CGPRT NO. 40

Food Security in Southwest Pacific Island Countries

Proceedings of a Workshop Held in Sydney, Australia December 12-13, 2000

The CGPRT Centre

The CGPRT Centre

The Regional Co-ordination Centre for Research and Development of Coarse Grains, Pulses, Roots and Tuber Crops in the Humid Tropics of Asia and the Pacific (CGPRT Centre) was established in 1981 as a subsidiary body of UN/ESCAP.

Objectives

In co-operation with ESCAP member countries, the Centre will initiate and promote research, training and dissemination of information on socio-economic and related aspects of CGPRT crops in Asia and the Pacific. In its activities, the Centre aims to serve the needs of institutions concerned with planning, research, extension and development in relation to CGPRT crop production, marketing and use.

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In pursuit of its objectives, the Centre has two interlinked programmes to be carried out in the spirit of technical cooperation among developing countries:

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(Continued on inside back cover)

Food Security in Southwest Pacific Island Countries

"CGPRT Centre Works Towards Enhancing Sustainable Agriculture and Reducing Poverty in Asia and the Pacific"

CGPRT NO. 40

Food Security in Southwest Pacific Island Countries

Proceedings of a Workshop Held in Sydney, Australia December 12-13, 2000

Edited by
Pantjar Simatupang
D.R. Stoltz

CGPRT Centre
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Research and Development of Coarse Grains,
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Foreword

A regional workshop on "Food Security in the Southwest Pacific Island Countries" was held during 12-13 December 2000 in Sydney, Australia, to discuss the findings and strategies achieved in a two-year research project "Food Security Strategies for Selected South Pacific Island Countries (SouthPIC)".

The national experts of the participating countries, Fiji, Papua New Guinea, Tonga and Vanuatu, presented reports of their country studies and the commentators from each country provided additional information. A resource person from the ESCAP Pacific Operations Centre discussed an overview of economies in the South Pacific region. Following an open discussion session, a consolidated discussion was prepared by Dr. Euan Fleming who served as a regional advisor.

I am pleased to publish the proceedings as a record of the workshop, which was very active and fruitful, owing to the enthusiastic discussions by the participants.

I thank those speakers who participated in the workshop and provided draft summaries. I also thank Dr. Pantjar Simatupang, the project leader, Dr. Euan Fleming, and Dr. D.R. Stoltz for their efforts in compiling and editing this volume. Finally, I express my sincere appreciation to the Government of Japan for funding the project and supporting the workshop.

Hoping this volume will provide useful information to the readers and to those island countries located in the South Pacific.

April 2001

Haruo Inagaki
Director
CGPRT Centre

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Acknowledgements

We wish to express our deep gratitude to authors of the invited papers, country reports, and commentators for writing their work publishable this proceedings.

In the course of preparation of this proceedings, we relied upon the help of the Centre's staff to whom we are indebted. First, we wish to express our thanks to Dr. Haruo Inagaki, Director, CGPRT Centre, for continuously backing up our activities. Also we wish to express our thanks to Ms. Babay P. Putra and Ms. Agustina Mardyanti for typing.

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D.R. Stoltz

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Opening Address

Haruo Inagaki[*]

Good morning, Gentlemen

It is my great pleasure that the CGPRT Centre can convene this two-day regional workshop on "Food Security in Southwest Pacific Island Countries" here in Sydney today.

First of all, I would like to express my sincere appreciation to all of you who have attended this workshop in spite of your busy schedules. Today we have attendance of all four national experts along with commentators from the four countries participating in the project, namely Fiji, Papua New Guinea, Tonga and Vanuatu. Also, we have Dr. Euan Fleming, of the University of New England, Armidale, the regional advisor of the project; Mr. Kiran Pyakuryal, representing the ESCAP secretariat, Bangkok; and Dr. John Williams from the ESCAP Pacific Operations Centre (ESCAP/POC) in Port Vila, Vanuatu.

At this opportunity, I would like to tell you a brief story about the formulation of this project.

In August 1997, I had a chance to visit various island countries scattered in the South Pacific starting from Tonga, the eastern most, through Fiji and Vanuatu, and ending at Papua New Guinea, the western most. It took me 15 days in total. The purpose of the travel was firstly to understand the socio-economic conditions of those countries with special attention to agriculture, and secondly to seek common subjects of research for possible formulation of a regional research project.

I planned this travel because I had heard, directly and indirectly, a kind of demand or even complaint from the Pacific island countries asking ESCAP and the CGPRT Centre to strengthen and expand their activities to support and promote the development of these island countries. The Centre received more direct argument on this point from a reviewer of Papua New Guinea in the impact evaluation of the Centre conducted in 1998.

Although my stay in each country was just a few days, I met many people including policy planners, administrative staff, research scientists and extension specialists, visited many places including agricultural sites, and learned many things. The conditions - the number and size of islands, total area, topography, climate, population, racial composition, religion, natural and energy resources, economy, politics, education, etc. - were, as a matter of course, very diverse among these countries. However, I found that the share and role of agriculture and ways to stabilize food production were equally important in their national economies.

