<td>Male</td>
<td>351</td>
<td>40.0</td>
<td>136.8</td>
<td>81.1</td>
<td>718</td>
<td>42.9</td>
<td>137.0</td>
<td>77.6</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>480</td>
<td>39.0</td>
<td>131.9</td>
<td>81.9</td>
<td>795</td>
<td>42.6</td>
<td>135.7</td>
<td>79.7</td>
</tr>
<tr>
<td>Indo-Fijians</td>
<td>Male</td>
<td>434</td>
<td>40.4</td>
<td>133.0</td>
<td>80.0</td>
<td>377</td>
<td>42.9</td>
<td>131.7</td>
<td>77.9</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>535</td>
<td>40.5</td>
<td>130.1</td>
<td>79.5</td>
<td>393</td>
<td>40.7</td>
<td>128.1</td>
<td>76.6</td>
</tr>
<tr>
<td>‘Others’</td>
<td>Male</td>
<td>36</td>
<td>36.9</td>
<td>134.0</td>
<td>82.8</td>
<td>8</td>
<td>43.1</td>
<td>139.4</td>
<td>84.6</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>59</td>
<td>41.5</td>
<td>132.3</td>
<td>82.3</td>
<td>8</td>
<td>37.5</td>
<td>139.8</td>
<td>83.6</td>
</tr>
</tbody>
</table>

Table 12.2.1 shows the mean systolic and diastolic blood pressure by ethnic group, gender and area type. The 2004 results found little difference between systolic and diastolic blood pressure in both males and females in all three ethnic groups in urban and rural areas.

### 12.2.2 Prevalence of hypertension

The majority of those surveyed were found with normal blood pressure (78.2% males and 73.6% females) (Appendix 23, Table 12.2). Slightly more females than males (19.2% females and 14.4% males) were found to have hypertension. A relatively small percentage (7.3% males and 7.2% females) were borderline.

By ethnic group and gender, the rates of hypertension in Indo-Fijian males (15.3%) were slightly higher than in Fijian male (13.8%). Hypertension rates in females were similar (19% Fijians and 19.4% Indo-Fijians respectively). Rates of borderline hypertension in Fijian and Indo-Fijian males were similar (6.8% and 7.4% respectively). However, female Fijians showed slightly higher rates of borderline hypertension (8.5%) compared to Indo-Fijians (5.2%).

By ethnicity and age group, the 2004 results indicated that the proportions of 45+ year old females with hypertension were higher compared to males. Hypertension increased with age in both Fijian and Indo-Fijians. More males (Fijians and Indo-Fijians) aged 20-44 years had borderline and hypertension (combined) compared to females in the same age group.

There was no difference in the rates of hypertension by locality.

### 12.2.3 Comparison of hypertension 1993 and 2004 Surveys

Based on these results (Table 12.2.2), the national rates of both borderline and hypertension have increased since the 1993 survey. Borderline hypertension rates increased from 2.9% in 1993 to 7.2% in 2004, while hypertension increased from 9.8% in 1993 to 17.1% in 2004. The increases were observed in all three ethnic groups (Fijian, Indo-Fijian and ‘Others’) and by gender.

A national concern is the increase in hypertension amongst Indo-Fijians and Females.
Table 12.2.2
Hypertension and Borderline Hypertension by ethnicity, 1993 and 2004

<table>
<thead>
<tr>
<th>Population Group</th>
<th>Sample Size</th>
<th>Borderline (%)</th>
<th>Hypertension (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ethnicity</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fijians</td>
<td>1117</td>
<td>2342</td>
<td>3.4</td>
</tr>
<tr>
<td>Indo-Fijians</td>
<td>1140</td>
<td>1738</td>
<td>1.9</td>
</tr>
<tr>
<td>‘Others’</td>
<td>148</td>
<td>110</td>
<td>2.0</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>1158</td>
<td>1927</td>
<td>2.0</td>
</tr>
<tr>
<td>Female</td>
<td>1245</td>
<td>2263</td>
<td>2.6</td>
</tr>
<tr>
<td>National</td>
<td>2403</td>
<td>4190</td>
<td>2.9</td>
</tr>
</tbody>
</table>

12.3 Smoking
Smoking includes cigarettes, hand rolled cigars etc.

12.3.1 Current smoking patterns
Participants 12 years and above were asked about their smoking habits. In particular: whether they smoked (daily or non-daily), and the number of cigarettes smoked per day.

Overall, about a quarter (24.5%) of the population surveyed smoked (Table 12.3.1). The proportion of smokers (daily and the ‘non-daily’) was relatively higher amongst Fijians (29.3%) compared to Indo-Fijians (17.5%).

Table 12.3.1
Current smoking status by ethnicity, 2004

<table>
<thead>
<tr>
<th>Ethnicity</th>
<th>Sample Size</th>
<th>Smokers</th>
<th></th>
<th>Non-Smokers</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Daily</td>
<td>Non-Daily</td>
<td>Total</td>
</tr>
<tr>
<td>Fijians</td>
<td>3022</td>
<td>407</td>
<td>13.5</td>
<td>477</td>
</tr>
<tr>
<td>Indo-Fijians</td>
<td>2227</td>
<td>259</td>
<td>11.6</td>
<td>132</td>
</tr>
<tr>
<td>‘Others’</td>
<td>145</td>
<td>22</td>
<td>15.2</td>
<td>24</td>
</tr>
<tr>
<td>All</td>
<td>5394</td>
<td>688</td>
<td>12.8</td>
<td>633</td>
</tr>
</tbody>
</table>

The 2004 NNS results showed a higher proportion of male smokers (daily and non-daily) compared to females (37.7% and 12.9%, respectively) (Table 12.3.2).
Table 12.3.2
Percent of current smokers by gender and age group, 2004

<table>
<thead>
<tr>
<th>Gender</th>
<th>Age Group (years)</th>
<th>Sample Size</th>
<th>Smokers</th>
<th>Non-Smokers</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>n</td>
<td>Daily</td>
<td>Non-Daily</td>
</tr>
<tr>
<td>Male</td>
<td>12-17</td>
<td>445</td>
<td>6</td>
<td>1.3</td>
</tr>
<tr>
<td></td>
<td>18-44</td>
<td>1320</td>
<td>363</td>
<td>27.5</td>
</tr>
<tr>
<td></td>
<td>45 and Over</td>
<td>745</td>
<td>189</td>
<td>25.4</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>2510</td>
<td>558</td>
<td>22.2</td>
</tr>
<tr>
<td>Female</td>
<td>12-17</td>
<td>434</td>
<td>2</td>
<td>0.5</td>
</tr>
<tr>
<td></td>
<td>18-44</td>
<td>1583</td>
<td>73</td>
<td>4.6</td>
</tr>
<tr>
<td></td>
<td>45 and Over</td>
<td>867</td>
<td>55</td>
<td>6.3</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>2884</td>
<td>130</td>
<td>4.5</td>
</tr>
<tr>
<td>All</td>
<td>12-17</td>
<td>879</td>
<td>8</td>
<td>0.9</td>
</tr>
<tr>
<td></td>
<td>18-44</td>
<td>2903</td>
<td>436</td>
<td>15.0</td>
</tr>
<tr>
<td></td>
<td>45 and Over</td>
<td>1612</td>
<td>244</td>
<td>15.1</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>5394</td>
<td>688</td>
<td>12.8</td>
</tr>
</tbody>
</table>

When examined by gender and age group, more males in the 18-44 years and 45 years and older age-groups smoked (45.8% and 43.4%) compared to females of the same age-groups (14.1% and 14.8%). Amongst the 12-17 years group the results indicated that 5% of adolescents smoke and a large proportion (95%) do not smoke.

12.3.1 Smoking patterns

Nearly half the population surveyed (47.5%) smoked up to 4 cigarettes a day, while 21.7% smoked 5-9 cigarettes and 30.8% smoked 10 or more cigarettes a day (Table 12.3.3). Of those who smoked up to 4 cigarettes a day, 49.7% were Fijians and 41.7% Indo-Fijians. Slightly more Indo-Fijians smoked 5-9 cigarettes/day (23.5%) compared to Fijians (20.9%).

A similar trend was observed amongst those who smoked 10 or more cigarettes (Indo-Fijians 34.8% compared to 29.4% Fijians).

In summary, a higher proportion of Indo-Fijians (58.3%) smoked 5 or more cigarettes compared to Fijians (50.3%). Some contributing factors to the differences could include stress, finance, availability or culture.
Table 12.3.3
Daily smoking patterns by ethnicity, 2004

<table>
<thead>
<tr>
<th>Ethnicity</th>
<th>Sample Size</th>
<th>Number of cigarettes per day</th>
<th>1-4</th>
<th>5-9</th>
<th>10 and more</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>no</td>
<td>%</td>
<td>no</td>
<td>%</td>
</tr>
<tr>
<td>Fijians</td>
<td>884</td>
<td>439</td>
<td>49.7</td>
<td>185</td>
<td>20.9</td>
</tr>
<tr>
<td>Indo-Fijians</td>
<td>391</td>
<td>163</td>
<td>41.7</td>
<td>92</td>
<td>23.5</td>
</tr>
<tr>
<td>Others*</td>
<td>46</td>
<td>26</td>
<td>56.5</td>
<td>9</td>
<td>19.6</td>
</tr>
<tr>
<td>All</td>
<td>1321</td>
<td>628</td>
<td>47.5</td>
<td>286</td>
<td>21.7</td>
</tr>
</tbody>
</table>

*Sample size too small to warrant any description.

In general, more males (39.0% Fijians, 38.0% Indo-Fijians) than females (11.1% Fijians, 9.1% Indo-Fijians) smoked 10 cigarettes a day (Table 12.3.4). When the 5-9 cigarettes/day and 10+ cigarettes/day categories were combined, about a third of all males, 63.9% Fijians and 62.8% Indo-Fijians, came under this ‘new’ category (smoked 5 or more cigarette/day) compared to 24.5% Fijian females and 22.7% Indo-Fijian females.

Table 12.3.4
Daily smoking patterns by ethnicity and gender, 2004

<table>
<thead>
<tr>
<th>Ethnicity</th>
<th>Gender</th>
<th>Sample Size</th>
<th>Number of cigarettes per day</th>
<th>1-4</th>
<th>5-9</th>
<th>10 +</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>no</td>
<td>%</td>
<td>no</td>
<td>%</td>
</tr>
<tr>
<td>Fijians</td>
<td>Male</td>
<td>579</td>
<td>209</td>
<td>36.1</td>
<td>144</td>
<td>24.9</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>305</td>
<td>230</td>
<td>75.4</td>
<td>41</td>
<td>13.4</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>884</td>
<td>439</td>
<td>49.7</td>
<td>185</td>
<td>20.9</td>
</tr>
<tr>
<td>Indo-Fijians</td>
<td>Male</td>
<td>347</td>
<td>129</td>
<td>37.2</td>
<td>86</td>
<td>24.8</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>44</td>
<td>34</td>
<td>77.3</td>
<td>6</td>
<td>13.6</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>391</td>
<td>163</td>
<td>41.7</td>
<td>92</td>
<td>23.5</td>
</tr>
<tr>
<td>‘Others’</td>
<td>Male</td>
<td>22</td>
<td>10</td>
<td>45.5</td>
<td>3</td>
<td>13.6</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>24</td>
<td>16</td>
<td>66.7</td>
<td>6</td>
<td>25.0</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>46</td>
<td>26</td>
<td>56.5</td>
<td>9</td>
<td>19.6</td>
</tr>
<tr>
<td>All</td>
<td>Male</td>
<td>948</td>
<td>348</td>
<td>36.7</td>
<td>233</td>
<td>24.6</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>373</td>
<td>280</td>
<td>75.1</td>
<td>53</td>
<td>14.2</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>1321</td>
<td>628</td>
<td>47.5</td>
<td>286</td>
<td>21.7</td>
</tr>
</tbody>
</table>

A higher proportion of males aged 18-44 years (61.4%) and 45 years and older (69.2%) smoked between 5 or more cigarettes a day compared to females of the same age group (23.7% and 30.3% respectively). Overall, females in all age groups reported smoking less cigarettes/day (up to 4 cigarettes a day) than males. Although the sample
size was small for the 12-17 years age-group, the results showed that 4 out of 41 adolescents (male and female) were already smoking 10 or more cigarettes per day (Table 12.3.5).

