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WORKING PAPER 55

Food Security Strategies for the Republic of Fiji

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Abbreviations and Acronyms

CDF	Commodity development framework
FBS	Food balance sheet
FAO	Food and Agriculture Organization of the United Nations
FCT	Food composition table
FDB	Fiji Development Bank
FPAN	Fiji Plan of Action on Nutrition
GDP	Gross domestic product
MAFF	Ministry of Agriculture, Fisheries and Forests
MAFFA	Ministry of Agriculture, Fisheries, Forests and ALTA
NFNC	National Food and Nutrition Committee
NGO	Non-government organization
NCD	Non-communicable disease
PAFCO	Pacific Fishing Company
SPARTECA	South Pacific Regional Trade and Economic Cooperation Agreement
TMFE	Total milk fat equivalent
UNICEF	United Nations Childrens Fund
UNDP	United Nations Development Programme
WTO	World Trade Organization

Foreword

In consideration of the importance of stable supplies of food to meet the increasing population and the changing dietary pattern in those island countries located in the South Pacific, the CGPRT Centre implemented the research project "Food Security Strategies for Selected South Pacific Island Countries (SouthPIC)" in collaboration with four countries: Fiji, Papua New Guinea, Tonga and Vanuatu. The project started in July 1999 and was operationally completed in December 2000.

The national experts appointed in each participating country carried out a country study with backup by the related institutions, which covered a wide range of socio-economic aspects related to the food security. Based on the analyses and findings achieved in the study, policy recommendations on the food security strategies in both short term and mid-long term were proposed.

It is my pleasure to publish **"Food Security Strategies for the Republic of Fiji"** as the report of the country study of Fiji. I sincerely hope this report will contribute to the improvement of food security and nutrition conditions in Fiji, and to the further development of its agriculture.

I thank Mr. Hiagi M. Foraete for his intensive research which enabled this report to provide useful information on possible food security strategies in the country. I am very much obliged to Dr. Euan Fleming, University of New England, Australia, and Dr. Pantjar Simatupang, Center for Agro-Socio Economic Research, Indonesia, for their contributions to the project as the regional advisor and the project leader, respectively. I also thank Dr. Douglas R. Stoltz for his editing services. Finally, I express my sincere appreciation to the Government of Japan for funding the project.

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Haruo Inagaki
Director
CGPRT Centre

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Hiagi M. Foraete

Executive Summary

Food security, as defined by the Food and Agriculture Organization of the United Nations Committee on World Food Security is "the ability of all people at all times to have both physical and economic access to sufficient, safe and nutritious foods which meet their dietary needs and food preferences for an active and healthy life." Household food security is the application of this concept to the family level, with individuals within the household as the focus of concern.

For the Republic of the Fiji Islands to make food security a reality, its people must first fulfil the following conditions:

- Have adequate food supplies (either domestically grown or imported).
- Have available food supplies.
- Have stability of food supply.
- Have access to food at the household level, especially those households with low incomes.

Fiji stands at an important crossroad, facing decisions that will determine its economic growth, food security and standard of living for the next 10 to 20 years. Its people must overcome obstacles in the development process that are not present in larger countries. This is because they live in a small island economy that is inherently less diversified than those of developed countries and larger developing countries. They are more vulnerable to both internal and external shocks. With a small population, economies of scale are difficult to achieve in domestic markets and investment in infrastructure more costly and often uneconomic. In addition to the problems of smallness, Fiji is relatively geographically isolated and prone to natural disasters, and its farmers operate under a land tenure system that constrains the availability of land and its productivity. However, there are offsetting advantages that stem from a favourable climate, location and relatively pest-free and unpolluted environment, natural beauty, and an ability to grow a wide range of nutritious foods.

The appropriate long-term agricultural strategy should be focused on minimising the disadvantages of size and isolation and maximising the advantages of location and environment. The areas that best satisfy these requirements are traditional food production and high-value niche exports. With suitable conditions in the right locations, these crops can give high returns to land and labour resources, and provide the greatest possible level of food security.

Fiji and other South Pacific countries have a lot of things in common. They share the same tropical climate, have limited resources (except for Papua New Guinea) and agriculture is the backbone of their economies. Furthermore, traditional cropping systems are very much village- and semi-subsistence-based, cultivating virtually the same crops, notably taro, cassava, sweet potato, kava, coconuts, breadfruit and bananas, primarily for home consumption.

The government of Fiji is firmly committed to the moral and philosophical principles of the World Food Summit Plan of Action, despite the recent change in government and political upheavals. It has already put in place mechanisms to achieve the seven commitments contained in the World Food Summit Plan of Action and necessary financial resources will be allocated through the budgets of key ministries towards the eradication of hunger and poverty in the rural areas. Government action is consistent with commitment seven of the World Food Summit Action Plan, which stresses the role of government as a focus of action with the main responsibility of promoting food security.

The most challenging food security issues for Fiji towards 2010 are sustaining domestic food production levels in line with food demands and market potential, and continuing the transition from subsistence to semi-subsistence and commercial agriculture. Fiji's ability to

meet this challenge is greatly enhanced by its long-term comparative advantage in the production of traditional food crops. These are highly sustainable activities if crops are grown in the traditional manner, without chemicals and in rotation. Provided the issue of expiring land leases and resettlement of displaced farmers from expired land leases under the Agricultural Landlord and Tenant Act can be satisfactorily resolved, a significant section of the sugar and food production industries should remain viable and achieve a high level of future production, even at current world and domestic market prices.

The Fiji economy has a very narrow resource base, and performance is heavily dependent on the success of the tourism and sugar industries. However, agriculture remains the mainstay and the largest sector of the economy, accounting for almost 43% of foreign exchange earnings. It provides nearly 50% of total employment and contributes 20% of GDP.

According to the 1996 Census, the estimated population in December 1996 was 772, 655. Fijians comprised 51.1% of the total, Indians 43.6%, with the balance made up of Rotumans, Chinese, Part-Europeans, Europeans and other Pacific Islanders. The population growth rate between 1995-96 was 2.9%. About 54% of the total population lives in rural areas. A much higher proportion of the population now lives in urban areas (46%) than ten years ago (38%). An increase in marketable food surplus is required to feed this increasingly urbanised population, and the farming community has so far responded to this need. Farmers produce an impressive quantity and range of traditional food crops. Traditional food crops are grown throughout the country and have been called the "hidden strength of the Fiji economy."

National food security depends on the continuation of semi-subsistence farming and its on-going transformation to more commercial production of crops for which Fiji has a competitive advantage. High-value agricultural export opportunities can usually only be exploited with reasonable access to the international seaports and airports, and to tourist resorts. This means that, in large measure, commercial agricultural development will continue to focus on Viti Levu. Crop, fish and livestock products are sold through a variety of outlets that could be broadly grouped into fresh produce municipal markets, cafes and restaurants, hotels, butchery and fish merchants, supermarkets and roadside stalls.

The level of food imports is still comparatively low, suggesting that the domestic food supply has been able to expand with increases in demand from the growing urban population. Municipal markets in Fiji appear to be thriving and to a large extent satisfying most of the needs of consumers in the country. Yet there is concern that major foods of high nutritional value in the market places are losing ground to imported foods. The national trend established from food balance sheets shows an increasing reliance on imported food.

Nutrition in Fiji is more a qualitative than a quantitative problem. Until 50 years ago, most people had sufficient quantities of their traditional foods and there were excellent systems for ensuring a sufficient supply of nutritious food. The change started when the Colonial Government's 1912 regulation on food security was repealed in 1970 when Fiji became an independent state, adopting the democratic system of government. Urbanisation has led to more sedentary lifestyles and changes in dietary patterns away from a traditional diet high in energy, fibre and nutrients to one dominated by refined carbohydrates and processed food. These changes have brought serious problems of over-nutrition and obesity, and an increased incidence of associated non-communicable diseases such as diabetes and hypertension.

In contrast to the high numbers of people suffering from these food-related diseases from over-eating, it seems that numerous households in Fiji are not able to secure enough food of the right quality to ensure good nutrition. The 1995 Study on Poverty found that 12% of households could not afford the most basic nutritious meal for the family. With the current political and economic situation in Fiji today, where employment opportunities are very limited, more households can be expected to fall into this category. Unemployment was estimated at 6% for 1996 but has probably increased substantially since that year.

The traditional system of extended family is relied upon as the major source of assistance to the poor. However, with the transition from an agrarian to an urban society, this traditional support system is weakening.

Economic development has occurred in many areas. For example, progress has been made in education, with nearly 90% of the workforce now educated to secondary school level and 4% to tertiary training at an academic or specialist skills level. However, it has been estimated that 23% to 25% of the population were living below the poverty line in 1991.

In rural areas, economic development has been largely devoted to cash crops for export. Often, land previously used for food gardens has been put to cash cropping. Both Fijian and Indian communities have experienced an overall reduction in the quantity and quality of food crops produced for household consumption. Available cash is being spent on imported cereals, canned foods and vegetables such as potatoes.

The current situation is typified by:

- A growing dependence on imports to meet national nutritional needs;
- High costs of local root crops compared with imported processed cereals;
- Reduced production of local root crops; and
- Increasing preferences for cheap and convenient processed foods.

Increases in rural-urban migration are of considerable concern. According to the 1996 population figures, the rural population had been declining over the previous ten years by an annual average of 0.6% per annum. In order to reduce this urbanisation trend, government efforts will continue to be directed at raising standards of living in rural areas and at creating opportunities for employment through the expansion of agricultural development programs focusing on food security and income-earning opportunities.

Poverty is not concentrated in either rural or urban areas, or in any ethnic group, but exists in all communities in Fiji. It is more than just a matter of incomes and expenditures. Studies provide information about non-market factors that constitute the coping strategies of the disadvantaged. These many sources consistently point to the same conclusions:

- Fiji is not an egalitarian society but one with deep inequalities.
- Although there is little absolute poverty, a sizeable proportion of households in Fiji have difficulty meeting basic needs for food and shelter and many cannot do so adequately.
- Despite the much-vaunted strengths of tradition and community, family networks now fail to support some of the poorest and most disadvantaged people sufficiently, if indeed they ever did.

Income is unevenly distributed between different parts of Fiji and between rural and urban populations. The pattern of income inequality is, foremost, a reflection of Fiji's dual economy in which one part is agricultural and subsistence-oriented and the other fuelled by urban-based business and paid employment, and the fact that different tiers in society have access to different sources of income.

Promoting household food security should be undertaken through the following strategies:

- Develop national objectives to encourage the increased production and improved marketing of local food.
- Encourage the growing of sufficient food at the household level for family needs.
- Promote the selection of nutritious foods to satisfy every household member's nutritional requirements.
- Assist families to secure sufficient income to ensure their food entitlements.
- Promote the proper distribution of available food within the household unit.

The government's principal strategy to reduce poverty and increase the economic well-being of the population has been to raise the rate of economic growth and to increase income-earning opportunities for the most disadvantaged. There is also a need to strengthen its resolve

to improve the living standards and the quality of life of its people by addressing nutritional health problems. It is therefore recommended that every effort be made to integrate the development policies, strategies and programs into multi- and inter-sectoral activities so that they become a component of the respective ministry's/institution's collective concerns, objectives, priorities and programmes.

The main outputs from the research conducted in this study are a review of relevant previous studies, and an analysis of government development policies and strategies. Information and data were collated from surveys and censuses to assess the impacts of actions by the government and other institutions on the status of food security at the national and household levels, to facilitate the identification of the problems of food insecurity and improve food security status in Fiji. Results should be used as a basis for debate and critique that, with revision, might culminate in nationally adopted policies, strategies and action plans to develop sustainable food security in Fiji.

1. Study Objectives and Background

1.1 Objectives of the study

The objectives of this study are to assess food security problems in Fiji, identify effective strategies and formulate appropriate policy options for solving the respective problems. They are achieved by:

- analysing food availability and its related risks, distribution institutions, food balances covering supply and utilization, and existing food strategies and policies at the national and provincial levels;
- analysing household food availability, access, consumption patterns, nutritional quality and sufficiency, risk-coping mechanisms and related government policies; and
- identifying strategies and formulating policy options to improve food security in the Republic of Fiji Islands (hereafter referred to as Fiji).

The main study subjects are food security performance and its determinants, food security risk-coping mechanisms and institutions, and government policies and action plans to improve food security.

1.2 Background

1.2.1 Location

Fiji consists of some 320 islands, located between 15˚ and 22˚ south latitude and 177˚ west to 175˚ east longitude, with a total land area of 18,376 km^2 (Figure 1.1). The largest island, Viti Levu (10,400 km^2), is the most developed and the most heavily populated. The capital Suva, Nadi International Airport, the ports of Suva and Lautoka, most of the primary and secondary industrial development, and a good deal of the tourism infrastructure are located on the main island. The second biggest island is Vanua Levu, where the main economic activities centre on the sugar industry, logging, copra, fishing and tourism.

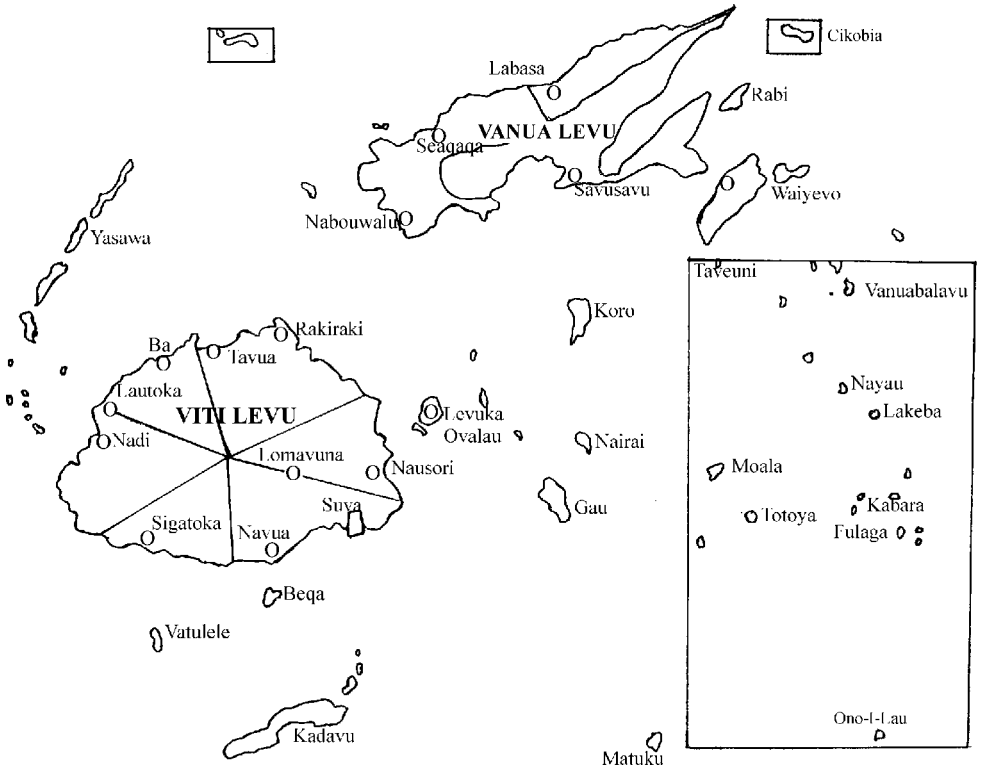
Suva, located in eastern Viti Levu, is 3,160 km north-east of Sydney and 2,120 km north of Auckland. Local time is 12 hours ahead of Greenwich Mean Time. The International Dateline runs directly east of Fiji, making it one of the first countries in the world to see a new day.

1.2.2 Population

According to the 1996 Census, the estimated population of Fiji in December 1996 was 772,655 (Bureau of Statistics 1998a), an increase of 123% from 345,737 in 1956. The annual inter-censal population growth rate from 1986 to 1996 was only 0.8%. The population in 2001 is projected to reach 821,000, representing an average annual growth rate of just less than 1%.

The significant decline in the population growth rate can be attributed to substantial out-migration, particularly amongst the Indian community, and an overall decline in fertility rates. The age structure of the population remains essentially unchanged. Fijians comprised 51.1% of the total population in 1996, Indo-Fijians 43.6%, with the balance made up of Rotumans, Chinese, Part-Europeans, Europeans and other Pacific Islanders. The indigenous Fijian population increased at an average annual rate of 1.8% over the ten years from 1986 to 1996 compared with a rate of 2.4% over the previous decade. The Indo-Fijian population grew at an average annual rate of 1.8% over the ten years from 1976 to 1986 and then declined by 0.6% per annum from 1986 to 1996 due to emigration and a lower rate of natural increase.

Figure 1. Map of Fiji Islands.



Average population density is 42 person/km^2 (Bureau of Statistics 1998a), which, while moderate, conceals localized densities in excess of 170 per km^2 of arable land. The increasing density of the urban population and extensions of urban boundaries contributed to an overall increase in the urban population between 1986 and 1996 by 29%. While a majority of people still live in rural areas, the gap between the urban and rural populations is rapidly narrowing. The urban population in 1986 was 277,025, or 39% of the total population. In 1996, the number was 358,131, or 46% of the total population, which means that only about 54% of the total population now live in rural areas. The total rural population declined by 23,826, or about 5%, between 1986 and 1996. The Indo-Fijian component of the rural population showed the greatest decline mainly as a result of urbanization and emigration.

Migration has affected all provinces, leaving some provinces with a net loss and others with a large net gain in population. The availability of improved transportation has contributed to the greater mobility of the population, and hence migration. Both out-migration and in-migration are related to the degree of urbanization in the provinces, such that those with no urban centres have the highest out-migration. The outlying provinces like Lau are steadily losing people. Almost 50% of the total increase in the urban population occurred in Central Division. The Fijian urban population grew by 4%, more rapidly than the Indo-Fijian population (1%) and other ethnic groups (2%). Central Division and Western Division now account for about 38% each of the total population. The past decade has seen quite rapid urbanization in the cities of Suva, Nadi and Lautoka, which now have to grapple with urban problems of unemployment, poverty and squatter housing. Movements from rural areas to other rural locations appear to be influenced largely by economic factors such as the seasonal migration to sugarcane- and ginger-growing areas. The rural to urban pattern of mobility has been the most significant in Fiji.

There is a comparatively high level of human resource development. With an average life expectancy at birth of 72 years, an infant mortality rate of about 23 per thousand and a literacy rate over 80%, Fiji has the standard of living of a lower-middle income developing country.

Ethnic Fijians are usually classed as Melanesians but actually combine both Polynesian and Melanesian elements. Indo-Fijians are descendants of the Indian indentured labourers brought in by the British to work in the sugarcane fields. When the indenture system was abandoned in 1916, many Indians elected to stay in Fiji as free settlers and have since become an integral part of the social and economic fabric of the country.

The official language is English while Fijian and Hindi are widely used in education, media and general communication. Religion plays an important part in Fiji life. Principal religious affiliations are Methodists (37%), Hindus (37%), Roman Catholics (9%), Muslims (8%) and Sikhs (1%).

Citizenship may be acquired by birth, descent, naturalization or registration. New citizenship must have the Prime Minister's consent. Permits are also granted to people wishing to visit, reside or work in Fiji. Visitors normally receive permits for six months, while work permits need to be approved by the Immigration Office. Special permits of up to three years can be granted to investors whose projects are approved by the Fiji Trade and Investment Board.

1.2.3 Climate

Fiji has the advantages of a mild tropical climate without undue extremes of temperature and humidity. There are distinct seasons, the "hot, wet" season from October to April and the "cool, dry" season from May to September. The cooling south-east trade winds blow from May to November, the driest period of the year. Between December and April, it is hotter, the winds are more variable and temperatures may rise to about 32° C with relatively high humidity.

There are distinct wet and dry zones on Viti Levu, with the wet zone being on the windward south-east. Suva has an annual average rainfall of 3850 mm while Lautoka on the leeward western side has an average 1,910 mm of rainfall. Average annual rainfall for the wet zone ranges from 2,800 mm to 3,600 mm and for the dry zone from 1,300 mm to 1,600 mm.

1.2.4 Soils, vegetation and land use

Land, and more specifically soil, is a vital economic factor in Fiji. Its usage and management is of vital importance for future generations. The soils of Fiji are well described by Twyford and Wright (1965) and Leslie (1997). The Ministry of Agriculture, Fisheries and Forests (MAFF), the predecessor of the Ministry of Agriculture, Fisheries, Forests and ALTA (MAFFA), tabulated the land area, and described the agricultural capability of, eight slope classes on Viti Levu. These classes are presented in Table 1.1 Increases in Fiji's population over recent decades have placed pressure on the land, particularly marginal sloping land, and this continues to result in significant soil erosion and other forms of land degradation. With the exception of recent soils derived from alluvium, soils are rated as moderately to severely erodible, especially on the slopes.

There is also a categorization of soils by soil fertility into four classes for land use purposes. Class I soils are suited to permanent agriculture without improvement, other than by occasional addition of fertilizers. All forms of agricultural and conservation activity may be undertaken. Class II soils are suited to permanent agriculture with minor improvement across a wide range of crops if regularly supplied with fertilizers. They are also useful for pastoral activities and certain orchard crops after minor soil conservation measures and the application of some fertilizers. Alternatively, they may be used for reforestation or forest preservation for catchment protection. Class III soils are suited to permanent agriculture for a narrow range of crops but require major improvement, notably regularly supplied with heavy doses of fertilizers and sometimes major reclamation projects to control the water table. They also can be used as

forest reserves for catchment protection. Class IV soils are largely unsuited to permanent agriculture, but are suited to reforestation for catchment protection, mainly suited to forestry for continuous timber production, and in a few places can accommodate shifting agriculture.

Table 1.1 Land area and description of the agricultural capability of the eight slope classes on Viti Levu.

Class	Slope	Area (km^2)	Description
I	0-3°	1,362	Deep, easily worked, well drained and fertile soils with little risk of erosion and not seriously affected by drought.
II	0-7°	141	Slight limitation to cropping – flat to gently undulating, deep to slightly shallow, moderately fertile and moderately well drained soils that are slightly susceptible to erosion.
III	0-11°	344	Moderate limitations to cropping – flat or gently sloping, slightly unstable with moderate to severe wetness, subject to frequent flooding, shallow, moderately stony and/or fertile.
IV	0-15°	578	Marginal arable land with severe limitations to cropping – flat to rolling, poor to very poorly drained, stony and/or bouldery, very shallow and infertile; with low water holding capacity. Cropping restricted to subsistence cultivation.
V	16-20°	1,112	Unsuitable for arable cropping, suitable for pasture or forestry – steepness and/or stoniness are major limitations, and erosion risk increases under cultivation.
VI	21-25°	2,179	Marginal pastoral land with moderate to severe limitations – very steep, severe visible effects of past erosion and highly susceptible to erosion.
VII	26-35°	2,724	Unsuitable for pastoral use, but fair to marginal for forestry – very steep, severe visible effects of past erosion, highly erosive, shallow, bouldery and of very low fertility.
VIII	>35°	2,178	Unsuitable for productive use.

Source: MAFF.

On all major islands, dense tropical forest covers the wet zone while the drier zones have only savannah cover. Repeated burning of the grass cover has reduced some areas to bare ground (*talasiga* areas) where subsoils are often exposed. Economic planting of exotic pine and tropical hardwood species is now proceeding in such areas.

Fiji's most comprehensive land use capability survey (International Union for Conservation and Nature 1992) revealed the following:

- 19.4%, or 355,750 ha, of land area are suitable for sustained arable agriculture.
- 10.5%, or 193,195 ha, require minor improvements for sustained agricultural use.
- 31.9%, or 586,752 ha, require a great deal of land management if they are to be used in a sustainable manner.
- 38.2%, or 702,092 ha, are unsuitable for agricultural development, but may be of limited use in forestry production.

1.2.5 Economy

The principal economic industries are sugarcane production and processing (more than 350,000 tons of sugar were produced for export in 1998), tourism (visitor arrivals exceeded 300,000 in 1998), timber and woodchip production, gold mining, fresh and canned fish production, manufacture of garments and furniture, and horticultural production.

In the late 1980s and early in the millennium, there were major political and economic upheavals following the coups of 1987 and 2000. The political adjustment process wrought by these upheavals continues, with implications for all sectors of the economy. There have also been fundamental adjustments in the focus of economic policy, from import substitution and protection to a more outward-looking export-oriented and deregulated approach with less direct government involvement. Large currency depreciations significantly improved the terms of trade in favour of locally-grown food and agricultural exports. There were restrictions on nominal wage movements and a tax-free factory scheme was promoted. This scheme coincided with significant changes in the rules-of-origin provisions of the South Pacific Regional Trade

and Economic Cooperation Agreement (SPARTECA) that were favourable to garments manufactured in Fiji.

The introduction of a policy of deregulation in 1987 to replace import licensing was accompanied by a streamlined tariff system that allowed for a progressive reduction of rates from a maximum of 50% to 20%. With these policy initiatives, the economy of Fiji showed a remarkable ability to recover from adversity and experienced substantial growth from 1989 through the first half of the 1990s. The leading sector of this growth was garments for export.

The past few years have seen the Fiji economy stagnate. Overhanging the economy has been the political uncertainty of protracted reviews of the Constitution and the future of expiring native land leases. A Constitutional Review Commission has recommended sweeping changes to the 1990 Constitution that discriminates against the Indo-Fijian community. A substantial part of the Commission's recommendations are likely to be adopted, which is expected to substantially restore investor confidence.

Although the government is still actively pursuing a strategy of deregulation, the implementation of deregulation policies has faltered in recent years. This is at a time when the value of trade preferences offered under SPARTECA is being eroded, thereby undermining the viability of many tax-free factories, particularly those in the garment sector. A declining garment industry brings with it the prospect of increased urban unemployment and socio-economic strain.

Protectionist policies such as import substitution and self-sufficiency, which the Fiji government pursued prior to 1987, are likely to hurt an economy. Pursuing a policy to attain self-sufficiency is like putting all the eggs in one basket because in the case of any natural disaster, a high proportion of crops of a country can be ruined.

1.2.6 Labour force

Fiji has a highly skilled labour force, which has continued to grow after a small decline in 1988. The labour force estimate for 1996 was 281,000. Paid or formal sector employment expanded from 91,729 people in 1991 to an estimated 110,100 at the end of 1996 (Bureau of Statistics 1998a). This growth has mainly been achieved through the private sector.

Unemployment was estimated at 6% in 1996 (Bureau of Statistics 1998a). Nearly 90% of the work force has been educated to secondary school level and 4% to tertiary training at an academic or specialist skills level.

Acts of Parliament regulate conditions and terms of employment for all workers. While there is no statutory minimum wage, there are specific wage regulation orders setting minimum hourly rates for designated trades to be negotiated by either specific trade councils or trade unions. These rates range from F$1.04 to F$1.16 per hour. Wage differentials are applied to skilled workers and tradesmen within the general range of F$1.36 per hour to F$1.54 per hour.

A number of labour reforms have also been put in place to make trade unions more accountable for their actions, for example government-supervised strike ballots. A team from the Ministry of Labour and Industrial Relations is updating labour laws to reflect modern-day trends.

2. Factors Influencing National and Provincial Food Security

2.1 Food demand

Because the past decade has seen Fiji achieve a manageable overall rate of population growth, total food energy requirements over the period are estimated to have grown in line with population growth. Thus, urban food energy requirements have risen by 2.5% per annum over the past decade. An increase in marketable food surplus was required to feed the increasingly urbanized population, and the farming community responded to this need. The demographic and food energy requirement trends of the past decade are projected to continue until 2010.

Observations made at Naduri village in the Sigatoka Valley are useful in showing long-term trends in food consumption. Dietary surveys have been undertaken every ten years since 1952, based on a one-week record of weighed household food consumption. Results presented by the National Food and Nutrition Committee (NFNC) indicate a marked decrease in the consumption of root crops between 1952 and 1994. Whereas root crops contributed 61% of energy in the diet in 1952, this contribution had decreased to 33% in 1994. For the same period, and reflected in national trends, there has been a corresponding increase in cereal consumption, recording a five-fold increase from a 5% dietary energy contribution in 1952 to 26% in 1994.

Results of the 1993 National Nutrition Survey indicate a shift in preference from nutritious traditional vegetables and fruits to more introduced varieties amongst Fijians. Indo-Fijian choice of vegetables has remained largely unchanged. However, the likelihood of vitamin and mineral deficiencies is high for both ethnic groups, considering the low nutritional value of the exotic varieties of fruits and vegetables that are now more popularly consumed.

The state of school nutrition continues to be of concern, with grossly inadequate funding allocated to meet the cost of school meals. Observations in boarding and day schools indicate a continual deterioration in the nutritional quality of the meals served, with tea and cassava being a commonly served meal in boarding schools. Current activities by non-government organizations (NGOs) and the Ministry of Health in conjunction with the Ministry of Education to improve school meals appear to be unsustainable unless steps are taken to recognize the critical role of nutrition in education.

The sale of non-nutritious snacks in school canteens is widespread. Initiatives by mothers' clubs and hawkers, while commendable, have not ensured the provision of affordable nutritious meals and snacks to children. About 10% of households reported that their income was insufficient to cover the cost of a minimally nutritious diet (UNDP 1996).

2.2 Nutritional and health status

2.2.1 Trends in nutritional status

A survey conducted in 1950 on the state of nutrition of Fijians and Indo-Fijians found no evidence of widespread anaemia and made no reference to a problem of overweight or the incidence of diabetes or other non-communicable diseases (NCDs) (Bell and Wills 1950). The nutrition situation in recent years is very different. The first national nutrition survey was conducted in 1980. From its results, it is possible to identify problems of infant malnutrition, underweight children, anaemia, and overweight in many adults leading to heart disease and diabetes. According to NFNC in 1980, malnutrition severely affected 6% of children and moderately affected a further 21%.

Findings from the 1993 National Nutrition Survey indicate that these health conditions had improved as a result of many health programmes directed at prevention. There was a significant decline in the proportion of severely malnourished children to only 1%. But only 40% of the population had "healthy" weights. Extreme overweight (obesity) was found to be a serious health problem amongst both Fijian and Indo-Fijian women from 35 years of age onwards. Overweight is a major risk factor for coronary heart disease and maturity-onset diabetes, and is associated with both poor diet (including a significant over-supply of dietary energy as well as qualitative changes in the energy contribution of specific nutrients) and lifestyle. The proportion of children under 5 years of age who were underweight in 1993 was 10.5% while the proportion for children between 5 and 9 years was 16.3%.

Overweight was also apparent in children under 5 years, predominantly among Fijians but also other races. Of concern is the tendency for childhood eating habits and lifestyles to carry on to adulthood, when associated problems are often manifest in the form of NCDs. Malnutrition at infancy is strongly associated with poor performance at school age. It interferes with a child's motivation, ability to concentrate and ability to learn despite any improvements in the intervening years. Thus, there is the cost of irreversible loss of opportunity resulting from malnutrition, the cost of treatment and sometimes the cost of the continuous support given to those afflicted individuals throughout their lifetime.

Nutrition and health surveys undertaken every ten years since 1952 at Naduri village in the Sigatoka Valley confirm these trends in nutritional and health status. The current trend in dependence on overseas markets for the bulk of national food supplies can ultimately undermine time-tested traditional forms of food production (including agriculture, fisheries and preservation methods). Acquired tastes and preferences for the convenience of imported processed food will further undermine the viability of locally produced food. Then there is the further major concern that the changing consumption patterns will continue to fuel the dual situation of undernutrition for some members of low-income groups and overnutrition for some members of high-income groups, both of which can lead to poor health.

It may be premature to state conclusively the overall effect of import deregulation on dietary patterns. But it is anticipated that dependence on food imports will continue to increase, further increasing the proportion of energy and protein derived from processed cereals and other food products. In this respect, it is important to note that the energy density (calories/weight) of cereal products is twice that of traditional root crops.

2.2.2 Health indicators

Poor nutrition caused by lack of sufficient food of good quality to provide adequate energy, protein, vitamins and minerals results in a low level of health. This in turn results in a lack of resistance to infection, poor physical performance and frequent work absenteeism. Ill health caused by poor nutrition has always been present amongst the Indo-Fijian population, and over the years there has been very little improvement. However, there is now concern over the rapid rate of increase of NCDs amongst Fijians.

Anaemia was found in 27% of the population in the 1993 National Nutrition Survey, thus remaining a major public health problem. It is particularly prevalent in urban areas and is associated with the lack of dietary intake of iron. The rates among children under 5 years, adults and pregnant women were 40%, 20% 57%, respectively, in 1993. Anaemia severely affects physical and mental performance and hence productivity. It handicaps the learning process in children and increases the likelihood of women of child-bearing age having babies of low birth weight. Low birth weight is currently estimated at 11.4%, with Indo-Fijian babies accounting for 80.8%. Babies born with low birth weight are susceptible to a host of childhood diseases, and are at risk of growth failure.

While health problems such as anaemia have their origins in poor dietary habits, the reciprocal is also true that poor health status makes people more susceptible to deteriorating nutritional status and food insecurity. Acute respiratory infections remain the commonest cause

of morbidity and mortality in children under 5 years of age, accounting for 30% to 50% of visits to health facilities and 20% to 40% of cases of hospitalization of children nationwide.

Diarrhoeal diseases are responsible for 14% of all childhood deaths. A 1990 cluster survey showed that each child under 5 years of age had three episodes of diarrhoea per year.