Also, I found in the discussions that although the demand and supply situation of food varies among countries, the trade imbalance in food commodities had impeded the development of the small economies. For example, it is difficult for the governments to secure sufficient rice and wheat flour to meet the currently changing dietary patterns of the people.

Then I concluded from my observations that the CGPRT Centre should formulate a collaborative research project with these island countries on "how to maintain and strengthen food security".

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[*] Director, CGPRT Centre, Bogor, Indonesia.

This concept was presented as an idea for a future project to the 15th session of the Technical Advisory Committee (TAC) of the Centre held in November 1997. In the discussions during the meeting, I remember that Dr. Euan Fleming, who was a member of the TAC at that time, advised the Centre to take into account the common understanding that there were no substantial food security problems in those Pacific island countries. Despite his advice, I stuck to this topic, that is "food security", as a common subject of study among those countries and asked the research and development programme leader of the Centre, that is Dr. Pantjar Simatupang, to formulate a two-year project entitled "Food Security Strategies in Selected South Pacific Island Countries (SouthPIC)".

In September 1998, the project was proposed to the ESCAP secretariat, then through it to the Government of Japan for funding, and it was further discussed in the 16th TAC session in November and the 17th session of the Governing Board of the CGPRT Centre in December. The proposal was approved by both the Executive Secretary of ESCAP and the Government of Japan in January 1999. The fund for the first year was allocated in May 1999. Accordingly, the project "Food Security Strategies in Selected South Pacific Island Countries (SouthPIC)" formally started in July 1999 under the leadership of Dr. Euan Fleming as the regional advisor and Dr. Pantjar Simatupang as the project leader. The story after the project started will be presented later to you by the project leader, Dr. Simatupang.

The principal purpose of this regional workshop is to discuss the findings and policy recommendations, which were achieved in the country studies implemented in the individual countries participating in the project. Also, we will have additional comments on the country reports by designated commentators, and an overview discussion by Dr. John Williams of ESCAP/POC, a consolidated discussion by Dr. Euan Fleming, and finally closing remarks by Mr. Kiran Pyakuryal.

The time is limited and the schedule is tight, but I really hope we can enjoy active discussions during the meeting and use this chance to finalize the draft country reports of the project for publication, which had been expected to be completed by the end of this year.

Finally, I thank Fiji, Papua New Guinea, Tonga and Vanuatu for their participation in the project and all national experts for the implementation of their country studies under difficult conditions with limited funds. I sincerely and seriously hope that the publications, the country reports in particular, achieved in this project will be further discussed, disseminated and utilized not only in the participating countries but also in other countries and related institutes in the region. In this regard, I would like to ask all national experts to seek possible arrangements for organizing a seminar or workshop in your individual countries.

I also would like to render many thanks to the Government of Japan for funding the project, the ESCAP/POC for its assistance in the arrangement of the project and in the organization of this workshop, and Dr. Euan Fleming for this advisory services in the project.

Now, I conclude my address and ask Dr. Simatupang to present a brief record of the project implementation.

Thank you very much.

Introduction

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Food Security in Selected South Pacific Countries: Project Background and Implementation Notes

Pantjar Simatupang[*] *and Euan Fleming*[**]

Background

South Pacific island countries share some similarities in their national characteristics. All have small populations, ranging from a few thousand people in Niue to 4.2 million for Papua New Guinea in 1996. Land area is small and soils are of variable quality, with atoll soils being particularly poor. There is no irrigation to speak of, and water supply is sometimes variable. Arable land and settlement areas are fragmented and dispersed over wide areas in most countries. There are exceptions. For example, all farming areas in compact countries such as Niue and Samoa are within a few hours drive of their respective capital cities. Mineral resources are limited, except in Papua New Guinea. All countries are remote from world input and output markets. Within each nation, the rural population is also often remote from markets, knowledge and technological centres, and prone to natural disasters, particularly tropical cyclones (and to a lesser extent, drought). Because a high proportion of the land mass of South Pacific island countries lies within the humid tropics, drought tends not to be the major threat that it is in many other parts of the developing world. However, Papua New Guinea and Fiji have suffered from major droughts in recent years, and parts of Tonga have also been susceptible to short periods of drought. These characteristics are the major physical factors limiting economic development, in general, and agricultural development, in particular. The economies of South Pacific island countries are generally very small, dominated by the agricultural sector, and highly dependent on outside economies (Fleming and Hardaker 1995).

Economic dependence on agriculture varies quite significantly between South Pacific island countries. As a general rule, though, agriculture now tends to be a relatively minor contributor to gross domestic product, but still provides a substantial proportion of exports. Its importance remains greatest as an employer of labour (Hardaker and Fleming 1994).

The traditional food staples in the South Pacific island countries are roots and tubers, primarily yam, taro, sweet potato and cassava. The food sector is constrained by small production capacity, limited and poor supporting infrastructure and an absence of technological innovations. The result is low and stagnant agricultural productivity and a relatively high cost of production, transportation and marketing (Fleming and Hardaker 1995; Hardaker and Fleming 1994). Competitive advantage in international markets is restricted to a limited number of products and economies become increasingly dependent on import supplies and government subsidies. These factors have the potential to make South Pacific island countries susceptible to serious food insecurity.