<table>
<thead>
<tr>
<th>Gender</th>
<th>Age Group (years)</th>
<th>Sample Size</th>
<th>Number of cigarettes per day</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>1-4</td>
</tr>
<tr>
<td>Male</td>
<td>12-17</td>
<td>21</td>
<td>16</td>
</tr>
<tr>
<td></td>
<td>18-44</td>
<td>604</td>
<td>233</td>
</tr>
<tr>
<td></td>
<td>45 and Over</td>
<td>323</td>
<td>99</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>948</td>
<td>348</td>
</tr>
<tr>
<td>Female</td>
<td>12-17</td>
<td>20</td>
<td>19</td>
</tr>
<tr>
<td></td>
<td>18-44</td>
<td>224</td>
<td>171</td>
</tr>
<tr>
<td></td>
<td>45 and Over</td>
<td>129</td>
<td>90</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>373</td>
<td>280</td>
</tr>
<tr>
<td>All</td>
<td>12-17</td>
<td>41</td>
<td>35</td>
</tr>
<tr>
<td></td>
<td>18-44</td>
<td>828</td>
<td>404</td>
</tr>
<tr>
<td></td>
<td>45 and Over</td>
<td>452</td>
<td>189</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>1321</td>
<td>628</td>
</tr>
</tbody>
</table>

12.3.2  Comparison of smoking between 1993 and 2004 surveys

12.3.2.1  Smokers

Overall, there was a 1.4% increase in smokers in 2004 compared to 1993 (Table 12.3.6). The proportion of male smokers was similar (around 37%) in 2004 and 1993. However, compared to 1993, female smokers increased by 3% in 2004.

Compared to 1993, there has been an increase of 3.7% in male smokers and a 4.3% increase in female smokers amongst adolescents aged 12-17 years in 2004. An increase in the number of smokers was also found amongst the 18-44 years age group: a 1.8% increase amongst males and a 5.7% increase in females. However, there has been a reduction of 6% in the proportion of smokers amongst the 45 year and older age group of both genders.
Table 12.3.6
Proportion of smokers by gender and age group, 1993 and 2004

<table>
<thead>
<tr>
<th>Gender</th>
<th>Age Group (years)</th>
<th>1993</th>
<th>2004</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>%</td>
<td>n</td>
</tr>
<tr>
<td>Male</td>
<td>12-17</td>
<td>292</td>
<td>1.0</td>
</tr>
<tr>
<td></td>
<td>18-44</td>
<td>854</td>
<td>44.0</td>
</tr>
<tr>
<td></td>
<td>45 and Over</td>
<td>395</td>
<td>49.4</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>1541</td>
<td>37.2</td>
</tr>
<tr>
<td>Female</td>
<td>12-17</td>
<td>314</td>
<td>0.3</td>
</tr>
<tr>
<td></td>
<td>18-44</td>
<td>955</td>
<td>8.5</td>
</tr>
<tr>
<td></td>
<td>45 and Over</td>
<td>380</td>
<td>21.6</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>1649</td>
<td>9.9</td>
</tr>
<tr>
<td>All</td>
<td>12-17</td>
<td>606</td>
<td>0.7</td>
</tr>
<tr>
<td></td>
<td>18-44</td>
<td>1809</td>
<td>25.3</td>
</tr>
<tr>
<td></td>
<td>45 and Over</td>
<td>775</td>
<td>35.7</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>3190</td>
<td>23.1</td>
</tr>
</tbody>
</table>

12.3.2.2 Smoking patterns
The results showed there was an increase of 4.8% in males who smoked up to four cigarettes a day in 2004 over 1993. However, there was a decrease of 1.4% in 2004 of males who smoked 5-9 cigarettes/day and of 3.5% of those who smoked 10 or more cigarettes/day. It could be said that there was a slight improvement (reduction in smoking) in the number of males who smoked 5-9 and 10 plus cigarettes/day. The rate of improvement observed in 2004 was slightly better in Indo-Fijians than in Fijians: ranging from 1.9%-4.7% in Indo-Fijians and 1%-3% in Fijians.

There has been an increase in the smoking rate for 12-17 year olds in 2004 compared to 1993.

There was a 9.3% increase in 2004 of male smokers aged 18-44 years that smoked up to 4 cigarettes a day compared to 1993 (Figure 12.3.1). There was a decrease in male smokers aged 18-44 years who smoked 5-9 and 10+ cigarettes in 2004 compared to 1993.

A 5.7% decrease was observed in male smokers aged 45 years and above who smoked up to 4 cigarettes a day in 2004 over 1993. However, there were slight increases in male smokers who smoked 5-9 and 10 and more cigarettes a day in 2004 compared to 1993.
In general, the proportion of females who smoked up to 4 cigarettes a day increased by 15.3% in 2004 over 1993. However, there were some improvements (reduction) in 2004 in the proportion of females who smoked 5-9 (5.4%) and 10 or more (9.5%) cigarettes per day over 1993.

There had been an increase of 13.3% in female smokers aged 18-44 years and an increase of 12.5% in smokers 45 years and over smoked 1-4 cigarettes a day in 2004 compared to 1993 (Appendix 24). Some positive results were observed. For example, there was a decrease in the number of females who smoked 5-9 and 10 or more cigarettes a day in 2004 compared to 1993.

It was not possible to compare the rates of adolescent smokers in 1993 and 2004 because of the small sample size of the age group.
12.4 Alcohol consumption

The 2004 survey showed that just over half (51.1%) of those surveyed reported drinking alcohol (Table 12.4.1). The heaviest drinkers were Indo-Fijians (59.7%), with Fijian drinkers making up 42.9%.

<table>
<thead>
<tr>
<th>Ethnicity</th>
<th>Sample Size</th>
<th>Drinkers</th>
<th>Non-Drinkers</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>%</td>
<td>n</td>
</tr>
<tr>
<td>Fijians</td>
<td>1025</td>
<td>440</td>
<td>585</td>
</tr>
<tr>
<td>Indo-Fijians</td>
<td>813</td>
<td>485</td>
<td>328</td>
</tr>
<tr>
<td>‘Others’</td>
<td>70</td>
<td>50</td>
<td>20</td>
</tr>
<tr>
<td>All</td>
<td>1908</td>
<td>975</td>
<td>933</td>
</tr>
</tbody>
</table>

By gender and age group, more males (58%) than females (32.7%) drank alcohol (Table 12.4.2). More males aged 18-44 years (67.6%) than females of the same age group (36.3%) drank alcohol. Amongst the adolescents aged 12-17 years, significantly more males (45.6%) than females (16.7%) drank alcohol. Of those aged 45 years and older, 40.9% males drank compared to 22.2% female of the same age category. Although the 12-17 age group sample size was small, the results indicated that teenagers drank alcohol.
Table 12.4.2
Alcohol drinkers by gender and age group, 2004

<table>
<thead>
<tr>
<th>Gender</th>
<th>Age Group (years)</th>
<th>Alcohol Drinking Status</th>
<th>Sample Size</th>
<th>Drinkers</th>
<th>Non-Drinkers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>12 – 17</td>
<td></td>
<td>57</td>
<td>26</td>
<td>31</td>
</tr>
<tr>
<td>Male</td>
<td>18 – 44</td>
<td></td>
<td>879</td>
<td>594</td>
<td>285</td>
</tr>
<tr>
<td>Male</td>
<td>45 and Over</td>
<td></td>
<td>452</td>
<td>185</td>
<td>267</td>
</tr>
<tr>
<td>Male</td>
<td>Total</td>
<td></td>
<td>1388</td>
<td>805</td>
<td>583</td>
</tr>
<tr>
<td>Female</td>
<td>12 – 17</td>
<td></td>
<td>18</td>
<td>3</td>
<td>15</td>
</tr>
<tr>
<td>Female</td>
<td>18 – 44</td>
<td></td>
<td>394</td>
<td>143</td>
<td>251</td>
</tr>
<tr>
<td>Female</td>
<td>45 and Over</td>
<td></td>
<td>108</td>
<td>24</td>
<td>84</td>
</tr>
<tr>
<td>Female</td>
<td>Total</td>
<td></td>
<td>520</td>
<td>170</td>
<td>350</td>
</tr>
<tr>
<td>All</td>
<td>12 – 17</td>
<td></td>
<td>75</td>
<td>29</td>
<td>46</td>
</tr>
<tr>
<td>All</td>
<td>18 – 44</td>
<td></td>
<td>1273</td>
<td>737</td>
<td>536</td>
</tr>
<tr>
<td>All</td>
<td>45 and Over</td>
<td></td>
<td>560</td>
<td>209</td>
<td>351</td>
</tr>
<tr>
<td>All</td>
<td>Total</td>
<td></td>
<td>1908</td>
<td>975</td>
<td>933</td>
</tr>
</tbody>
</table>

Note: 1 standard drink = 10g alcohol content.
Examples – 1 glass/can/bottle (300ml) regular beer
1 glass wine (120ml)
1 measure spirit (40ml)

12.4.1 Alcohol consumption patterns

12.4.1.1 Mean Alcohol Intake
Mean alcohol intake by ethnic group was 6.45 standard drinks with a wide range of 1-90 (Table 12.4.3). There was differences in mean intake between Fijians and Indo-Fijians with higher mean intake reported by Fijians (8.72 standard drinks) – almost double the mean intake reported by Indo-Fijians. It could be concluded from these results that Fijians on the whole were heavier drinkers compared to Indo-Fijian and ‘Others’.

Table 12.4.3
Mean alcohol intake by ethnicity, 2004

<table>
<thead>
<tr>
<th>Ethnicity</th>
<th>n</th>
<th>Mean*</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fijians</td>
<td>440</td>
<td>8.7</td>
<td>1</td>
<td>72</td>
</tr>
<tr>
<td>Indo-Fijians</td>
<td>485</td>
<td>4.5</td>
<td>1</td>
<td>90</td>
</tr>
<tr>
<td>‘Others’</td>
<td>50</td>
<td>5.2</td>
<td>1</td>
<td>25</td>
</tr>
<tr>
<td>All</td>
<td>975</td>
<td>6.5</td>
<td>1</td>
<td>90</td>
</tr>
</tbody>
</table>

* Mean of standard drinks consumed.

By gender and age group, males had a higher mean alcohol intake than females (Table 12.4.4).

Mean intake for male aged 12-17 years was higher (4.27 standard drinks) than for females (1.00 standard drinks). Males aged 18-44 years had the highest mean intake (7.99 standard drinks) than any other age group. But this declined by 45 years. Females
reported mean intake of 4.37 standard drinks at ages 18-44 years and 2.58 standard drinks at 45 years and above.