Goitre has been found to be endemic in the Sigatoka Valley. A recent study of the prevalence of goitre amongst pregnant women and schoolchildren found that 45% of those studied suffered from the condition, which was more common among Indo-Fijian women.

The Diabetes Centre estimates that 12% of the population have this disease. In hospitals 12% of all amputations are due to diabetes. The rate of increase in this disease is highest among Fijians although Indo-Fijians comprise the greatest number.

Ischaemic heart disease and high blood pressure caused 41% of all Indo-Fijian and 28% of Fijian deaths in 1990. Between 1982 and 1990, death rates in people over 20 years increased by 30% among Fijians and 40% among Indo-Fijians. High blood pressure is more common in urban populations for both groups. The cost of in-patient care for cardiovascular diseases was estimated at F$3 million. Follow-up out-patient care would add considerably to this cost. The World Bank estimated a cost of a similar order for diabetes, of which F$1.8 million was for in-patient care, the remainder being for ongoing out-patient treatment (NCD Task Force 1993).

Results of the 1993 National Nutrition Survey show some positive trends in health and hygiene that influence nutritional status. A significant proportion of rural as well as urban families had access to a clean water supply and adequate sanitation. Breast-feeding was initiated by 95% of mothers with 88% starting to feed their babies on the day of birth. (It is of concern, though, that only 47% of mothers were still breast-feeding after 3 months.) For children aged from 12 to 17 months, only 27% were breast-fed. Finally, the low infant mortality rate (17/1000 live births in 1993) attests to the quality of the community health services in Fiji.

Research in Fiji and other Pacific Islands has clearly shown that a major cause of all prevalent NCDs and nutrient-deficient diseases has been the change to a poorer quality diet and lifestyle than previously experienced in the traditional way of life. The 1993 National Nutrition Survey report shows that the level of physical activity has decreased considerably for persons residing in urban areas. Likewise, alcohol consumption was found to be more prevalent amongst urban dwellers. Smoking prevalence, however, was higher for rural dwellers.

The loss of working years due to debility and premature deaths of people at the peak of their lives resulting from NCDs adds considerably to national health care costs. Often forgotten are the additional hidden social and economic costs to be borne by the families of those who are afflicted by conditions such as cardiovascular diseases, diabetes and malnutrition.

2.3 Impacts of natural calamities on food security

Three broad categories of natural calamities affect the agricultural sector, namely physical natural disasters, biological disasters and environmental disasters. Each is now discussed in turn in the Fijian context.

2.3.1 Physical natural disasters

Cyclones are the most prominent and widespread natural disasters that afflict Fiji. The main hurricane season is from November to March. However, major cyclones have occurred as early as October (e.g. Cyclone Oscar in 1982).

For the Fijian islands, 136 cyclones were recorded between 1880 and 1997. The magnitude of the damage caused depends on the storm intensity and path taken. The damage caused to crops and vegetation tends to increase exponentially with wind speed (the damage of a 180 km/hr wind is four times that of a 90 km/hr wind). The rapid upward movement of the spiralling air in a cyclone can cause extremely heavy rain, particularly when the system is forced to rise over mountains. The low atmospheric pressure experienced during tropical storms

can cause the sea to rise as much as two metres, causing the engulfment of low-lying areas and considerable foreshore damage.

Substantial losses of soil and vegetation, together with damage to foreshores and coral reefs, are a natural impact of tropical cyclones. Indications are, however, that these losses have been accentuated in recent decades by the expansion of non-sustainable agricultural and logging practices. There can be less direct, but more insidious, losses through the damage caused by outbreaks of pests and diseases that follow a major cyclone.

There is a perception that recent times have been a period of increasing and unprecedented cyclone activity. This is likely to be the situation in the future as global warming increasingly impacts on weather patterns. Yet records dating back to the 1840s show the 1870s to be a period of intense cyclone activity in Fiji. What has increased is the vulnerability to major cyclones. Human settlement has moved from inland to be predominantly located on the coast. Traditional cropping patterns that mitigated the adverse impacts of cyclones are not as strong as they were. Deforestation means that there is not the degree of protection there was in the past. Finally, traditional food preservation has all but disappeared as a strategy for disaster mitigation.

River flooding is a common disaster on the larger islands of Fiji. A very high percentage of rain that falls on Viti Levu ends up in the four main river systems and is discharged into the sea. Severe incidences of river flooding are usually associated with cyclones. The most recent severe flooding occurred with Cyclone Wally (1980) and Cyclone Kina (1993).

The consequences of such flooding can be considerable given that river valleys and flat coastal areas tend to be the most intensively cultivated and densely populated. The flood-influenced area from Cyclone Kina was estimated at 21,700 ha for four watersheds (Japan International Cooperation Agency 1997). The population directly affected by floodwater was 38,900, or around 5% of the total population. Such flooding causes immediate heavy crop losses and more insidious problems of erosion, siltation and nutrient loss that damage the coastal ecosystems. Often, the land use practices adopted by commercial agriculture and logging greatly accentuate the problems associated with the prolonged flooding of large delta systems in South and Southeast Asia. Fortunately, such consequences do not occur in Fiji where the river systems rise and fall rapidly. For example, some 900 mm of rainfall fell in the interior of Viti Levu in 24 hours during Cyclone Kina in Fiji in 1992. The Sigatoka River, Fiji's largest, rose above 13 metres within 24 hours, sufficient to wash away a major bridge. However, the river was almost back to its normal wet-season level within a further 24 hours.

Landslides associated with river flooding land can have serious localized impacts on food crops, with associated siltation and debris having a much wider impact on the agricultural sector. The flooding of the Sigatoka Valley during Cyclone Kina is such an example. Similarly, landslides caused large-scale sedimentation of the Rewa and Navua Rivers during Cyclone Wally in 1980. Landslides are often natural phenomena, but they can be induced or accentuated by poor land use practices. In the case of Cyclone Kina, the extent of landslides in the interior of Viti Levu can in part be attributed to poor logging practices in the Nadi, Ba and Sigatoka catchment areas. Most landslides in Viti Levu are found on the margins of farmland (Japan International Cooperation Agency 1997).

Farming on excessive slopes continues to cause serious soil erosion problems in traditional ginger/root crop areas and marginal sugarcane lands, making them far more vulnerable to the impact of cyclones and drought than in the past. Some of this land is now becoming obsolete for agriculture due to a combination of land degradation and economic pressure.

Agricultural drought is defined as a reduction in moisture availability below the optimum level required by a crop during different stages of its growth cycle, resulting in impaired growth and reduced yield (Glantz 1987). Most parts of the region experience a dry season drought (May to October) to which cropping patterns have been fully adjusted. However, in some years the dry season has been very pronounced and extended, putting agricultural activities under severe pressure. Examples are the 1987 and 1992 droughts, which were associated with El Niño

southern oscillation episodes. The 1987 drought was considered to be one of the worst in the 20th century. It began in the 1986 dry season and extended through the 1986/87 wet season (Anon 1994). A compounding problem of drought for the agricultural sector is uncontrolled fires.

2.3.2 Biological disasters

The introduction of a pest or disease can cause a far greater long-term disaster than a cyclone or a volcanic eruption. The impact of an incursion of a major pest or disease is open-ended and may never have an end. Two recent examples of devastating biological disasters in Fiji are:

- The incursion of yellow zucchini mosaic virus and watermelon one virus into western Viti Levu has made it difficult to grow cucurbits such as watermelon on a commercial basis.
- The establishment of the papuana beetle on Viti Levu has excluded many growers from lucrative export markets.

The impacts of these disasters on the agricultural sector, and the economy as a whole, have been on balance far worse than any physical disasters such as cyclones. There can also be an inter-relationship between physical and biological disasters. A cyclone can seriously disrupt delicate ecological balances and lead to a rapid proliferation of a pest or disease.

2.3.3 Environmental disasters

Environmental disasters have a significant impact on the agricultural sector in Fiji. They can be externally induced, such as a rise in sea level, or internally induced, such as indiscriminate burning, deforestation, unsustainable cropping patterns and the incursion of animals. These environmental disasters can greatly accentuate the impact of a physical natural disaster such as a cyclone or a drought.

Traditional agricultural systems can be highly sustainable even when they involve planting on steep slopes. This is explained by the generally discontinuous nature of cultivation, the limited population relative to arable land, the small size of gardens and the minimum tillage practices adopted. The bush surrounding the garden acts as a windbreak, reducing the rate of evapotranspiration from the soil and lessening soil loss from cyclones. Crops were traditionally grown in rotation with a long fallow period and without chemicals. Forest areas were an integral part of the food security system of the village and provided protection against cyclones and drought. In most places, domestic pigs were an important part of the system, but social controls meant that they were always fenced out of cropped areas.

However, traditional systems and controls have been breaking down with major implications for sustainable food security and the island communities' ability to deal with disasters. This breakdown is manifested in a number of causes and consequences of environmental degradation. The situation found in Fiji is quite disturbing because there has been serious and increasing land degradation despite greater environmental awareness.

Widespread and indiscriminate burning, inter-related to soil erosion, has long constituted a problem for Fiji, and other problems of land degradation are not new. The eminent geographer, Professor Oscar Spate, noted in a report to the Legislative Council in 1959: "I have seen some classical areas of erosion in India, Australia, and New Caledonia but I do not think I have seen sheet erosion of such intensity as in parts of the hinterland of Nadi and Lautoka". A Soil Conservation Officer in the 1950s described the damage done to Fiji soil resources by indiscriminate burning. This description highlights how burning greatly accentuates the impact of cyclones and drought. To quote Whitehead (1952): "The destruction by fire of the vegetable cover, which is the grass with its attendant dead litter, exposes the soil to strong winds, scorching sun, and pelting rains. The wind more often than not blows the residue of light ash away, and, if very strong, the fine soil particles as well. The scorching sun creates terrific soil

temperatures, which rapidly oxidise out the organic content of the vital few inches of topsoil. Such soil bared, and deprived of its humic content, cannot absorb and hold pelting rain which soon seals off the soil pores (air spaces between particles) at the surface, and with a velocity proportionate to the slope of the land, runs towards the first creek or gully, carrying with it all those fine soil particles which were formerly held in a sponge like structure of a once healthy soil."

No effective legal sanctions have replaced traditional and colonial controls. For a number of villages in western Viti Levu, this has meant the loss of food gardens within reasonable proximity. On some smaller islands, fire in combination with overgrazing of goats is proving a devastating combination. Overall, there is very low farmer participation in technology generation, resulting in poor adoption and application of land husbandry practices (International Board for Soil Research and Management 1996). This lack of participation accelerates rates of land and water degradation. Impacts of, and vulnerability to, natural disasters are becoming increasingly more acute. While land pressure indicates a need to increase production per unit area, there is a poor understanding of sustainable agricultural production technologies to match land use, crop type and land capability in order to meet productivity goals (Leslie and Ratukalou 1999).

Over a short period of time, the soil resources in many areas, particularly in sugarcane-growing areas and on sloping lands, have been completely exhausted with severe problems relating to low fertility, low organic matter levels, poor water-holding capacity and declining productivity. Where land degradation has become extreme, farmers are forced into growing non-sugarcane crops or forgoing their leases. Current estimates suggest that some 15,000 ha of sugarcane land on Viti Levu are in urgent need of soil conservation work and a further 6,500 ha should not be planted to sugarcane or used for any other arable farming (International Union for Conservation and Nature 1992). A recent estimate of the cost of this land degradation in terms of lost sugarcane production and increased fertilizer input is conservatively estimated at $F16 million per annum (Drysdale 1994).

The use of vetiver grass along the contour in sugarcane lands was widespread until 30 years ago. This is no longer the case with only a fraction of vetiver grass planted remaining even though it is a proven technique to control soil movement and loss on sloping lands. Also, the burning of sugarcane trash is a widespread practice that has been repeated over the years. It can result in seriously low levels of soil organic matter, limit soil fertility and result in substantial soil losses through water and wind erosion (Grimshaw and Helfer 1995).

In the 1960s, an estimated 140,000 ha of forested land were converted to non-forest land uses, leading to serious soil degradation. Also, the unplanned alignment of logging roads has had both on-site an off-site consequences for the environment with the siltation of creeks and run-off surges during storms (Burns et al. 1960).

Case studies have identified increasing incidences of unsustainable cropping practices that have increased vulnerability to disasters. In Kadavu, the larger new plantings of kava have usually involved the clear felling of forests reducing the habitat for yams and other wild food or so-called "bank" crops. Trees are cut down with chain saws (traditionally they are girdled and allowed to decay slowly), leading to much higher rates of soil loss and erosion. In the outer islands, pigs, particularly in combination with burning, should be seen as a potential ecological disaster for which mitigation measures need to be urgently taken. The Kadavu case study found the activities of pigs, both wild and domestic, a greater threat to food security than cyclones. Other examples of practices that could lead to environmental disasters in Fiji are the excessive use of weedicides in the expansion of the taro industry and felling of primary forests to plant kava.

3. Food Availability and Utilization

3.1 Local food production

Fiji's farmers produce an impressive quantity and range of traditional food crops. This range includes a variety of root crops, coconuts, traditional rice varieties, leafy vegetables (both Fijian and Indo-Fijian), other traditional Indo-Fijian vegetables and fruits. The subsistence value of this food production is estimated at 40% of agricultural GDP, similar to that contributed by sugarcane.

Three broad categories of food producers are found in Fiji. Predominantly subsistence producers may earn income from other sources but they do not normally sell their produce. Such producers can be urban wage earners and those living in remote islands who cultivate perishable crops, such as cassava and *dalo* (taro), which are quick to deteriorate after harvesting. Second, semi-subsistence, or semi-commercial, producers grow food for themselves and for commercial sale as an important source of cash income. Such producers are very important providers of foods to local markets. Finally, for commercial production, producers generally produce on a large scale and make food production a business. They include commercial poultry, commercial fishing, cattle ranching, extensive *dalo* cultivation, sugarcane cultivation and coconut plantations.

During the 1991 census period, 187,535 hectares, or 31.7% of the total farmland, were under cash crops whereas 41,989 hectares, or 7.1%, were under food crops.

According to 1993 National Nutrition Survey, 85% (772 out of the 912 households surveyed) grew some food on their farm and/or in food gardens nearby their houses of households for their own consumption. Around 70% of urban households grew some of their own food (only 60% of households in Suva) compared with 94% of rural households. By ethnic group, more Fijian households (89%) grew their own food than Indo-Fijians (82%) and "others" (71%).

Eastern Division (97%) and Northern Division (97%) had the highest proportion of households growing food. But inter-divisional differences were not great, as 92.5% of households in Central Division and 87% of households in Western Division grew some of their own food. These differences reflect the level of urbanization in each division.

A significant volume of the production of traditional crops is surplus to subsistence requirements and sold in local markets. For example, based on the Agricultural Census, it is estimated that 120,000 tons of root crops and 11,000 tons of vegetables are traded annually for farm-gate values of F$60 million and F$6 million, respectively (MAFFA 2000). Public investment in roads, particularly on Viti Levu, has contributed significantly to this process. Lautoka and Suva city councils have had to expand the municipal food market facilities in order to cope with the increased domestic food supply for commercial sale.

The availability of root crops has increased since 1993, reversing a declining trend observed in the previous decade. Nuts and oilseeds showed an increase in availability after an improvement in the market price for copra. Oils and fats, both vegetable and animal, have shown increasing trends since 1994 as a result of increasing production of coconut oil.

Traditional food crops are grown throughout the country, and were described in the recent agricultural sector review by the Asian Development Bank as the "hidden strength of the Fiji economy" (McGregor and MacCarney 1995). Nevertheless, food production for subsistence is declining in relative importance in the national food system as crop and livestock farming systems continue their transformation to a more commercial orientation, producing more of those crops and livestock products in which Fiji has a competitive advantage. Yet the

composition of crops grown has not changed substantially over the past decade and national food security still depends heavily on subsistence farming

3.2 Food marketing and distribution

3.2.1 Markets for locally produced food crops

Crop products in Fiji are sold through a variety of outlets that could be grouped into municipal fresh produce markets, cafes and restaurants, supermarkets and roadside stalls.

The fresh produce markets appear to be thriving and, to a large extent, satisfying most of the needs of consumers. Yet there is concern that major foods of high nutritional value in the market places are losing ground to imported foods. Possible explanations are that the retail prices are increasing relative to the prices of imported foods, and that the simple presentation, grading and quality control procedures currently in place for local foods are becoming less adequate over time as consumers' incomes increase and they demand better choice and quality.

It is possible that alternative marketing modes to the existing reliance on individual wholesalers and retailers acting independently may enable fresh produce markets to develop more quickly, and better meet the changing demands of consumers of fruits and vegetables. The Fiji Plan of Action on Nutrition (FPAN) proposes an investigation of how to strengthen production and marketing cooperatives for local food produce as a means of encouraging and supporting community-based food production enterprises. There are numerous instances of ventures undertaken in other developing countries to introduce group marketing schemes to improve marketing performance. A review of the experiences of these ventures should be a prelude to any similar scheme in the fresh produce marketing system in Fiji, because these schemes have met with mixed success.

Farmers are becoming more market-oriented in supplying the domestic markets for roots and tubers, horticultural produce and other foods. However, it is widely recognized that production remains a major constraint. Supplies are inadequate, prices are high and production tends to be irregular and seasonal.

The small size of most island economies means that farmers wishing to expand production and increase their incomes look mainly to the possibility of expanding exports. In most, if not all, South Pacific countries, the value of agricultural output for export far exceeds that of fresh produce sold on the domestic market. As noted above, however, it does not exceed the value of produce consumed domestically in Fiji as subsistence production remains very important.

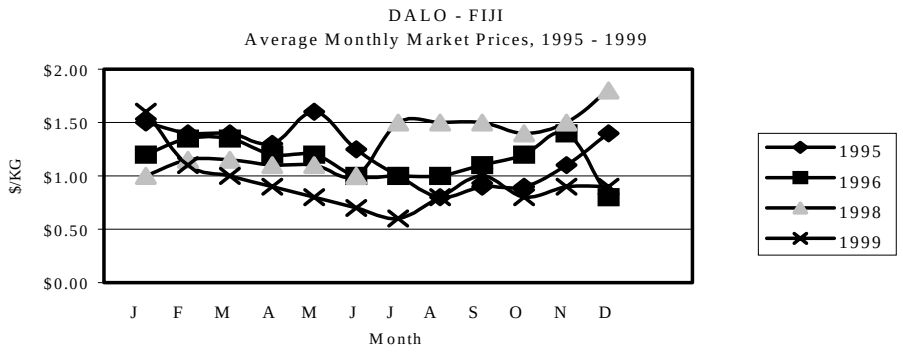
In general, farmers should be able to satisfy domestic demand and the present food shortages cannot be considered in any way structural. The relatively limited commercial demand domestically, exacerbated by high marketing costs and poor infrastructure that cause significant post-harvest losses, is a major problem for food producers seeking to increase production. Lack of domestic demand is also one reason why few agricultural processing ventures targeted at domestic markets have been sustainable. The demand has been insufficient to permit the necessary economies of scale.

The two major staple crops in Fiji are *dalo* and cassava. Figure 3.1 shows the five-year trend in the annual average *dalo* price in four municipal markets in Fiji. Although *dalo* is a seasonal crop that is mainly harvested between January and June, there is no pronounced seasonal variation in prices, although prices do tend to increase towards the end of the year. Note that 1999 recorded a good supply of *dalo* compared with other years and, accordingly, prices were quite lower. The unusually high prices in the second half of 1998 reflect the shortages in supply caused by drought conditions, but market conditions had returned to normal by early 1999.

Figure 3.2 shows a five-year trend in the annual average cassava price in the four municipal markets. Because cassava grows throughout the year, there is no pronounced seasonal

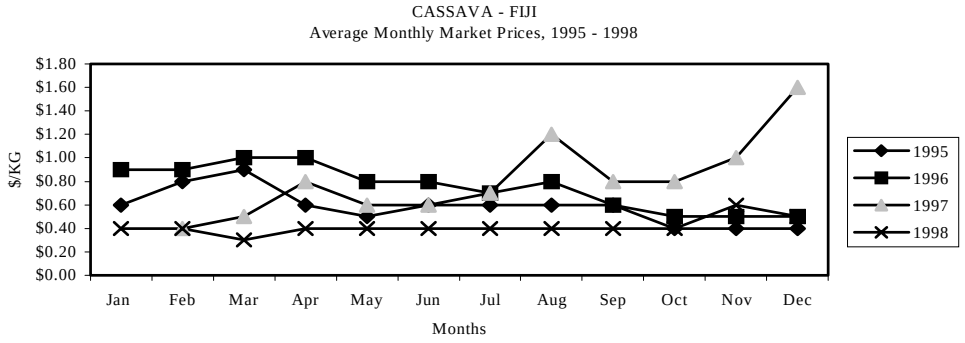
variation in prices. Nevertheless, unlike *dalo*, prices tend to decrease slightly towards the end of the year. As for *dalo*, there was an abnormally large supply of cassava in 1999, making prices relatively low, and high prices were recorded during the drought of 1998 before rapidly returning to normal levels in 1999.

Figure 3.1 Dalo market information.



The above graph shows a 5 year average price trend of dalo in the 4 Municipal Markets of Fiji. Dalo is a seasonal crop (Jan to Jun). 1999 recorded a good supply of dalo compared to other years.

Figure 3.2 Cassava market information.



Cassava grows in Fiji all throughout the year. 1995 and 1996 has slightly stable prices as compared to 1997. The 1998 price for first seven months was quite high compared to other years. This indicates a shortage of cassava in the market due to drought.

3.2.2 Fisheries domestic market

An estimated 3,300 tons of off shore by-catch of fish is sold in the domestic market at an average retail price of F$2.50/kg. The offshore fishery products are the cheapest source of animal protein available. They have started to penetrate the hotel industry and have the potential to grow. Over 60% of fish products are sold in Central Division.

Fish products are sold through a variety of outlets that could be broadly grouped into: municipal markets; hotels, restaurants and cafes; butchery and fish merchants; retail shops and supermarkets; and roadside stalls. The relative importance of these various outlet categories varies by division, with butcher shops important in Central Division, municipal markets and roadside stalls in Western Division, and municipal markets in Northern Division. Sales of fish in the municipal markets have declined considerably in the past two decades and now only 11.5% of finfish are sold through them. There are increasing sales of fish on doorsteps of consumers, especially in settlements and roadside villages. The municipal markets remain the major outlets for non-finfish products. However, sales of non-finfish products such as *kai*, *ura*, *qari* and *kaikoso* are also becoming popular in roadside markets, settlements, butcher shops and supermarkets.

3.3 Assessing the food balance situation in Fiji

3.3.1 Preparation of food balance sheets

During the Second World War, food was in short supply. There was a need to distribute it fairly, and hope for a rapid end to the war. This need initiated a study of food consumption and nutritional requirements of the populations of the war-torn countries concerned. In 1942, a Committee on post-war requirements made a number of studies where food balance sheets (FBSs) were first used. The following year, a more detailed FBS technique was developed to estimate the level of food consumption.

An FBS presents a detailed picture of a country's food supply and utilization for a given period of time. It is the final product of the commodity statistical system, which shows:

- the quantities and types of food available for human consumption;
- sources of supply;
- utilization of both primary and processed commodities; and
- the content of the food supply expressed in terms of nutrient value per capita.

Annual FBSs tabulated regularly over a period of years show trends in the overall food supply, changes taking place with the types of food consumed, and the extent to which the food supply is likely to meet the nutritional requirements of the population. By bringing together a large part of the national data on food and agriculture, they serve as a focal point for a detailed examination and appraisal of the agricultural, food and nutrition situation in a country. For example, a comparison of the quantities of locally produced food available for human consumption with those imported, as shown in the FBS, indicates the extent to which a country depends on imports to meet its food requirements.

It then becomes a useful tool for planners for a variety of uses including developing trade, food and agricultural policies, and subsequently agricultural and health promotion programmes. The information provided by FBSs is also useful to researchers concerned with the national food and nutrition situation.

FBS studies were initially carried out by the Food and Agriculture Organization of the United Nations (FAO) and since 1992 by NFNC. In recent years, NFNC has expended a lot of effort in compiling FBSs for Fiji (although no official report has been produced). During this period, considerable reliance has been placed on food availability data published by FAO.

Collation of data based on computerized standard FBS worksheets prepared by FAO using Microsoft Excel software commenced once all available data had been collected and verified. Major food groups in these standard worksheets include total cereals, meat, roots, pulses, vegetables, fruits, eggs, milk, fish, vegetable oil, animal fat and oil, miscellaneous, spices, stimulants, nuts and oil seeds, sugar and beverages. The methods used to compile each worksheet column and definitions for relevant terms used in the calculations are presented in Appendix 1, along with estimated FBSs and data sources.

3.4 Food imports

The level of food imports in Fiji remains comparatively low, suggesting that domestic food supply has been able to expand with rising demand from the increasingly urbanized population. Food imports as a proportion of total imports have fallen slightly over the past decade despite deregulation.

However, high proportions of calories and protein are still obtained from imported foods and changes in world cereal prices affect the cost of living in Fiji. In 1995, food made up 14.9% ($F182 million) of the total value of annual imports (F$1,218 million), down from 15.7% in 1985. Cereals such as rice and wheat were the main items, amounting to 26% (nearly F$48 million) of the total food imports.

Dependence on an overseas food supply is increasing, and a tendency to rely on overseas food supplies to supplement domestic supplies has been evident over the years. While cyclones have had a definite impact on the food situation, increasing volumes of food imports will be a continuing trend unless the government actively supports domestic food production and marketing.

The national trend established by the compilation of FBSs shows an increasing reliance on imported food, which accounts for more than half of the available supply in nutritional terms. Table 3.1 shows that the proportion of imported energy increased from 43% in 1975-77 to 63% in 1997. A trend in the proportion of protein derived from imported foods is harder to discern. Table 3.1 shows that the proportion increased from 60% in 1975-77 to a peak of 66% in 1992 from which it declined to 62% in 1993-96 and then increased again to 63% in 1997. Fiji imported 70% of fats consumed in 1997.

Table 3.1 Proportion of food nutrients imported, 1975-77 to 1993-96.

Year	Proportion of Kilo Calories Imported (%)	Proportion of Protein Imported (%)
1975-77	43	60
1985	42	65
1992	52	66
1993-1996	60	62
1997	63	65

Sources: NFNC, Food Balance Sheet, 1975-77 (unpublished); FAO, Food Balance Sheet 1985 (unpublished); NFNC, Food Balance Sheet 1992 (unpublished): NFNC Food Balance Sheet 1996 (unpublished).

Although the volume of food imports as a proportion of total imports has decreased from around 20% in the 1970s to about 15% in the 1990s, associated costs in nominal dollar terms have escalated. World food prices have been declining since 1995, with the US dollar-denominated food price index (base 1995 = 100) standing at only 69.4 on 20 March 2001 (*The Economist*, 24 March 2001). However, the substantial devaluation of the Fiji dollar against the US dollar since the mid-1990s has meant that consumers of imported food items in Fiji have not been able to take advantage of this decline.

Increases in the cost of food imports between 1977 and 1995 were:

- meat, fresh chilled frozen: F$7,724,443 to F$19,717,293
- fish and fish products: F$10,844,821 to F$33,674,526
- cereals and cereal products: F$14,364,831 to F$47,791,798
- fruit and vegetables: F$7,628,896 to F$31,649,855.

3.5 Empirical evidence on food supply from food balance sheets

3.5.1 Total nutrient availability

Total daily per capita energy availability showed a steady increase from the mid-1980s to the mid-1990s at a rate of approximately 10 kcal annually, reaching a peak in 1996 of 3,011 kcal, an increase of 2.4% on the 2,939 kilocalories available in 1995 (see Table 3.2). This was 783 kcal in excess of the average daily per capita energy requirements of 2,228 kcals calculated by FAO, taking into consideration the age-sex structure, level of urbanization and number of pregnancies in the population of Fiji.

The contribution of specific macronutrients towards total energy supply has also undergone changes during this period. Generally, the contribution of each macronutrient is within the broad population nutrient goals recommended by the World Health Organization. However, there is a proportional shift towards less energy being provided by carbohydrates (-7%), and more energy being derived from fats (+6%) and protein (+2%) over the 10 years to 1996.

Table 3.2 Total nutrient availability and contribution towards total energy supply per capita per day, 1985 to 1996.

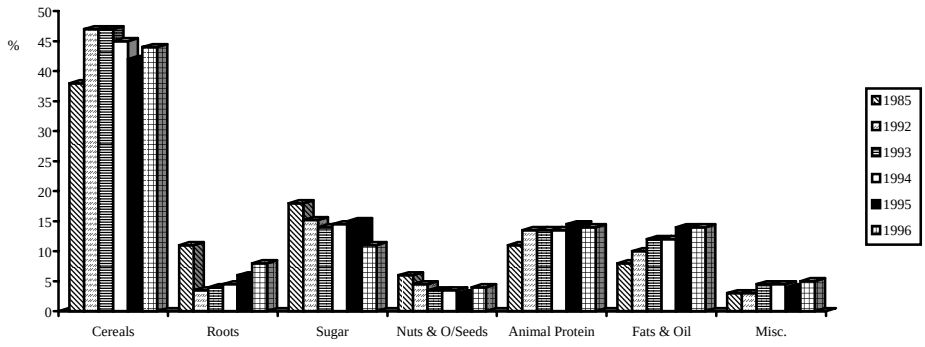
Year	Total Calories (Kcal)	Carbohydrates (%)	Protein (%)	Fat (%)
1985	2,819	69	9	21
1992	2,879	65	10	25
1993	2,910	64	11	25
1994	2,900	64	11	25
1995	2,939	63	11	26
1996	3,011	63	11	27

3.5.2 Availability of energy from major food sources in 1996

Cereals continued to be the major contributor of available energy. In 1996, their contribution was 41%, followed by animal protein (14%), oils and fats (14%), sugar (13%) and root crops (8%). The situation in 1996 was similar (especially for cereals and root crops) to what was observed in the previous three years, but there was a shift in consumption pattern when compared with the situation in 1985. In that year, cereals contributed 39% while root crops contributed 11% to the total available energy.

A brief summary of statistics for each major food group is presented below and 1996 statistics are compared with those for previous years, especially 1995. Details of trends from 1985 to 1996 for each food group are provided in Figure 3.3.

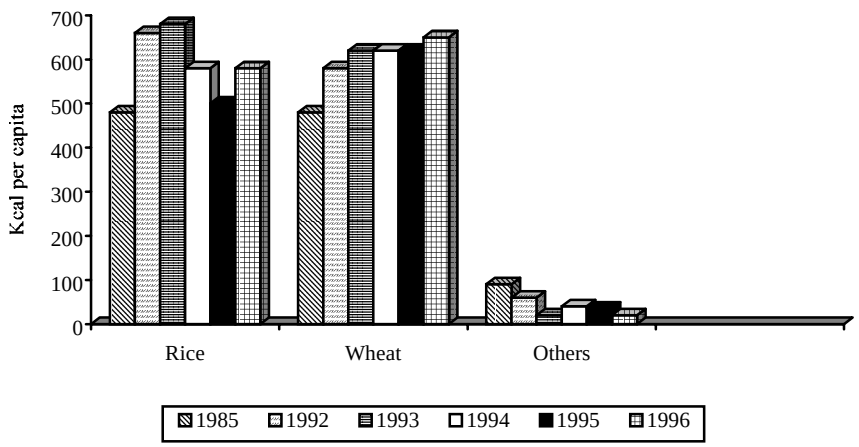
Figure 3.3 Percentage of total calories contributed by food groups, 1985-1996.



Cereals

The annual availability of cereals per capita increased slightly from 124 kg in 1995 to 125 kg in 1996 (see Figure 3.4). This was a direct result of an increase in rice imports, from 24,000 tons in 1995 to 26,000 tons in 1996. Availability of sharps continued its declining trend from 7,902 tons in 1993 to 4,941 tons in 1996 but not enough to offset the total increase in calorie availability from cereals, which increased from 1,224 kcal in 1995 to 1,234 kcal in 1996. Overall, cereals contributed 41% of the 3,011 total kilocalories available in 1996 compared with 42% in the previous year, and remained the major contributor of food energy in the diet.

Figure 3.4 Availability of calories from different cereals, 1985-1996.



Root crops

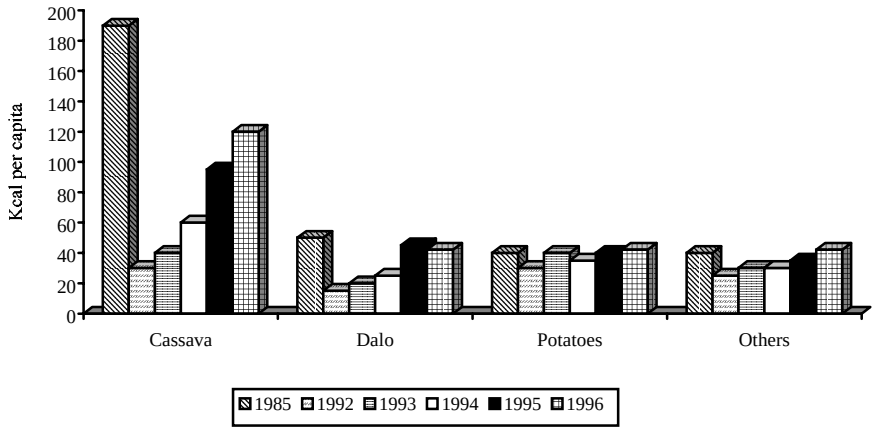
The availability of root crops per capita increased sharply to 98 kg in 1996 from 75 kg in 1995. As a result, an increase of 31% in kilocalories obtained from root crops was recorded, from 193 kcal in 1995 to 252 kcal in 1996. This was the highest increase recorded for root crops in the four years from 1992 to 1996. Such an increase can be considered an outcome of the strong drive by MAFFA to increase the planting of root crops to meet the increased demand in both the local and export markets. The change in agricultural policy from largely subsistence to more cash-oriented enterprises may have also contributed to this increase in root crop production and availability.