[*] Programme Leader, Research and Development, CGPRT Centre, Bogor, Indonesia.
[**] Senior Lecturer, Department of Agricultural and Resource Economics, University of New England, Armidale, Australia.

Yet, historically there is little evidence of chronic food shortages in South Pacific island countries, and certainly nothing comparable to the famines that have afflicted many emerging countries in Africa. This apparent anomaly can be explained by at least three factors. First, while agricultural land resources tend to be limited and variable in quality, man-land ratios have to date been favourable for securing adequate food supplies in virtually all South Pacific island countries. Consequently, countries have historically been able to produce enough food to satisfy their basic needs, with little recourse to food imports. Second, traditional social mores, farming systems and institutions have maintained a strong presence, particularly in rural areas, with reasonably strong egalitarian principles. Third, large foreign remittances and aid have increased purchasing power in most South Pacific island countries. As explained below, the second factor is in the process of dissipating, while the third factor is unreliable. Hence, food security could become precarious, if domestic agricultural production cannot be enhanced through technical improvements that raise total factor productivity.

One important traditional attribute of the Melanesian, Polynesian and Micronesian indigenous cultures in the South Pacific region is a modest and harmonious way of life. Material consumption and asset accumulation are limited determinants of welfare and should be kept modest. Sharing and caring among the family and community members are most important for living in harmony. Assisting family members and others is a moral obligation. This lifestyle has had at least two important implications for food security in the past. First, modest monetary aspirations limited land allocation for cash crops, and hence adequate land was made available for food production. Second, sharing and reciprocity increased household access to land for subsistence farming as well as for food or income transfer.

Integrated semi-subsistence farming systems still predominate in the South Pacific island countries. By their nature, they have the primary objective of the attainment of food security for the farming households (Yen 1979; McGregor 1997). Because the integrated semi-subsistence farming system is always limited in size, more farming households can be supported in a given area of arable land than with commercial farming systems. This would also enhance food security.

The land tenure system is the most persistent traditional institution in the South Pacific island countries, dominated by customary land tenure arrangements (Schoeffel, 1995). The key factor of this system is its reallocation mechanism to meet the changing needs of demographically fluctuating groups. For the most part, all members of a community are assured access to sufficient land for subsistence purposes. Those with inadequate land for planting food gardens can usually borrow land from others without payment of any significant rent. This egalitarian feature has made the traditional customary land tenure system an effective instrument for food security in most parts of the South Pacific island countries.

Modest material aspirations, obligations to assist relatives and others, integrated semi-subsistence farming systems and customary land tenure systems are the key traditional features that enabled the South Pacific island countries to achieve "subsistent affluent" living conditions in the pre-contact period (Fisk 1964). These conditions are also the major factors that have enabled the South Pacific island countries to maintain food security. But all of these traditional features are being eroded by modernisation and growing aspirations. Education and contact with foreigners have made the indigenous people more commercial-minded, with higher monetary aspirations. This increasing importance of a monetary objective has increased the commercial component of the integrated semi-subsistence farming system, even to the point of some fully commercial farming operations. Commercialization has also gradually changed the customary land tenure system. The opportunity cost of lending land rises, given that land is a potential source of cash either from commercial cropping or from rental. Informal transfers of land become less common, those with land tend to plant it in cash crops, and borrowing land for long-term cash crops becomes rare (Hauofa and Ward 1979). These tendencies have the

potential to lead to food insecurity to the extent that the South Pacific island countries might face a serious food insecurity situation in the near future.

The emerging food insecurity is aggravated by at least three major factors. First, a large influx of Asian and European migrants has increased the demand for new food items such as rice, wheat, sugar, meat, eggs, milk, canned meat and fish, coffee, tea, alcohol and soft drinks (Ward and Hauofa 1979; Doumenge, Villenave and Chapuis 1988; Yen 1979). Most of these food items must be imported. Moreover, these new food items are superior to roots and tubers in some aspects of cooking and serving practicality, shelf life, and also with respect to social prestige, which tempts the indigenous people to substitute these foods in their traditional diet. The South Pacific island countries have become highly dependent on food imports. Many of these newer foods are, however, nutritionally inferior to the more traditional ones (Ward and Hauofa 1979). This high degree of dependence on, and subsequent inelastic demand for, imported food could produce serious nutritional social effects, especially in periods of rapid decline in export prices or output, or inflated import costs (ESCAP 1985).

Second, expansion of large plantations and smallholder commercial farms pulls a large area of land, and potentially much labour, out of traditional food crop production, reducing its output. Reduction of food supplies that leads to an increase in their prices could further aggravate the food security problem by making these foods less accessible to poor households. Furthermore, as they become relatively more expensive, the roots and tubers would be replaced by imported foods.

Third, increasing land pressure has pushed food gardens to less fertile land further away from homes, or even wiped them out (e.g. Hardaker and Fleming 1994). A number of households, especially in urban areas, do not have sufficient access to sufficient land for food gardening. In Tonga for example, there is now insufficient land for all commoner males to obtain their own plots and indeed some 30% of Tongans now do not own land (Schoeffel 1995). An increasing number of households, especially in urban areas, must rely on commercial markets for their food supplies. Food market and cash income risks, rather than merely production risks, become major determinants of household food security in the South Pacific island countries.