Table 12.4.4
Mean intake of alcohol by gender and age group, 2004

<table>
<thead>
<tr>
<th>Gender</th>
<th>Age Group (years)</th>
<th>Mean</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>Mean*</td>
<td>Min</td>
</tr>
<tr>
<td>Male</td>
<td>12 - 17</td>
<td>26</td>
<td>4.27</td>
</tr>
<tr>
<td></td>
<td>18 - 44</td>
<td>594</td>
<td>7.99</td>
</tr>
<tr>
<td></td>
<td>45 and Over</td>
<td>185</td>
<td>4.01</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>805</td>
<td>6.95</td>
</tr>
<tr>
<td>Female</td>
<td>12 - 17</td>
<td>3</td>
<td>1.00</td>
</tr>
<tr>
<td></td>
<td>18 - 44</td>
<td>143</td>
<td>4.37</td>
</tr>
<tr>
<td></td>
<td>45 and Over</td>
<td>24</td>
<td>2.58</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>170</td>
<td>4.06</td>
</tr>
<tr>
<td>All</td>
<td>12 - 17</td>
<td>29</td>
<td>3.93</td>
</tr>
<tr>
<td></td>
<td>18 - 44</td>
<td>737</td>
<td>7.29</td>
</tr>
<tr>
<td></td>
<td>45 and Over</td>
<td>209</td>
<td>3.85</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>975</td>
<td>6.45</td>
</tr>
</tbody>
</table>

* Mean of standard drinks

12.4.1.2 Frequency of drinks per week
Of those who reported drinking alcohol, the majority (96%) reported that they drank it in less than 5 days a week (Table 12.4.5). Only a very small proportion reported consuming alcohol 5 days or more in a week. A similar drinking pattern was found amongst ethnic groups.

Table 12.4.5
Frequency of alcohol drinking by ethnicity, 2004

<table>
<thead>
<tr>
<th>Ethnicity</th>
<th>Total sample size</th>
<th>Alcohol Drinking (per week)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>≥ 5 days per wk</td>
</tr>
<tr>
<td></td>
<td>n</td>
<td>%</td>
</tr>
<tr>
<td>Fijians</td>
<td>440</td>
<td>13</td>
</tr>
<tr>
<td>Indo-Fijians</td>
<td>485</td>
<td>24</td>
</tr>
<tr>
<td>‘Others’</td>
<td>50</td>
<td>2</td>
</tr>
<tr>
<td>All</td>
<td>975</td>
<td>39</td>
</tr>
</tbody>
</table>

12.4.2 Binge drinking
Binge drinking is any drinking session involving the consumption of at least double the average daily recommended intake of alcohol at any one time.

About half of the surveyed adult population (49.9%) binge drinks (Table 12.4.6). By ethnic groups, Fijians binge drink more than Indo-Fijians (62.7% compared to 38.4%). By ethnic group and age group, more Fijians aged 18-45 years (67.7%) binge drink compared to Indo-Fijians (44.1%) of the same age group. Binge drinking declined with age. Adolescents also binge drink but the small sample size made any extrapolation meaningless.

In summary, Fijians binge drink much more than Indo-Fijians.
### Table 12.4.6
Proportion of binge drinkers by ethnicity, age group and gender, 2004

| Ethnicity | Age Group (years) | *Binge Drinkers* |  |  |  |  |  |  |
|-----------|------------------|------------------|---|---|---|---|---|
|           |                  | Male | Female | All |  |  |  |  |
|           |                  | N    | n     | %  | N  | n  | %  | N  | n  | %  |
| Fijians   | 12 – 17          | 11   | 1     | 9.1| 2  | 0  | 0  | 13 | 1   | 7.7|
|           | 18 – 44          | 290  | 208   | 71.7| 82 | 44 | 53.7| 372 | 252 | 67.7|
|           | 45 and Over      | 47   | 17    | 36.2| 8  | 6  | 75.0| 55  | 23  | 41.8|
|           | Total            | 348  | 226   | 64.9| 92 | 50 | 54.3| 440 | 276 | 62.7|
| Indo-Fijians | 12 – 17        | 14   | 4     | 28.6| 1  | 0  | 0  | 15 | 4   | 26.7|
|           | 18 – 44          | 280  | 139   | 49.6| 44 | 4  | 9.1 | 324 | 143 | 44.1|
|           | 45 and Over      | 134  | 39    | 29.1| 12 | 0  | 0  | 146 | 39  | 26.7|
|           | Total            | 428  | 182   | 42.5| 57 | 4  | 7.0 | 485 | 186 | 38.4|
| ‘Others’  | 12 – 17          | 1    | 1     | 100 | 0  | 0  | 0  | 1  | 1   | 100.0|
|           | 18 – 44          | 24   | 15    | 62.5| 17 | 5  | 29.4| 41  | 20  | 48.8|
|           | 45 and Over      | 4    | 3     | 75.0| 4  | 1  | 25.0| 8   | 4   | 50.0|
|           | Total            | 29   | 19    | 65.5| 21 | 6  | 28.6| 50  | 25  | 50.0|
| All       | 12 – 17          | 26   | 6     | 23.1| 3  | 0  | 0  | 29  | 6   | 20.7|
|           | 18 – 44          | 594  | 362   | 60.9| 143| 53 | 37.1| 737 | 415 | 56.3|
|           | 45 and Over      | 185  | 59    | 31.9| 24 | 7  | 29.2| 209 | 66  | 31.6|
|           | Total            | 805  | 427   | 53.0| 170| 60 | 35.3| 975 | 487 | 49.9|

* 5 or more drinks for males and 4 or more for females on a drinking day

#### 12.4.3 Comparison of alcohol consumption between 1993 and 2004 surveys

Overall, there was a reduction in the number of those who drank more than 5 days in a week, while there was an increase in those who drank alcohol less than 5 days in a week in 2004 compared to 1993.

When examined by ethnic group, the proportions of Fijian drinking less than 5 days in a week and those drinking more than 5 days in a week in 2004 were similar to 1993 (Table 12.4.7). A relatively smaller proportion reported drinking in more than 5 days a week. There was a slight reduction (2.5%) in those who drank in more than 5 days amongst Indo-Fijians.

However, there was some increase (2.5%) in those who drank less than 5 days in a week. Unfortunately, the sample sizes for some of the variables are too small to make meaningful comparisons let alone extrapolation to the wider Fiji population.
Table 12.4.7
Frequency of alcohol drinking-days per week
By ethnicity and gender, 1993 and 2004

<table>
<thead>
<tr>
<th>Ethnicity</th>
<th>Gender</th>
<th>Days of drinking/week</th>
<th>1993</th>
<th>2004</th>
<th>1993</th>
<th>2004</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>≥ 5 days</td>
<td>&lt; 5 days</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>n</td>
<td>%</td>
<td>n</td>
<td>%</td>
<td>n</td>
</tr>
<tr>
<td>Fijians</td>
<td>Male</td>
<td>4</td>
<td>4.4</td>
<td>12</td>
<td>3.4</td>
<td>87</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>0</td>
<td>0.0</td>
<td>1</td>
<td>1.1</td>
<td>13</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>4</td>
<td>3.8</td>
<td>13</td>
<td>3.0</td>
<td>100</td>
</tr>
<tr>
<td>Indo-Fijians</td>
<td>Male</td>
<td>13</td>
<td>6.6</td>
<td>22</td>
<td>5.1</td>
<td>185</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>2</td>
<td>40.0</td>
<td>2</td>
<td>3.5</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>15</td>
<td>7.4</td>
<td>24</td>
<td>4.9</td>
<td>188</td>
</tr>
<tr>
<td>‘Others’</td>
<td>Male</td>
<td>5</td>
<td>13.5</td>
<td>2</td>
<td>6.9</td>
<td>32</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>2</td>
<td>12.5</td>
<td>0</td>
<td>0.0</td>
<td>14</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>7</td>
<td>13.2</td>
<td>2</td>
<td>4.0</td>
<td>46</td>
</tr>
<tr>
<td>All</td>
<td>Male</td>
<td>22</td>
<td>6.7</td>
<td>36</td>
<td>4.5</td>
<td>304</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>4</td>
<td>11.8</td>
<td>3</td>
<td>1.8</td>
<td>30</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>26</td>
<td>7.2</td>
<td>39</td>
<td>4.0</td>
<td>334</td>
</tr>
</tbody>
</table>

12.5 Kava or Yaqona consumption

Abuse of kava has been an issue of concern for some time for health and social reasons. It has become an every day social drink instead of its cultural role during traditional functions only. Anecdotal evidence indicated that its use in combination with alcohol and smoking has increased in the last two to three decades.

The results of the 2004 survey (Table 12.5.1) showed that, in general, more males consume kava. By ethnicity, more Fijian males (67.8%) drink kava compared to Indo-Fijian males (58.6%) and ‘Others’ (63.9%).

In terms of females, more Fijians (47.6%) reported consuming kava compared to Indo-Fijians (8.7%).

Table 12.5.1
Kava drinking by ethnicity and gender, 2004

<table>
<thead>
<tr>
<th>Ethnicity</th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total Sample Size</td>
<td>n</td>
</tr>
<tr>
<td>Fijians</td>
<td>1408</td>
<td>955</td>
</tr>
<tr>
<td>Indo-Fijians</td>
<td>1039</td>
<td>609</td>
</tr>
<tr>
<td>‘Others’</td>
<td>61</td>
<td>39</td>
</tr>
<tr>
<td>All</td>
<td>2508</td>
<td>1603</td>
</tr>
</tbody>
</table>
12.5.1 Consumption patterns
Kava consumers were asked how many days they had consumed kava in the past month. Table 12.5.1 showed the results of the responses re-calculated into weekly consumption.

Overall, only 11.2% reported drinking kava daily, 19.7% on 2-6 days a week and the highest proportion (69.1%) consumed kava less than two days in a week.

By ethnicity, significantly more Indo-Fijians consumed kava on a daily basis (18.1%) compared to 8.7% Fijians. Consumption of kava on 2-6 days in a week was also higher in Indo-Fijians (24.6%) than Fijians (18.0%) while those that drank kava in less than 2 days in a week was highest for ‘Others’ (86.8%) compared to 73.3% Fijians and 57.3% Indo-Fijians. (Sample sizes for ‘Others’ for the two previous consumption categories were too small to warrant inclusion in the description).

<table>
<thead>
<tr>
<th>Ethnicity</th>
<th>Total Sample Size</th>
<th>Number of days kava was consumed/week</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>&lt; 2 days</td>
<td>2-6 days</td>
<td>Daily</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>n</td>
<td>%</td>
<td>n</td>
<td>%</td>
</tr>
<tr>
<td>Fijians</td>
<td>1722</td>
<td>1262</td>
<td>73.3</td>
<td>310</td>
<td>18.0</td>
</tr>
<tr>
<td>Indo-Fijians</td>
<td>712</td>
<td>408</td>
<td>57.3</td>
<td>175</td>
<td>24.6</td>
</tr>
<tr>
<td>‘Others’</td>
<td>68</td>
<td>59</td>
<td>86.8</td>
<td>7</td>
<td>10.3</td>
</tr>
<tr>
<td>All</td>
<td>2502</td>
<td>1729</td>
<td>69.1</td>
<td>492</td>
<td>19.7</td>
</tr>
</tbody>
</table>

When examined by age group and gender the results also showed that males and females aged 12-17 years reported consuming kava (Table 12.5.2). The majority in this age group reported drinking kava up to two days in a week. (The numbers for 2-6 days/week and daily were too small to warrant reporting).

More males (15.8%) than females (1.9%) in the 18-44 years group consumed kava daily (Note: only 11 females were included in this group).

Daily consumption of kava by males 45 years and over was higher (17.9%) compared to only 3.7% females of the same age group (Note: also only 11 females in this age group).
Table 12.5.3
Kava consumption per week by gender and age group, 2004

<table>
<thead>
<tr>
<th>Gender</th>
<th>Age group (years)</th>
<th>Total Sample size</th>
<th>Number of days kava was consumed/week</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>&lt; 2 days</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>N</td>
</tr>
<tr>
<td>Male</td>
<td>12-17</td>
<td>56</td>
<td>49</td>
</tr>
<tr>
<td></td>
<td>18-44</td>
<td>949</td>
<td>537</td>
</tr>
<tr>
<td></td>
<td>45 and Over</td>
<td>598</td>
<td>331</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>1603</td>
<td>917</td>
</tr>
<tr>
<td>Female</td>
<td>12-17</td>
<td>33</td>
<td>31</td>
</tr>
<tr>
<td></td>
<td>18-44</td>
<td>571</td>
<td>517</td>
</tr>
<tr>
<td></td>
<td>45 and Over</td>
<td>295</td>
<td>264</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>899</td>
<td>812</td>
</tr>
<tr>
<td>All</td>
<td>12-17</td>
<td>89</td>
<td>80</td>
</tr>
<tr>
<td></td>
<td>18-44</td>
<td>1520</td>
<td>1054</td>
</tr>
<tr>
<td></td>
<td>45 and Over</td>
<td>893</td>
<td>595</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>2502</td>
<td>1729</td>
</tr>
</tbody>
</table>

To summarize, males drank more kava than females in a week; more Indo-Fijians drank kava on a weekly basis compared to Fijians; more males were daily kava drinkers; and adolescents 12-17 years were already drinking kava up to two days in a week (Figure 12.5.3).