Despite these recorded increases in production, absolute amounts of root crops available remain well below the amounts that were available a decade ago. A total of 316 kcal were obtained from root crops in 1985 compared with 252 kcal in 1996 (see Figure 3.5). The observed shift in consumption pattern from traditional root crops to a cereal-based diet may be due to changing consumer preferences, based on the economics and convenience of cereals.

Sugar

Sugar available for consumption decreased from 43 kg in 1995 to 39 kg in 1996. As expected, total kilocalories for sugar decreased in 1996 and contributed 13% to the overall available kilocalories for this period.

Figure 3.5 Sources of calories from root crops, 1985-1996.



Pulses

The slight increase in imports of pulses contributed to an increase in the consumption level from 73 kcal in 1995 to 79 kcal in 1996. Pulses, especially dhal, are widely used as part of the diet for Indo-Fijian families in particular, not only in urban areas but also in rural parts of the country.

Nuts and oilseeds

Coconut remains an important source of food and cash income for many households in both rural and urban parts of Fiji. Therefore, there may be some underestimation because household consumption is not included here. Coconut production increased from 69,313 tons in 1995 to 86,940 tons in 1996. This increase may be attributed to an increase in the price of copra during this period. Other nuts recorded slight increases in local production (peanuts) and imports.

Vegetables

In 1995 and 1996, extension efforts were made to increase off-season vegetable production, but adoption of the required technology has been slow. The availability of calories from vegetables in 1996 remained at almost the same level as in 1995.

Fruits

The Extension Division of MAFFA has focused on increasing the production of fruit such as papaya and pineapple for export markets. Energy derived from fruits available for local consumption increased from 20 kcal in 1995 to 25 kcal in 1996.

Alcoholic beverages

The increase in caloric availability from alcoholic beverages in 1996 was the first since 1992. This was a direct result of increase in beer production, which had reported a declining trend in the previous three years.

Meats

A rapid increase in the availability of energy from the consumption of meat and meat products took place between 1985 and 1992 after which there was a levelling off to 1996 (Figure 3.6). Energy availability slightly increased to 175 kcal in 1996 from 173 kcal in 1995. Protein availability in meats slightly increased from 11 g in 1995 to 12 g in 1996.

The performance of the local beef industry showed some signs of recovery during 1996 after a decline for over a decade. The increase in the price of sheep meat due to a decline in the importation of lamb and mutton made it more attractive for consumers to increase their beef consumption.

Imports of sheep meat have more than doubled since 1985. Recently, however, the level of imports of mutton and lamb declined for the third year in a row, from 10,381 tons in 1995 to 9,550 tons in 1996. This was largely attributable to the increase in price overseas, which made other types of meat, particularly locally produced beef and poultry, very competitive. Almost 90% of the goat meat available for consumption is now imported.

Local production of poultry meat increased from 8,763 tons in 1995 to 9,602 tons in 1996. Furthermore, poultry meat imports, mainly from USA, recorded an increase from 249 tons in 1995 to 387 tons in 1996.

Milk and eggs

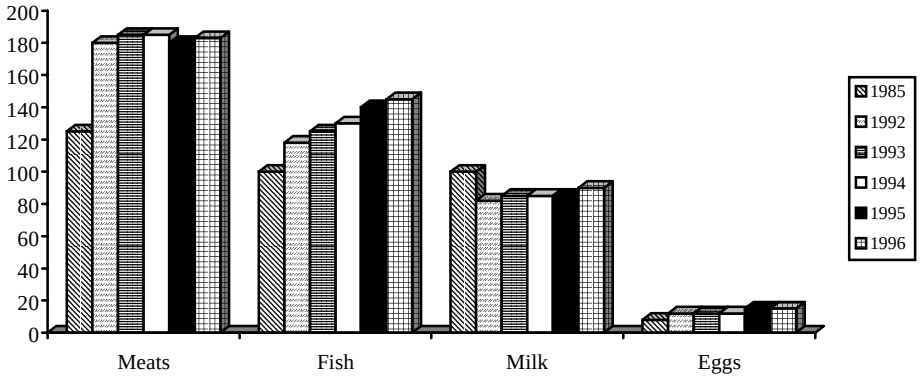
Availability of energy from dairy products declined between 1985 and 1995, but increased significantly from 79 kcal in 1995 to 84 kcal in 1996 (Figure 3.6). This increase was mainly contributed by an increase in imports of powdered milk from 2,645 tons in 1995 to 2,900 tons in 1996.

The level of egg supply in 1996 was virtually the same as in 1995. As a result, the availability of calories from eggs remained at the same level as 1995. This ended a consistent but small increase in the availability of energy from eggs during the decade from 1985 to 1995.

Fish and other seafoods

The availability of energy from seafoods increased consistently between 1985 and 1996 (Figure 3.6). It increased from 136 kcal in 1995 to 140 kcal in 1996. This increase was attributed to an increase in tinned fish production during the year.

Figure 3.6 Availability of calories from animal protein, 1985-1996.



Vegetable oils and fats

A 1.7% increase in the availability of vegetable oils and fats for human consumption was recorded from 290 kcal in 1995 to 295 kcal in 1996. The increase in this category was due to increased coconut oil production, from 5,530 tons in 1995 to 6,154 tons in 1996.

Animal fats

Availability of calories from animal fats increased from 124 kcal in 1995 to 130 kcal in 1996. This was the result of an increase in imports of ghee and ghee substitutes.

4. Institutional Policies

4.1 General policy approach

It is the policy of MAFFA that all activities it implements or influences protect, stabilize and wherever possible improve the nutritional status of people in Fiji by securing an adequate supply of a variety of attractive, highly nutritious food products. These activities are to be equally sensitive to all primary producers irrespective of race, religion, geographic location or gender. They are to be conducted using modern techniques including accurate data collection and appropriate statistical analysis. All programmes will ensure environmental conservation for sustainable agricultural development. MAFFA will attempt to maintain and, wherever possible, increase the revenue from sugarcane production.

4.2 Government agricultural policy reforms

4.2.1 Era of protection and government-led development

In the decade following independence, a policy of import substitution and development projects aimed at import-substituting industries was vigorously promoted. In times of high commodity prices, protected local markets and quality management of the various government-funded projects and programmes, this approach was reasonably successful in terms of increasing production. But the costs were high and the gains unsustainable.

The government instituted a programme of direct government investment in agricultural development that continued throughout the 1980s. This programme was chiefly based on a policy of growing food locally to replace imported food. The main commodities affected were rice, beef, dairy, poultry and feed grains. A series of major loan- and grant-funded projects were implemented to increase production: Central Division Agricultural Development Project; Northern Rice Development Project; Sigatoka Valley Rural Development Project; Yalavou Beef Scheme; and Uluisaivou Rural Development Project. Not only did the government set the policy but also it provided project managers, extension staff and administration staff to implement these projects. The role of farmers (and others in the private sector) was merely to respond to the benefits provided and increase production. The programme was not confined to import substitution, as there was also a drive to develop new commodity exports such as cocoa.

In order to reduce competition from imported food, and to enable local producers to get "a fair return for their labour", imports were restricted by either tariff or licence. Food import-substitution industries such as rice, dairy, poultry, beef and pork had been protected by a complex array of quotas, tariffs and subsidies until 1989. Despite this protection, overall production did not meet planning targets. There were several reasons for this: targets were set too high; government service provision was generally inefficient; the incorrect assumption was made that Fijian semi-subsistence farmers would quickly acquire the attitude of commercial farmers during projects; and political upheavals occurred in 1987.

The government was also involved in the processing and marketing of some goods, notably rice, cocoa and, on occasion, even root crops. Although the intention was noble, these interventions proved detrimental to industry development. The aim was to fill a perceived gap in the marketing of agricultural produce, and to ensure that farmers did not suffer from wide variations in price and "exploitation" by middlemen. In the case of rice, the government-funded rice mills competed directly with very efficient small mills in the farming areas. While these small mills could not produce high-quality milled and polished rice, they were able to offer better prices to the farmers with lower transport costs. Cocoa marketing was handled

exclusively by the National Marketing Authority, later called NATCO. Government deemed that it was not in the farmers' interests to allow private-sector involvement in cocoa marketing. The consequent lack of competition and inefficiency led to huge marketing margins, ranging from 30% to 45%, with the consequence that farmers received a low price even when world market prices were high.

Government pursuit of import-substitution goals cost the taxpayers a lot of money, and raised prices of basic food items for the urban consumer. Not only were the development projects expensive but also the wide range of hidden subsidies in the form of cheap farm inputs, credit and mechanization services consumed a large portion of the national budget each year. After decades of protection and government-led investment projects, the private sector had grown dependent on the government. Farming had been driven either by the need for (subsistence) food or in response to government direction.

4.2.2 Impetus for deregulation

By the late 1980s, circumstances had changed with growing awareness within the government of the importance of facilitating rather than directing the growth of the agricultural sector. The first step in dismantling this system began with the August 1989 Mini-Budget when the agricultural sector became a part of the national policy of deregulation. There was a switch from licensing and import controls to tariff protection. Import-licensing controls were removed on 34 food items. Since that time, de-licensing has widened and there has been a gradual reduction in the overall level of tariff protection. To date, these measures have not had the significant adverse effect on the import-substitution industries that was expected. Pork and, especially, poultry appear to be prospering in the new environment while consumers have benefited from lower prices and wider variety.

The monopoly status afforded NATCO for certain crops (cocoa and fresh fruit to Japan) was withdrawn. There was also a change in mindset in terms of what the government was perceived to be capable of doing and in attitude towards the private sector. The fundamental basis for this change in policy was a recognition that the sector would only have a future in a competitive world if it were to become more efficient.

The process of deregulation has not been easy, and the government has assisted some sectors, notably dairying, with transitional finance. It is not uncommon for the private sector to expect the government to continue to assume a direct leadership role and dependency on government remains pervasive. The private sector is finding itself faced, sometimes reluctantly, with unfamiliar responsibilities. The quarantine treatment facilities are now owned and operated by the fruit export industry. Ginger growers and exporters are now members of a council that determines industry policy and raises funds for industry support.

Deregulation has meant that the private sector (farmers, processors and exporters) has had to lead the way, and set the course for the sector (which crops, which markets). The role of government, and its ancillary organizations such as the Fiji Development Bank, remains important but is confined to facilitating private sector efforts. This facilitation is to be achieved not by direct intervention in trading or production but by the provision of cost-effective technical advice, the negotiation of quarantine agreements with importing countries and oversight of their enforcement, facilitating the development and transfer of appropriate technologies, providing access to credit for viable projects, and maintaining a stable economic environment.

4.2.3 Industry effects of deregulation

A number of recent studies have shown the economic benefits to Fiji of this new approach. Already, the agricultural sector has responded to the opportunities offered. The dramatic increase in *dalo* exports, the diversification of tobacco farmers to papaya, a more co-ordinated approach to quarantine by the private and public sectors, private investment in ginger

processing, planned diversification of the dairy industry to assist the wet processing of coconuts, the export of processed organic foods (products grown in a sustainable manner without artificial chemicals) to Europe, and the adjustments made in the pork and poultry industries are all examples of the benefits of deregulation and private sector-led development. Yet, in 1996, a significant change took place that has been interpreted by some as a policy reversal.

The main food import-substitution industries were subjected to changes in agricultural policies during the period following deregulation. Reforms were brought about because these industries had not met the targets set by the planners. There were four main causes for this apparently poor performance:

- The targets of the planners were set unrealistically high.
- The expected impact of this protection on farmers' decision making was overstated.
- The inefficiencies of government services meant farmers became dependent on this assistance and not all farmers received the planned assistance at the right time.
- Sharp rises in the prices of imported farm inputs following the devaluations of the Fijian dollar in 1987 made some intensive farming activities much more costly.

Since 1992, it has come into more direct competition with imports, with licence controls removed in the 1994 budget. The classical example of ineffective protection to an import-competing industry is rice in Japan. To quote Reeves and Quirke, 1996**:** "Japan has maintained a policy of self-sufficiency for rice by maintaining internal prices at levels several times higher than world market prices. We estimate the welfare costs to Japan of this policy at around US$15 billion per year, based on a comparison of current policies with free trade. Consumers pay substantially more than they should. In a less affluent country than Japan, this would lead to a substantial worsening of the food security situation of the poorest and most vulnerable in society. Furthermore, without established trade connections, internal production shortfalls as a result of drought or other factors would add to food insecurity."

From the late 1960s until the mid-1980s, Fiji had self-sufficiency in rice production as a policy objective. The government actively supported and protected the rice industry from foreign competitors through quantitative restrictions on imports in addition to tariffs. Direct support was provided through subsidized inputs, government machinery and credit. As a result of this policy, Fiji was able to reach a production level of around 32,000 tons of rice and achieve a self-sufficiency ratio of nearly 70%. However, this was achieved at considerable cost to both taxpayers and consumers. The policy also had an unintended negative impact on food security. The real income of the urban poor was significantly decreased by an increase in the price of a basic food staple above world market prices. Resources were allocated to rice production that could have been utilized more efficiently in food production activities for which Fiji had a competitive advantage (e.g. root crops). Had more root crops been produced, domestic root crop prices would have fallen and food security been enhanced.

As part of deregulation policy, virtually all support to the rice industry has been phased out since 1987. In 1992, the industry came into more direct competition with imports, with licence controls removed in the 1994 budget and replaced with tariffs of 40% on white rice and 10% on brown rice. The deregulation of the rice industry has seen a substantial increase in rice imports, and yet this has been to the benefit of food security. Low-income consumers, particularly in urban areas, have had access to imported rice at lower prices. Food security would be further enhanced if the 40% tariff on white rice were reduced. Rural consumers still have the same access to traditional rice, as do urban consumers willing to pay the price premium. Some of the resources previously devoted to inefficient rice production are now being devoted to crops in which Fiji has a comparative advantage, notably root crops. This has enhanced the availability of root crops and thus food security.

Production was in decline before deregulation, and this downward trend has continued. The underlying reason has been the low returns to farmers and activity in the irrigation schemes, with the exception of Dreketi on Vanua Levu, has now ceased. However, low-input traditional

rice remains an important subsistence crop, particularly in the sugarcane-growing areas. Other minor import-substitution grain crops, maize and sorghum, have not survived deregulation.

The government has actively encouraged development of the dairy industry, located in Central Division. Domestic production has not been impressive despite heavy protection through import licensing, and a heavy reliance on milk powder and butter imports has persisted. Only bulk butter is now subject to licensing, with tariffs ranging from 25% to 35% on other products. Despite deregulation, dairy production has remained stable but in the longer term in a competitive environment only the fresh milk segment of the industry is likely to be sustainable. This is recognized by the government in its compensatory adjustment package included in the 1994 budget.

It is difficult to estimate total beef production, as so much is informal. Although there are some successful large-scale commercial ranches, most beef comes from draught cattle and dairy cows kept on small farms. Commercial production has been in decline. The government attempted to develop some beef schemes, but these schemes have suffered from poor management, competition from cheap imported mutton and distorted marketing structures. Imported sheep meats are now subject to only a 5% tariff. It is disappointing to note that the local canneries use negligible amounts of local beef in their product, particularly since cattle producers in Fiji receive lower prices than those received in the countries supplying the canneries. This reflects major structural weaknesses in the industry that must be addressed if the industry is to prosper.

The poultry industry developed rapidly during the 1970s under generous trade protection. Deregulation began in 1989 when licensing was removed. Tariffs have since fallen progressively from 75% to 25%, resulting in increasing levels of imports from Australia. Yet domestic production has increased significantly over the period to 8,760 tons in 1995. The highly integrated structure of the poultry industry, in contrast to the beef industry, has been a contributing factor to its strong market performance. The industry shake-up that was expected with the removal in 1995 of phytosanitary barriers to the importation of low-cost American chicken has not yet occurred. Licences have only been issued to indigenous Fijians, who have not been able to raise the necessary working capital to develop the trade.

There are about 120,000 pigs in Fiji, 25% of which are on commercial farms that supply 70% of the retail trade and 90% of the hotel market. This commercial sector is well managed and vertically integrated. Deregulation in the pig industry has been in line with that of the poultry industry, also with minimal impact. Increases in efficiency enabled commercial pork production to increase strongly during the period since deregulation, reaching a record level of 832 tons in 1994. Further gains in efficiency are achievable and the industry has now reached the stage that it is more than competitive with imported fresh pork from New Zealand. Pigmeat, with its high income elasticity of demand, is expected to experience significant price increases on world markets as a result of recent multilateral trade reforms. This will further enhance the viability of the pig industry in Fiji.

4.3 Commodity orientation of the current agricultural development programme

In 1996, a change of Minister and Permanent Secretary in MAFFA led to the development of a four-year (1997-2000) investment programme in the form of the Commodity Development Framework (CDF). The plan of the CDF was to quadruple capital expenditure over the four-year period to F$69 million, with increased export earnings targeted at F$1.71 billion, or F$426 million per year. Key commodities were identified for assistance, giving a commodity-based structure to the programme. They were coconuts, ginger, dalo, *yaqona* (kava), fruits, vegetables, dairy, beef and sheep. In addition to crops and livestock, increased funds were also spent on fisheries development and forestry. Funds were spent on upgrading the services of

MAFFA staff (training, vehicles, computers, etc.), increased funding for research, and capital investment in parastatals such as Yaqara Beef Station. Some funds were also spent on directly subsidizing farm inputs such as seeds, fertilizers and tools.

The CDF was a very controversial programme within government. The arguments for its commencement were based upon two key principles: that agriculture provides the best comparative advantage for Fiji exports, and that agriculture provides employment to more people than any other sector. However, there was a widespread perception that the CDF was "pushed" through the regular government channels, especially the Ministry of Finance, without being properly thought out. The original CDF blueprint document was significantly revised, with funds being spent in areas not originally envisioned (e.g., a credit scheme for flower growers). Furthermore, significant amounts of CDF funds were used for the government once again to become directly involved in production, for example the purchase of an equity stake in the Wonder Gardens hydroponic farm and reviving the Batiri citrus orchard. The government also resumed direct subsidies to farmers, giving the impression that its agricultural policies were at odds with the national economic policy. There was also a recent decision by the government to guarantee the purchase of a large tract of land at Navua near Suva to be run as a commercial youth training farm by a government corporation.

The government commissioned a deregulation review report in 1997, which pointed out that the rural sector faces significant constraints in adjusting to the new deregulated environment. To a certain extent, the CDF can be justified as providing transitional assistance to farmers to relieve these constraints, so as to lift the sector to a "take-off" stage of development. Furthermore, trade policy within agriculture is in line with overall government policy and tariff rates on imported agricultural products have remained stable since the inception of the CDF. Whatever the merits and demerits of the CDF, it has successfully raised the profile of the agricultural sector and improved the standing of MAFFA within the farming community.

4.4 Food production policy

The nation's food security is dependent on the continuation of subsistence farming and its ongoing transformation to semi-commercial farming of crops for which Fiji has a competitive advantage. The strong upward trend in traded food crops indicates that Fiji's agricultural sector, far from stagnating at subsistence levels, sustained a dynamic process of increased commercialization through the 1990s.

The great bulk of food production is for domestic consumption. A combination of ability to grow a variety of foods successfully, consumer preference and unavailability or high cost of imported substitutes provides a long-term competitive advantage in the production of these crops. If grown in the traditional manner, without chemicals and in rotation, these are highly sustainable activities.

The government has a limited, although potentially important, contribution to make to the development of the traditional food crops sector. Farmers have little or nothing to learn from frontline extension officers in the production of traditional crops. On the contrary, experienced farmers should be used as resource persons in youth training programmes promoting sophisticated traditional crops such as yams. Research can on occasion come up with an improved variety or cultural practice that is acceptable to growers and consumers, although no such examples adopted by farmers come to mind. However, there are important areas in which government can support traditional food crop development:

- Quarantine has a crucial role to play in minimizing the risk of introduction of pests and diseases.
- Strategically located roads can open up significant markets for traditional food crops and provide an incentive for increased plantings, as shown by the Waidina Valley road near Suva.

- The high nutritional value of traditional foods compared with imported and processed foods needs to be continually brought to the attention of the community. Low-cost activities such as the nutrition posters produced in the past by NFNC can be very beneficial.
- Landowners, and others, need to be made fully aware of the devastating consequences of indiscriminate burning on the productivity of food gardens. The rapid expansion in commercial taro production has brought with it unsustainable production practices that need to be addressed through education and, in some cases, regulatory enforcement.
- The status of traditional foods and farming systems needs to be enhanced through school curricula, youth training programmes, and via the media. MAFFA's Information Section has a contribution to make here. Such programmes should include creating awareness of composting and other environmentally sustainable production methods.
- The employment-generating youth training programmes currently being promoted by the government should give priority to traditional food crop production as a high return/low risk set of activities with a high propensity to generate employment, and social and economic stability.

Finally, traditional food production has as much to gain as any other activity from the demand generated by outward-looking economic policies that lead to sustained economic growth. As incomes rise, so will the demand for high-value traditional food. In this respect, the low prices currently prevailing for root crops in urban markets reflect the sluggishness in the economy as much as it does abundant supply.

Details of recent trends in specific food production sectors are presented in Appendix 2.

4.5 Crop research

Crop research within MAFFA is to be directed towards improvement of crop production efficiency and crop quality. Research objectives include agronomic optimization, sustainability, nutritional value and cost reduction in agricultural land practices to increase accessibility for all farmers. Research activities will include the evaluation of cultivar features and their suitability for local production conditions and markets, gene pool improvement, land use studies, evaluation of climate suitability and assessment of contributions to food security. A watching brief will be maintained on all overseas research and development activity to assess the prospects for testing and introducing improved technologies developed in other countries.

Research will be directed towards the identification of crops for diversification, with preference given to indigenous and traditional crops. Food research and development will be influenced by defined market strategies, with priority placed on those crops for which the market demand has been confirmed. Diversification and extension programmes will be implemented once new species have been evaluated for environmental compatibility with existing crops, potential as an export earner, potential to offer increased food security and overall social benefit.

The programme of value adding through product development, waste utilization, processing and applied research will be expanded to increase income from food crops. Established market intelligence networks will be expanded and product opportunities will be identified for product development activity. For these initiatives, MAFFA will forge much closer links with the private sector with a view to forming partnerships, joint ventures and other cooperative activities.

4.6 Crop extension

Emphasis in crop extension is placed by MAFFA on the production of the highest possible quality of food crop commodities through the dissemination of information and programmes of continuous training. Recommended cultural practices will form the framework of field production. Total quality management systems are to be implemented in horticultural production, with particular emphasis on post-harvest handling and packaging to meet the requirements of export markets, local markets, and the hotel and tourism sector. Every possible commercial advantage will be extracted from the horticultural industry by either selling fresh or processing.

Where financial advantages can be gained from processing, MAFFA is to exploit those opportunities with or without private sector involvement. Where supply exceeds demand, a programme of product development will be implemented for subsequent commercialization. MAFFA will continue to provide assistance to growers of nutriceutical crops (notably, *yaqona*) to maintain or improve quality so that prices can be sustained.

4.7 Animal health and production

MAFFA's policy is to improve meat production efficiency and the quality of meat products so that their use in the tourism, manufacturing and local trade increases. It intends to provide the springboard for a meat export industry.

A programme of improvement of the genetic pool, slaughter practices and processing will be introduced. Quality features required by the tourism and manufacturing industries will be established. Strategies for the revival of the goat industry will be evaluated. The dairy industry will be reviewed with the aim to improve productivity and thereby continue increases in profitability. Where appropriate, intensive rearing practices will be introduced.

A major emphasis will be placed on reducing feed cost, entailing a programme of evaluation of suitable feed crops such as maize for domestic production. MAFFA's policy is to capitalize further on the strengths of the existing poultry industry, increase the local content of the feed, substitute for poultry imports and increase rural sector involvement.

MAFFA will continue to monitor the production and quality of honey and to conform to quality standards required by overseas consumers.

MAFFA will maintain and wherever possible improve the quarantine inspection service to reduce threats from disease and reduce the risks to public health. Programmes of in-house training and public awareness campaigns will be implemented to reduce the risks of introducing pests and diseases and for the protection of local resources.

4.8 Fisheries policy

The main goal of MAFFA in the fisheries sector is to increase the income generated from fish, seaweed and other marine resources through a programme of resource management, quality improvement and training. Training programmes in post-harvest handling, processing and quality control will continue so that lucrative markets remain accessible.

Monitoring systems of fish catches will be implemented so that the management of the fish resources ensures sustainability.

Wastage and by-catch will be the subject of product development programmes.

Modern seaweed farming techniques will be monitored and, where appropriate, adapted to the local environment.

5. National Risk-Coping Systems

In section 2, some of the major threats to food and nutrition security were outlined. In this section, a review is made of the five main forms of risk-coping mechanisms to counter these threats at the national level. These mechanisms are (a) poverty alleviation, (b) agricultural development, (c) various activities of NFNC to improve nutritional status, (d) food security and nutrition surveillance, and (e) mitigating the negative impacts on food security of natural disasters.

5.1 Increasing food security through poverty alleviation

Poverty alleviation is arguably the main risk-coping mechanism to prevent food insecurity in Fiji, which already has a relatively high human development index (0.863 in 1997) and life expectancy at birth (71.8 years). These parameters are by far the highest in the South Pacific, and indicate a general absence of hunger and undernutrition. The 1993 National Nutrition Survey found that most people in Fiji do not lack for food and that more than 90% of the population surveyed had a balanced diet. However, according to the 1990-91 Household Income and Expenditure Survey, 10% of households (75,000) had incomes too low to afford a minimum diet. Poverty is a problem for some people in all places and ethnic groups.

The government's principal strategy to reduce poverty and increase economic well-being has been to raise the rate of economic growth and increase income-earning opportunities for the most disadvantaged. This has involved generous tax and other incentives to attract investment. The "traditional" system of extended family is relied upon to be the main major source of assistance to the poor. However, traditional support systems are weakening with the transition from an agrarian to an urban society. The government has a longstanding policy to provide affordable rental housing for low-wage urban households, but demand for affordable housing far exceeds supply. It is government policy to reduce immigration into urban areas by providing services and creating income-earning opportunities in rural areas. Concern about ethnic disparities in wealth and welfare is an issue that has been heightened in recent years. The government has given increasing attention to encouraging business participation by indigenous Fijians.

Fiji has a high official rate of primary school completion but farmers do not have a very high standard of education. According to the Agricultural Census, less than 5% have received secondary education, and almost 50% have gone no further than primary school. This holds back the pace of development in rural areas. A recent Education Sector Review recommended that higher priority be given to basic education, particularly in rural schools (World Bank 1995). It is government policy to improve the academic performance of indigenous Fijians and to make 12 years of education available to all. Government policy is to increase the access to all for health services. However, while government expenditure on health has increased by 60% over the past decade, most of these funds have gone to hospital-based curative care and operating costs.

Government policies seek to strengthen traditional forms of family assistance. The income tax threshold was raised from F$4,500 to F$5,000 in 1995 with the main purpose of assisting those in the low-income brackets. The Department of Social Welfare provides assistance to the disadvantaged through the Family Assistance Scheme, legal assistance, financial assistance, juvenile justice, support for women, and help for the disabled.

Those who qualify for family assistance also become eligible for assistance from several other government agencies and NGOs. This assistance includes remission of school fees, free

uniforms and books, free medical care and assistance, rations and other support from NGOs. It was recently reviewed in order to improve its effectiveness and to provide clearer qualification criteria.

The Ministry of Education waives school fees for children whose parents jointly earn less than F$5,000 per year if they are in the Family Assistance Scheme. The Ministry of Health also provides health services for the public on a low fee structure at hospitals and health clinics. NGOs provide the bulk of welfare assistance in Fiji, generally through non-cash donations, in a most cost-effective manner and are also involved in educating the poor.

The prominent role played by the NGO community in the delivery of social services, much of this through volunteers, is widely recognized and appreciated. Links with the co-ordinating NGO umbrella bodies, namely the Fiji Council of Social Services, the Fiji National Council of Women and the Fiji National Council for Disabled Persons, are set to strengthen. The government will also examine ways by which NGOs can play an even greater part in the development process. The Department of Women has facilitated a Women's Social and Economic Development Programme in recent years to assist with access to micro-credit. The project has successfully increased incomes and the status of many poor women in urban and rural areas.

Additional assistance is being provided through UNDP funding for small-scale projects being implemented by Montfort Technical Institute, Chevalier Hostel, Save the Children Fund, Ba Rotary Club, Fiji National Council for Disabled persons and the Ministry of Regional Development and Multi-Ethnic Affairs.

Policies and strategies to reduce poverty can be summarized as follows:

- providing income-earning opportunities;
- ensuring the poor have the means to take advantage of job opportunities; and
- providing a safety net for those in greatest need.

Increased employment opportunities require higher economic growth and investment, particularly in those kinds of activities that are labour-intensive. Many of these employment opportunities may be considered lowly paid, but this situation is better than not having employment at all. The government undertook a reform of the labour market partly with the aim of maximizing the number of new jobs being created. Having minimum wage guidelines for certain occupations can restrict employment opportunities.

A sum of F$4.4 million was provided in 1998 for a Poverty Fund. This sum was to be derived from duties on tobacco and alcohol in addition to the existing poverty alleviation allocation made by the government. A major objective of the fund is to assist the poor with income-generating activities.

To ensure that those at risk are better able to take advantage of income-earning opportunities, the minimum requirements of good nutrition, affordable housing and access to health care and education must be provided. The government will continue to provide additional support to institutions involved in both vocational and technical training and general education provision. Funding and other assistance, elaborated further in section 7, is to be provided to enable more affordable accommodation to be constructed for those on low incomes.

The existing safety net for the most disadvantaged will continue to be encouraged through traditional systems of support, assistance from voluntary organizations, the Family Assistance Scheme and other measures.

5.2 Agricultural development to enhance food security

5.2.1 Potential for development of the agricultural, fisheries and forest sector

Another major risk-coping system for food security is agricultural, fisheries and forestry development. Despite increasing urbanization, agriculture remains the most important sector in the economy, contributing around 16% to GDP over the past decade. Sugarcane and subsistence

production are still the dominant activities. Foreign exchange earnings of the sector (including fisheries and forests) have remained fairly constant in real terms and contribute about 55% of gross exports. The low foreign-exchange leakages from agriculture mean that its share of net foreign exchange earnings is substantially higher than those for the other main export sectors of tourism and garments. Although agricultural workers are frequently under-employed, the sector remains the main source of employment, contributing nearly 50% of total employment, and contributes to a more equitable distribution of national income.

The fisheries sector, also a vital and a promising potential area for economic growth, contributes about 1.2% of GDP. It has become increasingly commercialized, is the fourth largest export sector by value, and is a major source of growth and employment in the economy. Foreign exchange earnings of agriculture, fisheries and forests have remained fairly constant in real terms at about 55% of gross exports.

About 60% of the total land area is suited to some form of agriculture activity, but only 16% is suitable for sustained arable farming. As reported in the 1991 Agricultural Census, 95,400 farms covered 591,407 hectares (Otanez and Tubuna 1992) of which 93% was in rural areas and the remainder in peri-urban, or rural-urban fringe, areas. Land use in 1991 was classified as:

- 39%, or 230,881 ha, of cultivated land under temporary or permanent crops with fallow of less than one year (mainly sugarcane, copra and coconut oil, cocoa, ginger and rice);
- 29%, or 173,406 ha, of pastures and grazing areas; and
- 32%, or 187,120 ha, fallow of more than one year (20,398 ha), natural forest (104,338 ha), planted forest (8,359 ha) and non-agricultural area (54,025 ha).

Much arable land has been alienated to housing and industry due to increases in population and, as a result, considerable farming activity has shifted into marginal lands, especially sloping marginal lands, as is evident in the sugarcane-growing areas. This has led to increasing public awareness and concern in Fiji regarding land use and the need for a national land use plan (Leslie and Ratukalou 2000).

Land use in Fiji, as elsewhere, is dynamic and responds rapidly to changing market demands, land productivity, public policies, social pressures, pests and diseases, and other natural calamities such as flood, droughts and cyclones. According to Otanez and Tubuna (1992), the following changes in land use took place in the period from 1968 to 1991:

- The number of farms increased by 280%, from 33,500 to 95,400.
- Land used for agriculture increased by 240%, from 242,500 ha to 591,407 ha.
- The cultivated area increased by 59% in absolute terms, from 145,000 ha to 231,000 ha despite declining by 24% in the decade to 1978, but declined in relative terms, from 60% to 39% of farmland area.
- The area under pastures increased almost fivefold, from 37,000 ha to 133,000 ha.
- The average size of farms decreased by 14%, from 7.2 ha to 6.2 ha.