While historically there is little evidence of chronic food shortage in the South Pacific island countries, this discussion shows that some new emerging trends may have gradually eroded the adaptability strength of the national food security systems in the region. This is the main hypothesis to be assessed in the country studies of this project. However, as discussed previously, the food security issue in the South Pacific island countries is complex. The appropriate food security strategies and policy options can be formulated properly only through a comprehensive study. Accordingly, the outcome of this project is intended to help the governments in South Pacific island countries to assess the extent of food insecurity, and devise appropriate food security strategies and formulate policy options through a comprehensive study in each participating country.

End-users and intended impacts

The general objectives of this project are to analyze food security conditions in selected South Pacific island countries and to formulate appropriate policy options for their food security strategies. Three specific objectives are:

- To analyze food supply and demand balance and dynamics at the national level, in terms of:
  (a) agricultural resource endowments and utilization, supporting infrastructure and related institutions, with an emphasis on food production capacity;

(b) food production policy, realization and risks;
(c) food import and export potentials, constraints, policy, realization and risks;
(d) domestic food trade, distribution policy and market dynamics;
(e) domestic food demand for household consumption and other uses;
(f) national food balance structure and its dynamics; and
(g) national food strategies and policies.

- To assess food security at the household level, in terms of:
  (a) food availability and risks at the local market and in households;
  (b) ability of household members to access the food they need, and its related risks;
  (c) household food consumption patterns, food composition and allocation among household members, differentiated by age and gender;
  (d) nutritional quality and sufficiency of the household food consumption, differentiated by age and gender; and
  (e) government strategies and policies related to household food security.
- To identify a food security strategy and formulate policy options to improve food security in the respective countries.

The primary end-users of results of the proposed project are the governments of the participating countries, especially ministries of agriculture and/or food, trade, health and nutrition, and national development planning. They should be able to make more informed decisions on food security by gaining a clearer understanding of the underlying determinants, present state and future trends in food security and food security risks, along with their consequences for household welfare, as well as effects on macroeconomic performance in the participating countries. The strategy and policy options, expected primary outputs of this project, could be valuable for the participating countries in planning their food and economic policies. Implementation of the appropriate food security strategies and policies should improve the well being of the people and macro-economic performance in the participating countries.

Participating countries, scope and general approach

The countries that participated in the project are Fiji, Papua New Guinea, Tonga and Vanuatu. They were selected on the basis of similarities in traditional food staples (roots and tubers), dominant cultures (Melanesian and Polynesian), physical conditions and resource endowments, size, stage of economic development and geographical region. There is also a degree of diversity among the four countries for the purpose of contrast. All countries are ESCAP members that are infrequently invited to participate in CGPRT Centre projects.

Based on the framework, the main study subjects of the project are:

- food security performance and its determinants at the national and household levels;
- food security risk-coping institutions; and
- feasibility of regional cooperation in food security.

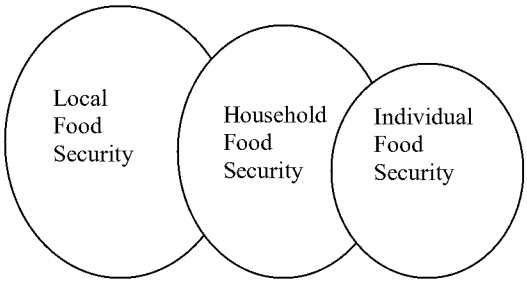
The study was conducted using the latest "sustainable food security" paradigm, in which six criteria were analysed for food security: food availability, access, utilization, stability, self-reliance (autonomy) and sustainability. Food availability, access and utilization determine adequacy. Stability and self-reliance determine vulnerability. Sustainability determines long-term persistence of food security. Using these criteria, food security in the participating countries was evaluated using a food security performance evaluation matrix (Table 1). In addition to economic and geo-bio-physical conditions, food security performance is also affected by social and political institutions.

Table 1 Food security performance evaluation matrix.

Principal determinants	Average	Vulnerability		Sustainability
	Adequacy	Stability	Self-reliance	
Food availability	✔	✔	✔	✔
Food access	✔	✔	✔	✔
Food utilization/distribution	✔	✔	✔	✔

Sustainable food security can also be viewed within a hierarchical system of, in descending order, global, regional, national, sub-national/local (e.g. provincial), household and individual levels. Higher order food security is a necessary but not sufficient condition for lower order food security (Figure 1). The performance evaluation matrix (Table 1) was used to analyze food security at three levels of the food security hierarchical system: national, provincial and household.

Figure 1 Food security within a hierarchical system.



Organization and implementation

The project was conducted by the CGPRT Centre with the assistance of one regional advisor, and partnerships with one institute and one national researcher from each participating country. The regional advisor rendered advisory services to the Centre and national researchers on various aspects needed for successful implementation of the project. The national researchers were assigned to conduct the country studies. The partner institutes played roles of supervising national researchers and contact institutes in disseminating the project outputs to their appropriate end-users. The preliminary findings were discussed in a regional workshop. Publication and dissemination is to be conducted by the Centre, which was also responsible for overall coordination.