12.5.2 Comparison of kava drinkers between 1993 and 2004 surveys
A comparison of the proportion of male and female drinkers between 1993 and 2004 (Table 12.5.4) showed that there has been an increase in the proportion of kava consumers in 2004 compared to the 1993 survey results.

Overall, the proportion of male consumers of kava had increased in 2004 by 8.2% and by 15.5% for females. The proportion of Fijian male drinkers had increased by 6.8% in 2004 and by 8.8% for Indo-Fijian males. Increases were also observed in females where there was an increase of 21.5% for Fijian and 4.2% in Indo-Fijian females.

Obviously, the use of kava is no longer restricted to traditional functions, but it is now used more and more for socializing in all ethnic groups.
Table 12.5.4
Kava drinkers by ethnicity and gender, 1993 and 2004

<table>
<thead>
<tr>
<th>Ethnicity</th>
<th>Male</th>
<th></th>
<th></th>
<th>Female</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1993</td>
<td>%</td>
<td>2004</td>
<td>%</td>
<td>1993</td>
<td>%</td>
<td>2004</td>
<td>%</td>
</tr>
<tr>
<td>Fijians</td>
<td>424</td>
<td>61.0</td>
<td>955</td>
<td>67.8</td>
<td>206</td>
<td>26.1</td>
<td>767</td>
<td>47.6</td>
</tr>
<tr>
<td>Indo-Fijians</td>
<td>376</td>
<td>49.8</td>
<td>609</td>
<td>58.6</td>
<td>32</td>
<td>4.2</td>
<td>103</td>
<td>8.7</td>
</tr>
<tr>
<td>‘Others’</td>
<td>59</td>
<td>64.8</td>
<td>39</td>
<td>63.9</td>
<td>21</td>
<td>23.3</td>
<td>29</td>
<td>34.5</td>
</tr>
<tr>
<td>All</td>
<td>859</td>
<td>55.7</td>
<td>1603</td>
<td>63.9</td>
<td>259</td>
<td>15.7</td>
<td>899</td>
<td>31.2</td>
</tr>
</tbody>
</table>

In summary, there has been an increase in kava drinking amongst all three ethnic groups with significant increase in female drinkers in 2004 compared to 1993.

In terms of number of days kava was taken, the results show that overall there has been an increase in the proportion of kava drinkers (less than 2 days a week) in 2004 by 13.7%, but there was a decrease in the proportion of those who drank kava in 2-6 days a week and daily, by 3.9% and 9.8% respectively, over the 1993 results.

By age group, there has been an increase in the proportion of kava drinkers with age in all three ethnic groups and both genders.

12.6  Physical activity
Subjects were asked to report on the level of physical activity while at work and during leisure time. The levels of physical activity were categorized as light, moderate or vigorous.

12.6.1 Work activity level
Table 12.6.1 shows that the majority of the population surveyed was engaged in light activity (65.4%), less than a third (29.2%) did moderate physical activity and a very small proportion (3.3%) was engaged in vigorous activity. Examined by ethnicity, more Indo-Fijians reported doing light physical activity (71.6%), compared to Fijians (60.6%).

Table 12.6.1
Work activity level by ethnicity, 2004

<table>
<thead>
<tr>
<th>Ethnicity</th>
<th>Sample Size</th>
<th>Work activity level</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>None*</td>
<td>Light</td>
<td>Moderate</td>
<td>Vigorous</td>
<td></td>
<td></td>
</tr>
<tr>
<td>n</td>
<td>%</td>
<td>n</td>
<td>%</td>
<td>n</td>
<td>%</td>
<td>n</td>
<td>%</td>
</tr>
<tr>
<td>Fijians</td>
<td>3028</td>
<td>63</td>
<td>2.1</td>
<td>1835</td>
<td>60.6</td>
<td>1009</td>
<td>33.3</td>
</tr>
<tr>
<td>Indo-Fijians</td>
<td>2217</td>
<td>45</td>
<td>2.0</td>
<td>1587</td>
<td>71.6</td>
<td>529</td>
<td>23.9</td>
</tr>
<tr>
<td>‘Others’</td>
<td>146</td>
<td>2</td>
<td>1.4</td>
<td>104</td>
<td>71.2</td>
<td>37</td>
<td>25.3</td>
</tr>
<tr>
<td>All</td>
<td>5391</td>
<td>110</td>
<td>2.0</td>
<td>3526</td>
<td>65.4</td>
<td>1575</td>
<td>29.2</td>
</tr>
</tbody>
</table>

* Reported ‘No’ to this part of the question

Examined by gender, reported work activity level showed that 60.1% males did light work, 31.7% did moderately active work and 6.6% did vigorously active work. Slightly
more females reported doing light work (70.1%), 27% did moderately active work and only 0.5% did vigorously active work.

Table 12.6.2 showed by gender and age group that no consistent patterns could be identified. It seemed that more in the 12-17 year age group reported doing light work (67.6% males and 78% females).

Amongst those 18-44 years of age, 57.4% males and 66.2% females did moderately active work, which was slightly less compared to the younger age group but more than the 45 and older age group (30.6% males and 23.3% females).

In general, gender differences existed where males tended to be more active than females.

Table 12.6.2  
Work-activity level by gender and age group, 2004

<table>
<thead>
<tr>
<th>Gender</th>
<th>Age Group  (years)</th>
<th>Sample Size</th>
<th>Work-activity level</th>
<th>None*</th>
<th>Light</th>
<th>Moderate</th>
<th>Vigorous</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>n</td>
<td></td>
<td>n</td>
<td>%</td>
<td>n</td>
<td>%</td>
</tr>
<tr>
<td>Male</td>
<td>12 - 17</td>
<td>447</td>
<td>6</td>
<td>1.3</td>
<td>302</td>
<td>67.6</td>
<td>122</td>
</tr>
<tr>
<td></td>
<td>18 - 44</td>
<td>1320</td>
<td>14</td>
<td>1.1</td>
<td>758</td>
<td>57.4</td>
<td>447</td>
</tr>
<tr>
<td></td>
<td>45 and Over</td>
<td>744</td>
<td>20</td>
<td>2.7</td>
<td>448</td>
<td>60.2</td>
<td>228</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>2511</td>
<td>40</td>
<td>1.6</td>
<td>1508</td>
<td>60.1</td>
<td>797</td>
</tr>
<tr>
<td>Female</td>
<td>12 - 17</td>
<td>431</td>
<td>11</td>
<td>2.6</td>
<td>336</td>
<td>78.0</td>
<td>83</td>
</tr>
<tr>
<td></td>
<td>18 - 44</td>
<td>1586</td>
<td>34</td>
<td>2.1</td>
<td>1050</td>
<td>66.2</td>
<td>493</td>
</tr>
<tr>
<td></td>
<td>45 and Over</td>
<td>863</td>
<td>25</td>
<td>2.9</td>
<td>632</td>
<td>73.2</td>
<td>202</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>2880</td>
<td>70</td>
<td>2.4</td>
<td>2018</td>
<td>70.1</td>
<td>778</td>
</tr>
<tr>
<td>All</td>
<td>12 - 17</td>
<td>878</td>
<td>17</td>
<td>1.9</td>
<td>638</td>
<td>72.7</td>
<td>205</td>
</tr>
<tr>
<td></td>
<td>18 - 44</td>
<td>2906</td>
<td>48</td>
<td>1.7</td>
<td>1808</td>
<td>62.2</td>
<td>940</td>
</tr>
<tr>
<td></td>
<td>45 and Over</td>
<td>1607</td>
<td>45</td>
<td>2.8</td>
<td>1080</td>
<td>67.2</td>
<td>430</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>5391</td>
<td>110</td>
<td>2.0</td>
<td>3526</td>
<td>65.4</td>
<td>1575</td>
</tr>
</tbody>
</table>

* Reported ‘No’ to this part of the question

12.6.2 Leisure time
Respondents were asked about the level of activity they engaged in during their leisure time. The results showed that overall, just over half (51.0%) did light activity, 6.3% did moderate activity, and 41.1% reported that they engaged in vigorous activity (Table 12.6.3). Relatively more Fijians (46.4%) did vigorous activity, compared to 34.1% Indo-Fijians and 37.2% ‘Others’.

By gender, more males (58.6%) were engaged in vigorous activity compared to only 25.9% females.

Examined by age group, there was a clear decline in the pattern of vigorous physical activity with age in both males and females. In males, it was 79.4% at 12-17 years of
age, 68.4% at 18-44 years and 28.6% amongst 45 years and over. The pattern observed in females showed 58.6% at 12-17 years, 24.7% at 18-44 and 11.6% at 45 years and over (Figure 12.6.4).

More people shifted from being moderately and vigorously active to light activity as a consequence of age.

Table 12.6.3
Leisure time activity level by ethnicity, 2004

<table>
<thead>
<tr>
<th>Ethnicity</th>
<th>Sample Size</th>
<th>Activity Type</th>
<th>Light</th>
<th>Moderate</th>
<th>Vigorous</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>None*</td>
<td>n</td>
<td>%</td>
<td>n</td>
</tr>
<tr>
<td>Fijians</td>
<td>3029</td>
<td>52</td>
<td>1.7</td>
<td>1401</td>
<td>46.3</td>
</tr>
<tr>
<td>Indo-Fijians</td>
<td>2229</td>
<td>34</td>
<td>1.5</td>
<td>1276</td>
<td>57.2</td>
</tr>
<tr>
<td>‘Others’</td>
<td>145</td>
<td>3</td>
<td>2.1</td>
<td>77</td>
<td>53.1</td>
</tr>
<tr>
<td>All</td>
<td>5403</td>
<td>89</td>
<td>1.6</td>
<td>2754</td>
<td>51.0</td>
</tr>
</tbody>
</table>

- Reported ‘No’ to this part of the question.