From these figures, it is apparent that more and more people have turned to the land for a living. With almost complete utilization of first-class arable land, the current expansion of agriculture into marginal hill areas and steep land will continue. This is an alarming situation given the smallness, geographical harshness and land ownership realities in the country. It is exacerbated by unsustainable production practices and rare application of soil conservation measures, outlined in section 2.

The alienation of agricultural lands to non-agricultural activities such as housing, industry and urban infrastructure also continues. This growth of alternative non-farm uses has increased the competition for land and intensified its use by farmers. The small size of farm holdings (60% are now less than three hectares) also forces farmers to undertake intensive cultivation, often monocropping, for high-output, short-term production without, or with only minimal, fallow periods (Leslie and Ratukalou 2000). Low-input subsistence farming operations are increasingly being forced onto steeper slopes with the expansion of cash cropping and grazing operations onto flatter more fertile arable lands (Craswell et al. 1998). The dependence

on the sugar industry with its internal quota and incentive system further encourages farmers to move onto steeper slopes. Soil-loss measurements clearly demonstrate that the agricultural productive base in many sugarcane-growing areas and steeply sloping ginger production areas is being eroded at a rate that is well above what would be regarded as economically acceptable (Leslie and Ratukalou 2000).

MAFFA's policy for the sector is set out in the CDF project document. The priority commodities in the CDF are (i) crops – coconuts, ginger, taro, kava, fruits (papaya, mango and oranges) and vegetables (hydroponics); (ii) livestock – beef, dairy and sheep; (iii) fisheries – brackishwater culture, mariculture, fresh water aquaculture, in-shore fisheries (resource management), off-shore fisheries (resource management); (iv) forestry – hardwood plantation development, value-adding wood use, resource management and logging, and eco-tourism development. Rice and cocoa, past priority commodities, have been dropped from the CDF programme. Given the past experience of such programmes, MAFFA has set extremely ambitious medium-term output targets that it expects to be achieved as a result of the expenditure programme. For example, the target for the coconut sub-sector is to replant 40,000 hectares of existing senile trees with high-yielding hybrid coconut varieties. The substantial response required from farmers is unlikely to be forthcoming given the low returns from producing copra and shortages of labour in the main areas of coconut production. Overall, the CDF was projected to increase the value of agricultural production by F$45 million per year over the period 1997-2000. The projected increases for the fisheries and forestry sub-sectors were F$119 million and F$25 million, respectively.

Rural poverty alleviation and employment generation are complex, inter-related and often paradoxical processes. Commercial farmers find labour in short and irregular supply and of low productivity. This is partly caused by the demands on rural people from subsistence agriculture, which inevitably has first call on their time, but also because rural Fijians generally do not have an acquisitive nature. People clearly value their own time almost as highly as the market rate for their labour. Agricultural planners need to recognize that in substantial areas of rural Fiji, particularly the traditional coconut production areas, there exist genuine labour shortages, rather than a problem of unemployment. The outer islands have been characterized by significant depopulation over the past decade. Yet where market access constraints are removed, farmers have shown to be responsive in planting crops that give a high return to their labour resources. Traditional food crops are amongst those that give the highest returns to labour input, which bodes well for food security.

As a small island economy, Fiji faces obstacles in the agricultural development process that are not present in larger countries. It is inherently less diversified, which makes it more vulnerable to both internal and external shocks. With a small population, economies of scale are difficult to achieve in domestic markets and investment in infrastructure more costly and often uneconomic. Superimposed on the problems of smallness, Fiji is relatively geographically isolated, is prone to natural disasters, and operates under a land tenure system that constrains the availability of land and its productivity. However, there are offsetting advantages that stem from climate, location, a relatively pest-free and unpolluted environment, natural beauty, and an ability to grow a wide range of nutritious traditional foods. The appropriate long-term agricultural strategy should be focused on minimizing the disadvantages of size and isolation and maximizing the advantages of location and environment. The areas that best satisfy these requirements are traditional food production and high-value niche exports. With suitable conditions in the right locations, these are the crops that can give the highest returns to farmers' land and labour resources, and provide the greatest possible level of food security.

The government is responsible for ensuring a stable food supply, largely through the activities of MAFFA. For a narrow agro-based economy such as Fiji, domestic production to ensure food security is not only a function of the production of agricultural products but also of risk management. In this light, food security can be regarded as one aspect of the multi-

functionality of agriculture that makes the government accountable for stable domestic agricultural production.

The food security agenda is hence one of the primary areas of corporate policy responsibility for MAFFA. It needs to focus on food supply at all times and high-quality fresh food products biased towards easy market accessibility attracting premium prices and long shelf-life qualities.

The policy emphasis of food security is greatly influenced by the agricultural policy paradigm shift of the government. Four examples follow.

- Food security activities were prominently visible in the self-sufficiency and import substitution policy orientation in the late 1980s and early 1990s. They were somewhat diluted, in terms of resource allocation, in the export-led growth policy of the mid 1990s when domestic food supply was assumed to be sustained as a spin-off from increased export growth. Food supply did experience growth (availability and accessibility improved significantly), but the issue of power to access food (affordability) was in the forefront of discussion. The increased cost of the "basic food basket" led to food preferences being diverted to cheaper imported processed foods away from fresh traditional foods. Food quality was believed also to have improved since quality standards were aligned to the importing country standards and domestic price structures were also competitive with overseas market prices in line with the CDF outcome platform.
- Promotion of traditional subsistence crops became a key part of the CDF in terms of tapping the "hidden strength" of the subsistence sector.
- Food security activities became more prominent, with a programme of "A New Beginning" to enter the new millennium. The policy thrust of MAFFA now focuses on a balanced agricultural diversification programme, encompassing export-led growth but with greater emphasis on the multi-functional roles of the agricultural sector. These roles comprise food security, poverty alleviation, employment generation, human resource and gender development, and preservation of land and the environment.
- MAFFA's foremost priority stances to the World Trade Organization (WTO) Round of Negotiations are to prolong the time frame of WTO implementation compliance for a further 10 years in terms of tariffication levels, alignment of food security programmes and the CDF/agricultural diversification programme towards a WTO-consistent "green box" provision package, and the multi-functional roles of agriculture – WTO exemption provision.

The two main WTO agreements that have an impact on trade in agricultural products, and which are handled by MAFFA's WTO Desk, are:

- an agreement on agriculture, in the key sub-areas of market access, domestic support measures and export subsidies; and
- an agreement on sanitary and phytosanitary measures, in the key sub-areas of fuller notification in pest risk assessment, informal barriers in the name of quality standards and harmonization of quarantine protocols with trading partners.

5.2.2 Agricultural and food exports

The development of agricultural and food exports is a potentially important measure to secure affordable food imports to ensure national food security. It entails the application of the law of comparative advantage, in that Fiji produces and exports those agricultural and food products in which it has a comparative advantage, and imports those food products in which it has a comparative disadvantage.

Statistics on trade by commodity in 1998 show that food items (including sugar) made up 63% of the total exports. The total export value generated from the CDF commodities for the year was approximately F$295 million, an estimated increase in revenue of F$185 million over

the 1997 export value (Bureau of Statistics 1998b). The fisheries sector contributed 61% of the total export revenue generated from the CDF commodities.

Some product growth opportunities have been identified based on Fiji's comparative and competitive advantage relating to climate, location, economy and environment. They include: fresh fruit (pineapple, papaya and mango); processed fruit (pineapple, papaya, mango, banana and guava); root crops (fresh and processed ginger, Colocasia taro, Xanthosoma taro and yams); spices and herbs (vanilla, turmeric, pepper, basil, thyme, etc.); kava; floriculture (anthuriums and orchids); coconut products (coconut cream, timber, speciality oil, activated carbon); cocoa (speciality); coffee (local market and organic); vegetables (eggplant and cucurbits such as watermelon, rock melon and zucchini); handicraft raw materials; and certified organic products.

High-value agricultural export opportunities can usually be exploited only with reasonable access to the international seaports and airports, and to tourist resorts. This means that to a large measure the focus of commercial agricultural development will continue to be on Viti Levu. Vanua Levu, Taveuni and other larger nearby islands do have some opportunity to share in these developments, and the creation of a port of entry at Savusavu would enhance these prospects. However, the outer islands, with expensive and infrequent shipping, have no competitive advantage in exporting agricultural products. Some farmers will continue to generate a meagre cash income from making copra so long as coconut oil continues to be manufactured. High-value non-perishable crops such as vanilla can provide opportunities in selected locations. However, there appears to be little point in significant resources being devoted to developing export agriculture in the outer islands. Apart from subsistence production, the focus should be in areas such as non-perishable marine products, "import substitution" agriculture for the island community, handicrafts and handicraft raw materials, and eco-tourism. It is of note that the combined value of trochus shell, beche-de-mer and mother of pearl shells in 1994 was F$3.5 million, which was almost equivalent to that of coconut oil. The cash economies of the outer islands are increasingly characterized by remittances from Viti Levu. Lack of disposable cash, together with the high cost and infrequency of inward shipping, provides a significant problem to agricultural commercialization in the outer islands.

Copra, the traditional cash crop of Eastern Vanua Levu and the outer islands, experienced a decade-long overall decline, with only a limited revival in the past two years. World prices for coconut oil were unfavourable on average, and the financial viability of the sector relied heavily on the intervention price mechanism supported by the government. The decade saw the industry surpassed by ginger, kava and taro as an export earner. A number of attempts have been made to diversify the industry, but with little success. Copra production varies with price, so the trend continues to be downward. In 1993 it hit an all-time low of 10,000 tons and the value of oil exports fell below F$4 million. Much of the total area under coconuts (65,114 ha) has been abandoned. The proportion of total area under "pure stand" has fallen by over 70% since the 1968 census, and the Coconut Board has estimated that 60% of bearing coconut trees are considered senile and in need of re-planting. However, two events have occurred since 1995 that offer the industry some encouragement. First, a cyclone in 1995 negatively affected production in the Philippines, which led to a price revival but it was short-lived. Secondly, in early 1998 the buying market price was deregulated by allowing an Australian-based company to purchase and export copra direct. This has led to a price war with buying prices reaching F$600 per ton, which is 50% more than the minimum price set by the Coconut Board. It is unsure how long these high prices will last. These events have seen an upturn in production.

Cocoa that was grown in all divisions achieved a high of 406 tons of dry beans in 1990, but exports have now almost disappeared. The declining world market price, and the high marketing margins of the sole, government-owned buyer (NATCO) yielded very low average farm-gate prices despite government price support. The policy of NATCO as the sole exporter was abandoned in 1993, along with government price support. Cocoa is a good example of a commodity that has failed to succeed despite large and long-term investments from government

in production, processing and marketing. Its failure has been due to the absence of competition in marketing mechanisms, and an over-emphasis on production, rather than quality and marketing efficiency and effectiveness. It is only now that the government has moved from a controlling to a facilitating role for the private sector that there are some prospects of recovery. Export prices have recently increased substantially.

After many disappointments, horticultural and niche export market crops are now the fastest growing part of the agricultural sector. There are few published summary statistics, but Quarantine Department data now show an impressive array of products exported to a range of markets. The development of the three most important crops on this list (ginger, taro and kava) has been entirely driven by the private sector.

Ginger, grown in high rainfall areas close to Suva, has been the most successful. The value of total production increased to F$6.4 million in 1990, becoming the second most important export crop. It is estimated that there are 800 farmers growing ginger. However, recent problems with disease (fusarium rot) and farmers shifting resources to taro resulted in a decline in production with the value of the industry falling to F$1.5 million in 1994. Exports were valued at F$1.7 million in 1998. The practice of growing ginger on steep slopes has created problems with loss of topsoil and associated siltation of the river systems. However, economic pressure is now pushing ginger production to flatter areas where land preparation can be mechanized.

Taro has now surpassed ginger as the second major export earner, with the value of exports almost trebling from F$5.5 million in 1994 to F$14.3 million in 1998. Farmers and exporters responded to the high prices on offer in New Zealand and USA resulting from the loss of exports from Samoa due to taro leaf blight disease. Around 70% of export taro now comes from Taveuni.

Yaqona has now also surpassed ginger as an export earner. The value of exports in 1997, mainly to the German pharmaceutical industry, totalled F$3.4 million. Yet it showed a dramatic increase of F$33 million to F$35.7 million in 1998. Kava is the most profitable crop grown on any scale in Fiji (McGregor and MacCarney 1995). It is an industry that receives scant recognition in national statistics, yet plays a fundamental economic role in transferring income from the sugar industry and urban areas to growers with fertile land in mountainous and coconut areas.

Fruit purees processed by South Pacific Foods, owned by the large French food and beverage company, SIAS-MPA, and Pernod Ricard, have expressed strong growth in recent years. Its factory is in Sigatoka and it sources raw material from small farmers in Tailevu/Naitasiri (bananas), the upper Sigatoka Valley (guava) and Ba (mango). Currently, around 1,000 tons of frozen product (valued at approximately F$1 million) is being exported to markets in Europe, Australia and New Zealand and a trial shipment has been sent to USA. These products recently acquired organic certification, enhancing their marketability.

International markets are only interested in the products of a small producer when there is something special on offer – be it a seasonal window, premium quality, or a perceived contribution to good health and environmental sustainability. Fortunately, Fiji has important inherent advantages in the production of certain high-value products that are in demand. These factors are now discussed briefly.

Isolation has meant relative freedom from major pests and diseases. This enviable quarantine status has given access to some markets from which competitors are excluded or restricted, such as mango and papaya exports to Japan. It needs to be rigorously protected and exploited. MAFFA has taken the lead to implement measures to capitalize on and safeguard this advantage by supporting the South Pacific Regional Fruit Fly Project and facilitating the transfer of non-chemical quarantine treatment technology to the fresh fruit export industry. This project has placed Fiji in a position to negotiate quarantine agreements with importing countries. Verifiable data can be presented on what fruit flies are present, their distribution and host status.

Importing countries require maintenance of these data and resources will have to be made available for quarantine surveillance, field control and developing quarantine treatments.

The greater emphasis on high-value export development has increased the demands on the Quarantine Section in MAFFA. Fiji has become signatory to WTO, which places the onus on scientific justification for phytosanitary measures. Yet the service is having difficulty satisfactorily meeting current requirements as shown by the ongoing problems of eggplant shipments to New Zealand and exports of chillies and mango to Australia. Increasing numbers of bilateral quarantine agreements will need to be negotiated and enforced; regulatory supervision of the operations of the HFTA facility is required; quarantine rules and regulations that minimize risk but facilitate trade and allow farmers access to improved seeds need to be formulated and implemented; and public awareness on the need for quarantine must be developed. To meet these demands, plans are underway to strengthen and reorganize the Quarantine Section into a modern service by making it a division in its own right.

Being strategically located in the southern hemisphere provides producers with opportunities to be off-season suppliers of a range of horticultural products. Examples of seasonal opportunities already being exploited, and with scope for further expansion, are fresh ginger to North America, mango to Japan and eggplant to New Zealand.

Direct transportation linkages exist to major Pacific Rim markets. Fiji's produce exporters have direct air links to Sydney, Melbourne, Auckland, Los Angles, Tokyo and Seoul. High air freight rates, particularly to Japan, pose a constraint that needs to be addressed. Markets in New Zealand, Australia and the west coast of North America are well served by frequent and competitive shipping services. A subset of these large and affluent urban markets is some half a million loyal Pacific Islander consumers whom Fiji is best placed to serve.

Fijian products have duty-free access to all these markets under various trade agreements: Australia and New Zealand (the South Pacific Regional Trade and Economic Cooperation Agreement – SPARTECA); USA and Japan (General System of Preferences); and countries of the European Union (the Lomé Convention). However, with movement toward freer world trade in agriculture, the value of duty-free access is declining.

Hawaii provides an example of exploiting linkages with tourism. Its development of large papaya and floriculture export industries was a direct by-product of the outward freight capacity at reasonable cost created by tourist arrivals. For some high-value products, tourism can provide a domestic demand base upon which an industry can be established. Hawaii's macadamia nut industry, the largest in the world, is built around export via the suitcases of tourists. Supplying hotels is the basis of Hawaii's anthurium, orchid and other floriculture industries. The kona coffee industry is based entirely on selling the ambience of Hawaii to visitors and former visitors. Tourism presents Fiji's diversified agriculture with similar value-adding opportunities for flowers and packaged products such as spices.

Environmental and health concerns need to be set against these advantages. As indicated in section 2, some current land use practices pose serious environmental concerns. Yet there is an opportunity to develop markets based on environmental sustainability that capitalizes on the increasing health concerns and environmental awareness of consumers in importing countries, notably in Europe and Japan. Success in this endeavour can lead to improved national food security by raising the capability to import food.

Fiji has six distinct advantages in developing significant industries based on certified organic products:

- A general market perception of Fiji (with some justification) as possessing an unpolluted and relatively unspoiled environment.
- An opportunity to build on, and market, existing traditional and sustainable organic production systems.
- High demand for certain products that are technically feasible to produce organically in Fiji (sugar, cocoa, fresh and processed fruits, coconut products and spices).

- Locally available resources (e.g. "mill mud", the residue from the clarifier in sugarcane processing) to provide sufficient nutrients to produce quality products organically.
- A non-chemical (high-temperature forced-air) quarantine treatment that will allow the export of organic fresh fruit.
- Willingness of donors to provide technical assistance to support organic agriculture.

In the new trade environment, the terms of trade can be expected to continue to move against bulk commodities as the demand for these commodities grows slowly relative to world income (Thirlwall 1991). In contrast, the demand for goods such as horticultural products and speciality foods, and sophisticated services such as tourism, can be expected to grow rapidly compared with world income (Rae 1995).

Profitable opportunities have been identified for Fiji in exporting certain high-value niche products. However, such products are not new to Fiji. More significant examples are fresh ginger to North America, mangoes to Japan, taro to New Zealand, eggplant to Canada, coconuts to Australia, organic banana puree to France, kava to Germany, and *voivoi* (prepared pandanus leaves for mat weaving) to Hawaii. The lesson from this long experience is that marketing, and not markets per se, has been the major constraint. Quality and continuity of supply are seen as marketing problems and, for high-value exports, they are the hallmarks of success, even more important than price competitiveness.

Fiji has developed a not altogether undeserved reputation as a "land of samples" (McGregor 1995). Sustained high-value product market development for export and hotel supply requires the product to be in the hands of the buyer in the amount required, when required and on a continuing basis. As the recent experience of pineapple exports to New Zealand shows, meeting the uncompromising and unforgiving supply demands of the market has been more of a problem for Fiji's exporters than identifying markets. Bulk commodities sold to spot markets are far less demanding.

Some so-called niche market opportunities in the context of the importing country can be large, and initially unrealistic, for a small producer like Fiji. A recent marketing study for Fijian minimally processed fruits, reported by McGregor (1995), revealed the extent of the problem. Product samples were shown to food service companies and distributors in Australia, North America and Japan. The product has some unique advantages and strong interest was shown by a number of buyers. The response of Karen Holzberg, President of KHI International (USA), a large dealer in imported frozen fruit products, was typical according to McGregor. She indicated that her company "would be interested in handling 10 to 15 sea freight containers of purchased pineapples and mangoes per month if the price was right and the quality could be assured". Fiji is fortunate to have access to the smaller New Zealand market, which can provide an initial bridge to larger markets by allowing demand to grow in line with supply.

Past experience has shown that high-value export markets cannot be developed and sustained in Fiji with small exporters securing supplies from farmers in an informal and ad hoc fashion (Eaton 1989). Larger-scale commercial plantations could be a solution and should be encouraged if they bring with them the technology and capital for industry development. An example is the improved-variety mango plantation adjacent to Nadi airport owned by Tailevu Development Ltd. However, the availability and distribution of land means that such developments are likely to be the exception. By necessity, production will be largely based on smallholders. Exporters are now offered substantial fiscal incentives to expand export production.

5.2.3 Agricultural support services

Key research support services are:

- genetic improvement activities (improved plant varieties, livestock breeding programme and performance improvement);
- pest and disease control and management activities;

- an improved package of management practices;
- planting material supply;
- mechanization upgrading;
- better land use management and farming systems research and development;
- resource replenishment (e.g. re-stocking marine reef food resources); and
- a food technology programme and post-harvest technology (notably, in handling and storage).

Important key areas of extension support services include:

- strengthening food production systems development;
- identification of markets and improvement of marketing systems in partnership with private sector players;
- quality control development, notably Codex Alimentarius principles;
- capital structural development, such as roads, drainage and equipment;
- disaster rehabilitation programme;
- small-enterprise development to empower rural households, in particular;
- incorporation of gender issues in agricultural development programmes, such as the household food security programme;
- support to agro-processing entities, particularly funding assistance; and
- to act as a focal point in the implementation of FPAN.

Major general policy support services cover:

- WTO implementation compliance variance;
- World Food Summit policy implementation;
- quarantine services;
- environmental preservation and rehabilitation programmes;
- human resource development; and
- disaster preparedness and rehabilitation.

5.2.4 Agricultural product marketing policies

The following nine recommendations were addressed to policy makers, donors, technical assistance agencies and those involved in agricultural marketing in South Pacific developing countries at a recent regional workshop on food security. They are relevant to the development of food product marketing systems in Fiji.

1. Farmers are becoming more market-oriented in supplying domestic markets with roots and tubers, horticultural produce and other foods, but production remains a major constraint. Supplies are inadequate, prices are high and production tends to be seasonal. The government and NGOs could assist farmers to increase the regular supply of local produce for domestic markets and the increasingly important tourism market by:
   - making available the necessary knowledge about existing and new crop production techniques and out-of-season cultivation;
   - encouraging the private sector to stock the right varieties of seeds, planting material and other supplies;
   - improving extension in production, post-harvest handling and marketing; and
   - working directly with commercial farmers, traders and others to promote improved farming techniques.
2. It is important, however, that governments and others remain fully aware of the social, cultural and nutritional constraints to a greater market orientation, and bear these in mind when planning production and marketing development activities. It is also important that governments ensure a realistic allocation of resources between domestic

and export production support, giving prime emphasis to food crop production and the food security needs of the Pacific island countries.

3. Good-quality market infrastructure can play an important role in promoting efficient marketing of domestically produced crops, and markets can often act as focal points for local communities. Governments, and more importantly municipalities, need to be aware of this and ensure that urban and rural markets are adequate and planned in association with the market users, and that revenue raised from market fees is reinvested in market development. The upgrading of transport infrastructure is vital. Governments should seriously re-examine the merits of subsidizing export producers during periods of low world prices and compare the impact of such subsidies with the alternative of spending the available funds on infrastructure and other developments. The workshop stressed the need for the countries themselves to take the lead in improving infrastructure.
4. The benefits of providing farmers with timely market information are considerable. Farmers should be provided with market information on both domestic and export markets. It was recommended that the information provided should cover matters such as price, supply, demand, production prospects and economic returns. The need to ensure effective dissemination was stressed, and radio is considered the best means for this. But it is not sufficient just to provide information. Farmers, through extension services and other channels, must be assisted to interpret market information in order to make informed marketing and planting decisions.
5. Training in marketing at all levels is essential. FAO, and relevant regional agencies, were requested to provide training support for farmers, traders, extension workers, market managers and exporters in areas such as post-harvest handling, pest and disease management, and business management.
6. Marketing is a legitimate extension function and government extension services should establish marketing extension units. At the same time, new approaches to extension need to be explored, such as the provision of extension by industry organizations and the private sector.
7. Improved communication between those involved in marketing and governments should facilitate a greater partnership between government and the private sector. The development of farmers', traders' and exporters' associations was highly recommended.
8. Greater cooperation on export marketing is desirable, both within countries and between countries. Initially, it is vital that all outstanding quarantine issues be resolved and approached on a regional basis, under the umbrella of relevant regional agencies. In the long run, there may be scope for collaboration between countries to supply the major export markets.
9. It is important to note that export markets for agricultural produce are growing increasingly competitive. To ensure that countries in the South Pacific region survive in this competitive environment, governments were recommended to:
   - make efforts to improve the quality of agricultural produce exported from the region, both for traditional and non-traditional export crops, through improved extension, industry regulation, primary processing support and export inspection;
   - separate their quarantine organizations from their quality control organizations;
   - ensure that crops recommended for development or expansion can conveniently fit into the cultural and farming systems of their countries;
   - ensure that farmers and traders are fully aware of the requirements of the markets in terms of quality, quantity, continuity, packaging, labelling, etc.;
   - ensure that they are able to make available support services such as plant protection and, in the case of organic farming, facilitate necessary certification;
   - rapidly establish bilateral quarantine agreements with relevant countries;

- develop updated lists of pests and diseases for each country in association with relevant regional agencies;
- promote the acceptance by other countries of the "non-host" quarantine protocols of the type agreed with New Zealand;
- allocate resources to the development of domestic skills in areas such as pathology;
- explore further the possibilities for production of niche and off-season markets in association with relevant agencies; and
- improve technical knowledge of handling, shipping temperatures, etc.

Finally, it was felt that the topic of agricultural marketing needs to be discussed in a comprehensive way in the region, in recognition of the increasing importance which is now being given to the development of market-oriented agriculture and the importance of agricultural marketing for food security. Where possible, regional programmes to address the above recommendations should be encouraged, although it was recognized that the considerable diversity of agriculture within the region means that problems would also have to be addressed on a national level.

5.3 Activities of the National Food and Nutrition Committee

The current National Food and Nutrition Policy was adopted by Cabinet in 1982 as an outcome of the first National Nutrition Survey in light of the planning processes in the Eighth Development Plan period in which nutrition was given prominence. The overall aims of the policy are to:

- reduce dependence on imported food and increase domestic food production;
- reduce incidence of nutrition related problems in vulnerable groups;
- continue nutrition education programmes for the general public and extension agents;
- continue to advice implementing agencies on food and nutrition matters.

In support of these policy goals, the strategies to be undertaken were:

- encouragement and promotion of more food production;
- provision of adequate food safety legislation;
- provision of food and nutrition education and training; and
- improvement of health environment and planning.

NFNC was formed in 1980 and comprises government departments and NGOs concerned with food and nutrition matters. NFNC, through the Ministry of Health, is charged with the responsibility of co-ordinating all government and NGO efforts aimed at implementing food and nutrition policy. The Committee undertakes nutrition, food and health surveys, compiles food balance sheets, and prepares educational material on food and nutrition. FPAN is implemented by NFNC.

With the government now committed to develop FPAN, the NFNC Secretariat is the appropriate body to undertake its development and coordinate and monitor its implementation. Therefore, the role and functions of the NFNC Secretariat should be strengthened to undertake this task effectively. They would be to: focus on the priorities set out in FPAN; service a high-level committee of representatives of ministries to coordinate its implementation; provide expert food and nutrition advice to the government and its ministries; conduct research, including pilot surveys; and monitor and report on the food and nutrition situation and the implementation of FPAN. The scientific expertise in NFNC needs to be strengthened and its activities reviewed in light of its changing role and functions. Some of the current activities of the NFNC Secretariat would be more appropriately undertaken by other agencies, such as nutrition education by the National Centre for Health Promotion.

In its role of coordinating food and nutrition development in Fiji, NFNC has the resolve that Fiji's people must be able to buy and plant their own food on the premise that food is a key to health.

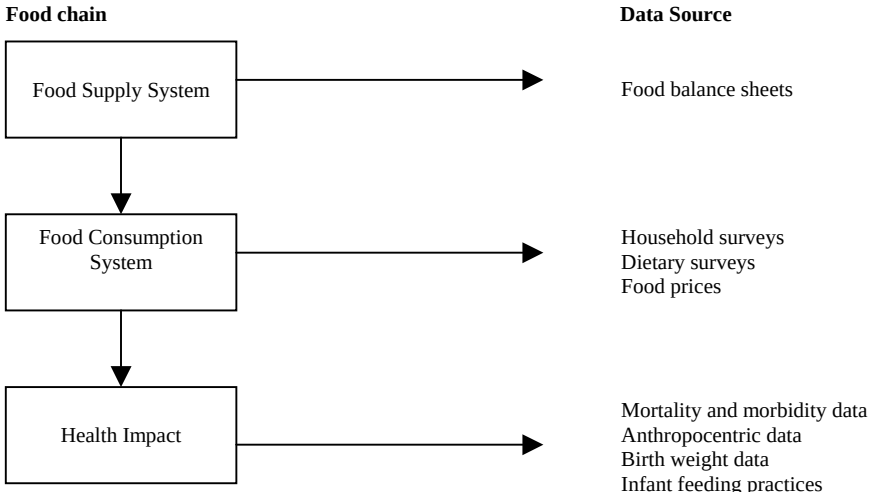
5.4 Food security and nutrition surveillance

Food security and nutrition surveillance means monitoring or finding out what changes occur over time in the population. This is done in order to make relevant and timely decisions about how to improve or prevent the worsening of the food security and nutritional status of the population. The governments needs information about the food and nutrition system and its impact in order to formulate policies and programmes in health, agriculture, fisheries, trade and social welfare. They have to ensure that:

- the food supply is adequate to meet the nutrient needs of the people;
- the food supply is safe to consume;
- an adequate food supply is accessible to all segments of the population; and
- if there any evidence of nutrition-related problems, the problems need to be identified along with the segments of the population in which they occur and the major risk factors associated with them (Rutishauser 1997).

In order to achieve the above, governments collect information similar to that outlined in Figure 5.1. The kinds of data used for monitoring food and nutrition status are mainly those routinely collected at a national level, usually for administrative purposes (Rutishauser 1997). The principal sources of such data are national statistics on food supply and expenditure, vital statistics, hospital records and other health and community service records.

Figure 5.1 Primary sources of data for a food and nutrition monitoring system.



Source: Rutishauser (1997).

These sources provide information that can be used as a guide to the overall food security, health and nutritional status. The principal advantage of routinely collected data is that they can be used to monitor trends that can be related to changes in diet, socio-economic status and other environmental factors (Rutishauser1997). From time to time, routinely collected data are supplemented with information from health, nutrition or food consumption surveys to address specific issues and/or to provide direct measures of the food intakes and the nutritional

status of the population. The essential features of a national food security and nutrition monitoring and surveillance system should be for data collected to be:

- relevant to the food security and nutritional problems encountered;
- available to decision makers within a reasonable time frame;
- available on a regular basis;
- collected by standard methods to enable trends over time to be established;
- presented in away in which they are readily understood;
- capture the interests of those responsible for policy decisions; and
- able to be used to address issues that have the potential to be changed by policy measures.

The policy and planning activity involving national food and nutrition systems shows that governments are seeking to understand and control factors influencing the supply of foods to the people. Understanding causal factors leads to decisions for intervention. Information on the change in food security and/or nutritional status of the population is then gathered to measure the success or failure of the interventions. Using this information leads to further decisions, and so the cycle of surveillance continues. In most cases, the longer the surveillance cycle, especially between the collection of data and feedback to decision makers, the less likely decisions and corrective action will be taken in time to be effective.

The purpose of nutrition surveillance is to facilitate pertinent and timely action, not merely to generate data (Habicht and Pinstrup-Andersen 1990). The accumulation of data, no matter how valid or sophisticated the methodology for collection, will not improve food security and nutrition if it is not used in making decisions for action. The link between collected data and action differentiates nutrition surveillance from mere data collection.

A nutritional or food security indicator is a measurement, or combination of measurements, used to reflect the health and well-being of a population or to predict the consequences of food insecurity for nutritional status. Indicators for a food security and nutrition surveillance system usually measure the different stages in the food chain, as shown in Figure 5.1, which are also the three components of food security, namely, adequacy and safety of food supply, consumption (accessibility) of food and nutritional and/or health impact (utilization). For example, the weight for age of children 0-5 years is commonly used as a measure of the nutritional status of children. Food purchases and food consumed are indicators of food consumption while food balance sheets measure adequacy of food supply at the national level. Questions that need to be asked about each selected indicator for the food security and nutrition surveillance system are:

- Is it valid (does it measure what you want it to measure)?
- Is it reliable (what are the sources of mistakes and how great would they be expected to be)?
- Does it represent what is really happening in the community (is the indicator measured on a representative sample of the population)?
- What is the cost of measuring the indicator, in terms of staff time, transport and other costs?

There are several decisions that should be made in Fiji. For nutritional status indicators, for example, there is a need to identify a reference/standard population and appropriate cut-off points that will be used to define such conditions as underweight, overweight, and average or normal weight for children and adults. For food supply data, the government in Fiji would have to set the minimum per capita supply of food below which populations are at an increased risk of food insecurity and, ultimately, poor nutritional status. For nutrient intakes, what recommended dietary allowance is appropriate for the population that would define low energy or protein intakes?

In addition, each indicator selected for a food security and nutrition surveillance system must have critical limits or “trigger levels” so that it is clear at what point action needs to be

taken. For example, at what point do we say the proportion of overweight children is "very high" so as to merit public health intervention? These trigger levels need to be appropriate for the conditions in Fiji, in terms of resources available to take action, previous experience, etc.

5.5 Mitigating the impacts on food security of natural disasters

A number of studies have indicated the relatively high level of vulnerability of developing Pacific countries to natural disasters. The factors leading to this vulnerability are summarized by the World Conference on Natural Disaster Reduction (1994):

- proportionally high disaster impact;
- fragile island environments;
- scattered and isolated communities;
- urbanization and population pressures; and
- degradation of traditional coping measures.

To this list should be added:

- increasing environmental degradation.