The organization of the project was as follows:

Overall Coordinator and Supervisor:	Dr Haruo Inagaki, Director, CGPRT Centre
Team Leader:	Dr Pantjar Simatupang, Programme Leader, Research and Development. CGPRT Centre
Regional Advisor:	Dr Euan Fleming, Senior Lecturer, University of New England, Australia
National Experts:	
Fiji:	Mr Hiagi Foraete, Acting Principal Agricultural Officer, Ministry of Agriculture, Fisheries and Forest
Papua New Guinea:	Mr P.B.K. Igua, Project Leader, National Agricultural Research Institute

Tonga:	Dr Siosiua Halavatau, Head of Extension Unit, Ministry of Agricultural and Forestry
Vanuatu:	Mr Shadrack R. Welegtabit, Research Department, Reserve Bank of Vanuatu

A coordination planning meeting was held at the Centre on 20-21 September 1999. The regional advisor participated in the meeting along with the Centre's director. The agenda items discussed at the meeting were:

(a) brief review of the project — background and objectives;
(b) formulation of methodological guidelines for country studies;
(c) framework of the project reports;
(d) schedule of in-country planning meetings; and
(e) other related matters.

Based on the discussion, the project leader, in consultation with the regional advisor, prepared the following materials for the in-country planning meetings:

(a) report of the coordination planning meeting;
(b) general reference of the project plan; and
(c) basic concepts and analytical framework.

The in-country planning meetings were held in each participating country during 6-17 December 1999. The project leader and the regional advisor participated in the meetings. The concept of the project, methodologies of the country study, work plan, framework of reports and other related issues were thoroughly discussed in the meetings. The national experts were requested to finalize their work plan of the country study and start the country study from January 2000. Due to the withdrawal of Mr Wycliff Bakeo and assignment of Mr Shadrack Welegtabit as his substitute as the national expert of Vanuatu, the project leader revisited Port Vila on 16-17 March 2000 for a planning meeting with the new national expert of Vanuatu.

The regional workshop was initially planned to be held at the CGPRT Centre, Indonesia, for October 2000. In order to increase direct participation of the stakeholders, the place of the workshop was changed to Port Vila, Vanuatu on 26-27 October 2000. In the initial plan, in addition to national experts and commentators of the four participating countries, we also intended to invite representatives of ESCAP/POC in Port Vila, Kiribati, Samoa and Solomon Islands to participate in the workshop. However, due to technical constraints, the place and time of the workshop had to be revised again. The workshop was finally held in Sydney, Australia, on 12-13 December 2000.

Reports resulting from the project

There are three types of reports as the outputs of the project: (i) country reports, (ii) an integrated report and (iii) proceedings of the workshop.

The tentative titles of the country reports are as follows.

1. Food Security Strategies for the Republic of Fiji by Hiagi M. Foraete (Working Paper No. 55)
2. Food Security Strategies for Papua New Guinea by Passinghan Bukley K. Igua (Working Paper No. 56)
3. Food Security Strategies for the Kingdom of Tonga by S.M. Halavatau and N.V. Halavatau (Working Paper No. 57)
4. Food Security Strategies for Vanuatu by Shadrack R. Welegtabit (Working Paper No. 58).

The title of the integrated report is "Food Security Strategies for Selected South Pacific Island Countries" which will be prepared by Pantjar Simatupang and Euan Fleming (Working Paper No. 59).

References

Doumenge, J.P.; Villenave, D.; and Chapuis, O. 1998. Agriculture, Food and Nutrition in Four South Pacific Archipelagos, New Caledonia, Vanuatu, French Polynesia, Walles and Futuna. CGPRT No. 11, CGPRT Centre, Bogor, Indonesia

ESCAP. 1985. Food for the Hungry: A study of Food Supply and Distribution in the Asia-Pacific Region. Economic and Social Commission for Asia and the Pacific, Bangkok.

FAO. 1998. Guidelines for National Food Insecurity and Vulnerability Information and Mapping Systems (FIVIMS): Background and Principles. Committee on World Food Security CFS: 98/5, 24th Session, 2-5 June 1998. Food and Agriculture Organization, Rome

Fisk, E.K. 1964. Planning in a primitive economy: from pure subsistence to the production of a marketed surplus. Economic Record 40:156-174.

Fleming, E.; and Hardaker, J.B. 1995. Strategies for Polynesian Agricultural Development. National Centre for Development Studies, Australian National University, Canberra.

Hardaker, J.B.; and Fleming, E. 1994. Strategies for Melanesian Agriculture for 2010: Tough Choices. National Centre for Development Studies, Australian National University, Canberra.

Hauofa, E.; and Ward, R.G. 1979. The social context. *In* Pacific Agriculture: Choices and Constraints. South Pacific Agricultural Survey 1979. The Asian Development Bank, Manila, p. 45-66.

McGregor, A. 1997. Disasters and Agriculture in Western Melanesia: The Case Study of Vanuatu. Trade and Development Office, Suva, Fiji (mimeo).

Schoeffel, P. 1995. Sociocultural Issues and Economic Development in the Pacific Islands. Pacific Studies Series. Asian Development Bank, Manila.