Table 12.6.4
Leisure time activity by gender and age group, 2004

<table>
<thead>
<tr>
<th>Gender</th>
<th>Age Group (years)</th>
<th>Sample Size</th>
<th>Activity Type</th>
<th>Light</th>
<th>Moderate</th>
<th>Vigorous</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>None*</td>
<td>n</td>
<td>%</td>
<td>n</td>
</tr>
<tr>
<td>Male</td>
<td>12 - 17</td>
<td>447</td>
<td>5</td>
<td>1.1</td>
<td>52</td>
<td>11.6</td>
</tr>
<tr>
<td></td>
<td>18 - 44</td>
<td>1320</td>
<td>12</td>
<td>0.9</td>
<td>324</td>
<td>24.5</td>
</tr>
<tr>
<td></td>
<td>45 and Over</td>
<td>745</td>
<td>15</td>
<td>2.0</td>
<td>451</td>
<td>60.5</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>2512</td>
<td>32</td>
<td>1.3</td>
<td>827</td>
<td>32.9</td>
</tr>
<tr>
<td>Female</td>
<td>12 - 17</td>
<td>435</td>
<td>12</td>
<td>2.8</td>
<td>134</td>
<td>30.8</td>
</tr>
<tr>
<td></td>
<td>18 - 44</td>
<td>1589</td>
<td>19</td>
<td>1.2</td>
<td>1084</td>
<td>68.2</td>
</tr>
<tr>
<td></td>
<td>45 and Over</td>
<td>867</td>
<td>26</td>
<td>3.0</td>
<td>709</td>
<td>81.8</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>2891</td>
<td>57</td>
<td>2.0</td>
<td>1927</td>
<td>66.7</td>
</tr>
<tr>
<td>All</td>
<td>12 - 17</td>
<td>882</td>
<td>17</td>
<td>1.9</td>
<td>186</td>
<td>21.1</td>
</tr>
<tr>
<td></td>
<td>18 - 44</td>
<td>2909</td>
<td>31</td>
<td>1.1</td>
<td>1408</td>
<td>48.4</td>
</tr>
<tr>
<td></td>
<td>45 and Over</td>
<td>1612</td>
<td>41</td>
<td>2.5</td>
<td>1160</td>
<td>72.0</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>5403</td>
<td>89</td>
<td>1.6</td>
<td>2754</td>
<td>51.0</td>
</tr>
</tbody>
</table>

* Reported ‘No’ to this part of the question.
12.6.3 Comparison of physical activity levels between 1993 and 2004

Because of the differences in the way the questions were posed between the two surveys, it is only possible to compare the levels of activities. Overall, the 2004 results showed an increase in the proportion of the population doing light activity compared to 1993: 66.8% compared to 47.2% respectively – an increase of 19.6% (Table 12.6.5). There has been a slight increase in the proportion of those engaged in vigorous activity by 22.9%.

By ethnic group, there have been increases in the proportion of Fijians engaged in light (16%) and moderate physical activity (8.6%) but a decline in the proportion of those engaged in vigorous activity (24.6%) in 2004. Indo-Fijians showed similar trends with the proportion of those engaged in vigorous activity declining by 22%, and a subsequent increase in the proportion of those engaged in light activity (26.3%) in 2004.

Table 12.6.5
Comparison of physical activity level at work
By gender and ethnicity, 1993 and 2004

<table>
<thead>
<tr>
<th>Gender</th>
<th>Ethnicity</th>
<th>Year</th>
<th>Sample Size</th>
<th>Activity Level</th>
<th>Light</th>
<th>Moderate</th>
<th>Vigorous</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>n</td>
<td>n</td>
<td>n</td>
</tr>
<tr>
<td>Male</td>
<td>Fijians</td>
<td>1993</td>
<td>569</td>
<td>119</td>
<td>20.9</td>
<td>138</td>
<td>24.3</td>
</tr>
<tr>
<td></td>
<td>2004</td>
<td>1392</td>
<td>767</td>
<td>171</td>
<td>55.1</td>
<td>517</td>
<td>37.1</td>
</tr>
<tr>
<td></td>
<td>Indo-Fijians</td>
<td>1993</td>
<td>618</td>
<td>171</td>
<td>27.7</td>
<td>155</td>
<td>25.1</td>
</tr>
<tr>
<td></td>
<td>2004</td>
<td>1018</td>
<td>696</td>
<td>267</td>
<td>68.4</td>
<td>267</td>
<td>26.2</td>
</tr>
<tr>
<td></td>
<td>'Others'</td>
<td>1993</td>
<td>79</td>
<td>35</td>
<td>44.3</td>
<td>17</td>
<td>21.5</td>
</tr>
<tr>
<td></td>
<td>2004</td>
<td>61</td>
<td>45</td>
<td>73.8</td>
<td>13</td>
<td>21.3</td>
<td>3</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>1993</td>
<td>1266</td>
<td>325</td>
<td>25.7</td>
<td>310</td>
<td>24.5</td>
</tr>
<tr>
<td></td>
<td>2004</td>
<td>2471</td>
<td>1508</td>
<td>61.0</td>
<td>797</td>
<td>32.3</td>
<td>166</td>
</tr>
<tr>
<td>Females</td>
<td>Fijians</td>
<td>1993</td>
<td>657</td>
<td>444</td>
<td>67.6</td>
<td>173</td>
<td>26.3</td>
</tr>
<tr>
<td></td>
<td>2004</td>
<td>1573</td>
<td>1068</td>
<td>67.9</td>
<td>492</td>
<td>31.3</td>
<td>13</td>
</tr>
<tr>
<td></td>
<td>Indo-Fijians</td>
<td>1993</td>
<td>641</td>
<td>418</td>
<td>65.2</td>
<td>201</td>
<td>31.4</td>
</tr>
<tr>
<td></td>
<td>2004</td>
<td>1154</td>
<td>891</td>
<td>262</td>
<td>77.2</td>
<td>22.7</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>'Others'</td>
<td>1993</td>
<td>75</td>
<td>59</td>
<td>78.7</td>
<td>16</td>
<td>21.3</td>
</tr>
<tr>
<td></td>
<td>2004</td>
<td>83</td>
<td>59</td>
<td>71.1</td>
<td>24</td>
<td>28.9</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>1993</td>
<td>1373</td>
<td>921</td>
<td>67.1</td>
<td>390</td>
<td>28.4</td>
</tr>
<tr>
<td></td>
<td>2004</td>
<td>2810</td>
<td>2018</td>
<td>71.8</td>
<td>778</td>
<td>27.7</td>
<td>14</td>
</tr>
<tr>
<td>All</td>
<td>Fijians</td>
<td>1993</td>
<td>1226</td>
<td>563</td>
<td>45.9</td>
<td>311</td>
<td>25.4</td>
</tr>
<tr>
<td></td>
<td>2004</td>
<td>2965</td>
<td>1835</td>
<td>61.9</td>
<td>1009</td>
<td>34.0</td>
<td>121</td>
</tr>
<tr>
<td></td>
<td>Indo-Fijians</td>
<td>1993</td>
<td>1259</td>
<td>589</td>
<td>46.8</td>
<td>356</td>
<td>28.3</td>
</tr>
<tr>
<td></td>
<td>2004</td>
<td>2172</td>
<td>1587</td>
<td>73.1</td>
<td>529</td>
<td>24.4</td>
<td>56</td>
</tr>
<tr>
<td></td>
<td>'Others'</td>
<td>1993</td>
<td>154</td>
<td>94</td>
<td>61.0</td>
<td>33</td>
<td>21.4</td>
</tr>
<tr>
<td></td>
<td>2004</td>
<td>144</td>
<td>104</td>
<td>72.2</td>
<td>37</td>
<td>25.7</td>
<td>3</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>1993</td>
<td>2639</td>
<td>1246</td>
<td>47.2</td>
<td>700</td>
<td>26.5</td>
</tr>
<tr>
<td></td>
<td>2004</td>
<td>5281</td>
<td>3526</td>
<td>66.8</td>
<td>1575</td>
<td>29.8</td>
<td>180</td>
</tr>
</tbody>
</table>

To summarise, Fiji’s population had become more inactive by 2004 compared to 1993. This could be a result of an improved standard of living indicated by the increase use of vehicles, TV watching and other sedentary activities.
12.7 Discussion

12.7.1 High blood pressure or Hypertension
High blood pressure is the number one risk factor for NCDs.

The findings of the third NNS 2004 indicated a worsening situation: the rates of borderline hypertension had doubled and that of hypertension was 1.75 times more since the second NNS 1993.

The results of the third NNS 2004 appeared consistent with the following 2002 STEPs survey findings. For example, the hypertension rates were similar (17.1% in 2004 NNS and 19.1% in the 2002 STEPs); hypertension increased with age; and no difference was found in the prevalence rates of borderline hypertension and hypertension between urban and rural dwellers. However, the rural and urban findings appeared inconsistent with studies in other countries which have reported a tendency for those moving to urban from rural locations to have higher rates of hypertension (Taylor, 2006).

The 2004 NNS results showed that a higher proportion of males were found to have borderline hypertension and hypertension before 45 years of age compared to females. However, a reversal trend was observed at 45 years and over, with females showing higher proportions of hypertension compared to males. These results appeared consistent with Taylor (2006) that prior to age 50 years, males are at greater risk of hypertension than females. However, above 55 years, both males and females face an equally greater risk of about 90% chance. Based on the NNS 2004 results, a higher proportion of older females developed hypertension compared to males.

Although the exact causes of high blood pressure are not fully understood, it is known however that some lifestyle behaviours contribute to the problem. These include: smoking, family history, obesity (or overweight), drinking a lot of alcohol especially binge drinking, a lack of exercise and poor diet. A high sodium (salt) diet is also known to increase blood pressure in some people (Taylor, 2006).

An important contributing factor to hypertension that is seldom highlighted is stress. Since the late 1990s, research evidence has shown that stress and hypertension are closely linked (Taylor, 2006). Repeated exposure to stressful events contributes over the long term to the development of chronically high blood pressure (D. Carrol et al, 2001). Job stress and unemployment have also been linked to high blood pressure (Pickering et al, 1996). High blood pressure in women has been linked to extensive family responsibilities, and among white collar women, the combined impact of job strain and many family responsibilities.

The relatively high rates of borderline hypertension are of concern. These cases are more likely to shift and develop into full hypertension if not checked by medical professionals.

12.7.2 Smoking
Smoking is second only to high blood pressure as a risk factor for NCDs.

The overall prevalence rates of smokers found in the 2004 NNS is not comparable to the findings of the 2002 STEPs survey. However, there were a number of similarities in trends. For example, a greater proportion of smokers are males, and a higher proportion
of the current rates for Fijians were slightly higher in the 2004 NNS compared to the STEP survey, which showed the opposite trend (Indo-Fijian's rates of daily smokers were higher than Fijians). Of interest, the 2004 NNS showed a higher proportion of Indo-Fijians smoking more cigarettes a day compared to Fijians. As stated previously, this could be indicative of stress, addiction or both.

12.7.3 Alcohol consumption
Alcohol consumption is ranked 5th amongst the top ten risk factors for NCDs.

Overall, the 2004 NNS results showed a slightly higher (51%) proportion of alcohol drinkers compared to the 2002 STEPs survey results (45%).

Although absolute proportions found in both surveys appeared incomparable, the trends were similar. For example, a higher proportion of males drank alcohol; and the proportion of drinkers decreases with age. In terms of ethnic group, the highest proportions of drinkers were Indo-Fijians, compared to Fijians.

In relation to the amount of standard alcohol drinks consumed, the absolute numbers again differed between the 2004 NNS and the 2002 STEPs survey (less alcohol was consumed in 2004). However, similar trends were observed in that Fijians were the highest consumers of mean standard drinks of alcohol compared to Indo-Fijians.

Although the proportion of binge drinkers was lower in 2004 than reported in the STEPs survey, similar trends were also found with binge drinking between the two surveys. For instance, a higher proportion of male binge drinkers compared to females and a higher proportion of Fijian binge drinkers compared to Indo-Fijians.

The result of binge drinking is known to cost the country hundreds of thousands of dollars in terms of hangovers and drink-driving-related illnesses and injuries. Excessive alcohol consumption over a long period may result in liver damage, as well as overweight.

It is possible that alcohol is used as a coping strategy for stress by all ethnic groups. Unfortunately, alcohol use in combination with smoking and kava use has not been systematically studied in Fiji to determine its combined effect towards the development of NCD. Excessive use alcohol in combination with smoking and kava consumption in Fiji is a concern.

12.7.4 Kava consumption
There has been some concern in recent years regarding consumption of kava. Its direct link to NCD is not very clear. However, its known associated use with alcohol and smoking has been a worrying trend to health professionals. The problem with the kava drinking session is that it encourages smoking. Anecdotal evidence suggested that young kava drinkers generally have a ‘wash-down’ after kava sessions with alcohol. No systematic study has been conducted to determine the extent of the practice.

Kava is an analgesic and a sleep inducer. It is also used as coping strategy for stress.