Evidence of the impact of natural disasters on these economies can be gleaned from macroeconomic indicators such as GDP growth following a major cyclone. For example, Benson (1996), in her recent comprehensive study of the impact of natural disasters in Fiji, concluded that severe natural disasters constitute major exogenous shocks, resulting in substantial declines in GDP.

There still remains a surprising resilience of small economies such as that in Fiji to natural disasters, particularly cyclones. Traditional Fijian societies evolved cropping systems and coping mechanisms to deal with natural disasters such as cyclones and drought. All indications are that these traditional agricultural systems provided a high level of food security. Economic and social change, particularly since the Second World War, has seen significant adjustment in these agricultural systems. Yet, in varying degrees, many of the components of traditional cropping systems remain in place. As the Fiji case studies by Benson (1996) show, traditional coping mechanisms continue to be an important force mitigating the adverse impact of disasters. However, overall, economic and social change has brought with it less food security and greater vulnerability to disasters.

In some countries, land tenure distortions have created substantial inequities in the distribution of land and, with it, variability in vulnerability to natural disasters. In Fiji, with a low overall population density, such disparities are most marked with no rational relationship between the number of cultivators in any one traditional landholding unit and the amount of land available to them. Landless rural communities in Fiji who depend on the sugar industry for employment were identified as a particularly vulnerable group. As a result of rapid urbanization, poor people living on the margins of the towns are particularly ill equipped to handle a natural disaster such as a major cyclone.

The ecological environment in which most Pacific island rural communities live is far from marginal. Most rural people have access to good-quality land resources and live in areas of low population densities, although the atolls of the region are an important exception. However, recent decades have seen the adoption of non-sustainable practices, and other unfavourable developments that increase the communities' vulnerability to future natural disasters. They include:

- unsustainable commercial logging, which reduces the capability of the forest to serve as a food store;
- unsustainable cropping practices on slopes;
- an increase in the uncontrolled pig population;
- unsustainable land clearing of forest for kava planting;
- increasing incidence of indiscriminate burning and soil erosion;

- pollution of ground water;
- shorter crop rotation with increasing importance of cassava;
- declining importance of cultivated yams; and
- a decrease in the wild yam population.

Actions to prevent further increases in vulnerability to natural disasters should cover the following three sets of programmes implemented by MAFFA. First, MAFFA is to implement programmes to reduce flood risks that may result in damage to agricultural crops, livestock, infrastructure and human life. These programmes include an increase in the flood discharge capacity of rivers by dredging, coastal protection through the construction of sea defences, and protection of river banks.

Secondly, MAFFA will implement programmes to improve agricultural land quality, quantity of output and agricultural productivity. Irrigation and drainage systems will be constructed to improve the production of food crops and livestock. An effective maintenance programme will be implemented to service existing irrigation and drainage schemes. An effective water management scheme will be implemented to counter the effects of drought.

Finally, MAFFA will continue its programme of support for regional development. Provisions will be made for the construction of access roads to farms, markets and agricultural growth centres. Village life will be improved through better drainage. Coastal villagers will be protected from erosion damage.

6. Household and Individual Food Security

6.1 The key role of the family in ensuring food security in Fiji

Six years ago at the National Summit of the Family, His Excellency Ratu Sir Kamisese Mara, then President of the Republic of the Fiji Islands, gave an inspired address entitled "The Family – a nation's guarantee for success and survival and a formidable insurance against undesirable and destructive forms of existence and governance". I share with Ratu Sir Kamisese Mara the belief and conviction that healthy families make up a healthy and successful nation. With this belief at heart, it is most unfortunate that most of the work on food security and data analysis on nutrition continue to focus on the national level with very little effort directed towards the household or family unit. However, the Nabaka Home Garden Project and recent household surveys on food security and nutrition conducted by NFNC provide the basis for the analysis of household food security.

The real wealth of any nation is its people whose development is the most important aspect of social and economic development. Human development has two dimensions: human resource development and human resource utilization. Human resource development is the formation and development of capabilities through good health, knowledge and skills. Human resource utilization is to ensure that these acquired capabilities are put to productive use. Achieving the necessary balance over time between human resource development and the full utilization of the acquired skills constitutes human resource planning.

Nutrition in Fiji is more a qualitative than a quantitative problem. As discussed in section 2, this is due to the trends in urbanization and sedentary life styles, and changing dietary patterns away from a traditional diet high in energy, fibre and nutrients to one dominated by refined carbohydrates and processed food. These trends have brought with them serious problems of overnutrition, and increased incidence of obesity and NCDs.

6.2 Household food availability

6.2.1 Overview

Until 50 years ago, sufficient quantities of their traditional foods were readily available as Fijian households had excellent systems for ensuring a sufficient supply of nutritious food. In those days, modern diseases like diabetes were unknown. The production, harvesting and storage of food crops were planned to provide food for daily meals, with a surplus for ceremonial obligations and storage for times of need. Agricultural production was regulated by a planting calendar that determined the times of year for planting and harvesting.

Following Cession in 1874, the Colonial Government ensured food supply was sufficient by enacting regulations concerning cultivation of Fijian crops. The 1912 regulation states that: "Every adult shall care for 100 bananas, 500 yams, *dalo*, *kawai* or *kumala*. Any adult failing to do this will be fined 2 pounds [F$4.40] or be imprisoned for two months."

Cropping systems changed after the repeal of these regulations in 1960. Farmers grew more cassava, which is a root crop of lower nutritional value than yams and *dalo*. About this time, the serious form of infant protein energy malnutrition, kwashiorkor, became prevalent for the first time. Change in the food production system was thought to be one cause.

The rural Indo-Fijian population traditionally grew sufficient rice, together with some legumes and other vegetables, to feed the family. Milk cows and chickens were also part of the food system. Wheat flour, in the form of sharps, was imported to provide about half of their staple food. In recent years, there has been a noticeable trend for Indo-Fijian people to use more

root crops and coconut in their meals. There is also an apparent reduction in home-based food production.

Rural Fijian households consumed significantly more food items produced by their households than Indo-Fijian households. Whilst 'others' had a similar pattern to Fijians, the sample number was too small to draw definite conclusions.

The pattern in rural areas also reflects traditional dietary differences between each ethnic group, particularly for indigenous Fijians and Indo-Fijians. Indo-Fijian households used more home-produced rice, animal fat and vegetable protein, while Fijian households used more traditional crops, vegetable fat, green leaves and fruit.

With increased trade and economic development, food systems have been changing along with diets. Fiji is no longer self-sufficient in its food supply, as the large and growing quantity of imported foods indicates. The food balance sheet of Fiji confirms that no household is self-sufficient and that the majority of food items consumed are purchased, even in rural areas. This is not surprising as there is now virtually no community that is was without a shop or access to regular transport to a town or city.

A good and varied diet provides people with energy, helps them to grow and helps them to fight off infections. Yet, little investment has been directed at the small farmer who produces a high proportion of food for the domestic market compared with that given to cash crop farmers. This is one reason for the high prices and often poor quality of indigenous food crops sold in urban markets. This situation has encouraged a widespread preference for cheaper and more convenient rice and wheat-based products.

6.2.2 Key role of women in maintaining household food security

Do women really feed Fiji? There is not a single step in the food cycle where women do not feature. Women's contributions are significant in soil preparation, planting, garden maintenance, harvesting, processing, cooking and serving food. In addition, women are playing an increasing role in cash cropping and informal trading. Furthermore, women's handcrafted goods are central to cultural exchanges and are a valuable income earner. Whether in rural or urban areas, business or other professions, women carry the responsibility of feeding their babies and children from gestation to weaning and during the critical growth period. They produce and prepare food for their families. Women play a crucial role in ensuring that households, as well as the whole nation, are healthy and have access to adequate food for all family members at all times of the year.

Rural women, in particular, should be recognized as co-workers in development and be heard on equal terms with men when formulating policies and plans to eliminate poverty. Men must assist women in their efforts to reduce the rate of poverty by planting more food for local consumption.

6.2.3 Quality versus quantity in household food availability

NFNC plans to carry out a large-scale study of fast food outlets to assess the nutritional and economic benefits and costs of eating out. The study will include:

- finding out the prices for the different meal packs;
- determining the nutritional value and nutritional adequacy of the different meal packs, especially the most common;
- determining the satiety value of the meal packs; and
- observing the trend in the popularity of fast food outlets.

Eating fast foods too frequently is often blamed for bad health. The general criticisms are that they have too much fat, salt, sugar and very few vitamins, minerals and fibre. Fast foods bring to mind food from the fish and chips takeaways, pizza, fried chicken, hamburger or those foods typically associated with the overseas image of fast food companies. In Fiji, there are good and bad 'fast foods'. There are Chinese takeaways, curry shops and quick foods like meat

pies, sausage rolls and sandwiches bought across the food counter. There are also the enterprising food vendors who go from office to office selling *roti* and curry parcels, cakes and pies – sometimes on credit to be paid during pay week.

A *lovo* is an important part of the diet of Fijians. It is an underground oven in which meats, fish, vegetables and root crops are baked. *Lovo* food packs can now be ordered and delivered to homes and offices. Many of these foods provide healthy meals, for example meat and vegetable chop suey, and *roti* parcels made with *churaiya* or *tubua*.

The most potent means to maintain high quality of available food is for households to produce their own crop and livestock foods, particularly nutritious staples. MAFFA, District and Provincial Administration and Ministry of Health officials based at Korovou jointly conducted a survey on food security in the district of Vugalei in Tailevu in 1997. The focus was on root crops. The data analysed showed that the number of households surveyed was 218 out of a total population in the district of Vugalei of 1,094. The root crop consumption requirement for self-sufficiency was 463 tons per year while root crop availability was only 154 tons per year, a shortfall of 309 tons per year. Hence, villagers were not secure with root crops.

In comparison, in the National Nutrition Survey in 1993 it was found that 15.2% (140 households) did not grow food at all. The majority of this group were households in urban areas (75%). The reasons given are presented in Table 6.1.

Table 6.1 Reasons for not growing food.

Reasons stated	Urban		Rural		Total	
	Number	%	Number	%	Number	%
No land available	59	56.2	9	25.7	68	48.6
Time consuming	24	22.9	8	22.8	32	22.8
Poor soil	9	8.6	5	14.3	14	10.0
Not interested	6	5.7	2	5.7	8	5.7
Physically unfit for gardening	0	0.0	4	11.4	4	2.9
Difficult to maintain	1	0.9	3	8.6	4	2.9
Just moved in	2	1.9	1	2.9	3	2.1
No one to look after	0	0.0	2	5.7	2	1.4
Others	4	3.8	1	2.9	5	3.6
Total	105	100.0	35	100.0	140	100

Source: National Nutrition Survey Fiji (1993).

More than one-half (56.5%, or 515 out of 912) of surveyed households were raising animals to produce food for household use. The animals raised were mostly chickens, pigs and cattle. Only 26.8% of urban households compared with 75.4% of rural households raised animals. More Indo-Fijian households (63%) raised animals than Fijian (54.7%) or 'others' (21.4%). Most households in all divisions raised animals, namely Eastern Division (78.3%), Northern Division (76.3%), Western Division (64.4%) and Central Division (63.2%). But only 13.5% of households in Suva raised animals as a food source.

A majority of households (53.4%, or 487 out of 912) were growing food and raising animals as food sources. More households were doing this in rural areas (72.5%) than households in urban areas (23.4%). The highest proportions were in Eastern Division and Northern Division, 76.7% and 74.3% respectively, followed by 61.9% of households in Central Division and 59.8% in Western Division. Only 10.9% of households in Suva were doing both.

6.2.4 Effects of the 1997-98 drought on household food availability and nutritional status

The biggest drought of the century, which was triggered by the so-called El Niño phenomenon, was first apparent in March 1997 when the Fiji Meteorological Office started to report below-average rainfalls. The situation steadily deteriorated and, by early 1998, the

sugarcane crop showed stunted growth. Most sites in Fiji, except for Central Viti Levu and the western tip of Vanua Levu, had their driest-ever period from September to August 1998.

Both commercial and subsistence agricultural production suffered substantial losses and, as a result, the food security of vulnerable households became compromised in terms of availability and financial access to foods such as vegetables and green leaves, and staple foods such as cassava, *dalo* and *kumala* (sweet potato), the leaves of which also serve as an important source of micronutrients.

Nine out of ten households surveyed in drought assessment exercises in Western Division reported partial or complete failure of their food gardens and/or subsistence agricultural production. Although major municipal markets continued to have available commonly consumed vegetables and root crops through supply from Central Division and other areas with sufficient rainfall or irrigation, low-income peri-urban and rural households were often unable to purchase these food items. This was because their already low income had been further affected by lack of normal employment opportunities (such as sugarcane cutting), income-generating opportunities such as selling home-grown vegetables, and the relatively high market prices of these commodities. As part of the resulting dietary substitution processes, flour, rice and sugar became the major sources of energy since they have the lowest cost per calorie ratio. However, a diet based mainly on these food items is often lacking in the proteins, minerals and vitamins necessary for a healthy life.

The 1997-98 drought seems to have had an amplifying effect on previously existing malnutrition and micronutrient deficiencies. While there was no widespread severe malnutrition, data from affected areas suggest that the drought had an impact on vulnerable groups, in particular children and pregnant women. Medical records from Western Division show that children under 5 years of age were showing growth problems as 1998 progressed, while primary school students showed a steep increase in iron deficiency. Pregnant women were also affected by nutritional deficiencies, resulting in weight problems (underweight and static weight). Furthermore, the incidence of anaemia rose sharply amongst pregnant women, which in turn contributed to increased numbers of babies with a low birth weight, especially amongst Indo-Fijian mothers where rates almost doubled from the previous year. The drought meant that women faced an even greater challenge than usual.

Food rations, which generally consisted of rice, sugar, flour and tinned fish, cushioned the effects of the drought by preventing outright hunger and starvation. But they did not adequately address the problem of micronutrient deficiencies.

Possible short-term solutions exist in such circumstances but are often costly. They include the addition of preserved fruits and vegetables to the rations, the distribution of specific vitamin and mineral tablets and the fortification of relief food items such as flour with iron. In the long run, however, the affected families need to be assisted to return to a balanced and diverse diet that is based as much as possible on fresh local foods rich in the nutrients that processed relief foods lack.

6.3 Gaining food entitlements

The United Nations defined food security as “access by all people at all times to the food needed for a healthy life”. Judging by the high numbers of Fiji people suffering food-related diseases, it seems that numerous households are not able to secure enough food of the right quality to ensure good nutrition. Economic development has seen progress in many areas but, according to the 1995 Study on Poverty, 33% of the population is living in relative poverty. The weekly cost of the most basic nutritious meals for a family of five is calculated by NFNC to be F$55.82 for urban households and F$58.79 for those in rural areas. The Study on Poverty found that 12% of households could not afford this basic diet.

An observation that reveals a satisfactory level of food security in Fiji is that most traditional “Sunday” or special delicacy food products are now increasingly finding their way

onto the family table during weekdays, indicating that entitlements to food have indeed improved.

The poorest households average about four members and the richest about six members. Poor households, therefore, have fewer people and thus a lower number of income earners, and per capita household income is more equally distributed than total household income.

Women are increasingly bearing the burden of the demands of a cash economy and changing food prices. A recent report by the United Nations Children's Fund (UNICEF) looked at household food security issues in Fiji. The report examined women's roles in family food production, choices made about how that food is used and the positive impact of savings and income generation on household food security in motivating women to sustain home gardens. The report stressed the importance of women's informal trade to family security and demonstrated that women were successfully introducing new crops and techniques into their gardens to meet market demand for pot plants, flowers, chutneys and pickles whilst maintaining production of traditional root crops for food consumption.

Through case studies, the report showed that when poor and disadvantaged women were provided with land, training and support, and in some cases a loan, they were able to grow enough to feed their families and to earn a little cash to supplement their family income. One young mother living in a Housing Assistance and Relief Trust village said: "I grow the cucumbers and other things for our food, and lunch parcels for my child. The pot plants are for selling to pay school fees."

Women who head households are particularly vulnerable to poverty. A recent report in Fiji suggests that one in seven poor households is headed by a woman.

6.4 Household food utilization

For both Fijian and Indo-Fijian households, there has been an overall reduction in the quantity and quality of food crops produced for own consumption. Available cash is being spent on imported cereals, canned foods and vegetables like potatoes. Rural Fijians purchase foods such as flour, sugar, canned fish and corned beef, salt, tea, rice and milk. Stores in rural areas seldom have refrigeration. Perishable foods, like fish and meat, are occasionally purchased in towns. Instead of purchasing to compensate for seasonal shortages of staples, households now consume rice and dry biscuits more frequently. In urban areas, some grow root crops and green leaves, but most other food items are purchased. Indo-Fijians are more dependent on purchased food than Fijians because local production of their staple foods, rice and pulses, is limited and in terms of energy expended their staples are more difficult to produce than root crops.

It is interesting to note that, although the proportion is small, a higher proportion of Fijian households consume food given to them than others. Among Fijian households, the main gift food items are those associated with traditional values and ceremonial functions, such as yams, pork and beef. This suggests that the Fijian culture of reciprocity is still strong. In contrast, among Indo-Fijians, food items given were not of their usual traditional food groups such as traditional crops, green leaves and fruit.

Since 1970, there has been a steady decrease in the production of root crops as the main source of energy. This is documented in the food balance studies calculating the foods available per head of population. In 1953, households in Naduri village, Sigatoka, obtained 60% of their energy needs from root crops. By 1994, this proportion had decreased to 33% because cereals – rice and wheat – had replaced root crops as the main staple food.

Changes in food habits are to be expected over time, but it is unusual for a people to shift from a traditional staple food to one of different origin over a comparatively short period of time. Such a change affects health and has economic repercussions when the new staple food is imported.

Results of the 1993 National Nutrition Survey show that 20% of the sample of households raising animals had consumed some in the previous 24 hours. Like farm produce,

more rural households used their own animal produce, 22.6% compared with 9.1% in urban areas. In contrast to farm produce, however, a significantly higher proportion of Indo-Fijian households tended to consume their own animal produce than Fijian households. Among Indo-Fijians, 36% of rural households and 11.1% of urban households used their own produce. In fact, all animal protein foods consumed in 21% of rural Indo-Fijian households and 5.6% of urban Indo-Fijian households were their own produce. This was high compared with 9% of rural Fijian households and 5.9% of urban Fijian households. No Fijian household was found to have depended on its own produce to obtain all animal protein food. None of the households defined as 'others' used any of their own animal produce during the period.

This is the opposite picture to the significantly higher proportion of Fijian households that depended on food from the sea, rivers and creeks. The following figures were derived from all 912 households in the survey as opposed to the 515 households that raised animals. Some 36.8% of rural Fijian households and 8.3% of urban Fijian households consumed their catch from the sea, river or creek (mainly fish) compared with 4% each for urban and rural Indo-Fijian households. 15.1% of rural Fijian households had their catch – fresh fish – as their sole protein source and most of these were from coastal villages.

Rural Fijian households made the greatest use of sea/river food and rural Indo-Fijians depended most on their raised animals. There were no statistical differences between ethnic groups in urban areas either in the use of raised animal food or their catch from the sea/river.

When animal and sea/river food are combined, 55.3% of households in Eastern Division, 45.2% in Central Division, 41.6% in Western Division and 29.3% in Northern Division used their own produce or catch. Only 11.5% of households did so in Suva. The overall picture shows that, of all the food items used, 16.7% came from the households, 79.9% were purchased and 3.4% were from other sources (e.g. gifts). In urban areas, only 6.9% of food items used came from the household while 90.4% were purchased. In contrast, 23.1% of food items came from the household in rural areas while 73.1% were purchased.

While there is a general pattern of a high dependency on purchased food in urban areas, and less dependency in rural areas, the degree of dependency differs by ethnic group. Fijian households had the highest proportion of home-produced food items in both urban and rural areas, 8.5% and 31.5% respectively. Indo-Fijian households had lower proportions of food items coming from their households in both urban and rural areas, 6.2% and 16.1% respectively. It is also interesting to note that, although the proportion was small, Fijian households had the highest proportion of food from other sources, 4.8% compared with 2.2% among Indo-Fijian households.

Food from other sources occupied only a small proportion in each food group, except traditional crops and animal protein, in both areas.

6.5 Household risk-coping systems

Despite the unfavourable future prospects for sugar and other bulk commodities such as copra, agriculture has realistic potential to be a leading sector for many individual households as well as the nation in growth and employment generation to the year 2010. Agricultural development depends largely on the private sector (farmers, fisherpersons, traders, processors and exporters). The government and other agencies have a facilitating role in this development. Four key strategic functions for government have been identified in achieving agriculture-led growth and development:

- safeguarding and enhancing Fiji's favourable quarantine status;
- creating an environment for private sector investment;
- ensuring agricultural, fisheries and marine development takes place within environmentally sustainable limits; and
- facilitating the development and transfer of technology.

The successful achievement of this strategy does not require large investments of public funds. The re-allocation of existing resources and the focusing and coordination of efforts will be largely sufficient to achieve the necessary changes to secure the future of the agricultural sector. There is also a case for strategically targeted technical assistance that benefits households.

Economic policies need to give more attention to the welfare of the people. Low-income urban households, in particular, need some assistance to enable them to buy the necessary foods. This group is severely affected by any increase in tariffs on basic foods. Even small measures to improve the food supply of a household can result in better health and nutritional status. The production of a variety of root crops apart from cassava should be encouraged. Attention to the problems of transporting and marketing rural produce is important. However, solutions to the major problems require legislation such as changes to food tariffs and agricultural policy, and a revised Pure Foods Act.

Small home gardens provide a source for some of the vitamins and minerals needed for health. Studies carried out in South-east Asian countries have found that efficiently operated home garden schemes make a remarkable contribution to the health of a nation. An example is the Family Food Production and Nutrition Project, sponsored by UNICEF, which is a regional programme that has been implemented in a number of countries since 1984. In Fiji, the project was attached to NFNC in May 1985. The Fiji government initially endorsed the project for a period of two years, but it has continued to the present with funding from UNICEF, which originally covered the salary costs of project officers but which has now been discontinued. Activities were conducted at one time in three of the four divisions – Northern, Western and Central. Only one project officer recruited as a staff member of NFNC remains, based in Lautoka at the office of the Divisional Medical Officer and responsible for the project in Western Division.

Reviews of the project were conducted in 1991 and 1995. While recognizing the achievements of the project, both reviews were critical, agreeing that weaknesses in implementation were related to low levels of support given to the project. There has been no sustainability in staffing, and also the implementation of the project, with the subsequent loss of manpower, training and work experience. The district and sub-district Food Nutrition and Health Committees are not regularly monitoring project activities in their areas as proposed, nor drawing on the resources of other government agencies and NGOs (e.g. agricultural extension officers and women's organizations). A field trip to Sigatoka, Nadi, Lautoka, Ba and Rakiraki to visit a number of garden sites in villages, hospitals, a boarding school and a Housing Assistance and Relief Trust estate indicated that much of the activity could be described as still in a pilot phase.

It is understood that both UNICEF and NFNC have raised the matter of the Family Food Production and Nutrition Project being incorporated into the agricultural extension programme of MAFFA. With funding from UNICEF, the Ministry has been organizing some training in family gardens for its agricultural extension workers. Advice was given that the Ministry favoured developing its own household food security programme.

In theory, economic development should reduce the vulnerability of households to natural disasters. Households with increased incomes should be better able to cope with disasters by having cash to buy food, to repair and rebuild housing, and to re-invest in productive activities. However, such an assumption assumes a reasonably high rate of savings amongst Pacific Island communities. This is not the case. Domestic savings in all countries are low, and in some cases negative (McGregor et al. 1991). This can be attributed to the high spending propensity of consumers and monetary policies that generally suppress nominal interest rates. Thus, if increased household income has been accompanied by a decrease in the food self-sufficiency of households, then it is likely there has been an increase in their vulnerability to natural disasters.

The case of the island of Kadavu in Fiji reveals such a situation. Blessed with abundant high-quality land and marine resources, this is an agriculturally affluent community. Kadavu maintains a strong subsistence base and has the opportunity to produce highly remunerative cash crops. The imputed annual income generated by *yaqona* and taro alone is F$15 million (which is equivalent to F$1,600 per capita). There are sufficient land resources and market opportunities to increase this level of income considerably. While it was not possible to collect any data on levels of household savings on Kadavu, there is no reason to believe that these would be different from the aggregate rates that have been estimated for Fiji.

The core of Kadavu's traditional disaster mitigation and food security was the yam, particularly the wild yam. In times past, people on Kadavu were expected to maintain a store of yams as both planting material and food store – a custom that has all but disappeared. Yams are now rarely planted. The crop's labour requirements are seen to be too high, the returns from efforts into the alternative crops of *yaqona* and taro far greater, and planting material scarce and expensive. The area planted to Xanthosoma taro, the most disaster-resistant tuber, has also substantially declined. The focus of food production has shifted to *dalo* (particularly the *tausala* variety) and cassava at the expense of other crops, for reasons of ease of planting, faster growth, market demand and local preference.

In the foreseeable future, Kadavu can expect another cyclone of the severity of Val, Meli or Oscar. It is anticipated that the likely impact on its agriculture today would be considerably more than it was for such a cyclone 20 years ago despite the substantial increase in income levels over this period, for two reasons:

- The group has become heavily dependent on a single non-food crop, yaqona, which is highly susceptible to cyclone damage.
- A decline has occurred in the importance of crops that provide food security at the time of a natural disaster (notably wild yams and Xanthosoma taro).

Despite the thrust of MAFFA's current strategy being oriented to export-led growth, food security is still the centrepiece of its activities to foster national development. Its programmes and projects in the foreseeable future will have as their priorities the harmonization of increased agricultural exports and increased national and household food security within the framework of commercializing agriculture.

In rural areas, economic development has been largely devoted to cash crops intended for export, and much of the land previously used for food gardens has been put into cash crops. In contrast, little investment has been directed at the small farmer who produces a high proportion of food for the domestic market. This is one reason for the high prices and often poor quality of indigenous food crops sold in urban markets.

MAFFA and nutrition planners need to agree on the definition of important concepts such as food security and self-sufficiency in order to coordinate agricultural production and nutritional requirements. Assessment of national food security is currently done through the compilation of food balance sheets by NFNC but promoting household security requires more specific actions.

Promoting household food security should be undertaken through the following strategies:

- Develop national objectives to encourage increased production and improve marketing of local food.
- Encourage the growing of sufficient food at the household level for family needs.
- Promote the selection of nutritious food to satisfy every household member's nutritional requirements.
- Assist families to secure sufficient income to ensure access to available food.
- Promote the proper distribution of available food within the household unit.

Some agricultural programmes currently being implemented, with positive implications for the improvement of national and household food security, need to be encouraged and maintained. To begin with, the Extension Department in MAFFA needs to develop standardized

practices for the promotion of sustainable food security. There needs to be an effective program of extension to support local producers of traditional crops and the growing of these crops in household gardens. Also, the post-harvest quality of local food crops should be improved by introducing simple food processing techniques and more effective marketing systems at the village level.

The mission statement of MAFFA commits the organization to "the responsible and sustainable development of Fiji's agriculture, fisheries and forest resources through applied research, training and dissemination of information with an aim to guarantee food security and improve the standard of living of all people throughout Fiji". This broad food security goal in the mission statement of MAFFA should be translated into more meaningful and practical programmes and activities to promote and improve national and household food security.

The plan of action of NFNC aims to promote and improve household food security in Fiji. It includes the following activities:

- Negotiate for the allocation of resources for activities relating to food security issues.
- Promote family food production through backyard food gardens.
- Encourage and support community-based food production and food processing enterprises.
- Promote better resource management, food selection and intra-household distribution of food.
- Diversify farming practices to strengthen the growing of food for home use.
- Promote household food preparation, processing and preservation.
- Disseminate relevant agricultural, food, nutrition and related information to create greater awareness of these related issues.

Increasing rural-urban migration is of considerable concern. In order to reduce this trend, efforts will continue to be directed at raising the standard of living among rural households and creating opportunities for employment through the expansion of agricultural development programmes, focusing on food production and related activities, and other rural income-earning activities.

7. Policy, Information and Research Implications

7.1 Reconciling export-oriented agricultural commercialization with the maintenance of food security

7.1.1 A continuing need for agricultural policy reform

Despite some reversals, the process of policy reform and transition to private-sector led development, detailed in section 5, is still taking place and is central to the future success of the agricultural sector. Yet, national food security should be a priority objective for any nation, and needs to be in balance with the current export-oriented agricultural development strategy. Because complete self-sufficiency in food is unlikely to be an achievable or a desirable objective, particularly in the context of inevitable urbanization, increasing food imports should not necessarily be seen as a bad thing from a viewpoint of food security in Fiji. They are an inevitable consequence of agricultural development and economic transition.

National policies and strategies can either directly or indirectly enhance the realization of food security and nutrition goals by providing, at least, an enabling environment to support the needed changes.

7.1.2 Strategic focus to expand niche market exports and increase traditional crop production

The strategy that emerges from this report has as its foundation private sector-led development, with the government and other agencies playing a facilitating role. The key elements are listed below.

1. Enhancing quality and consistency of supply:
   - Support industry-directed extension efforts.
   - Legislate to support industry-determined and enforced quality standards.
   - Give full commitment to bilateral quarantine agreements.
2. Safeguarding and commercially exploiting Fiji's favourable quarantine status:
   - Strengthen MAFFA Quarantine.
   - Reduce the incidence of smuggling plant and animal material through increased surveillance and education programs.
   - Ensure the ongoing sustainability of the SPRFFP.
   - Gain maximum commercial advantage from SPRFFP and the high-temperature forced-air facility.
3. Ensuring and commercially capitalizing on environmental sustainability:
   - Initiate educational programs on the negative consequences of burning.
   - Enforce existing laws and regulations relating to environmental protection.
   - Create awareness of the adverse consequences of excessive use of chemicals.
4. Improving export market access:
   - Adopt a proactive public approach in negotiating quarantine agreements with importing countries.
   - Ensure reasonable (not subsidized) freight rates by Air Pacific, particularly to Japan.
   - Improve trade representation in overseas missions.
   - Develop export insurance coverage.

5. Encouraging the continued transformation of subsistence to commercial farming:
   - Improve road access.
   - Educate people in the value of growing and eating traditional foods.
   - Encourage the development of small markets in urban and peri-urban areas.
6. Revitalization of agricultural research and access to technology:
   - Corporatize MAFFA Research Division.
   - Make available food technology and other specialist expertise for industry.
   - Contribute some public funding to non-government research.
7. Rationalizing and focusing extension efforts:
   - Provide extension support for quarantine efforts.
   - Support industry associations, and nucleus processors and exporters
   - Emphasize on-farm demonstrations.
   - Provide organic agriculture SMS.
8. Improving supply and effectiveness of credit:
   - Arrange for FDB to review outlook and polices for agricultural lending.
   - Encourage FDB to be more proactive in discussions with industry at senior levels, using proven exporters, processors and management companies to resolve working capital constraints.
   - Support the development of the informal credit sector.
9. Public investment in critical infrastructure:
   - Develop Savusavu port and further strategic roads.
10. Support for industry organizations:
    - Facilitate the establishment of industry organizations.
    - Legislate to allow industry self-management
11. Attracting investment in agriculture:
    - Promote the incentives available to the agricultural sector.
    - Implement the Investment Act.
    - Promote horticultural agro-processing export opportunities to overseas investors.
12. Promoting farming as a business:
    - Develop distance education programs utilizing the radio as part of existing youth training programs and to promote Fijians in business.
    - Focus on the Fiji College of Agriculture for training commercial farmers and farm managers.

While responsibility for expanding the agricultural sector lies firmly with the private sector, other agencies have important, and sometimes critical, supporting roles to play, as specified in the Plan of Action. These agencies include:

- MAFFA (quarantine – surveillance, research, certification, agreement negotiation; extension in a industry-focused form; research in a corporatized industry-responsive form; information to the farming community; and facilitating the formation of industry associations).
- FDB (improving the supply and effectiveness of credit to the agricultural sector).
- Fiji Trade and Investment Board (promotion of incentives to the agribusiness community; encouragement of foreign investment in horticultural exports and agro-processing; facilitation of negotiations on freight rates).
- Central Planning Office/Ministry of Finance (liaison with the Asian Development Bank and donors on technical and other support for the implementation of the strategy to ensure adequate levels and distribution of public sector funding for implementation of the strategy).
- Asian Development Bank (coordination of donor efforts to implement the strategy).

- Ministry of Fijian Affairs and Fijian Affairs Board (priority to commercial agriculture in the "Fijians in Business" programs).
- Ministry of Cooperatives (promotion and support for viable grower owned agribusiness).
- Ministry of Education (curriculum development to promote sustainable commercial agriculture and the consumption of traditional foods).
- Ministry of Youth and Employment (promotion of viable farming activities for youths with access to land).
- Ministry of Women and Culture (Women's Social and Economic Development Program).
- South Pacific Commission (ongoing technical support for quarantine surveillance and research).
- Air Pacific (provision of reasonable freight rates to export markets).
- Fiji's Overseas Missions (assistance in negotiations of quarantine agreements – Japan and Korea; commercial representation).
- Fiji Visitors Bureau (support of the publicity campaign to reduce the incidence of fruit smuggling).
- Fiji Broadcasting Commission and TV One (assistance in promotion of farming as a business, sustainable agriculture and campaign against burning).
- Crown Law Office (drafting legislation to support the development of industry associations).
- Native Lands Trust Board (negotiation of mutually satisfactory renewal of native leases; assistance in the campaign to reduce burning and land degradation).
- Pine Commission (assistance in the campaign to reduce burning and land degradation).
- Fiji Police Force (assistance in the campaign against burning.
- National Food and Nutrition Committee (promotion of traditional foods).
- University of the South Pacific (to compete for research funds to solve industry problems).
- Ports Authority (Savusavu port of entry).
- Ministry of Public Works and Transport (implementation of strategic roads program).
- City Councils (development of decentralized markets).