Ward, R.G.; and Hauofa, E. 1979. The demographic and dietary context. *In* Pacific Agriculture: Choices and Constraints. South Pacific Agriculture Survey 1979. The Asian Development Bank, Manila, p. 23-44.

Yen, D.E. 1979. Pacific production systems. *In* Pacific Agriculture: Choices and Constraints. South Pacific Agricultural Survey 1979. The Asian Development Bank, Manila. P. 67-100.

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Food Security: Basic Concepts and Measurement

Pantjar Simatupang[*]

Food security definition

A widely accepted definition of food security is "secure access by all people at all times to adequate, safe and nutritious food which meets dietary and food preferences for an active and healthy life" (FAO 1998; Maxwell 1996; von Braun et al. 1992).

Food security is defined by a triad of concepts: *food availability, food entitlement and food utilization* (Chung et al. 1997). These concepts are the fundamental determinants of food security. Food availability refers to the physical availability of food that is readily accessible to all people to meet their dietary needs and preferences. Food entitlement refers to the ability of individuals to command adequate food for consumption. Food utilization refers to the proper processing and allocation of food intake by individuals. These three concepts are hierarchical in that:

- Adequate food availability is necessary but not sufficient to guarantee adequate food entitlement for all people.
- Adequate food entitlement is necessary but not sufficient to guarantee adequate food intake by all people (food utilization).

For household food security, as an example, adequate physical availability of food in a neighbourhood is necessary to facilitate entitlement to adequate food for all households in the area. If there were no food available, then food entitlement would not exist. On the other hand, even if there were plenty of food available, some households would be food-insecure if they lacked entitlement to food. Furthermore, even if a household has secure access to adequate food, some of the household members could be food-insecure if the food utilization (processing and allocation) within the household is not appropriate. Adequacy of food intake at the individual level is the final necessary and sufficient condition for household food security.

This triad of concepts is the main reason to reject the *food availability approach* (FAA) to food security. The food availability approach is the theoretical foundation of the well-known food self-sufficiency strategy for national food security policy, which has been widely adopted by developing countries. Sen (1981) proposed an alternative paradigm, the *food entitlement approach* (FEA). The essence of FEA is that entitlement or ability to command adequate food, rather than food availability, is the key to food security. FEA is a useful paradigm to analyze food security issues within a perfect market economy.

The term "secure access" indicates that the food security concept addresses people's risks of not having access to enough food. Food security is the ability to secure enough food to ensure adequate dietary intake for all people at all times. The food security concept addresses people's risks of not having access to needed food. The aim of an effective food security policy is to ensure that all households have an adequate dietary intake and can acquire it without being subjected to excessive risks (von Braun et al. 1992). It is clear, therefore, that the food security concept also includes a vulnerability element (Watts and Bohle 1993; Radimer et al. 1990; Kendall et al. 1995). Risks determine vulnerability and hence the level of food insecurity (Maxwell and Frankenberger 1992). Operationally, risk or vulnerability should be treated as an

[*] Programme Leader, Research and Development, CGPRT Centre.

indicator of performance of the triad of concepts of food security. In other words, food security is determined not only by adequacy, but also by vulnerability to inadequate food availability, food entitlement and food utilization. Identification and measurement of the risk factors for these three fundamental determinants of food security are important for understanding food security problems, and hence for strategy identification and policy formulation to deal with the problems.

The term "at all times" means that food security should be achieved on a sustainable basis in a long-term perspective. In other words, sustainability is another indicator of food security performance. It is now widely adopted as a necessary element of food security induced by a growing awareness of environmental issues. The new concept is commonly known as sustainable food security (Swaminathan 1995; Simatupang 1999). Sustainability is treated as another indicator of performance of the triad of concepts. Empirically, sustainability is indicated by the trend in performance. Sustainable food security is indicated by a non-negative trend of food availability, entitlement and utilization. S*ustainable food security is thus determined by the adequacy, vulnerability and sustainability of food availability, entitlement and utilization*.

The term "by all people" indicates that food security concerns the food needs of all individual members of a society. As mentioned above, food security can be measured at various hierarchical levels: individual, household, provincial, national, regional and global. Since an individual is usually a member of a household, household food security is a necessary but not sufficient condition for individual food security. This can be explained as follows. If a household does not have access to enough food to meet the total needs of all its members, some individual(s) in the household would face food insecurity. But, if all members of the household have secure access to adequate food (individual food security for all household members), then by definition the household is food-secure.

Conceptually, absolute food security must be measured at the individual level. But this is very burdensome and expensive, and hence impractical. Empirically, the household is the lowest level at which it is practical to evaluate food security by collecting survey data. The broader levels of food security can usually be evaluated using secondary data.

The term "adequate food" means that both the quantity and quality of food must meet nutritional requirements and food safety standards for an active and healthy life. Also, the food should suit eating preferences. Socio-economic research on food security in developing countries usually does not consider food safety standards, which vary with the object of measurement. Although increased attention is now being given to other nutritional requirements, the nutritional standard is generally based on the energy requirement for practical research. In other words, food adequacy may be measured by the energy content of the actual food consumption.