In terms of general nutrition, kava drinkers have been known to miss meals or not eat properly because they have lost their appetite or are too tired (kava contains sleep-inducing chemicals) after kava sessions.
12.7.5 Physical activity

Physical inactivity is the result of a progressive shift of lifestyle towards more sedentary patterns in developing countries. It ranks 9 out of the top ten risk factors to NCD. Numerous studies have also demonstrated that increased physical activity reduce the risks of NCDs (Winnet, 1995). Cardiovascular fitness and physical activity have been known to reduce significantly the effects of overweight and obesity on health (WHO, 2003). Physical inactivity and smoking have been found independently to predict cardiovascular disease and stroke in later life (WHO, 2003). Research has shown that physical activity can improve mental health. Active people are more likely to be able to manage anxiety and stress, improve ability to concentrate, and improve self-esteem.

The level and intensity of physical activity offers different health effects.

12.8 Conclusion

The risk factors included in this chapter include 4 of the 10 leading risk factors attributed to millions of deaths globally in 2000 (WHO, 2002). In descending order, high blood pressure topped the list with smoking being the second. Alcohol ranked fifth and physical inactivity ranked ninth.

Three of these risk factors (high blood pressure, excess alcohol consumption and physical inactivity) are directly linked to overweight and obesity, a NCD health problem as well as a common risk factor for most NCDs. In other words, diet and physical inactivity are risk factors common to most NCDs.

An additional perspective that has not been discussed as part of this chapter is economic development and globalization. The theory believes or assumes that if the economics are ‘right’ or ‘strong’, prosperity will follow, and health (and education) automatically falls into place. However, in practice, this has failed to happen. While Fiji represents a particular example, the general principles outlining the linkages between globalization and NCD epidemics have been described by Beaglehole & Yach (2003) who identified a nutritional transition towards diets with a high proportion of saturated fat and sugars which they attributed to global trade and marketing developments. This transition involves the replacement of traditional diet rich in fruit and vegetables by a diet rich in calories provided by animal fats and low in complex carbohydrates. This diet, in combination with tobacco use and little physical activity, leads to population-wide atherosclerosis and the widespread distribution of NCD.

By their nature NCDs are chronic, long-term diseases, so each patient is likely to require health services over many years. At the same time, national economies are suffering as a result of the increasing number of premature deaths of individuals in their prime productive years. According to Khaleghian (2003), the total estimated disease burden for low to middle-income countries like Fiji show that NCDs as a whole, account for 42.5% of all disability-adjusted life years (DALYS) lost in 1998 as compared to 40.4% for communicable diseases and 16% for injuries. The largest contribution to lost DALYS was the burden caused by cardiovascular diseases and cancer, responsible for 37.3% for all NCD-related DALYS lost in 1998 (Khaleghian, 2003).

The total cost of NCDs in 1998 for Fiji was estimated to be 1.5 % of its GDP. Direct cost estimates for NCDs as percent of total health budget for 1998 was just over 11% (Khaleghian, 2003). This means that for Fiji with its small economy, the economic cost of
NCDs is enormous. Its health system is increasingly burdened by the high cost of diagnosing, treating, caring and sending patients overseas for special treatment.

According to WHO (2003), eating healthily, maintaining normal weight, not smoking, and being physically active throughout the life span can prevent:

- Up to 80% of cases of coronary heart disease (CHD)
- Up to 90% of type 2 diabetes
- About one third of cancers

Prevention of NCDs must address risk factors common to most NCDs rather than individual diseases.

No single organization or institution whether international, national, non-government can solve the problem alone. It is “only through new innovative partnerships can we make a difference” (Dr Gro Harlem Brundtland, 2002)

The Global Strategy on Diet, Physical Activity and Health should be the basis for future preventive actions. In other words the strategies and policies applied to prevent chronic diseases must fully recognize the essential role of diet, nutrition and physical activity (WHO, 2003).

While the above are necessary strategies, most if not all risk factors discussed in this chapter are linked to stress although stress has not been linked previously to NCDs. It is an area or topic that has yet to be appropriately addressed by health professionals.
13.0 CURRENT SITUATION IN RELATION TO THE FIJI NATIONAL PLAN OF ACTION FOR NUTRITION (FPAN)

13.1 Introduction
Fiji's first FPAN was endorsed by Cabinet in April 1998. FPAN was structured around eight priority themes for action identified at the 1992 International Conference on Nutrition:
1. Incorporating nutrition considerations, objectives and components into development policies and programmes;
2. Promoting and improving household food security;
3. Protecting consumers through improved food quality and safety;
4. Preventing and managing infectious diseases;
5. Caring for the socio-economically deprived and nutritionally vulnerable;
6. Prevention of specific micronutrient deficiencies;
7. Promoting healthy diets and lifestyles;
8. Assessing, monitoring and analyzing the food and nutrition situation.

13.2 Implementation of FPAN
Because the implementation of FPAN has been problematic, it has been a subject of a number of reviews:
- a) "Revitalization Workshop" in December 1999 which aimed at revitalizing the implementation of FPAN;
- b) Review of FPAN in March 2005;

Two problems identified by the reports as major contributing factors to the problem were:
i) Line ministries were delegated ‘ownership and implementation’ of FPAN without genuine or adequate consultation and with little advocacy;
ii) The lack of clear mechanism/structures for coordinating and monitoring FPAN.

Anecdotal evidence indicated that line ministries had their own action plan priorities with little or no serious considerations of incorporating FPAN. Therefore any FPAN-related programme activities implemented by these line ministries would have been incidental to and independent of FPAN.

13.2.1 The short term targets of the FPAN grouped under FPAN themes
Documents showed the following are the short term/medium term targets of FPAN and Ministry of Health. FPAN targets for other line ministries have not been included due to non-availability.

**Prevention of specific micronutrient deficiencies**
- eliminate iodine deficiency diseases;
- reduce the total incidence of anaemia by 25% of the 1993 level;

**Preventing and managing infectious diseases**
- reduce the prevalence of diarrhoeal diseases in the community by 50% of the 1990 level *;
- reduce the mortality due to diarrhoeal diseases by 50% of the 1990* level;
Caring for the socio-economically deprived and nutritionally vulnerable

- reduce the number of hospitalized cases with severe pneumonia in children under 5 years of age by 50% of the 1990 level*;
- reduce the number of deaths from pneumonia in children under 5 years 50% of the 1990 level*;
- reduce maternal mortality to <20 per 100,000*;
- reduce the prevalence of low birth weight babies by 25% of the 1993 level;
- reduce the prevalence of underweight and PEM by 25% of the 1993 level;

Promoting healthy diets and lifestyles

- reduce the prevalence of underweight and obesity by 10% of the 1993 level;
- reduce the prevalence of raised blood pressure in adults (SBP greater or the same as 160mmHg and/or DBP greater or the same as 95mmHg by 2% per year, to 8% by the year 2000*;
- reduce the death rate from non-communicable diseases by 2% per year, i.e. 8% by the year 2000*;
- reduce the per capita consumption of tobacco by 2% per year, i.e. by 8% by the year 2000 10%*;

[* Targets of the Ministry of Health and Social Welfare]

13.2.2 Summary of Accomplishments
The short/medium term performance indicators have been assessed based on several sources of data including the MOH 2002 NCD survey, the 2004 National Nutrition Survey, and the MOH’s Annual reports (which contained information from hospital/Health Centre records). Figures showed that there have been improvements in some areas since the last nutrition survey in 1993 while it has worsened in others. These results must be read with caution in view of the limitations of the 2004 survey and the fact that the data is un-weighted.

1. Eliminate iodine deficiency diseases
Hospital records indicated that the number of cases had shown a decline since 1999 from 40 cases to around 22 in 2004. Although the problem has not been eliminated, the data indicates improvements. It should be noted that no systematic studies have been conducted to determine the effect of iodized salt since it was legislated in 1996.

2. Reduce the total incidence of anaemia by 25% of the 1993 level
Anaemia continues to be a problem in children and women. The 2004 survey results showed that rates in pregnant women had decreased compared to the 1993 results but increased in young children.

3. Reduce the prevalence of diarrhoeal diseases in the community by 50% of the 1990 level
Hospital data showed that there has been a reduction of 53% in the rates of diarrhoeal cases by 2004 (3,202) compared to the number of cases in 1990 (6,115). In general the decline has not been gradual but has peaked at certain periods. For example, there were 5736 cases in 1995 which peaked in 1998 at 12,278. Data showed that a general decline in the number of reported cases had been observed since 2001 to 3202 cases in 2004.
4. **Reduce mortality due to diarrhoeal diseases by 50% of the 1990**
No clear picture could be found because of inconsistent data reporting. However, it can be stated that mortality due to diarrhoea has been steady at an average of just above 30 deaths per year. Compared to the 1995 (23 deaths), the rates have increased since 1999 to above 30.

5. **Reduce the number of hospitalized cases with severe pneumonia in children under 5 years of age by 50% of the 1990 level**
Overall there has been a decline in hospitalized cases of pneumonia in children under 5 years. However, the number of cases varied from year to year e.g. from 654 in 1994 to 447 in 1996 to 636 in 1997. A decline in the number of cases has been reported since then with 349 cases n 2001.

6. **Reduce the number of deaths from pneumonia in children under 5 years 50% of the 1990 level**
There has been a decline in the number of deaths from pneumonia for children under 5 years. In 1994 there were 52 deaths but in 1997 this increased to 68. However, since 1998 there has been a steady decline.

7. **Reduce maternal mortality to <20 per 100,000**
There have been fluctuations in the trend of maternal mortality ratio (MMR) over the years. The MMR has remained above 20 per 100,000 for the past 20 years.

8. **Reduce the prevalence of low birth weight babies (<2500g) by 25% of the 1993 level**
A slight decrease in prevalence rates of LBW from 11.4% in 1993 to 10.2% in 2004 nationally has been observed. However, there has been an increase in the rates of LBW in Fijian children from 4.2% in 1993 to 7.5% in 2004 while a slight improvement had been observed in the rates of LBW in Indo-Fijian Infants from 21.2% in 1993 to 18.8% in 2004. (Note: the number of children under 2 years in the sample was relatively small)

9. **Reduce the prevalence of underweight and Protein-Energy Malnutrition by 25% of the 1993 level**
The overall prevalence of underweight in 2004 was 12.8%. By age groups, the results showed an increase in underweight for age amongst the 5-9 year-age group compared to the 0-4 year-age group. The rate of underweight by weight for age in Indo-Fijian children continues to be high compared to Fijians.

10. **Reduce the prevalence of overweight and obesity by 10% of the 1993 level**
The prevalence of overweight and obesity in both children and adults continued to increase. Overweight and obesity in children under 10 years (using weight for age, height for age and weight for height) as well as 10-17 years of age showed increased rates amongst all age categories in 2004.

In adults, the prevalence rates of overweight had also increased from 22.9% in 1993 to 32.3% in 2004. Obesity rates increased from 9.8% in 1993 to 23.9% in 2004, an increase of 23% overweight and obesity over a decade. Consistent with the MOH STEPs, obesity increased with age, females had higher rates than males, and Fijians had higher rates than Indo-Fijians.
11. Reduce the prevalence of raised blood pressure in adults (SBP greater or the same as 160 mmHg and/or DBP greater or the same as 95 mmHg by 2% per year, to 8% by the year 2000

There has been a general increase in rates of hypertension. In 1993, 10% of adults surveyed had hypertension whereas the 2004 survey recorded 17.1%. The 2004 survey results are similar to the 2002 STEPs survey which showed that 19.1% of those surveyed had hypertension.

12. Reduce the death rate from non-communicable diseases by 2% per year, i.e. 8% by the year 2000

The 1990 MOH Annual report showed that 40.7% of all deaths were due to diseases of the circulatory system. 82% of all deaths in 2002 were due to non-communicable diseases. Based on these figures, the death rates attributed to non-communicable diseases had doubled between 1990 and 2002.