In a private sector-led development environment, MAFFA has four core functions:

- generation and dissemination of information, sector monitoring and policy formulation;
- creating an environment for private sector development;
- ensuring agricultural development takes place within environmentally sustainable limits; and
- facilitating the development and transfer of technology.
- The first two functions are now briefly discussed.

7.1.3 Information, monitoring, and policy formulation

Information of the type provided in the 1991 Agricultural Census is critical for the private and public decision makers and policy makers in the agricultural sector. However, this information needs to be upgraded on a regular and systematic basis to be of sustained value. This should be a core function of MAFFA's Economic Planning and Statistics Division, along with providing professional policy advice to the government on the sector. Part of MAFFA's information-generation process should be regular consultation with participants in the industry to obtain their input into the policy formulation process. Commercial farmers also need timely and accurate price and marketing cost information if they are to make efficient management decisions. This sort of information is best provided by the industry itself, as is now starting to occur through the Ginger Council. However, MAFFA needs to fulfil this function on an ongoing

basis on behalf of industries in the sector in advance of operational industry associations being established.

7.1.4 Creating an environment for private sector development

MAFFA has an indispensable role in creating an environment for sustained private sector development. The most critical areas in this respect relate to quarantine, the enforcement of quality standards, facilitating the establishment of industry associations and environmental protection. If the sector is to prosper, MAFFA must ensure the timely negotiation and effective enforcement of quarantine agreements. Quarantine rules and regulations must be formulated and implemented that minimize the risk of importing serious pests and diseases, yet facilitate trade and allow farmers access to improved seeds. Effective ongoing quarantine surveillance programs must be maintained. Industry associations have been identified as having a critical role in improving quality standards and in determining research priorities and other industry needs. Thus, the creation of the Ginger Council was listed as one of the encouraging recent developments in the sector. However, as the Ginger Council experience has shown, MAFFA has a critical catalytic role to play in the creation of industry associations and empowering them to develop and enforce quality standards, and to raise funds to support their activities.

7.2 The social commitment

The present government is committed to improving the performance of the economy by creating an enabling environment to support investment and private-sector development. This it sees as a necessary precondition to creating jobs and increasing real incomes, which in turn lead to improvements in the standard of living. Emphasis is placed on the importance of the link between wages and productivity to achieve competitiveness of the labour force.

The policy objectives and actions identified below indicate some policies of the government that can be seen as simultaneously addressing food security and nutrition concerns, although this was not their primary intention. The government supports the widest national consultation on the various initiatives recommended for implementation to achieve social integration and development, eradicate poverty, expand productive employment and reduce unemployment. Various mechanisms have been put in place for such national consultation.

The National Economic Summit, held 10-12 May 1995, is a major example of this consultation. It brought together the government, private sector, trade unions, civil society representatives and observers from international organizations for wide consultations on major economic and social issues. The current initiatives of a task force charged with implementation of a set of recommendations from the National Economic Summit is a major step forward in fulfilling social commitments. The recommendations are prioritized according to the short, medium and long terms, based on how quickly (with given resources) they can be implemented. Task forces on law and order and employment creation are trying to bring together initiatives to promote a better law and order situation as well as more employment.

The Constitutional Review Committee is another example of the government's commitment to wider consultation and action, which impinges directly on social integration.

A further example was the joint initiative by UNDP and the government in carrying out the 1995 Fiji Poverty Study. The findings of the study will again assist government and the various NGOs involved to better target resources to reach poor and vulnerable people. The study provides a comprehensive and reliable picture of poverty in Fiji, enabling better policy formulation geared to reducing substantially the overall incidence of poverty.

A current joint initiative of the government and the International Labour Office to promote employment through an Integrated Human Resource Development Programme is expected to contribute greatly to employment promotion and generation.

The Women in Development policy objective is "upgrading of training and skill levels and overall human resource development for women in an effort to improve their access to employment opportunities". Improvements in the health and nutrition of the family are expected too if this policy objective is achieved. The Department for Women and Culture, with AusAID assistance, formulated a National Implementation Plan of Action for Fiji's five commitments at the 4th World Conference for Women. The work involved writing situation analysis reports on the five major commitment areas, discussing the findings of the reports, drafting the national implementation plan, conducting a national preparatory meeting to discuss the draft implementation plan and the presentation of the National Implementation Plan of Action to Cabinet for endorsement.

The Coordinating Committee on Children meets monthly to attend to concerns relating to children. It completed a two-year progress report for submission to the United Nations Committee on the Rights of the Child after Fiji acceded to ratify the Convention on the Rights of the Child in August 1993. The report was sent to New York for presentation to the United Nations Committee on the Rights of the Child. With the recommendation of the Coordinating Committee on Children, the Cabinet endorsed the move for Fiji to ratify the Convention on the Civil Aspects of International Child Abduction. The National Policy, Strategy and Plan of Action for Children for Fiji includes: "Ensure that families have access to sufficient resources, knowledge and where necessary support, to be able to provide children with an adequate nutritious diet".

A National Action Plan was drawn up to address the Declarations of the National Summit on the Family which took place in December 1994, and which was endorsed by the Cabinet. In 1995, Fiji celebrated the 25th Anniversary of Independence with the theme of "The Family – Fiji's Hope". The government remains fully committed to the agreements made at the World Summit on Social Development in 1995.

There appears to be no specific policy or objective directly related to food security or nutrition. The overall intention to improve standards of living has been seen in improved housing standards, transportation, literacy, etc. However, there is no specific mention of improving the food supply and food self-sufficiency is no longer a focus of agricultural policy making.

The policy in relation to primary health services is to provide preventative and primary health care, and clinical and rehabilitative facilities with adequate manpower resources to meet national needs. Community health programmes of the Ministry of Health and Social Welfare include components influencing nutritional status, such as maternal and child health, immunization, family planning, school health services, and prevention of iodine and iron deficiency diseases. These health-related policies and strategies were geared towards the realization of health for all by year 2000.

The policies and strategies for rural development include the maintenance of effective social services in rural areas, particularly health, education and basic needs. The policy of the education sector to "provide a balanced programme of both academic and practical courses for the full development of Fiji's youth in a rapidly changing society" is consistent with the integration of food and nutrition into the school curriculum. Policies and strategies for the youth and sports sector relate particularly to physical fitness and activity, and so prevention of overweight and obesity. They include the "promotion of cultural, educational and recreational programmes for youth", and "support for the development of facilities to encourage sporting activities in urban and rural areas".

The population policy includes "education programmes to promote breastfeeding, combined with various other measures to make breastfeeding convenient", as a component of family planning programmes.

Fiji was one of the 159 states that attended the International Conference on Nutrition in Rome in December 1992. It supported the declaration to eliminate hunger and to reduce all forms of malnutrition, and affirmed the World Declaration on Nutrition and the Plan of Action

for Nutrition. Fiji pledged with the other countries at the conference to make all efforts to eliminate before the end of the decade:

- famine and famine-related deaths;
- starvation and nutritional deficiency diseases in communities affected by natural and man-made disasters; and
- iodine and vitamin A deficiencies.

The countries, including Fiji, also pledged to reduce substantially within the decade:

- starvation and widespread chronic hunger;
- undernutrition, especially among children, women and the aged;
- other important micro-nutrient deficiencies, including iron;
- diet-related communicable and NCDs;
- impediments to optimal breastfeeding; and
- inadequate sanitation and poor hygiene, including unsafe drinking water.

The government of Fiji subscribed to the World Summit's Declaration for Children and Plan of Action in 1990. These goals were endorsed again by member states at an international conference on nutrition. The nutrition goals of the World Summit are particularly relevant to the development of FPAN, and are detailed below:

- reduction by one-half in severe, as well as moderate, malnutrition, among children under five years of age;
- reduction by one-third of iron deficiency anaemia in women;
- virtual elimination of iodine deficiency disorders;
- virtual elimination of vitamin A deficiency and its consequences, including blindness;
- empowerment of all women to breastfeed their children exclusively for four to six months, and to continue breastfeeding with complementary food well into the second year;
- growth promotion and its regular monitoring to be institutionalized by the end of the 1990s; and
- dissemination of knowledge and supporting services to increase food production in order to ensure household food security.

7.3 Sustainable land management and food security

The essential element of the government policy on achieving sustainable development is to ensure development "through protection of the environment against activities that threaten long term productive potential". This policy would cover environmental strategies dealing with land degradation and pollution of marine and freshwater sources of food.

Like most developing countries, Fiji faces the crucial issue of sustainable land management and the allocation of its scarce land resources. From 1956 to 1991, two major factors influenced land use. First, there was a 200% increase in the land used for agriculture. Secondly, the population increased by about 100%. More people are turning to the land for a living at a time when arable lands are being lost to housing and industrial development. This is alarming given Fiji's small size, topographical harshness and land-ownership realities. Yet one of the main issues affecting sustainable land management in Fiji is the lack of a national land use plan and policy. The South Pacific German Forestry Project is assisting MAFFA review current rural land use policy to develop such a plan and policy.

This demands a holistic and multidisciplinary effort by stakeholders, a firm commitment by government, and a lot of room for public consultation and participation to be efficient and effective. Land use planning is vital for national development – biophysically, socially and economically. The institutionalization of a land use working group or steering committee is needed to bring all government agencies and NGOs together to develop a land use plan and land use process for Fiji. This would require an outline of a national planning process for adoption by

the government that identifies the institutions and support systems required to implement such a process.

MAFFA has identified the following issues affecting sustainable land management practices and land use in Fiji:

- demographic changes;
- pressure on the production base;
- an over-dependence on the sugar industry;
- weak institutional infrastructure;
- inappropriate land use in watersheds;
- inappropriate changes in lowlands land use;
- inadequate knowledge systems;
- land tenure;
- poverty; and
- poor central government control of land management.

The government enacted the Integrated Sustainable Development Act in 1999 to consolidate and update existing highly sectoralized legislation to address the above issues and promote Fiji's heritage for present and future generations. MAFFA is working with the PACIFICLAND network operated by the International Board for Soil Research and Management to identify technologies to develop and manage sloping lands in a sustainable manner.

Sustainable land management activities developed by PACIFICLAND have assisted MAFFA develop, validate and extend technologies to rural land users. Currently, some 150 farmers have adopted sustainable land management technologies, but there is still a lot of room for improvement. Further, these activities are required for research on options, such as the conversion of sugarcane lands to more appropriate land use, and downstream impacts of soil erosion and sloping land degradation on coastal flatlands and the adjacent reef environment.

The largest portion of land in commercial agriculture is leased from either the Native Lands Trust Board or the government (crown land). Tripartite discussions on the future nature of agricultural leasehold agreements are currently being held involving the Native Lands Trust Board, representing the land owners, the tenants, and the government represented by the Agricultural Landlord and Tenant Act (ALTA) Unit. Many existing leases administered under ALTA expired towards the end of the 20th century and more are due to expire early in the 21st century. It is difficult to predict the outcome of these negotiations, and no firm agreement has yet been reached. MAFFA recently set up a special unit aimed at resettling displaced farmers onto currently vacant farmland in Central Division and Northern Division.

7.4 Financing agricultural development

The financial system in Fiji comprises six commercial banks, the Fiji Development Bank (FDB) and other non-bank financial institutions. Outstanding loans and advances from commercial banks to agriculture were F$104 million in December 1996 but showed a decline in 1997. Agriculture now receives significantly less of total lending than in 1986, with most lending to the sugar industry. Despite agriculture's contribution to GDP, foreign exchange earnings and income distribution, it has received relatively modest amounts of credit.

Investors, including financiers, see agriculture as a risky venture due to its susceptibility to large and sudden changes in weather and market prices. This, allied to the commercial banks' need to have 100% security on lending, has restricted the levels of investment in the sector. FDB was established as a statutory body in 1967 to facilitate and stimulate the promotion and development of the economy, giving special attention to rural and agricultural activities. Yet it has become increasingly reluctant to lend to agribusiness even where financial and economic viability can be shown. It adopts a very commercial (rather than developmental) approach to

lending, in order to remain viable. This is because FDB had faced major arrears problems in the agricultural sector in the past, particularly where Fijian landowners offered their own leased land as security. It now directs more of its resources towards the industrial and commercial sectors. The financial problems currently faced by the National Bank of Fiji have accentuated the adverse lending environment for agribusiness. It can be concluded that availability of credit is a constraint to growth for non-sugarcane commercial farmers, traders and processors of these crops.

7.5 Promoting agribusiness investment and the use of agricultural inputs

A wide range of input subsidies was available during the government-led development era. These subsidies extended to inputs such as fertilizers, fencing materials, dryers, water supply, roads and credit, and at one time coconut planting and replanting, and cocoa maintenance. They were ineffective and financially and administratively costly (McGregor and Lee 1986), and have now been abandoned as part of the government's deregulation program. Interest rate subsidies are still available on FDB loans to indigenous Fijians and price support for copra is still in place.

The Fiji Trade and Investment Board offers attractive fiscal incentives to export-orientated businesses in all sectors. They include a 13-year tax holiday for firms qualifying under the tax-free factory scheme. As part of the 1996 budget, businesses producing primary agricultural products for export became eligible for 13-year export incentives renewable for a further five years. In addition, the Board has the discretion to extend these benefits to other agribusinesses that would already be eligible for a five-year income tax holiday. In addition, agricultural machinery, planting material and seed, fertilizer and most agricultural chemicals enter free of duty or subject to only 10% duty. Thus, lack of fiscal incentives is not a constraint to investment in the agricultural sector. Yet only a small number of agricultural investors have sought incentives and an even smaller number have proceeded with projects for which the incentives were granted.

Most agricultural investors are local and do not go to the Fiji Trade and Investment Board as a matter of course. Thus, there is a general lack of awareness amongst the agribusiness community regarding the incentives that are available. The Board needs to mount a promotional campaign targeted at the agricultural sector. In common with all investors, there is the ongoing problem of having to obtain multiple permits and approvals, often discretionary, before operations can commence. It is hoped that the new Foreign Investment Act will resolve these problems. However, the disappointing response of agribusiness to the Board's incentive package reflects more fundamental problems, such as access to land and availability of finance.

A large portion of the existing sugar industry can remain viable in the future, even at world market prices. However, this will require significant, but achievable, reductions in costs. Thus, the appropriate policy emphasis should be on improving the efficiency of the existing industry and not on encouraging a large-scale transfer of lands out of sugarcane production. This is indeed fortunate for no single crop or group of crops has been identified that could replace sugar in the foreseeable future. Yet, while recognizing the continued importance of sugar, there is an urgent need to accelerate Fiji's diversification efforts. These efforts need to be directed into the areas where Fiji has a competitive advantage – high-value niche exports and the production of traditional food crops.

8. Conclusions and Recommendations

Addressing issues on food security in Fiji cannot be done in isolation. For meaningful outcomes to be realized, they must be addressed in the broader picture of poverty alleviation, economic empowerment of poor people and conservation of the environment. Eradication of poverty is one of the keys to maintaining food security in Fiji.

Poverty is not concentrated in rural or urban areas or in any ethnic group. It is an undercurrent in all communities in Fiji and is more than just a matter of incomes and expenditures. Studies provide information about non-market factors that constitute the coping strategies of the disadvantaged. These many sources consistently point to the same conclusions.

- Fiji is not an egalitarian society but one with deep inequalities.
- Although there is little absolute poverty, a sizeable proportion of households in Fiji have difficulty meeting basic needs for food and shelter and many cannot do so adequately.
- Despite the much-vaunted strengths of tradition and community, family networks now fail to support some of the poorest and most disadvantaged sufficiently if, indeed, they ever did.

Income is unevenly distributed between different parts of Fiji and between rural and urban populations. The pattern of income inequality is, foremost, a reflection of Fiji's dual economy, one part of which is oriented towards agricultural and subsistence production. The other part is fuelled by urban-based business and paid employment, and the fact that different tiers in society have access to different sources of income. These geographic differences outscale ethnic differences but contribute to them. Fiji is no longer a country of self-employed, self-sufficient farmers. From the lowest to the highest income groups, most households get some proportion of their income from paid employment. The subsistence sector is nevertheless an important source of livelihood and, although the scale of income inequality in Fiji is on a par with some South American and Asian countries, absolute poverty is not evident to the same extent.

A slight closure of the gap between rural and urban incomes since the late 1970s suggests that regional and rural development programmes have had some positive impact. Yet, another significant trend is the widening income gap within both urban and rural areas.

During the 1990s, the Fiji government put in place new programs to assist poor and disadvantaged families. The challenge of eradicating poverty is one of general concern in Fiji, which is not surprising in a country with a strong tradition of voluntary involvement in community and social services. There is a growing realization that NGOs are effective development partners of the government. The government provides the necessary funding and the NGOs provide the necessary services to disadvantaged people.

The government's principal strategy to reduce poverty and increase the economic well-being of the population has been to raise the rate of economic growth and to increase income-earning opportunities for the most disadvantaged. This has involved generous tax and other incentives to attract investment. The traditional system of extended family is relied upon to be the major source of assistance to the poor but, as stated above, traditional support systems are weakening with the transition from an agrarian to an urban society. The government has a longstanding policy to provide affordable rental housing for low-wage urban households, but demand for affordable housing far exceeds supply. It is government policy to reduce immigration into urban areas by providing services and creating income-earning opportunities in rural areas.

Concern with ethnic disparities in wealth and welfare is an issue that has been heightened in recent years. The government has given increased attention to encouraging

business participation by indigenous Fijians. It is government policy to improve the academic performance of indigenous Fijians and to make 12 years of education available to all.

It is also government policy to provide access to health services for all members of society. NFNC undertakes nutrition, food and health surveys, compiles food balance sheets, and prepares educational material on food and nutrition through FPAN.

The extent of national food insecurity is assessed by compiling health and nutritional indicators such as malnutrition, lifestyle diseases, and per capita energy and protein intake requirements. It is also assessed by studying other key indicators of entitlements, including the cost of the "basic food basket", measuring the level of food supply and household buying power and vulnerability indicators. Food security preparedness measures, which are also important, are currently underdeveloped due to lack of an effective data base to facilitate effective food security forecasting, but are currently being worked upon.

Most rural households continue to produce their traditional foodstuffs but none depends entirely on its own produce. The proportion of food items purchased for family meals is high, even in rural areas. Foods purchased are mainly non-traditional items. Indo-Fijian households have a higher dependency on purchased foods as their staples are more labour-intensive to produce.

Household food production and consumption patterns show a clear difference between ethnic groups, which reflects the differences in traditional dietary patterns. Fijian households grow more root crops and green leaves, and many depend on their catch from the sea and rivers for their protein food source. Some Indo-Fijian households grow rice and pulses and a significant proportion depend on animals as their protein source.

Many households in urban areas produce their own food. As indicated by past studies, low-income households depend on their home produce. With increasing urbanization and income disparity, the number of people who grow their home produce is likely to increase. Any home garden project should consider the practical constraints to home gardening in urban areas in their project design.

While there is no overall insufficiency of food, there is a trend of increasing scarcity, both physical and economic, of traditional foods, and of some of the nutritious imported foods. Household food insecurity in the form of nutritional insecurity is a major concern now in Fiji. It is no longer a simple matter solely of food production. Many factors need to be addressed in a coordinated manner to ensure an adequate supply of nutritious food to households. The main objective in the promotion of household food security is to ensure access by all people at all times to the food needed for a healthy life. Judging by the high numbers of Fiji people suffering food-related diseases, it appears that numerous households are not able to secure enough food of the right quality and quantity to ensure good nutrition.

The current situation is typified by:

- over-dependence on imports to meet at least national nutritional needs;
- high cost of local root crops compared with imported processed cereals;
- reduced production of local root crops; and
- an increasing preference for cheap and convenient processed foods.

The main objective of MAFFA is to produce crops for export, and little investment has been directed at the small farmer who produces a high proportion of food for the domestic market. This is one reason for the high prices and often poor quality of indigenous food crops sold in urban markets. The focus in production could be expanded to improve supply to the local markets, thus improving the availability of food for the growing population.

Promoting household food security should be undertaken through the strategies of:

- developing national objectives to encourage increased production and improve marketing of local food;
- encouraging the growing of sufficient food at the household level for family needs;
- promoting the selection of nutritious food to satisfy every household member's nutritional requirements;

- assisting families to secure sufficient income for entitlements to available food; and
- promoting the proper distribution of available food within the household unit.

Some agricultural programmes currently being implemented, with positive implications for the improvement of national and household food security, need to be encouraged and maintained. There needs to be an effective programme of agricultural extension, with standardized practices, to support local producers of traditional crops and the growing of these crops in household gardens. The post-harvest quality of local food crops should be improved by introducing simple food processing techniques and developing more effective marketing systems in villages.

The government has adopted the seven commitments to food security of the World Food Summit, and FPAN has begun to be implemented by the government. The priority given to coconuts, taro and tropical fruits in the CDF program is expected to have a positive impact on nutrition and food security. The abandonment of rice as a priority commodity for government intervention will not be detrimental to food security because Fiji has no competitive advantage in the capital-intensive irrigated rice production that was being sponsored. Farmers will continue to grow traditional rice varieties efficiently as a rotational crop in sugarcane-growing areas. With decreasing sugar prices, increased planting of rice can be expected by farmers provided leasehold land tenure issues are resolved.

The resolution of some 20,000 leases that are beginning to expire on native land in the sugarcane-growing areas has major poverty and household food security implications. The government is mindful that Fiji faces the daunting prospect of large and increasing numbers of rural households without access to land if this issue is not resolved. Furthermore, deteriorating prospects in the sugar industry will mean that rural employment opportunities for these displaced households will diminish.

The government considers agriculture as the priority sector for the creation of remunerative employment opportunities. The broad food security goal in the mission statement of MAFFA should be translated into meaningful and practical programmes and activities to promote and improve national and household food security.

The most challenging food security issues for Fiji in this millennium are sustaining domestic food production levels in line with food demands and market potential, and continuing the transition from subsistence to commercial agriculture. The ability to meet this challenge is greatly enhanced by long-term comparative advantage in the production of traditional food crops. This comparative advantage in traditional crop production is based on farmers' ability to grow, consumer preferences and the unavailability of high-cost imported substitutes. If grown in the traditional manner, without chemicals and in rotation, these traditional crops are highly sustainable activities.

The government has a limited, although important, contribution to make to the development of traditional foods in the following areas:

- Research support can be critical if there is an outbreak of a pest or disease that can devastate a traditional food crop, as shown by the taro beetle on Viti Levu and taro leaf blight in Samoa. If appropriate control measures are developed, then there is an extension role to disseminate this information to farmers.
- Quarantine has a crucial role to play in minimizing the risk of these introductions.
- Strategically located roads can open up significant markets for traditional food crops and provide an incentive for increased plantings of food crops, as past road developments have shown.
- The high nutritional value of traditional food compared with imported and processed food needs to be continually brought to the attention of the community. Low-cost activities such as the nutritional posters produced in the past by NFNC can be very beneficial.
- Farmers need to be made fully aware of the devastating consequences of indiscriminate burning on the productivity of food gardens. The rapid expansion in commercial taro

production has brought with it unsustainable production practices that need to be addressed through education and, in some cases, regulatory enforcement.

- The status of traditional foods and farming systems needs to be enhanced through school curricula, youth training programs, and via the media.
- The employment-generating youth training programmes currently being promoted by the government should give priority to traditional food crop production as a high return/low risk activity.
- The traditional food production sector has as much to gain as any other sector from the demand generated from outward-looking economic policies that lead to sustained economic growth. As incomes rise, so will the demand for high-value traditional food.

Fiji is fortunate to have received assistance for nutrition and health-related projects and programmes from several donor countries, such as Australia, Canada, USA, Britain and European Union countries, as well as from international organizations such as UNDP, UNICEF, FAO, World Health Organization and overseas volunteer groups. The assistance provided by these organizations in the form of human, and special technical and financial resources has been invaluable. Many of the programmes and activities could not have been implemented without them, and it is important that their support continues.

Future support may need to be rationalized. Assisting and encouraging the development of local professional expertise in the field of nutrition, particularly at NFNC, should be considered so that the country is able to draw on it when needed. The involvement of NGOs in nutrition-related activities has been welcome and badly needed. It has been out of interest and concern for the welfare of families. The roles of NGOs as implementing agencies for nutrition programmes in the future could be explored further. Commercial enterprises in the private sector have also been involved in the past with specific food and nutrition programmes, and their participation and cooperation needs to be encouraged.

Regional organizations have been instrumental in the development of nutrition education materials, and supportive in providing technical expertise. They have also funded certain nutrition-related projects, notably the construction of the food composition tables. The Secretariat of the Pacific Community has, through its Community Training Programme, trained many women community leaders now working in communities throughout Fiji. One of the areas of training that has been strengthened in the past few years in the nutrition component. This was done to address the felt needs of the communities. The University of the South Pacific continues to contribute through its nutrition training programmes. The use and assistance of academics at the University in future research could be explored further.

In view of the current nutrition situation in Fiji, there is a need to continue and strengthen the resolve by the government to improve the living standards and the quality of life of its people by addressing nutritional and nutrition-related health problems. This can be achieved by promoting equitable distribution of income and wealth, food security, a healthy diet, environment and lifestyle, and multi- and inter-sectoral cooperation. Policy priorities include:

- Continue macroeconomic policies directed towards generating income and employment opportunities.
- Encourage more local food production to keep prices of locally produced food affordable to consumers.
- Expand research efforts towards reducing post-harvest losses to include all foods, in order to increase the availability of food.
- Strengthen and better target food distribution systems to alleviate chronic and seasonal household food insecurity.
- Develop a national system to control food quality and safety.
- Put in place policies to reduce micronutrient deficiencies.

- Encourage a healthy lifestyle and the consumption of a nutritionally adequate diet in order to reduce the incidence of NCDs.
- Strengthen nutrition and healthy lifestyle education in the formal education system and the curriculum in tertiary institutions and at the workplace.
- Develop and strengthen nutrition and health education programs for specific target groups with specific problems, such as anaemia in women, cardiovascular diseases in adult males and obesity in women.
- Provide technical assistance through international agencies for the alleviation of household food insecurity, and strengthen food quality and safety.
- Review and strengthen the coordinating role of NFNC among government sectors, international agencies, NGOs, academia and industries for developing, planning, implementing, monitoring and evaluating nutrition-related programmes.
- Develop and implement a national nutrition monitoring system.
- Encourage and support health-promoting environmentally friendly practices.
- Develop a food assistance programme for vulnerable groups.
- Strengthen the maternal and child health program delivery by mobilizing NGOs.
- Encourage active involvement of food industries to support nutrition education programmes.
- Develop the entrepreneurial capacity of NFNC through the provision of services at cost.

It is also recommended that every effort be made to integrate the above into multi- and inter-sectoral activities so that they become components of the collective concerns, objectives, priorities and programmes of respective ministries, NGOs and private organizations. The challenge is how to handle the agenda of food security in the prevailing climate of deregulation. There is a need to develop an aggregate food database system within the agricultural statistics information system of MAFFA. Finally, it is recommended that a community-based approach be adopted to the sustainability of natural resources to ensure continuation of a policy commitment.

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Appendix 1. Compilation of Food Balance Sheets for Fiji

A1.1 Compilation procedure

The collation of data used to compile the FBS is based on computerised FAO-standard FBS worksheets using Microsoft Excel software. It commenced once all available data had been collected and verified.

Major food groups in this standard worksheet include total cereals, meat, roots, pulses, vegetables, fruits, eggs, milk, fish, vegetable oil, animal fat and oil, miscellaneous, spices, stimulants, nuts and oil seeds, sugar and beverages. The methods used to compile each worksheet column are given below. Definitions are provided for relevant terms used in the calculations.

Total supply represents the quantity of food available to the country for consumption and other non-food uses. Local food availability is calculated as:

$$TAFS = P + I \pm CS - E \qquad (1)$$

where: P = production,
I = imports,
E = exports,
CS = change in stock, and
TAFS = total available food supply.

All food production, including estimates of home-produced food supplies, is defined as production but in this report subsistence data on production are excluded.

Gross exports include re-exports. The figures recorded for exports and imports account for all trade in food products irrespective of whether the products are used wholly for direct food consumption or partly for other uses such as feed, seed and manufacture.

Stocks are of considerable importance in estimating the available food supply since the total supply can be influenced by changes in stocks. They include all food in storage including those products in warehouses and those awaiting exports. Stocks for sugar are calculated from the Annual Report of the Fiji Sugar Corporation. If sugar is kept at the end of the year to be exported the following year, then the figure should be recorded as (+). For the following year, that same figure should be recorded as (-).

Given the estimation of TAFS from equation (1), gross food is calculated as:

$$GF = TAFS - AF - S - M - W \qquad (2)$$

where: GF = gross food,
AF = animal feed,
S = seed,
M = manufacture, and
W = waste.

Gross food is the residual of the available food supply after accounting for feed, seed, manufacturing of non-food products and waste. Feed identifies the quantity of agricultural products that are usable as food but fed to livestock. The estimates of the quantities used for seeding purposes are based on the seeding rates in a normal year, the exception being when replanting is necessary. Manufacture includes: (i) all foods that are used for the manufacture of products such as vegetable oils for paints, (ii) some may be used to produce other food products that entail considerable loss of nutrients, such as milk used for butter, and (iii) transformations

into other foods with little loss of nutrients, such as sugar to jam and sweets. For raw sugar, 3% of the available supply is calculated as sugar used for manufacturing other products. Waste includes all quantities of foods lost from the first stage of production to the stage when the food reaches the kitchen.

Using the estimate of GF in equation (2), net food is calculated as:

$$NF = GF * ER \quad (3)$$

where: NF = net food in tons, and
ER = extraction rate.

Net food is actual quantities of food directly available to the country for human consumption. The extraction rate is the ratio of specific processed products to the primary product from which they originated. It reflects the rate at which the commodities are converted through processing to processed food and food by-products.

Net food in tons, from equation (3), is multiplied by 1000 kg and divided by the mid-year population (derived from the Bureau of Statistics) to give per capita supply per year in kilograms (PCS):

$$PCS = NF * 1000/Population \quad (4)$$

Per capita consumption indicates the national average per capita supply of foodstuffs available in kilograms per year. These estimates do not necessarily correspond to the quantities of food people actually eat. The reliability of the figures depends on the accuracy of the estimates on production, stocks, population and extraction rates.

Per capita supply in kilograms per year (PCS), from equation (4), is divided by 365 days multiplied by 1000 g to give per capita supply in grams (gm) per day (PCS). Daily per capita supply of calories was calculated as per capita supply of grams per day multiplied by the FAO food composition table (FCT) value for calories for that particular food item divided by 100 g (FCT values are given per 100 gm). Daily per capita supply of protein was calculated as per capita supply of grams per day multiplied by the FAO FCT value for protein for that particular food item divided by 1000 mg. Daily per capita supply of fat was calculated as per capita supply of grams per day multiplied by the FAO FCT value for fat for that particular food item divided by 1000 mg.

The percentages of calories, protein and fat imported were then calculated for each sub-food groups by the following three steps. First, determine the percentage of food imported from food availability by dividing imports (I) by total food available (TFA), then multiplying by 100:

$$X = (I/TFA)*100 \quad (5)$$

where: X = the percentage of imports.

Second, use the percentage calculated in equation (5) to calculate the amount of calories, protein and fat imported for each food by multiplying the percentage of food imported by the amount of calories (or protein or fat) per day then dividing by 100:

$$Y = (X*C)/100 \quad (6)$$

where: Y = the amount of calories (or protein or fat) imported for each food, and
C = calories (or protein or fat).

Finally, find out the percentage of calories, protein and fat imported by taking the total amount of calories, protein and fat imported divided by the total calories, protein and fat, then multiply by 100 for each food sub-group:

$$Z = (\sum Y/\sum C)*100 \quad (7)$$

where: Z = the percentage of total calories (or protein or fat) imported,
$\sum Y$= the sum of calories (or protein or fat) imported, and
$\sum C$ = the sum of total calories (or protein or fat) for each food sub-group.

A1.2 Data sources

The construction of an FBS involves compiling a wide variety of data from relevant government ministries and the private sector (food industry). The total amount of food available for consumption is established after adding up all data on local production and imports, minus exports and domestic non-food use and waste. Every attempt is made to account for all losses in the food chain from the farm to the consumer. Technical losses that occur during processing, especially for cereals, are accounted for in the extraction rates.

Most of the statistics used in the compilation of FBSs in Fiji are from official government publications and reports. The daily per capita nutrient content of the available food supply in terms of kilocalories, protein and fats was calculated using the FAO international nutritive factors. In instances where there are no official statistics available, efforts were made to collect data from other sources, such as the producers and distributors of a particular food or food product. Otherwise, no data are recorded for that particular commodity. In this study, efforts to collect data from participants in the private sector, such as food producers, exporters, importers and re-exporters, failed.