Food preference is assumed to be revealed by the actual food consumption bundle. The requirement for food adequacy that a food consumption bundle must meet the preferences of the people may be considered as the social dimension of the food security concept. Some researchers have broadened the notion of food security to include an element of social acceptability (Radimer et al. 1990; Kendall et al. 1995). But, according to the revealed preference argument, social acceptability criteria have been implicitly met if food adequacy is evaluated based on actual food consumption.

Although it need not be included as an additional indicator of food security performance, food preference or social acceptability might be an important risk factor for food security. In the long run, people's preferences change, usually away from locally produced foods to imported foods. This trend has the potential to either increase or decrease vulnerability of both food availability and food entitlement. On one hand, imported food dependency exposes the national food systems to external shock and uncertainties, and hence creates vulnerability for the national food security systems. But on the other hand, food importation is a mean to diversify sources of

national food availability and hence strengthen the national food security systems. Indeed, food preference is also an important determinant of food expenditure (and hence entitlement) as well as food utilization.

We can directly infer a definition of food insecurity from the definition of food security. Food insecurity exists when people are *already at risk* or are suffering from under-nourishment due to food unavailability, lack of entitlement and/or improper food utilization. Food-insecure people have food intake levels below their minimum energy requirements, and exhibit physical symptoms caused by energy and nutrient deficiencies resulting from an inadequate or unbalanced diets, or from an inability of the body to use food effectively because of infection or disease.

Food insecurity (and hence food security) can be measured by the level of risk of food intake falling below minimum energy requirements, and the degree of malnutrition deficiency syndromes. Socio-economic researchers generally use the first approach, whereas nutritionists use the second one. In this project, we used the first approach.

There are two kinds of food insecurity: chronic and transitory (World Bank 1986). Chronic food insecurity is the persistent incidence of food insecurity over a long period. The severity is generally low to medium, and could be continuous or seasonal. It is manifested by hunger and malnutrition syndromes. The root cause is usually poverty. Transitory food insecurity is the temporary incidence of food insecurity. It could be very severe, leading to famine or starvation. It results from instability in food prices, food production or household income due to factors such as economic crises, natural disasters and wars. In reality, however, the two types of food insecurity are closely intertwined. Typically, the poorest people, who are chronically food insecure, are hit hardest by transitory food insecurity problems (von Braun et al. 1992).

Root causes of food insecurity

While the root cause of food insecurity is poverty, food insecurity is also an important determinant of poverty. In fact, the main constraints to economic development—poverty, unsustainability and food insecurity—are interrelated in a vicious cycle that causes chronic food insecurity. Chronic food insecurity may be seen as a *food insecurity poverty trap*, to be solved through long-term poverty alleviation programmes that turn the vicious cycle into its converse, a virtuous cycle, illustrated in Figure 1.

There are two modes of transactions that may be effective as operating systems for ensuring food availability, entitlement and utilization: market transactions and institutional transfers. In general, food security systems can be divided into two elements: market economy systems and social safety net systems. Determinants of food security within these two systems are conceptualized in Figure 2. Market economy systems are characterized by price based market transactions. Social safety net systems are risk-coping mechanisms designed within an institutional setting. They can comprise both formal, governmental-based institutions and informal, non-government institutions.

Figure 1 A virtuous cycle of food security and life well-being.

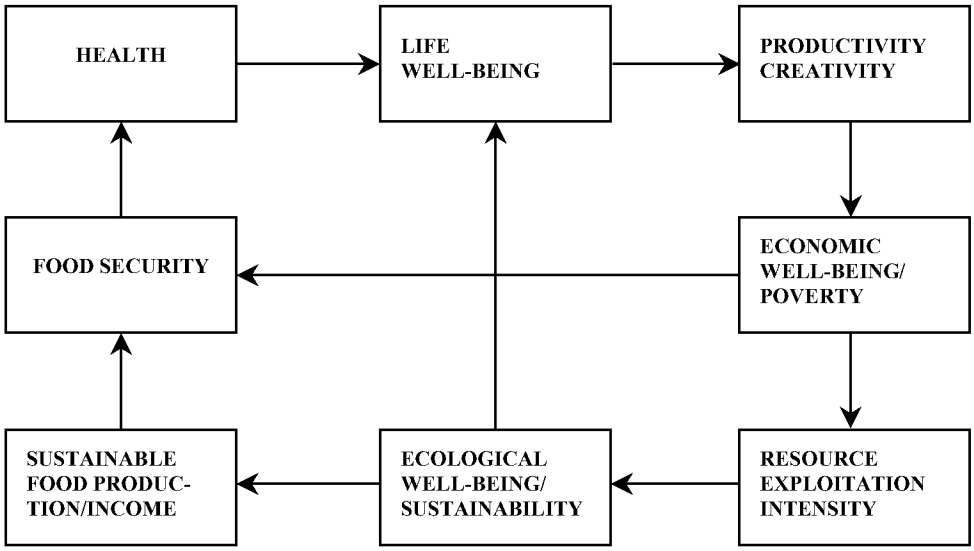
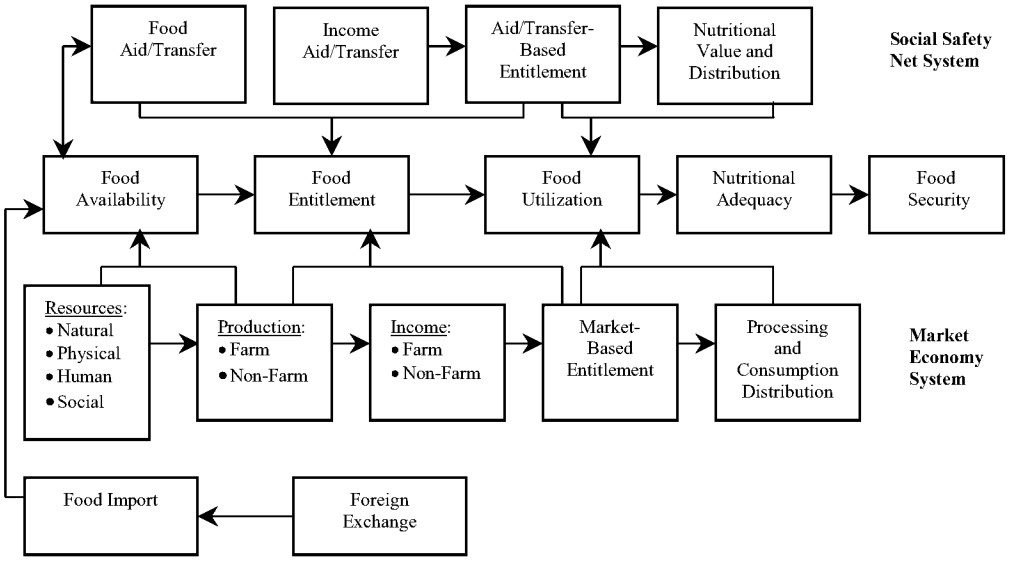