13. Reduce the per capita consumption of tobacco by 2% per year, i.e. by 8% by the year 2000 10%

The prevalence rates of smoking amongst 12 years and over in 1993 and 2004 were similar (23.1% and 24.5% respectively). However, there was an increase of 4.8% in males who smoked up to 4 cigarettes a day in 2004 compared to 1993. In addition, the rates of smokers amongst 12-17 years had increased in 2004. The prevalence of female smokers also increased in 2004 by 13.3%

13.2.3 Issues to be addressed

Based on a combination of data sources (surveys and other data sources) the nutritional problem areas identified include:

13.2.3.1 Higher Incidence of LBW amongst Indo-Fijian children

This has continued to be a problem over the years. LBW is a major contributing factor to neonatal deaths in this ethnic group. Maternal malnutrition (inadequate or under nutrition in general) and in particular anaemia, poor maternal health, low level use of prenatal care services are associated with the problem. Improving these aspects will reduce LBW and also reduce neonatal mortality.

13.2.3.2 High rate of under weight amongst Indo-Fijian children

Despite a slight improvement in 2004, the rate of underweight amongst Indo-Fijian (underweight by weight for age and stunting) remains high: less than 20% in the under 5 years; almost 30% in the 5-9 years; and around 37% late adolescents.

13.2.3.3 Growth faltering amongst Fijian children

Although Fijian infants generally grow well within the first few months, growth falters after 3-5 months. Growth faltering has been observed amongst Fijian infants for many years. Observations had also shown that growth faltering coincide with the weaning period followed by malnutrition amongst the under 5. This suggests serious problem about feeding practices of infants and young children within this ethnic group.

13.2.3.4 Persistently high prevalence rates of anaemia among young children and women

Anaemia continues to be a major problem affecting children and women with rates generally higher amongst Indo-Fijians. However, rates amongst Fijians have also continued to increase over the years. The 2004 survey showed that rates of anaemia amongst the under 5 years to 11 year old males were higher than females. This is a new
challenge for Fiji. Anaemia has been a major contributing factor to the high rates of LBW in Indo-Fijian infants, poor learning performance in school children, and low productivity in adults.

13.2.3.5 Relatively high rates of overweight and obesity in Fijian children
HBW amongst Fijian children have been observed for many years. However, its negative health consequences are now better understood. The rates of overweight in Fijian children are also high. Overweight and obese children are more likely to grow into overweight and obese adults who have a much higher risk of developing NCDs.

13.2.3.6 Persistently high rates of overweight and obesity in adults
Although overweight and obesity are present in both Fijians and Indo-Fijians, the rates of overweight and obesity (using WHO standard) has consistently been higher in Fijians over the years. The 2004 survey showed 32.3% were overweight and 23.9% were obese. Females had higher rates of overweight consistently (34% Fijians and 31% Indo-Fijians). Fijian females showed the highest rates of obesity (41.7%). Other studies have shown that Indo-Fijian women had the greatest rate of increase although the incidence rates are not as high as Fijian women.

Overweight and obesity are major risk factors to NCDs. This is of concern as it is associated with the current high incidence rates of diabetes and heart diseases.

13.3 Increased rates of hypertensive cases
There has been a 4% increase in hypertensive rates and a 7% increase in rates of borderline hypertension since the 1993 NNS. The association of hypertension and heart disease as well as diabetes underlines the importance of this health problem

New immerging issue

13.4 HBW amongst Fijian children
There was a high rate of HBW amongst Fijian children (13.6% in this survey). High birth weight (HBW) has increasingly become a problem in recent years because of its association with obesity in childhood and in later years and the development of NCDs.

13.5 Factors contributing to the current situation
It is suggested that the following may have contributed to the current nutritional situation:

13.5.1 Poor maternal health
Underweight and anaemia amongst child-bearing age and pregnant women continue to be a problem. Poor maternal health directly affects foetal development and hence birth weight. This means that the foetus has to draw its nutrient requirements from maternal reserves which may not be readily available. This leaves both foetus and mother exposed to problems at critical periods of development.

13.5.2 Poor infant feeding practices
Overall the rate of breastfeeding initiation within the first 24hrs is high (83%), indicating that majority of infants were receiving colostrums. However the proportion of children exclusively breastfed in the first six months is only about 40% with higher rates in Fijians. The four major reasons of discontinuing breastfeeding are that there is no more breast milk; mothers had to return to work; other reasons and complications.
Weaning practices continue to be a problem particularly with the introduction of other fluids and solids. Mothers appear not to be aware of or do not practise weaning practices that are conducive to optimum infant development.

The rate of bottle feeding is still relatively high especially amongst Indo-Fijian mothers.

13.5.3 Changes in food and diet patterns
Overall there has been an increase in energy intake over the last decade. Consumption of protein foods and fats has also increased. Fijians' food sources of energy have changed from the traditional starchy foods to cereals such as rice, and flour products.

Consumption of fruits and vegetables continue to decline.

Indo-Fijian diet appeared to have also changed with increased consumption of animal protein.
14.0 CONCLUSIONS

Economic developments in Fiji have clearly contributed to social changes, improved quality of life and health status of the population such as increased life expectancy, improved rates of infant and child mortality, better availability and access to basic services, much more variety of food available, and improved water and sanitation. Unfortunately developments impact both positively and negatively on our health.

The 2004 national survey showed that some improvements have been noted in a number of areas since the last national nutrition survey over a decade ago. The population had continued to increase in height and weight, an indication of improved protein and energy intake. There had also been a reduction in the rates of infectious diseases.

However, a worsening situation was noted in that Fiji as a country in transition, has been burdened with both under- and over- nutrition problems.

With caution, the following problems are highlighted:

1) Both LBW (10.2%) and HBW (10.5%) in children were noted in the 2004 survey. The 2004 rate of LBW (10.2%) was almost similar to that found in 1993 (11.4%). As had been the trend, the rate of LBW was higher amongst Indo-Fijians. HBW found in 2004 was substantially higher in Fijian children than Indo-Fijian.

   Maternal malnutrition, especially underweight and anaemia, have been identified as major contributing factors to LBW infants.

2) Underweight by weight for age amongst Indo-Fijian children throughout childhood to adolescents continued to be widespread. Rates in the under 5 years for Indo-Fijian was 15.8% (Fijian, 3.9%); 5-9 years was 28.9% Indo-Fijian (Fijian, 3.8%); 10-14 years was 27.7% Indo-Fijian (Fijian, 10.2%); 15-<18 years was 37.6% Indo-Fijian (Fijian 6.7%).

3) Growth faltering of Fijian children continued to be a problem. Although they were born well above the international average weight, their growth falters after rapid growth in the first two months.

   Poor weaning practices (early weaning, early discontinuation of exclusive breast feeding, poor weaning practices, poor quality weaning foods and poor child care) have been associated with the problem.

4) A high prevalence rate of anaemia amongst women and children persisted. 37% of women and 49.9% of children 6 months-5 years were anaemic. 43.5% of pregnant women were also found to be anaemic.

   Anaemia has multiple causal factors e.g. infection, low iron intake in the diet, poor source of iron in the diet are all contributing factors.
5) Persistent high rate of overweight and obesity was noted. Overall 56.2% of the population (18 years and over) were overweight and obese (32.3% overweight and 23.9% obese). This was more pronounced amongst Fijians and females.

6) The rates of a number of NCD risk factors noted in the 2004 survey were relatively high amongst those surveyed (12 years and over).
   - The overall rate of hypertension was 16.8% and borderline was 17.5%.
   - A quarter of the population smoked.
   - 51.1% drank alcohol with 49.9% binge drinking.
   - 69.1% drank kava in 2-6 days a week.
   - Overall, 65.4% reported doing light physical activity.

Basic to the above are other underlying factors such as income and the percentage of weekly income spent on food, education level, use of health care services, food production level and distribution, nutritional knowledge, and budgeting.

Risk factors of NCDs must be addressed to arrest the current national trend of cardiovascular disease being the leading cause of death amongst the economically productive males of Fiji population, and high rates of diabetes.

The survey also identified other areas of concern.

The nutrient intake data indicated that the diet of Fiji population does not meet the internationally recommended level for all the nutrients analyzed which could be indicative of household food insecurity. Growing nutritious local food to provide nutrients in the Fiji diet should be promoted. Nutrition surveillance needs to be established to closely monitor the situation.

In conclusion, an assessment of the 2004 survey goals showed the following:

**Goal 1**
Determine the prevalence of nutritional and diet related problems such as underweight, overweight, obesity, hypertension and diabetes among various population groups by age, gender, ethnicity, area type and division.

*This was partly achieved. The variables diabetes and division were excluded from being reported due to inappropriate protocol and survey sample design.*

**Goal 2**
Determine baseline information on nutrient intake and adequacy of nutrient intakes in different population groups by age, gender, ethnicity and area type.

*Goal 2 was achieved*

**Goal 3**
Determine the current food consumption patterns in households by ethnicity, area type and division.

*Goal 3 was also achieved*
**Goal 4**
Determine feeding patterns and practices (including complementary feeding) amongst infants and young children (0 – 2 years old) by ethnicity, division and area type.

*Goal 4 was achieved*

**Goal 5**
Establish trends in the prevalence of underweight, overweight, obesity, hypertension, diabetes and eating patterns of the different population groups by division, age group and area type.

*This was partly achieved. The variables diabetes and division were excluded from being reported due to inappropriate protocol and survey sample design.*

**Goal 6**
Gather information on demographic, socio-economic, environmental, food security and non-communicable disease risk-factors (i.e. physical activity, smoking, and kava and alcohol consumption) that will have an impact on the nutritional status of the population amongst the different population groups by ethnicity, age group, area type and division.

*Goal 6 was also partially achieved. Divisional comparisons have not been reported.*

**Goal 7**
Identify nutritional and dietary intake indicators for the development of a regular nutrition surveillance program for the country.

*This goal was achieved*

**Goal 8**
Determine the prevalence of specific micronutrient deficiencies and establish baseline data for specified micronutrients.

*Goal 8 was achieved and is presented in a separate report.*
15.0 RECOMMENDATIONS

The 2004 survey has identified a number of nutrition-related problem areas and risk factors that will need to be addressed by the National Food and Nutrition Centre if nutritional health is to be improved. Given the multi-factorial nature of nutritional problems, strategies must be comprehensive and multi-sectoral. It is recommended that the following strategies be considered as part of a comprehensive approach to improving nutritional health in Fiji:

15.1 Reduce the prevalence of anaemia

- Improve dietary intake to include iron-rich foods.
- Consider the fortification of other commonly eaten processed food produced locally in addition to flour.
- Improve and monitor pre- and post-natal check-ups and care and treat anaemia cases.
- Strengthen and monitor iron supplementation in pregnant women.
- Strengthen intervention programmes addressing anaemia in children and adolescents, and males in general.
- Strengthen and support nursing stations to enable them to carry out simple tests to all patients that come to the clinics and to provide appropriate advice.

15.2 Reduce the prevalence of overweight and obesity in children and adults

- Improve social communications on the risks of overweight and obesity.
- Promote prevention of overweight and obesity in children through a comprehensive health promoting school.
- Educate parents on simple prevention activities by promoting a healthy diet and physical activity.
- Promote physical activity and healthy canteens in schools.
- Reduce consumption of high sugar, high fat and high salt foods and increase consumption of fruits, vegetables, and healthy snacks.
- Promote the healthy setting policy.
15.3 Reduce the incidence rates of LBW babies

- Healthy women are more likely to give birth to infants with healthy weights. They are also more likely to take better care of their families.
- Maternal health programmes should be enhanced or re-invigorated. Early prenatal clinic and regular check-ups are to be emphasized.
- Early detection ‘correction’ of dietary problems e.g. anaemia in women before and during pregnancy is more likely to contribute to improving the situation.