MAFFA supplied data on local food production, covering all agricultural food categories included in the FBS. But the data from MAFFA only include commercial production, and exclude data on the significant area of subsistence food production (that is, the amount of food that is produced and consumed within the household and does not enter into market exchange). This can result in a gross underestimation of the volume of domestic food supplies and the proportion derived from local sources, seriously undermining a reliable assessment of the country's state of national food security. The Bureau of Statistics (2000) also supplied some data for locally manufactured food products.

Data on changes in stocks of sugar were calculated by using the total export figure reported by the Fiji Sugar Corporation in a sugarcane season minus total exports reported by the Bureau of Statistics, whose figure is based on exports for a calendar year while data from the Fiji Sugar Corporation are for a financial year to 31 March. Other data on changes in stocks were not available due to a lack of response by the private sector to requests for information.

Trade figures were collected from the annual trade reports published by the Bureau of Statistics. Apart from buckwheat, millet and sorghum, which are directly imported for animal feed, and sugar for manufacturing, no other data were available for the above.

Estimates of wastage for some commodities were derived from estimates of wastage proportions and conversion rates used in the compilation of previous FBSs. The only published data available are on rice paddy. The extraction rate of 68% was taken from extraction rate data stored in the internet computer system of ESS, FAO, Rome. Food composition data stored in the same system were used to estimate per capita food supply available in terms of calories, protein and fat content.

A1.3 Limitations of food balance sheets

Preparation of FBSs involved an arduous and painstaking process of data collection. As a result of the limitations on data available to NFNC, some underestimation is expected for four reasons. First, the unavailability of subsistence production data from MAFFA is a major problem. The exclusion of data on subsistence production in this analysis means that an important part of the country's food supply is not accounted for. Subsistence data are always difficult to collect; nevertheless it provides a more accurate picture of food availability in the country if at least reasonable estimates could be made. Efforts should be made to develop a system for recording subsistence production, or at least an estimation of it. Efforts have been made to address this issue with MAFFA. The Agriculture Census planned for the year 2000 has

included in the questionnaire some questions on subsistence production and it is hoped that this enables a satisfactory estimate to be made.

Second, a major problem faced was the unavailability of data from the food industries, which can adversely affect the accuracy of the FBS.

Third, data collected by other agencies is done for their own purposes and not for FBS requirement. Hence, it may not be suitable for the purpose for which it has been used.

Finally, the use of an FCT that aptly reflects food composition in Fiji was another problem. Without the help of FAO in Rome, it would have been very difficult to establish which FCT to use, especially for compatibility of results with those of the FBS for 1985. Previously, NFNC was using the South-east Asia FCT for nutrient conversion factors. In 1994, the Secretariat of the Pacific Community put out a FCT for the Pacific, which has some Pacific foods and imported processed foods.

In this analysis the FAO FCT was used, to ensure compatibility with the previous FBS published by FAO and thereby establish trends over time. But the question as to which FCT would be more accurate to use in future analysis still remains. This issue needs to be resolved soon to ensure an accurate assessment of the food supply situation.

It should be noted that FBS cannot give any indication of dietary differences between population groups, such as between low-income and high-income earners, Fijians and Indo-Fijians, people in urban and rural areas, or between seasons. This kind of information should be derived from dietary surveys throughout the year among different population groups in different localities.

Table A1.1 Total calories, protein and fat available from major food groups, per capita, per day, 1985 – 1996.

	Calories (kcal)						Protein (gm)						Fat (gm)					
	1985	1992	1993	1994	1995	1996	1985	1992	1993	1994	1995	1996	1985	1992	1993	1994	1995	1996
Cereals	1,089	1,351	1,368	1,305	1,224	1,234	25.50	33.6	34.1	32.9	31.1	31.0	4	5.8	5.5	5.3	4.9	4.7
Roots	316	90	107	132	193	252	3.90	1.5	1.7	1.9	2.6	3.3	1	0.2	0.2	0.3	0.4	0.5
Sugar	508	446	382	417	439	393	0.00	0.0	0.0	0.0	0.0	0.0	0	0.0	0.0	0.0	0	0
Pulses	54	43	79	81	73	79	3.50	2.8	5.1	5.3	4.7	5.1	0.3	0.3	0.5	0.5	0.4	0.5
Nuts & Oil Seeds	183	136	93	77	77	98	2.00	1.4	1.1	1.0	0.9	1.2	15.2	11.0	7.7	6.4	6.3	8.1
Vegetables	20	16	18	18	20	21	0.90	0.7	0.8	0.9	1.0	1.0	0.1	0.1	0.1	0.1	0.1	0.1
Fruits	28	17	24	24	20	25	0.40	0.2	0.3	0.3	0.3	0.3	0	0.1	0.1	0.1	0.1	0.1
Stimulants	5	3	4	5	6	5	0.30	0.0	0.1	0.1	0.1	0.1	0.3	0.3	0.4	0.5	0.5	0.5
Spices	13	36	32	37	37	28	0.50	1.2	1.0	1.2	1.2	0.9	0.4	0.8	0.8	0.9	0.8	0.7
Beverages	32	39	36	34	32	37	0.40	0.1	0.1	0.1	0.1	0.1	0	0.0	0.0	0.0	0	0
Meats	118	174	178	177	173	175	7.60	10.5	11.4	11.4	11.1	12.0	9.5	14.3	14.3	14.2	14	14
Milk	93	77	79	78	79	84	6.80	4.0	4.2	4.2	4.2	4.4	2.9	4.1	4.2	4.2	4.3	4.5
Eggs	11	13	14	14	15	15	0.90	1.0	1.1	1.1	1.2	1.2	0.8	0.9	1	1	1	1
Fish	94	109	120	126	136	140	12.20	15.9	17.2	17.2	19.7	19.0	4.3	5	5.2	5.2	5.8	6.5
Vegetable Oil & Fat	128	226	260	255	290	295	0.00	0.0	0.0	0.0	0.0	0.0	14.3	25.6	29.4	28.8	33	33
Animal Fat	120	101	116	120	124	130	0.10	0.1	0.1	0.1	0.1	0.1	13.6	11.4	13	13.6	13.5	15
Miscellaneous	7	0	1	1	1	1	0.10	0.0	0.0	0.0	0.0	0.0	0	0.0	0.0	0.0	0	0
Total	**2,819**	**2,879**	**2,910**	**2,900**	**2,939**	**3,011**	**65.1**	**73.0**	**78.3**	**78.6**	**78.1**	**79.7**	**66.7**	**79.8**	**82.3**	**81.1**	**85.1**	**89.2**
Available Nutrients																		

Table A1.2 Percentage of calories, protein and fat imported from major food groups, per capita, per day, 1985 – 1996.

	Calories (%)						Protein (%)						Fat (%)					
	1985	1992	1993	1994	1995	1996	1985	1992	1993	1994	1995	1996	1985	1992	1993	1994	1995	1996
Cereals	73.41	78	79	81	79	83	79.75	80.9	82.3	84	83	86	79.1	72.3	72.9	74	71	76
Roots	9.61	36	38	29	17	18	18.1	54	57.1	49	29	32	7.06	27	28.2	22	12	13
Sugar	0	0.8	12	6	2.8	2.9	0	0	0	0	0	0	0	0	0	0	0	0
Pulses	100	100	100	100	100	87	100	100	100	100	100	87	100	100	100	100	100	87
Nuts & Oil Seeds	0.93	1.5	2.9	4.3	2.7	3	0.86	6	9.59	13	9.1	9.3	0.93	1.5	2.9	4.4	3	3
Vegetables	40	76	72	67	65	68	33.3	65.6	61.8	56	54	58	0	62.7	56.3	49	51	50
Fruits	12.5	18	35	28	26	16	20.8	14.5	30	23	21	13	0	24.4	34.8	27	30	17
Stimulants	100	99	93	100	100	92	100	99.1	57.1	100	100	100	0	98.7	100	100	100	90
Spices	0	26	36	29	21	39	0	38.5	48.0	41	33	53	0	43	56	48	35	63
Beverages	0	18	12	13	13	17	0	3.59	4.34	4.4	6.8	4.4	0	0	0	0	0	0
Meats	6.78	68	69	62	61	57	6.91	14.5	62.7	49	50	46	6.84	24.4	70.8	65	65	61
Milk	31.43	72	74	68	68	69	31.4	73.4	75.2	65	69	71	31.4	70.4	71.9	61	66	68
Eggs	0	2.8	9.1	9.7	14	5.3	0	2.8	9.05	9.7	14	5.3	0	2.75	9.05	10	14	5
Fish	56.61	17	30	31	36	29	49.68	16.0	28	30	36	29	67	18.3	32.7	32	37	28
Vegetable Oil & Fat	82.81	96	98	98	85	89	0	100	100	100	100	100	83.9	96.3	100	98	85	89
Animal Fat	77.78	59	66	62	63	67	66.67	48.9	56.7	76	58	61	77.7	59	66	62	63	67
Miscellaneous	0	100	100	100	100	100	0	100	100	100	100	100	0	100	100	100	100	100
Total	**42**	**57**	**63**	**61**	**57**	**58**	**52**	**60**	**65**	**62**	**62**	**60**	**46**	**64**	**70**	**69**	**65**	**65**

Table A1.3 Fiji food balance sheet 1996. **Population: 775,000**

	Domestic Supply							Domestic Utilisation			Per Caput Supply						
Products	**Production**	**Imports**	**Stock**	**Export**	**Total**	**Feed**	**Seed**	**Manufac**	**Waste**	**Gross Food**	**Kg/YR**	**Per Calories**	**Day Protein GM**	**Fat Day GM**	**% CAL IMP**	**% PRT IMP**	**% FAT IMP**
					Metric Tons												
GRAND TOTAL	**762,244**	**172,848**	**-37,839**	**495,468**	**477,463**	#	**0**	**66,149**	**22,003**	**385,195**	**497**	**3,011**	**80**	**89**	**58**	**60**	**65**
VEG. ORIGIN												**2,172.4**	**43.4**	**15.2**	**55**	**78**	**35**
ANIMAL ORIGIN												**838.6**	**36.2**	**73.9**	**65**	**39**	**71**
CEREALS	**19,370**	**85,215**	**0**	**3,325**	**101,260**	#	**0**	**0**	**1,596**	**96,736**	**125**	**1234**	**31**	**4.7**	**83**	**86**	**76**
Sharps		4,941			4,941				98.82	4,842.2	6.2	62.3	1.8	0.2	0.2		
Wheat Flour		52,679		2,803	49,876				997.5	48,878	63	629	18	1.7	1.7		
Rice	17,370	25,920		507	42,783				427.8	42,355	55	534.5	11	2.7	2.7		
Maize	2,000	1,600		15	3,585	#			71.7	585.3	0.8	7.4	0.2	0.1	0.1		
Other Prep. Of Cereals		74.6			74.6				0	74.6	0.1	0.9	0	0	0		
ROOTS	**68,789**	**18,749**	**0**	**75,81.8**	**79,955.8**	**0**	**0**	**0**	**3,998**	**75,958**	**98**	**252.1**	**3.3**	**0.5**	**18**	**32**	**13**
Cassava	32,000			**488**	**31,512**				**1,576**	**29,936**	**39**	**115.4**	**1**	**0.2**			
Dalo	22,613			**7,027**	**15,586**				**779.3**	**14,807**	**19**	**45.0**	**0.8**	**0.1**			
Potatoes-Irish	85	18,748		30	18,803				940.2	17,863	23	44.8	1.1	0.1			
Potatoes-Sweet	7,821	0.6		3.8	7,817.8				390.9	7,426.9	9.6	25.7	0.3	0.1			
Yams	6,270			**33**	**6,237**				**311.9**	**5,925.2**	**7.6**	**21.2**	**0.3**	**0**			
SWEETNERS	**454,000**	**1,041**	**-37,839**	**462,001**	**30,879.1**	**0**	**0**	**895.2**	**0**	**29,984**	**39**	**393.1**	**0**	**0**	**2.9**	**0**	**0**
Raw Sugar	454,000	2	-37,839	462,000	29,841			895.2		28,946	37	381.7	0	0			
Other Sugars		1,039		0.9	1,038.1				0	1,038.1	1.3	11.4	0	0			
PULSES	**859**	**5,841**	**0**	**8.2**	**6,691.8**				**133.8**	**6,558**	**8.5**	**78.82**	**5.1**	**0.5**	**87**	**87**	**87**
Dried Leg. Veg	859	5,841		8.2	6,691.8				133.8	6,558	8.5	78.8	5.1	0.5			
OILCROPS	**87,247**	**1,91.5**	**0**	**0**	**87,438.5**	**0**	**0**	**55,642**	**8,695**	**23,101**	**30**	**97.62**	**1.2**	**8.1**	**3**	**9.3**	**3**
Coconuts	86,940				**86,940**			**55,642**	**8,694**	**22,604**	**29**	**88.7**	**0.9**	**7.4**			
Groundnuts shelled	307	119.6			426.6				0	426.6	0.6	8.3	0.4	0.7			
Nuts Nes		71.9			71.9				1.438	70.462	0.1	0.7	0	0.1			
VEGETABLES	**9,500**	**9,862.9**	**0**	**51.54**	**19,311.4**	**0**	**0**	**0**	**953.3**	**18,358**	**24**	**21.23**	**1**	**0.1**	**68**	**58**	**50**
Tomato Fresh	2,600	120.6		0.78	2,719.82				272	2,447.8	3.2	1.6	**0.1**	0			
Onions	400	6,001.9		27.76	6,374.14				191.2	6,182.9	8	8.3	0.3	0			
Lettuce		104.3		4	100.3				10.03	90.27	0.1	0.1	0	0			
Garlic		1,293.5		3.2	1290.3				38.71	1,251.6	1.6	4.7	0.1	0			
Other Fresh Vegs	6,500	2,342.6		15.8	8,826.8				441.3	8,385.5	11	6.5	0.4	0.1			

Table A1.3 Fiji food balance sheet 1996. **Population: 775,000**

	Domestic Supply							Domestic Utilisation			Per Caput Supply						
Products	**Production**	**Imports**	**Stock**	**Export**	**Total**	**Feed**	**Seed**	**Manufac**	**Waste**	**Gross Food**	**Kg/YR**	**Per Calories**	**Day Protein GM**	**Fat day GM**	**% CAL IMP**	**% PRT IMP**	**% FAT IMP**
					Metric Tons												
FRUITS	**14,657**	**2,739.6**	**0**	**83.91**	**17,312.7**	**0**	**0**	**0**	**1,318**	**15,995**	**21**	**24.74**	**0.3**	**0.1**	**16**	**13**	**17**
Watermelon	1,200	27.6		1.1	1,226.5				61.33	1,165.2	1.5	0.7	0	0			
Pineapples	3,403			5.1	3,397.9				339.8	3,058.1	3.9	2.8	0	0			
Banana & Plantain	6,300			0.85	6,299.15				629.9	5,669.2	7.3	12.6	0.2	0			
Passionfruit		0.06		0.06	0				0	0	0	0	0	0			
Pawpaw	1,054			50	1,004				50.2	953.8	1.2	0.9	0	0			
Oranges, Tangerines	500	659.2		5	1,154.2				57.71	1,096.5	1.4	1.0	0	0			
Apples Fresh		1,017.2		5.7	1,011.5				20.23	991.27	1.3	1.5	0	0			
Grapes Fresh		457.5		0.1	457.4				22.87	434.53	0.6	0.6	0	0			
Dried Fruit		65		0.2	64.8				0.648	64.152	0.1	0.6	0	0			
Fresh Fruit nes	2,200	513		15.8	2,697.2				134.9	2,562.3	3.3	4.1	0	0			
STIMULANTS	**125**	**948.3**	**0**	**147.5**	**925.8**	**0**	**0**	**0**	**18.52**	**907.28**	**1.2**	**5.3**	**0.1**	**0.5**	**92**	**100**	**90**
Coffee & Coffee Subs.		70.3		39.6	30.7				0.614	30.086	0	0.1	0	0			
Cocoa Beans	125			80	45				0.9	44.1	0.1	0.6	0	0			
Chocolate & Choc. Prod.		350		12.1	337.9				6.758	331.14	0.4	4.6	0	0.4			
Tea		528		15.8	512.2				10.24	501.96	0.6	0.0	0	0			
SPICES	**2,803**	**1,704.3**	**0**	**1,331.1**	**3,176.2**	**0**	**0**	**0**	**81.02**	**3,095.2**	**4**	**28.1**	**0.9**	**0.7**	**39**	**53**	**63**
Black Pepper		18.5		6.5	12				0	12	0	0.1	0	0			
Ginger	2,403	8		790.6	1,620.4				81.02	1,539.4	2	18.9	0.5	0.3			
Chillies Dried	400			0.3	399.7				0	399.7	0.5	4.8	0.2	0.2			
Sauces etc		935.7		4.6	931.1				0	931.1	1.2	1.8	0.2	0			
Spices Nes		742.1		529.1	213				0	213	0.3	2.5	0.1	0.1			
BEVERAGES	**17,414**	**1,860.5**	**0**	**163.62**	**191,109.9**	**0**	**0**	**0**	**955.5**	**18,155**	**23**	**37.3**	**0.1**	**0**	**17**	**4.4**	**0**
Wines		770			770				38.5	731.5	0.9	1.8	0	0			
Beer	16,890	764		105.5	17,548.5				877.4	16,671	22	27.7	0.1	0			
Whiskey & Brandy	33.85	170		2.2	201.65				10.08	191.57	0.2	2.0	0	0			
Gin	154.53	87.47		0.81	241.19				12.06	229.13	0.3	2.4	0	0			
Rum	326.18	21		54.8	292.38				14.62	277.76	0.4	2.9	0	0			
Liquers		42.7		0.28	42.42				2.121	40.299	0.1	0.4	0	0			
Other Spirits	9.51	5.3		0.03	14.78				0.739	14.041	0	0.1	0	0			

Table A1.3 Fiji food balance sheet 1996. **Population: 775,000**

	Domestic Supply							Domestic Utilisation			Per Caput Supply						
Products	**Production**	**Imports**	**Stock**	**Export**	**Total**	**Feed**	**Seed**	**Manufac**	**Waste**	**Gross Food**	**Kg/YR**	**Per Calories**	**Day Protein GM**	**Fat day GM**	**% CAL IMP**	**% PRT IMP**	**% FAT IMP**
					Metric Tons												
MEAT	**14,115**	**12,180**	**0**	**22.06**	**26,273.5**	**0**	**0**	**0**	**368.6**	**25,905**	**33**	**174.7**	**12**	**14**	**57**	**46**	**61**
Meat & Bovine Fresh	2401	1525		2.52	3,923.48				39.23	3,884.2	5	29.9	1.9	2.4			
Meat of Sheep & Lamb	24.1	9,550.2		8.69	9,565.61				95.66	9,470	12	82.7	4.1	7.2			
Meat of Goat	1,297	87.88			1,384.88				13.85	1,371	1.8	7.5	0.8	0.5			
Meat of Swine	791	30		3.9	817.1				8.171	808.93	1	10.3	0.3	1			
Poultry	9,602	387.38		1.08	9,988.3				199.8	9,788.5	13	42.2	4.3	2.7			
Edible Offals		600		5.87	594.13				11.88	582.25	0.8	2.2	0.4	0.1			
DAIRY PRODUCTS	**12,323**	**3,823.4**	**0**	**12.41**	**16,134**	**0**	**0**	**0**	**641.3**	**15,493**	**20**	**84.1**	**4.4**	**4.5**	**69**	**71**	**68**
Milk Fresh	12,323	220.8		3.14	12,540.7				627	11,914	15	26.5	1.3	1.5			
Skimmed Milk		114.9		0.01	114.89				11.49	103.4	0.1	1.3	0.1	0			
Milk Liquid & Semi Liquid		57.6		1.19	56.41				2.821	53.59	0.1	0.1	0	0			
Other Powdered Milk		2,900.6		2.7	2897.9				0	2,897.9	3.7	50.8	2.7	2.7			
Evap. Or Cond. Milk		328		3.47	324.53				0	324.53	0.4	2.6	0.1	0.1			
Cheese & Curd		201.5		1.9	199.6				0	199.6	0.3	2.7	0.2	0.2			
EGGS	**2,844**	**158**	**0**	**12**	**2,990**	**0**	**0**	**0**	**149.5**	**2,840.5**	**3.7**	**14.6**	**1.2**	**1**	**5.3**	**5.3**	**5**
Eggs in shell	2,844	158	0	12	2,990	0	0	0	149.5	2,840.5	3.7	14.6	1.2	1			
FISH	**50,322**	**16,116**	**0**	**15,552**	**50,886.2**	**0**	**0**	**9,612**	**3,095**	**36,992**	**48**	**139.9**	**19**	**6.5**	**29**	**29**	**28**
Fish Fresh or Frozen	33,422	13,731		7,560	39,593			9,612	2,969	25,824	33	78.5	12	3.3			
Fish Canned	13,847	1,860		6,921.4	8,785.6				0	8,785.6	11	57.5	6.5	3.2			
Crustaceans & Mollu.	3,053	525		1,070.4	2,507.6				125.4	2,382.2	3.1	4	0.8	0			
VEGETABLE OIL	**6,154**	**8,545.9**		**5,107.8**	**9,592.04**	**0**	**0**	**0**	**0**	**9,592**	**12**	**294.9**	**0**	**33**	**89**	**100**	**89**
Soyabean Oil Refined		7,403.2		100	7,303.2					7,303.2	9.4	228.2	0	26			
Coconut Oil (Ref)	6,154			5,000	1,154					1,154	1.5	36.1	0	4.1			
Other Fixed Veg. Oil		302.28		2.98	299.3					299.3	0.4	9.4	0	1.1			
Margarine		840.4		4.86	835.54					835.54	1.1	21.3	0	2.4			
ANIMAL FATS	**1,722**	**3,217.8**	**0**	**28.1**	**4,911.7**	**0**	**0**	**0**	**0**	**4,911.7**	**6.3**	**129.5**	**0.1**	**15**	**67**	**61**	**67**
Ghee	70	827.8		1.1	896.7				0	896.7	1.2	27.7	0	3.1			
Butter	1,652	2,000		7	3,645				0	3,645	4.7	92.4	0.1	10			
Ghee Substitute		390		20	370				0	370	0.5	9.4	0	1.1			
MISCELLANEOUS	**0**	**653.8**	**0**	**40.2**	**613.6**	**0**	**0**	**0**	**0**	**613.6**	**0.8**	**0.889**	**0**	**0**	**100**	**100**	**100**
Soups & Broths		41.3		0.2	41.1				0	41.1	0.1	0.1	0	0			
Powders & Prep.		185		2.2	182.8				0	182.8	0.2	0.3	0	0			
Other Food Prep.		427.5		37.8	389.7				0	389.7	0.5	0.6	0	0			

Appendix 2. Crop Production Sector

A2.1 Coconut

Northern Division and Eastern Division remain the major copra-producing areas, with Northern Division by far the predominant producer. Small quantities of copra are also being received from villages in the coastal areas of Viti Levu. Coconut production in Central Division is directed towards whole nut sales in the local markets.

There was a 100% increase in whole nut production from 42,322 dozen in 1997 to 85,104 dozen in 1998. During the year, three coconut hybrid demonstration plots were established in the Division.

Copra output increased from 12,194 tons in 1997 to 15,697 tons in 1998. This increase was due to the attractive price, at F$600/ton, better shipping services, the effects of the drought in increasing nut fall and efforts by MAFFA to promote the rehabilitation and replanting of senile plantations to revive this once-dying industry through the CDF. Eastern Division surpassed its production target by 118% in producing 7,296 tons. During the year, 57 copra dryers were constructed in Eastern Division. The new dryers produced top-quality copra that fetched premium price.

Delays in planting, the growing profitability of alternative cash crops like *dalo* and *yaqona* and the effects of the drought resulted in a shortfall of 5% in the planting target. Northern Division nevertheless exceeded its planting target by 7.2%.

In Western Division, about 58,000 dozen nuts were produced in the coastal areas of Ra, Ba and the Yasawas. Nurseries for hybrid nuts were also established, especially for drinking nuts to target the tourist market.

Ten direct micro-expellant projects funded through the CDF produced a total of 6,672 litres of oil in 1998. A total of 4,682 litres were produced from nine projects in Cakaudrove and 1,990 litres from one project in Macuata.

Commodity Traders Fiji Limited entered the copra industry during 1998, buying 5,168 tons of copra that were exported to Bangladesh. Competition between it and the other major buyer of copra in Fiji (Copra Millers Fiji Limited) resulted in a steady increase in price from F$400 per ton to almost F$700 per ton during the year.

A2.2 Dalo (taro)

The production of *dalo* is widely spread throughout the four divisions of Fiji. In 1998, Central Division produced 46% of the total output, followed by Northern Division (35%), Eastern Division (13%) and Western Division (6%). In Northern Division, Taveuni accounts for 50% of the total area and output. Production is concentrated on *Tausala dalo*, the preferred variety in the export markets. Production in Western Division is confined to Ra Province, again mainly for export.

Table A2.1 Dalo production.

	1990	1996	1997	1998	1999
Output (tons)	8,780	22,619	23,350	25,624	25,705
Export (tons)	2,188	7,027	6,040	5,262	
Consumption (tons)	6,592	15,592	17,310	20,362	
Per capita consumption (tons)	8.5	39.6	43.9	51.7	
Per capita consumption per day (kg)	0.02	0.11	0.12	0.14	
% exported	25	31	26	21	

The largest expansion in *dalo* production occurred between 1990 and 1996, with the opening up of the export market. In this period, output more than (Table A2.1). An increase in *dalo* output of 3,086 tons was recorded over the four-year period from 1996 to 1999. Output increased by 10% from 23,350 in 1997 to 25,624 tons in 1998, before declining slightly to 25,705 tons in 1999.

Total *dalo* exports increased by 21.4% from 6,088 tons in 1997 to 7,392 tons in 1998. The dry spell in 1998 affected the weight and quality of *dalo* in Eastern Division resulting in the rejection of 116 tons of *Tausala dalo* targeted for the export market.

As for production, annual per capita consumption of *dalo* expanded dramatically between 1990 and 1996. During the four-year period from 1996 to 1999, annual per capita consumption continued to increase, from 40 kg in 1996 to 52 kg in 1998. Mixed varieties of *dalo* are produced mainly for domestic consumption.

The price of *dalo* in the domestic market has remained high due to the high overseas demand. The farm-gate price during 1998 ranged from F$0.70/kg to F$2.40/kg. In addition, drought in 1998 greatly affected the supply of planting materials of *Tausala dalo*, reducing its area planted and production. The long dry spell also affected the weight and quality of the corm resulting in a lot of rejects. A 10.5% shortfall in Central Division's planting achievement in 1998 was due mainly to a shortage in planting material. Only 22 nurseries were maintained in the Division from the 40 established in 1997.

A2.3 Ginger

Ginger production is predominantly for export. Output increased by 30% from 2,683 tons in 1997 to about 3,500 tons in 1998. Both the planting and production targets for immature and mature ginger were exceeded for the year. Mature ginger exceeded the output in 1997 by 35.5%.

Attempts to expand ginger planting into flatland areas in Central Division were yet to produce convincing results. Many farmers opted for immature ginger because it had fewer disease problems and the returns were quicker.

In 1998, the local farm-gate price for ginger was F$0.50/kg for immature ginger and from F$0.70/kg to F$1.00/kg for mature ginger.

A2.4 Yaqona (Kava)

Rising *yaqona* prices provided incentives for farmers in Central, Northern and Eastern Divisions to surpass their planting targets in 1999. Central Division produced almost three times the target of 320 tons.

Rising prices during 1999 resulted in a buying frenzy that made *yaqona* one of the most sought after commodities. They were largely responsible for Central, Eastern and Western Divisions surpassing their planting targets for the year. Farm-gate prices in the first nine months of the year went as high as F$60/kg for A-grade *Waka* in some areas. However, this dropped to the normal price of F$20-F$30/kg in the fourth quarter.

A2.5 Fruits

Mangoes, papayas, pineapples and oranges are the main tropical fruits produced in Fiji. The production of fruits has decreased in the past four years, but there has been an increase in export. The ability of fruit trees to withstand the drought (with assistance of irrigation facilities in some crops) and bear fruits abundantly is one of the strengths of this sector. The Batiri Orchard exceeded its production target in 1999 by 58% for a total production of 1,020 tons. The

highlight of the year was the heavy fruiting and production of citrus in spite of the effects of the long drought.

Mango production is confined to Western Division where 217 farmers were involved in export production in 1998. Out of the 20 ha targeted for planting, 17 ha were achieved. The improved varieties produced 246 tons out of the 100 tons targeted – a 146% increase. A striking feature of this commodity was its ability to withstand the year's drought and still produce abundantly. The year's production was four times more than the 1997 production of 45 tons.

Drought had very little effect on the planting programme for papaya. Achievements in both planting and overall production were well beyond targets. Balthan International expanded production into new areas in Ra Province. Planting and production in Northern and Central Divisions also provided encouraging results. The export target for the year was exceeded by 91%, with about 61% of exports going to Japan.

The focus for pineapple production is on off-season production to ensure consistent supply in the markets. A shortage of planting materials in Central Division and Western Division led to shortfalls in their planting targets in 1998. However, production targets were achieved. In Northern Division, pineapple production was focussed on the Pineapple Micro Project, which covered the areas from Sasa in Macuata to Lekutu in Bua. Off-season production fetched the highest price, from F$0.50 to F$2.00 each depending on size. During the main season, the price ranged from F$2 to F$6 per bundle of 3 to 5 fruits.

Pineapple production in 1998 was 2,534 tons exceeding the previous year's production of 2,974 tons. Exports go mainly to New Zealand and Canada.

A total of 10,000 citrus plants, using different rootstocks, were planted during 1998 increasing the total area under citrus to 152 hectares. The production target of 644 tons in 1998 was exceeded by 376 tons, a 58% increase. A total of 51 tons of fresh fruit were sold in major outlets in Viti Levu and Vanua Levu, earning revenue of about F$285,500.

A2.6 Vegetables

The production of vegetables was maintained at around 20,000 tons for the four years from 1996 to 1999. There was a major decrease in output in 1998 due to the drought. Per capita consumption decreased from 38 kg in 1996 to 27 kg in 1998 (Table A2.2).

Table A2.2 Vegetable production.

	1996	1997	1998	1999
Output (tons)	20,701	21,132	13,933	19,882
Export (tons)	287	461	409	
Import (tons)	9,410	7,285	7,581	
Consumption (tons)	29,824	27,956	21,105	
Consumption per capita per year (kg)	38.5	36.1	27.2	
Consumption per capita per day (kg)	0.11	0.10	0.07	
% exported	1	2	3	

Irrigation during the drought helped vegetable production to the extent that eggplant and okra exceeded their planting and production targets in 1998. Their exports also exceeded the 1997 export quantities by 60% and 55%, respectively.

A2.7 Chillies

About 49 ha of chillies were planted during 1998 out of the targeted area of 50 ha. Almost 648 tons of fruits were produced, surpassing the year's target of 500 tons by 29.5%. This high production was attributed mainly to the use of irrigation facilities.

The drop in exports to New Zealand was attributed to the low-quality produce as a result of the drought. Fiji is the only Pacific island country allowed to export chillies to New Zealand under the high-temperature forced-air treatment. The main importing countries are New Zealand and Canada.

The local farm-gate price ranged from F$0.80/kg to F$1.00/kg.

A2.8 Eggplant

Export quality eggplants are grown in the Sigatoka Valley and around the Nadi River deltas. Non-irrigated areas were badly affected by the drought.

The area planted in 1998 was 89 ha, well beyond the projected target of 51 ha. The production achievement of 2,053 tons was treble the projected target.

The export volume in 1998 of 337 tons was 60% more than in 1997. New Zealand and Canada are the two main importing countries.

A2.9 Okra

Okra continued to be an important commodity in both the domestic and export markets in 1998 in spite of the drought. The area planted during the year was 76% above the projected target and output was 89% above the projected target.

The main importing countries are New Zealand, Australia and Canada. There was an increase in the amount exported to 264 tons in 1998, 55% more than in 1997.

Australia's imports were higher than New Zealand's, a result of increasing demand in the Australian market.

A2.10 Assorted vegetables

The major growing areas for assorted vegetables are Sigatoka Valley and the Ba and Ra districts in Western Division. Assorted vegetables included leafy vegetables such as amaranths (*moca* and *tubua*), *bele*, taro leaves, curry leaves, pigeon peas and various types of beans and any other vegetables that consumers may want from overseas markets.

Central Division is also a major producer of assorted vegetables, often supplementing export shortfalls in Western Division. However, the bulk of production in Central Division goes to the domestic markets.

The main importers of assorted vegetables are New Zealand, Australia and Canada. Australia's demand is highest during their winter months. A total of 254 tons of assorted vegetables were exported during 1998 with New Zealand accounting for 48%, Australia 35% and Canada 17%.

A2.11 Cocoa

Cocoa has been a less emphasized commodity in recent years because of its unattractive market price. However, price increased steadily during 1998, especially for sun-dried beans that were supplied mostly from the Namara area in Tailevu and Matasawalevu in Macuata. The two main buyers were NATCO and Koko Singa, which bought beans from F$1.20/kg to F$1.40/kg. These beans sold in local markets at about F$1.65/kg.