15.4 Improve growth and reduce underweight children

15.4.1 Improve infant and child feeding practices

- Enhance exclusive breastfeeding promotion. Establish and or strengthen breastfeeding support groups.
- Strengthen breastfeeding advisory through early prenatal counseling including both wife and husband team (and mothers in law with Indo-Fijians).
- Support, strengthen and expand the ‘baby friendly hospital and work place initiatives’.
- Promote legislation on the Fiji Code for marketing Breast-milk Substitutes and sales of milk feeding bottles.
- Aggressively promote programmes on the introduction of appropriate nutritious complementary foods.
- Promote the inclusion of breastfeeding in the training curriculum of all medical and health personnel.

15.4.2 Improve growth monitoring

- Strengthen growth monitoring programmes in health clinics, general practitioners surgeries, and hospitals.
- Mothers to be adequately trained to understand what infant growth chart (MCH card) means and its importance to the growth and development of the infant. Regular clinic attendance should be emphasized.
- Train health workers to follow-up children whose weight gain starts to slow down and provide appropriate advice.
- Assess the use and appropriateness of the growth chart (MCH card).
• Broaden school health services currently offered to primary school to include monitoring of nutritional status and growth in secondary schools. Results should be communicated to schools.

• Develop a closer partnership between the Ministry of Education and Ministry of Health to improve the health of children.

15.5 Reduce prevalence of high birth weight (HBW) in children

Given the current rates of HBW (and obesity) and scientific knowledge about the consequences particularly academically and socially during childhood and adolescent years, this must be tackled through a number of ways such as:

• Monitoring of weight gain in pregnant women during prenatal clinics;
• Aggressive social communications to modify cultural perception such as ‘big babies are healthy babies’, healthy infants and children;
• Promotion of comprehensive healthy schools concepts.

15.5.1 Further reduce the incidence rates of diarrhoea, skin infections, parasitic infestation and other infections

• Continue public health hygiene promotion (including good personal hygiene and sanitation). Educate mothers to care for their children’s sores and wounds.

• Ensure a safe water supply nationally.

• Maintain an excellent coverage of immunization.

• Strengthen the promotion of the use of oral re-hydration to manage diarrhoea.

15.6 Reduce prevalence rates of NCD risk factors

• Increase taxes on alcohol and tobacco. Create a Health Foundation funded from alcohol and tobacco taxes to be used to fund health promotion activities.

• Continue with and improve non-smoking and reduction in excessive alcohol consumption and binge drinking amongst adolescents and young adults.

• Effectively monitor anti-smoking laws.

• Promote physical activities.

• Reduce excessive consumption of fatty, sugary, and salty foods.
• Promote regular health check-ups, monitoring of blood sugar, cholesterol and total triglyceride levels.

• Strengthen anti-NCD work-place settings approach.

• Use comprehensive approaches.

15.7 Improve food consumption patterns

• Reduce consumption of fat and fatty foods and animal protein food and promote consumption of fruits and vegetable particularly local green leafy vegetables

• Increase availability of local traditional starchy foods at reasonable price

• Subsidize basic nutritious foods

• Promote the use of a variety of foods for healthy diets

• Promote local production of nutritious foods for the local market

• Develop food standards that meet minimum nutritional standards.

15.8 Improve family food production and household food security

• Encourage and promote appropriate family food production to improve household food supply.

• Support laws regarding allocation of small land plots for home food gardens where housing development takes place.

• Enact the food standards legislation and monitor.

• Support environmental laws that protect marine sources of food.

• Strengthen agricultural extension programmes in communities.

• Support poverty alleviation programmes.

15.9 Social communication strategies

• The National Food and Nutrition Centre to develop communication strategies to disseminate the survey results and the recommendations.

• The recommendations that relate to other sectors must be identified, first presented to the relevant sectors and their support and commitment sought before these are announced publicly.
15.10 Formulation of an appropriate policy and plan of action for nutrition

There is a need to review the nutrition policy (1983) to assess its appropriateness for the new millennium and incorporate emerging health issues. Broad policies should address:

- Improved household food security.
- Promotion of better dietary patterns including increased consumption of fruit and vegetable.
- Food quality standards and control
- Poverty alleviation
- Strengthen public health services for the prevention of nutrition-related problems.

Promotion of maternal and child health to incorporate:

- Promotion of exclusive breastfeeding and appropriate weaning practices
- Promotion of maternal health
- Promotion of legislation allowing mothers up to 6 months maternity leave
- Improved sanitation and safe water supply
- Improved provision of pre-and ante-natal care with growth monitoring
- Evaluation of programmes
- Promotion of healthy weight

15.11 Establishment of a nutrition surveillance system

To support monitoring of nutrition programmes, a nutrition surveillance system must be developed and maintained.

15.12 Strengthening of the National Food and Nutrition Centre

The NFNC needs to be appropriately supported and resourced to enable it to carry out its role more effectively.
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LIMITATIONS OF THE 2004 NNS

Any national survey is a major and costly undertaking by many who often work under difficult circumstances: this survey was no exception.

However, for a national survey to be of value to other professionals, policy makers and planners and other interested parties, a number of criteria need to be satisfied. For example, all important variables need to be clearly defined, sampling needs to be representative of the national population, data collection standardized and systematic, and analyses clearly described, appropriate and meaningful. Any conclusions drawn and recommendations offered should be based on sound evidence: i.e., on data that is representative, accurate, reliable and valid.

While the 2004 survey attempted to satisfy these criteria, limitations were identified that undermined its value. These have been presented under two main headings: (a) pre-survey considerations, and (b) survey and post-survey issues, and have been outlined in some detail to assist future national surveys of this nature.

1 Pre-survey Considerations

1.1 Sampling – The 2004 NNS followed the 1993 NNS sampling methodology. However no stratification of the survey sample by ‘ethnicity’, ‘gender’, ‘age’ and ‘urban/rural’ residency was undertaken. This may limit the degree to which survey findings might be generalized to the national population as well as making interpretation speculative because of uncontrolled variables.

1.2 Reduction in Enumeration Areas (EAs) sampled – these were reduced by 25% (from 60 in 1993 to 45 in 2004) due to financial constraints. Although more individuals were sampled within each EA in 2004, they were drawn from a restricted sample of EAs. Simply increasing the total number of participants from each EA does not necessarily provide a more representative sample [Endnotes]. The urban/rural distribution is also problematic.

1.3 Non-participation - identified participants ‘not available’ during the survey increased from 5% in 1993 to almost 12% in 2004, more than double the ‘expected’ non-participation rate.

Endnotes

1. Three points might be made. First, circumstances faced by those living in the wetter and relatively urbanized Central Division might be very different from those faced by farmers in the drier Western Division or more subsistence-oriented villagers in the maritime Eastern Division. Second, by constructing the survey sample strictly according to the principle of probability proportionate to size (PPS), nutritional and health characteristics of those living in Divisions with small populations (e.g., Eastern and perhaps Northern) tend to be ‘under-represented’. One solution is to ‘over-sample’ respondents from such areas (Divisions); another is to use a form of statistical weighting to compensate for this imbalance. Third, simply increasing the total size of the survey sample does not necessarily compensate for poor spatial (geographic) sampling or lack of stratification in a national survey of this nature. Statistical weighting should be carried out to ‘correct’ these imbalances.

2. For a variety of reasons, an urban/rural distinction in Fiji is especially problematic (Bureau of Statistics, 1997). These include inadequate definition and dated and/or inaccurately drawn boundaries. The problem is compounded further by considerable population mobility and circulation as a consequence of improved transportation (Chandra & Mason, 1998). Any analysis employing an urban/rural distinction needs to be treated with skepticism.
1.4 Data
1.4.1 The volume and complexity of data collected were overwhelming for processing, analysis, interpretation, and reporting. Compared to the 1993 survey, the third NNS (2004) saw a three-fold increase in the amount of data to be processed. The Second NNS (1993) used two main questionnaires containing a total of twenty questions capable of eliciting approximately eighty additional responses: i.e., a total of approximately 100 separate data items. The Third NNS (2004) contained five main questionnaires containing a total of 154 questions capable of eliciting approximately 150 additional responses: i.e., a total of over 300 separate data items - a three-fold increase in the amount of data to be processed.

1.4.2 The eating habits of children aged between 3 to 15 years were omitted. It would be quite reasonable to consider dietary information of this age group essential to a national nutrition survey. On the other hand, data that had no clear rationale and added little value to the survey were collected.

1.4.3 Inadequate sampling for the 24-hour Diet Recall. Samples selected for the dietary section was without stratification for ethnicity. It used the same age group as the micronutrient survey (females of child-bearing age: i.e., 15 – 44 years), plus one adult male per household).

1.5 Truncated training time
Although the pilot survey recommended 10 days for the adequate training of survey staff, this was five days for some and only three days for ‘Others’. In addition, training for 24-hour Diet Recall (using ‘the three-pass method’ which was new for Fiji) data collection required more practical exercises to better equip staff to deal with problems encountered in the field. This was necessary to avoid confusion when new methods are involved. Only trained persons competent in the new procedures and protocols should be used to instruct trainees. This did not occur. As a result, confusing and contradictory instructions were given by trainers resulting in compromised data.

1.6 Survey coordination continuity
The continuity of the Survey Coordinator or Manager’s leadership role is crucial in large surveys like the NNS which is conducted every ten years. Effective planning, professional management including public relations, technical knowledge and experience in research methodology are important skills necessary in a survey coordinator because of their impact on the quality of data collected. Records showed that three different officers were appointed to the position at different stages during the survey period.

2. Survey and Post-survey Limitations
Most limitations identified in this section are of an administrative and logistical nature.

2.1 Coordination and quality control
The need to have continuity of management with a coordinator who is able to take the survey processes from the beginning to the end; initial planning, data collection, data analysis, writing, and production of final report. The lack of continuity of management impacted on two important matters: (i) lack of quality control of data collection in the field, (ii) inadequate supervision of field staff.
2.1.1 To ensure quality control was maintained in all aspects of the survey and ‘trouble shoot’ as problems arose, it was necessary for the overall coordinator of the survey to travel with survey teams at the beginning of the field work at each Division to closely monitor progress. This did not happen.

2.1.2 Proper field supervision
Close, careful and competent supervision was crucial in the first two survey sites which required three supervisors: (i) A technical field supervisor was needed to take care of technical issues, especially the 24-hour Diet Recall procedure; (ii) A field supervisor needed to deal only with logistics and could be available to ‘troubleshoot’ transport, equipment and manpower needs in the field; (iii) A third supervisor whose sole responsibility was that of supervising the micronutrient component of the survey. Overall, the 2004 NNS attempted to achieve too much with too few experienced personnel.

Team supervisors needed to ensure commitment to assigned tasks and an adequate level of professionalism during the survey. Effective supervision requires a high degree of professionalism including an understanding of the requirements of data collection, commitment to quality control and a willingness to work long hours beyond the usual public service requirement.

2.2 Data base and analysis
Field testing of the data base for the 24hr diet recall was not adequate. A person with working knowledge on dietary research software is essential to avoid long delays in data entry and analysis.

2.2.1 All components of the survey need to be adequately field tested before the actual survey.

2.2.2 Reserves of trained field enumerators are needed to cover incidental resignations, sickness etc. Without this backup, and in the absence of careful supervision, in practice, data collection lacked standardization leading to additional errors and an increase in unreliability.

Summary
While the 2004 survey provided a large amount of potentially useful information, a number of fundamental problems plus ‘Others’ of an administrative or logistical nature undermined its value. These limitations made it:

(i) inappropriate to generalize the findings from the 2004 survey to the general community and;

(ii) Inadvisable to draw direct comparisons with the 1993 NNS.

In turn, this meant it could not be concluded that 2004 results indicated an ‘improvement’ or ‘deterioration’ compared to 1993 because the demographic composition of each sample was significantly different at the .0001 level.
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