Almost 600 farmers rely on cocoa as a source of income in Northern Division where 562 ha of cocoa were being maintained in 1998. In spite of the drought, Matasawalevu produced about 115 tons of dried beans. The impact of the new steel drums installed in cocoa dryers in 1995/1997 resulted in the production of good-quality dried beans in 1998.

A total of 172 tons of cocoa beans were exported in 1998. The major importers were Germany (90 tons), Australia (67 tons), Western Samoa (14 tons) and USA (2 tons).

A2.12 Vanilla

The vanilla expansion program has faced problems with its withdrawal from capital funding. About 73 kg of cured beans were exported to Australia in 1998.

In Northern Division, Buca Bay and Rabi had a combined area of 5 ha in 1998. During the year, the two areas harvested about 500 kg of green beans producing about 465 kg of Grades 2 and 3 cured beans. Other growing areas were Biaugunu and Saqani. About 6,400 vines were reported to be on the ground. Production in Western Division was confined to Ra Province, where over 1,000 vines were maintained.

Central Division produced about 19.4% more beans in 1998 than in 1997 (108 kg). Green beans were sold for F$6/kg and premium-quality cured beans were sold from F$70/kg to F$100/kg.

A2.13 Cassava

There is a growing export market for cassava in New Zealand and Australia. A total of 2,250 ha were planted in 1998 with the majority planted in Central Division (1,073 ha), Western Division (714 ha) and Northern Division (462 ha). The most popular variety in Central Division was the New Guinea variety, of which 620 ha were planted during the year and 596 ha harvested, yielding 6,165 tons. Cassava production for the year totalled 29,232 tons, which decreased to 26,900 tons in 1999 continuing a three-year fall in output from the record level of 1996 (Table A2.3).

A decrease in output of 15,277 tons had been recorded for the past four years. Annual per capita consumption dropped from 38 kg in 1996 to 13 kg in 1997, then increased to 24 kg in 1999. It fluctuates markedly according to variations in exports.

Table A2.3 Cassava production.

	1990	1996	1997	1998	1999
Output (tons)	23,526	42,177	32,619	29,233	26,900
Export (tons)	302	13,075	22,834	17,540	8,070
Consumption (tons)	23,224	29,102	9,786	11,693	18,830
Per capita consumption (kg)	30	38	13	15	24
Per capita consumption per day (kg)	0.08	0.10	0.03	0.04	0.07
% exported	1	31	70	60	30

Cassava exports increased dramatically in 1997, peaking at 22,834 tons or 70% of total output. They then declined, just as dramatically, to 8,070 tons in 1999. The biggest buyers of cassava are New Zealand, Australia, USA and Canada. Australia and New Zealand remain the major export markets for both fresh and frozen cassava. Domestic consumption of cassava has fluctuated widely in recent years, a result of variations in export quantities and the drought in 1997 and 1998..

A2.14 Yams

Most yams planted in 1998 were in Northern Division (230 ha) and Eastern Divisions (102 ha). These divisions also led production of 2,257 tons and 2,297 tons, respectively. A decrease in output of 1,879 tons had been recorded over the four years from 1996 to 1999. Output halved in 1999. The drop in yam production has resulted mainly from a shift of focus

from food security to export production, which has seen greater emphasis on *dalo* and cassava production. Nevertheless, yams have been, and will continue to be, regarded as one of the best food security crops due to their long storability.

Annual capita consumption also decreased from 6.43 kg in 1996 to 4.04 kg in 1999.

Table A2.4 Yam production.

	1990	1996	1997	1998	1999
Output (tons)	7,830	5,008	3,907	6,218	3,129
Export (tons)	30	22	47	31	0
Consumption (tons)	7,800	4,986	3,860	6,187	3,129
Consumption per capita (kg)	10.1	6.4	5.0	8.0	4.0
Consumption per capita per day (kg)	0.03	0.02	0.01	0.02	0.01
% exported	0	0	1	1	0

Of the small quantities that have been exported, the rounded white varieties, *Taniela Vula Leka* and *Futuna* are the varieties most in demand. Australia and Canada are the main importing countries.

A2.15 Kumala (sweet potato)

Kumala is grown mainly for food security purposes because it matures quickly and is a very good rehabilitation crop. The biggest plantings tend to be after droughts. Central Division remains the biggest producer of kumala, accounting for 74% of output in 1998.

Plantings increased under the drought rehabilitation programme, especially in 1998, and this is the reason the crop was readily available. An increase in output of 2,311 tons had been recorded between 1997 and 1998. Exports of *kumala* are negligible.

Per capita consumption increased from 5 kg in 1997 to 8 kg in 1998. This increase was related more to availability and affordability than taste preference.

Table A2.5 Sweet potato production.

	1990	1996	1997	1998	1999
Output (tons)	3,211	3,276	5,475	5,454	5,704
Export (tons)	1	3	2	3	0
Consumption (tons)	3,210	3,273	5,473	5,451	5,704
Consumption per capita (kg)	4.1	4.2	7.1	7.0	7.4
Consumption per capita per day (kg)	0.01	0.01	0.02	0.02	0.02

A2.16 Other root crops

Kawai remains a popular crop in Northern Division and Eastern Division. In Central Division, the crop is concentrated mostly in the Serua/Namosi area.

Dalo ni Tana is an ideal crop for food security due to its keeping qualities. Shortage of planting materials on certain atoll islands is cited as the major constraint to increased production.

A2.17 Banana and plantain

Banana is grown for domestic consumption and is a good cash crop for some farmers. It was also a major source of carbohydrates on some atoll islands in Eastern Division. Average national yield is 5.2 tons/ha.

A2.18 Rice

A decrease in output of 1,095 tons of rice had been locally produced in the past four years. Annual per capita consumption decreased from 56 kg in 1996 to 23 kg in 1999. These figures may be low due to un recorded imports.

Table A2.6 Rice production.

	1990	1996	1997	1998	1999
Output (tons)	26,477	18,888	18,691	5,192	17,793
Import (tons)	29,438	25,086	26,547	30,344	
Consumption (tons)	55,915	43,974	45,238	35,536	
Consumption per capita kg	72	57	58	46	
Consumption per capita/day	0.20	0.16	0.16	0.12	

Production and planting were badly affected by the drought in 1998. Production in Central Division was down by 37.3% compared with the 1997 output of 2,107 tons. In Northern Division, irrigated rice dominates in West Macuata and Bua areas. (Lekutu and Dreketi) where only 2,214 ha out of 6,000 ha planted were harvested. In Western Division, 80% of the 580 ha crop was lost due to drought. Average yield during 1998 was 0.65 tons per ha. Output recovered in 1999 to 17,793 tons.

A2.19 Pulses

Most pulses are grown in Western Division, where pigeon peas, cowpeas, mung bean and urd are the main crops grown as green pods as well as for dhal. Low levels of planting and production in recent years were attributed to drought. Pulse production in Central Division increased by 30.3% in 1998.

A2.20 Maize

Maize is grown mostly on small scale and sold as green cobs. Nirala is the most popular variety grown by farmers.

A2.21 Peanuts

Peanuts are grown in small quantities throughout Western Division. They are a good cash crop, because they can be stored for long periods and have a high demand in the confectionery market. Shortage of planting material is the major production constraint.

A2.22 Turmeric

The 1998 production of turmeric was 98 tons, an increase of 145% over 1997 production of 40 tons.

Appendix 3. Livestock Production Sector

A3.1 Beef

Beef industry output in the formal sector (that is, through the registered abattoirs) increased from 1996 to 1998. A record number of 12,630 beef cattle were slaughtered in 1998, 1,285 cattle (8%) more than in 1997 and yielding 3,005 tons of carcass. As a result, total beef imports fell by 11% from 2,059 tons in 1997 to 1,825 tons in 1998. An unusually high number of female cattle and 656 calves were slaughtered due to the severe drought and lack of pasture, and output subsequently declined in 1999.

Beef production in Northern Division was promising during 1998, with a slaughter of 1,682 cattle through the registered abattoirs. A lot of cattle continued to be slaughtered for *magiti* purposes for which no reliable data were available. However, two centres, namely Vatuwaqa Quarantine Station and Fiji Meat Industry Board, supplied 789 cattle for *magiti* purposes in the greater Suva area.

Table A3.1 Beef production.

	1996	1997	1998	1999
Output (TMFE)	2,402	2,748	3,005	2,362
Import (TMFE)	1,525	2,059	1,825	
Consumption (tons)	3,927	4,807	4,830	
Per capita consumption (kg)	5.07	6.20	6.23	
Per capita consumption per day (kg)	0.01	0.02	0.02	

Total income generated from the formal sector in 1998 was approximately F$7.5 million. The canneries acquired more boneless beef locally and paid a much better price. Their inability to cope with the local demand prompted the canneries to import fresh meat from New Zealand (646 tons), Australia (1,066 tons) and Vanuatu (17 tons). Total imports in 1998 were 1,825 tons, 11.2% less than in 1997, with the bulk of the imports being prime cuts for the hotels valued at F$1.7 million.

The beef industry received a total of F$792,000 from CDF funds in 1998 and the government provided technical assistance. The research section of MAFFA provides genetically improved breeds to beef farmers. The artificial breeding program is heavily subsidized to encourage farmers to use the technology to bring about efficiency and productivity gains.

Farmer training programs are undertaken that focus on beef farming as a business. To encourage producers, the Fiji Meat Industry Board is playing a greater role in restructuring the beef sector through improved hygiene, efficient marketing and possible export of beef to regional countries.

A3.2 Dairy

The dairy sector comprised 218 registered dairy farms in 1998 of which 185 farmers supplied whole milk and eight farmers supplied cream to Rewa Cooperative Dairy Company. During 1998, there were 33 bulk milk suppliers. Collectively, they supplied close to 80% of all the milk to the company. Some 152 farmers supplied the balance of 20%. A further 25 farmers were involved in the supply of fresh milk to consumers in towns (town suppliers). They produced 1.8 million litres of milk. Approximately 1.7 million litres of milk was used to produce 20 TMFE of ghee.

The dairy industry's performance was fairly constant from 1996 to 1998. The total volume of milk supplied to Rewa Cooperative Dairy Company was almost 13 million litres, or an equivalent of 536 TMFE, in 1998, an increase of almost 10% over 1997. Nevertheless, substantial dairy products were imported from New Zealand and Australia valued at F$36 million. The drought in 1998 had an adverse effect on overall dairy production, which dropped from 1,555 TMFE in 1998 to 1,183 TMFE in 1999.

The value of local production was F$4,128 million. The CDF assistance contributed almost 7% to the value of dairy output during 1998.

Table A3.2 Dairy production.

	1996	1997	1998	1999
Output (TMFE)	1,563	1,577	1,555	1,183
Import (TMFE)	4,150	4,750	4,105	4,969
Consumption/yr (TMFE)	5,713	6,327	5,660	6,152
Per capita consumption (kg)	7.37	8.16	7.30	7.94
Per capita consumption per day (kg)	0.02	0.02	0.02	0.02

The impact of assistance given by MAFFA, coupled with good weather, has contributed to the maintenance of production. Nevertheless, production per cow of 4.6 litres is low compared with commercial dairy herds. Collectively, backyard production was estimated at 25.3 million litres of milk. The subsistence and sugarcane farmers with one or two cows each produced about 21.8 million litres.

Imports have risen since 1996 as a result of increased consumption and a decrease in import tariff on selected dairy products from 35% to 27%. Major increases were seen in the import of butter and evaporated milk. Australia and New Zealand are the major suppliers of dairy products. Imports from NZ amounted to 3,134 tons while imports from Australia totalled 1,615 tons in 1998.

The government has continued to assist farmers with technical advice, disease monitoring, general extension work and the supply of breeding bulls at nominal rates. It has also assisted dairy farmers through MAFFA with regulatory services, farmer training, demonstrations and field days, to expose farmers to modern dairy farming techniques in order to improve efficiency and productivity in the industry. Research continues to seek consumers to a milk curding problem.

A3.3 Sheep

Table A3. Sheep production.

	1996	1997	1998	1999
Output (TMFE)	95	25	30	41
Import (TMFE)	5,418	3,499	3,575	11,362
Consumption (TMFE)	5,513	3,524	3,605	11,403
Per capita consumption (kg)	7.11	4.55	4.65	14.71

Local sheep meat output increased by 20% from 25 tons in 1997 to 30 tons in 1998. An even larger increase in output of 33% occurred between 1998 and 1999. Much of this increase in production was attributable to the CDF programme. The number of private sheep farms increased from 83 farms with a total of 2,503 sheep in 1997 to 114 farms with 3,414 sheep in 1999. A majority of the sheep farmers are in Central Division.

Local sheep meat production was valued at F$209,300 in 1998. Despite the drought, lambing percentages in Northern and Western Divisions were good in 1998. Total imports of sheep meat increased by 76 tons to 3,575 boneless equivalent tons in 1998, which was valued at F$15.8 million. This was followed by a trebling of imports in 1999. The annual apparent

consumption of sheep meat per head of population was estimated to be almost 15 kg in 1999, double the figure in 1996.

The government stations had 3,304 sheep as breeders and fattening stock at the end of 1998, or 10.8% fewer sheep than in 1997. This was due to de-stocking at Dobuilevu and Wainigata research stations. Stocks on private farms, however, increased by 36% from 2,503 in 1997 to 3,414 in 1998.

A number of farmer training programs have been conducted, addressing better husbandry practices and good management of breeding ewes. The government continues to provide technical back-up services to farmers in the form of advice, post-mortems on dead animals, anthelmintic sensitivity tests and the transfer of new technology through field days. It also continues to breed genetically superior sheep breed and address nutrition, sheep health and production-related issues.

A3.4 Goats

The overall goat population in 1998 was 220,765 animals, an increase of almost 10% over the population of 202,871 in 1995. Over one-half the goats are in Western Division, and most of the remainder are in Northern Division.

The number of goats slaughtered during 1998 was 1,380, an increase of 343 over the 1997 production of 1,037. This resulted in a significant decline in imports of goat meat during the year, from 127 tons to 68 tons. The value of local goat production was estimated at F$7.1 million in 1998. Per capita annual consumption was still low at 0.12 kg, mainly because goat meat is more expensive than imported lamb and mutton.

Table A3.4 Goat production.

	1990	1996	1997	1998	1999
Output (TMFE)	24	15	124	22	20
Import (TMFE)	85	82	127	68	26
Consumption (TMFE)	109	97	251	90	46
Per capita consumption (kg)	0.14	0.12	0.32	0.12	0.06

The future for the goat industry lies in improving productivity at the smallholder level through better breeding, nutrition, health and other husbandry practices. The research stations continue to produce genetically improved stock as breeders for the farmers. They also continue to stress the use of medicated urea-molasses blocks to curb the internal parasites, and the improvement of the genetic composition of the breeders by artificial insemination.

There is potential for a few large-scale farms, but availability of land is the limiting factor.

A3.5 Pigs

The number of pigs killed each year has remained fairly constant in recent years. Pork production increased by 4.5% in 1998 to 821 tons, valued at F$2.65 million, due to an improvement in the market for pork. A total of 14,732 pigs were slaughtered in registered abattoirs in that year. In 1999, output fell back to below the 1996 level. Imports contribute negligibly to total consumption.

Table A3.5 Pig production.

	1990	1996	1997	1998	1999
Output (TMFE)	647	791	785	821	759
Import (TMFE)	11	30	106	171	44
Consumption (TMFE)	658	821	891	992	803
Per capita consumption (kg)	1	1	1	1	1

Pig meat continues to be the most expensive meat with the prime cuts as high as F$7.00/kg. The main contributing factor to the high price has been the high feed costs and other production costs. There is a significant demand for *magiti* pigs, which are generally culled animals that fetch from F$350 to F$500 each. The porkers and baconers dress out at an average weight of 55 kg and are sold for F$2.80/kg to F$3.40/kg.

The government provides general extension, animal health and regulatory services. A number of field days have been held on the advantages and techniques of artificial insemination. The Japanese Government recently donated close to F$45,000 worth of equipment and an artificial insemination specialist to carry out the Pig Artificial Breed Improvement Programme at the farmer level.

There is a goal to increase production for the export markets, in particular to other Melanesian countries, through a focus on improving pig breeding and nutrition.

A3.6 Poultry

The broiler industry is concentrated in Central Division with a total production in 1998 of 7,226 tons from 5,560,260 birds, or 87% of total production, generating revenue of F$34.8 million. Western Division produced the remainder of 1,100 tons from 716,550 birds. Broiler production has expanded rapidly since 1990, but dropped by 9% in 1998 as a result of competition from cheaper cuts of poultry imported from USA and Australia. Broiler birds slaughtered in registered abattoirs decreased by close to 800,000 birds, or 11.3%. In spite of this, the broiler industry continued to be the highest producer of locally produced meat at 59% of total meat production. Its output in 1998 was valued at F$34.8 million and edible egg output contributed F$8.3 million to the economy. Egg production reached a record 4.13 million dozen eggs in 1998, just over 0.5% more than in 1997, despite an increase of 16% in the average wholesale price from F$1.80 per dozen in 1997 to F$2.10 per dozen in 1998.

Table A3.6 Poultry production.

	1990	1996	1997	1998
Output (TMFE)	5,492	9,602	9,156	8,326
Import (TMFE)	67	387	771	892
Consumption (TMFE)	5,559	9,989	9,927	9,218
Per capita consumption (kg)	7.17	12.89	12.81	11.89

Imports increased rapidly since 1990 and now represent about 10% of total consumption. That is, the self-sufficiency ratio has decreased to 90%. Imports increased by a staggering 130% or 505 tons over the two-year period, 1996-1998. Poultry meat imported during 1998 was 893 tons of which 66% was imported from USA, 30% from Australia and 4% from New Zealand. The import of poultry products was valued at F$2.7 million in 1998. No exports were recorded for 1998.

Close to 70% of all the raw ingredients for poultry feed were imported from New Zealand, Australia and Canada. In November, a 3% duty was placed on imported poultry feed, raising the domestic price.

The local broiler industry is finding it increasingly difficult to compete with imported poultry products from Australia and USA that sell at an average price of F$1.80/kg. As a result of a tariff reduction from 22.5% to 15%, this price can be lower than the local cost of production.

The government intends to support the orderly expansion of the local poultry industry with emphasis on such development in rural areas in order to create useful employment for rural dwellers. It also plans to provide technical knowledge to educate small farmers on husbandry practices to improve efficiency and productivity.

A3.7 Honey

A total of 47 new farmers established their own apiaries in 1998, increasing the nat production dropped by 10% from 69 tons in 1997 to 62 tons in 1998, valued at F$434,350. Imports of honey increased by 2 tons to 7.5 tons in 1998. The drop in production was attributed to extremely dry weather that affected nectar production. Also, 350 hives were destroyed in Western Division due to an outbreak of American fowl brood disease. Production recovered to 80 tons in 1999 as the effects of the drought disappeared.

Table A3.7 Honey production.

	1990	1996	1997	1998	1999
Output (TMFE)	47	61	69	62	80
Import (TMFE)	2	0	5	8	6
Consumption (TMFE)	49	61	74	70	86
Per capita consumption (kg)	0.06	0.08	0.10	0.09	0.11

The per capita consumption is increasing. But it remains low, at 110 grams per person in 1999.

Western Division had the largest number of hives in 1998 at 2,600, or 77.8% of all hives, followed by Central Division with 390 hives, or 11.7%, Northern Division with 305 hives, or 9.2%, and Eastern Division with 45 hives, or 1.3%. Similarly, Western Division produced the most honey in 1998 with 66% of total output, followed by Central, Northern and Eastern Divisions with 18.7%, 13.4% and 1.4%, respectively.

The government has continued to subsidise essential bee-keeping equipment in an effort to assist smaller beekeepers to commercialize their operations. Also, field days and farmer training courses have been held to equip beekeepers with necessary knowledge to improve their apiaries. The extension activities have concentrated on disease surveys, field days and farmer training programmes, which involve nucleus setting, queen grafting and manipulation of hives.

Appendix 4. Fishery Production Sector

A4.1 Industrial fisheries

The monetary value of exports from the industrial fisheries sector in 1998 was F$55 million, an increase of 25% over the export value in 1997. The increase in production was a clear signal of recovery from El Niño and the crucial role played by the government in the development of infrastructure and securing of markets to encourage participation by the private sector.

The industrial fishery sector consists of pole-and-line fishery for cannery (offshore and exclusive economic zone licences), longline fishery for cannery (exclusive economic zone), purse seine fishery for cannery (occasionally exclusive economic zone) and longline fishery for sashimi (offshore and exclusive economic zone).

Table A4.1 Industrial fisheries production.

	1996	1997	1998	1999
Sashimi tuna production (tons)	4,339	4,156	4,801	4,056
Fresh frozen tuna production (tons)	7,627	5,143	5,759	8,112
Sashimi tuna export (tons)	4,339	4,516	4,801	5,056
Fresh frozen tuna export (tons)	4,519	4,201	2,919	1,346
Total consumption (tons)	3,108	942	2,840	6,766
Per capita consumption (kg)	4.01	1.21	3.66	8.72

A4.2 Pole-and-line fishery

The target species for canning from pole-and-line fishing is skipjack. Local and foreign vessels supply most of the catch from waters in the exclusive economic zone.

Pole-and-line fishing has become increasingly unpopular because the method used is labour-intensive and requires live bait caught from the customary fishing right areas. Vessels have to obtain permission from fishing right holders and pay goodwill to catch bait.

A4.3 Longline fishery

Thirty-six domestic longline vessels were actively operating during 1998, targeting sashimi (fresh and chilled) tuna. The longline landings at PAFCO were stable until 1995 when numbers started to decline due to price competition from other canneries. The devaluation of the Solomon Islands dollar resulted in the movement of fish from the Fiji cannery to Solomon Islands. However, the competitive price offered by PAFCO during 1998 saw more catch being unloaded at the cannery.

The domestic longline fishery has large untapped resources in the 12 miles territorial waters and has the capacity to allow 150 vessels for sashimi tuna harvest. During 1998, only 36 vessels were actively fishing for the domestic sashimi market. Due to the large initial investment and risk, locals do not invest in the fishery.

The government has developed infrastructure and monitors health regulations to attract private sector investment. An increase in total catch landed by domestic longliners was due to an increase in other species (by-catch) that were landed. Good catches were recorded in the fourth quarter of 1998 when the weather pattern normalized. It was estimated that F$30 million of sashimi tuna and F$3 million of loin product were exported, mostly to the Japanese and US markets, and F$2 million of frozen tuna was exported to Pago Pago.

A4.4 Pursue seine and trawler fishery

An estimated 3,577 tons of skipjack tuna was received from purse seine operators in 1998. The sudden increase in the supply of tuna from purse seiners was to supplement the declining catches of pole-and-line vessels. US trawlers also provided 1,997 tons of skipjack.

The local registered fishing vessels supplied an estimated 653 tons of fish to PAFCO. These catches were made around the fish aggregation devices deployed by the Fisheries Division.

A4.5 PAFCO tuna processing cannery

The total volume of fish processed in 1998 was estimated to be 11,987 tons, an increase of 27% over the previous year. PAFCO's operations were hindered by a lack of fish supplies. The traditional supplier, Ika Corporation, went out of business and chartered foreign vessels opted to supply Solomon Taiyo in Solomon Islands rather than PAFCO. PAFCO exported canned and loin tuna worth F$14 million and F$4.8 million, respectively. The company sold F$4 million of canned products to the local markets where it has penetrated well.

A4.6 Artisanal fisheries

Commercial fishing in the inshore waters has been declining in recent years. The decrease has been attributed to excessive fishing pressure on the existing resource base and low economic yields. Rising inflation led to high costs of operation and the domestic market price was not high enough to match the increasing costs of operation, especially the harvesting of reef finfish.

Lower-income earners, who form a large proportion of fish consumers, turned to cheaper substitutes such as imported frozen mackerel, canned fish and lamb flaps. The pressure on the resource base caused by overfishing was clearly demonstrated by the ban on fishing in certain fishing right areas and a high price (goodwill) charged by fishing right custodians for obtaining a fishing permit. Lau province, which has relatively rich fishing grounds, has stopped issuing fishing permits.

Artisanal fisheries are the main source of domestic fish supply. Therefore, all fish are consumed locally with exception of coral, trochus, aquarium fish and beche-de-mer.

Table A4.2 Artisanal fisheries production.

	1996	1997	1998	1999
Commercial output (tons)	7,567	5,820	6,817	7,167
Subsistence output (tons	17,200	17,400	17,600	17,800
Total consumption (tons)	24,767	23,220	24,417	24,967
Per capita consumption (kg)	31.9	29.2	31.5	32.2

An estimated 4,182 metric tons of fresh and frozen finfish, worth F$16.7 million, were sold through various outlets in 1998 by local fishermen, an increase in weight and value by 12% and 40%, respectively, over 1997. The catch was dominated by inshore species with some 10% harvested from archipelago waters. The mean weighted price of fish per kilogram was F$3.99, making it cheaper than land-based animal protein supply such as pork, goat, sheep, beef and chicken. The price ranged from F$0.90 to F$8.00.

The volume of non-finfish (i.e. shellfish, crustaceans, molluscs, gastropods, holothurians, seaweeds, etc.) produced for the local domestic market in 1998 was estimated to be 2,630 tons, valued at F$4.05 million. This was an increase in weight by 17%, but a decrease in value by

23% over the previous year. The decrease in value was mainly due to an increase in the harvest of lower-value species such as *kai* and *kaikoso* (fresh water mussels).

Freshwater mussel production was 1,572 tons, mudcrabs (*qari*) 154 tons, *kaikoso* 225 tons and prawns 189 tons. The retail mean weighted price of non-finfish was F$1.54/kg and the range was from F$0.30/kg to F$25.00/kg. *Kaikoso* and *kai* were the dominant species in the local municipal markets.

A4.7 Subsistence fisheries

Subsistence fish production includes finfish and non-finfish species and was estimated to be 17,400 tons in 1998. This figure was based on a survey carried out in the early 1970s that covered semi-subsistence production. The subsistence fishery, in terms of volume, is about twice the size of the artisanal fishery.

Although its distribution is throughout the islands with abundant marine resources, the areas near urban centres have most felt the effects of over-exploitation and are having direct conflicts with commercial operators. Some of the fishing grounds near the urban centres are either only for restricted fishing practices or are banned from commercial fishing.

A4.8 Sedentary fishery resources

Marine products like trochus, pearl shell, ornamental fish, beche-de-mer and corals are important commodities for foreign exchange. Although these species are not consumed, several people depend on the income derived directly from these products. The management of these resources is vital to maintain a continuous flow of income to most of the rural population.

Beche-de-mer came under public scrutiny due to the health hazard problems caused by some of the methods used in its harvest. The Fisheries Department liaised with all stakeholders to develop policies to prevent further inconvenience to public health. A model for beche-de-mer management was published in a fisheries technical report. The department helped to establish the Beche-de-mer Association, Ornamental Fish and Coral Association and Offshore Council to manage the resources better.

The annual production of beche-de-mer in 1998 was estimated to be 250 tons worth F$5 million. Output has declined in recent years from a peak of 800 tons in 1989. This prompted the Fisheries Department to carry out a full-scale study of the commodity. A beche-de-mer hatchery was set up to study the techniques of breeding and reseeding the over-exploited reefs with juveniles. The future potential of operating commercial farms was also evaluated. The study will provide biological information that will be used in formulating legislation for the sustainable use of this resource.

A4.9 Aquaculture

During 1998, the production of tilapia was estimated to be 243 tons from 43 hectares, produced by 12 commercial and 250 subsistence farms. The three hatcheries in Ba, Savusavu and Naduruloulou were operating efficiently and were ready to provide farmers with seedlings. The local market price for tilapia is from F$3/kg to F$6/kg. The market has the capacity to absorb large quantities of harvest. The Fisheries Division has ready overseas markets of 5 to 7 tons per week.

Feed costs are high due to the need to import essential ingredients. To ease this problem, aquaculturists in Naduruloulou experimented with integrated farming systems using tilapia in the pond and ducks in the house constructed above the farm.

There has been an increase in the local demand for aquarium fish (worth about F$0.25 million) and it is envisaged that a huge export market could be tapped. The Fisheries Division identified this project to provide employment, serve the existing market and earn foreign exchange with relatively small levels of input.

Prawn farming is polycultured with carps and tilapia. Shrimp is regarded as a commodity with a higher economic return than other cultured marine animals. The coastal environment of Fiji is conducive to the culture of brackish species on a commercial scale.

The demand for milk fish as bait in the tuna industry gave the Fisheries Division the incentive to develop this commodity to enhance the tuna and live fish exports. Milk fish can grow to over one kilogram in a short period and be used for household consumption as a source of protein.

Appendix 5. Analysis of Crop, Fish and Livestock Prices in Local Markets, January-July 2000

A recent analysis of crop, fish and livestock products in local produce markets for the period January-July 2000 gives a snapshot of the considerable spatial and temporal variations that occur in market supply and price for individual products. Results of the analysis show that beans, cowpeas, English and Chinese cabbage, chillies, okra, tomatoes and eggplants are in abundant supply, resulting in a drop in their prices. Tomatoes that were selling at F$4/kg to F$5/kg now fetch as low as F$2/kg. Supply of root crops is overwhelming, and a bundle of *dalo* currently fetches from F$8/kg to F$12/kg whereas a month ago it was being sold for F$15 a bundle.

There is also abundant supply of *yaqona* in the local market, which has resulted in a decline in its price. *Waka*, which was selling for F$35/kg to F$45/kg a couple of months ago, is now fetching F$25/kg to F$35/kg.

Seasonal fruits such as mangoes and *kavika* too are back on market stalls, with mango fetching F$2 a heap.

The supply of seafood is very encouraging and fish such as *kawago*, *sabutu*, *kawakawa* and rock cod are in good supply. A bundle of fish in Lautoka fish market sells at F$10/kg to F$15/kg while, in Labasa, grade-A fish sells at F$4.80/kg. Freshwater prawns and crabs are in good supply as well. Supplies of tilapia fish in Nausori and Suva markets are also picking up as a kilogram fetches from F$4 to F$5.

Table A5.1 Local market information, January-July 2000.

Commodities	Suva price (F$)	Labasa price (F$)	Lautoka price (F$)	Nadi price (F$)	Remarks
Root crops					
Dalo	10.00-15.00	8.00-15.00	10.00-15.00	10.00	Moderate Supply
Cassava	2.00	2.00 heap	3.00-5.00	3.00-5.00	Good Supply
Kumala	2.00	2.00 heap	5.00	5.00	Short Supply
Vegetables					
Okra	2.00	0.70 heap	$0.50 heap	1.00 heap	Moderate Supply
English cabbage	1.00	0.50 each	1.00 each	1.00 each	Abundant Supply
Tomatoes	4.00	1.00 heap	1.00 heap	1.00 heap	Good Supply
Long bean	1.50	1.00 bundle	0.70 bundle	1.50-2.00 heap	Good Supply
Cucumber	1.00	1.00 heap	1.00 heap	1.00 heap (3)	Good Supply
Lettuce	1.00	0.50 plant	1.00 plant	0.50/plnt	Moderate Supply
Ginger	0.50/heap	1.00	1.00 heap	1.00/heap	Good Supply
Chillies	10.00	0.50 heap	1.00 heap	1.00 heap	Good Supply
Bele	1.00/bundle	1.00 bundle	1.00 bundle	1.00/bundle	Good Supply
Rourou	1.11 bundle	1.00 bundle	1.00 bundle	1.00 bundle	Good Supply
Eggplant	1.00 heap	1.00 heap	1.00 heap	1.00 heap	Good Supply
Yaqona					
Lewena	30.00	25.00	25.00-30.00	25.00	Good Supply
Waka	30.00-45.00	28.00-40.00	25.00-30.00	38.00	Good Supply
Fruits					
Coconuts	3.00-5.00 dozen	0.10 each	3.00 dozen	4.00 dozen	Good Supply
Watermelon	1.50	1.50	1.50	1.50	Good Supply
Bananas	5.00 bunch	0.60 heap	0.50 heap	1.00 bunch	Good Supply
Papayas	3.00	0.50-1.50 each	2.00 heap (3)	2.00 heap	Good Supply

Note: Prices are per kilogram unless otherwise stated.

Table A5.2 Local meat prices.

Meat price	Unit	Price (F$)
Beef mince	Kilogram	4.69
Pork belly	Kilogram	7.45
Pork shoulder	Kilogram	6.99
Chicken (12)	Each	5.99
Lamb chops	Kilogram	3.59
Lamb shank	Kilogram	2.98

Source: Retail survey, Suva.

Table A5.3 Local fish prices.

Fish	Tavua price (F$/kg)	Nausori price (F$/kg)	Nadi price (F$/kg)	Lautoka price (F$/kg)	Labasa price (F$/kg)
Kawago	9.00	5.80	n.a.	4.00	4.50
Sabutu	9.00	5.80	n.a.	6.50	4.50
Kabatia	6.00	4.00	n.a.	5.00	3.80
Kawakawa	n.a.	5.80	n.a.	7.50	4.50
Walu	6.00	5.50	n.a.	n.a.	4.20
Saqa	4.50	4.00	4.00	2.20	3.50
Damu	5.00	3.80	5.50	3.00	2.50
Dokonivudi	6.00	5.00	6.00	4.50	3.50
Ulavi	6.00	3.50	n.a.	2.00	2.50

Source: Fisheries Division market survey.