Figure 2 Determinants of food security.



Food security policy framework

Food security is a basic human right on the grounds that a lack of it causes human suffering, indignity and in its worst form even death (Byron 1988; Sen 1989). It is also a necessary condition for sustainable economic development (Timmer 1997). This is because food insecurity can lead to substantial productivity losses and a misallocation of scarce resources due to diminished work performance, lowered cognitive ability and school performance, and inefficient or ineffective income-earning decisions (von Braun et al. 1992).

Yet food security is a complex policy issue. Government plays a key role in its achievement through strategy formulation, policy design and implementation, monitoring and evaluation of progress. *An effective food security policy aims to ensure an adequate dietary intake for all households without exposing them to excessive risks in attaining that intake* (von Braun et al. 1992). The risk of food insecurity is dealt with by public and private actions, and the optimal combination of these actions—considering costs and benefits—characterizes successful food security policies. A policy is effective when it achieves its goal at the least cost and is sustainable in the long run.

The search for food security may have important implications for a region's environment and natural resource utilization as well as its demographic situation. Households may achieve temporary food security, for example, by disposing of assets or "mining" its resources, at the cost of becoming highly vulnerable to future insecurity.

The dimensions, causes and consequences of food insecurity differ widely from country to country, and even within the same country. Hence, a general blueprint for setting priorities should not be considered and the search for the optimal combination of policies has to be country-specific (von Braun at al. 1992).

The differing causes and characteristics of food insecurity among households may require different policy responses. In particular, there are differences in household food security issues in rural and urban contexts (von Braun et al. 1992; 1993). In rural areas, household food security is primarily a function of agricultural production, particularly food production. Technological changes in agriculture and expansion of the rural infrastructure go a long way towards mitigating rural food insecurity. In urban areas, the focus may have to be on generation of employment, social safety, health policies (von Braun et al. 1993) and the real wage rate (relative to food prices). Typically, energy consumption is lower in urban areas, partly because of differences in activity levels. Further, low levels of health and hygiene in poor urban areas sometimes make urban food security qualitatively different from that in rural areas.

Food security policy (FSP) and programmes address the risks of becoming food-insecure. There are seven important sources of risks to food security:

1. food production risks from market, institutional and national disaster-induced failure
2. uncertainties associated with food trade and availability
3. variability in food prices
4. variability in incomes and employment
5. health and other environmental risks
6. political and policy failures such as wars, and other political and social crises
7. socio-demographic risks, encompassing the disintegration of social norms and abnormal demographic structure.

Some policy actions to deal with these risks are listed in Table 2.

Table 1 Hypothetical policy option matrix.

Policy Option	Risks						
	Food Production	Trade and Availability	Food Price	Income and Employment	Health and Environment	Political and Policy Failure	Socio-demographic
1. Agricultural production							
a. Technological change	PHL	PHL	PHL	PHL	P/N	PLL	PLL
b. Input subsidies	PHS	PHS	PHS	PHS	NMS	NLS	-
c. Output price support	PHS	PHS	NHS	P/N	NLL	NLS	-
d. Diversification	PLL	PHL	PML	PML	PHL	PHL	PLL
e. Extensification	PHL	PHL	PHL	PHL	NLL	PHL	PLL
2. Conservation	PHS	PHS	PHS	PLS	PLS	PHS	PLS
a. Food trade and distribution intervention							
3. Food subsidies and transfer							
a. Food price	NHS	PHS	PHS	PML	PLL	PHS	PLS
b. Feeding programme	NLL	PHS	PLS	PLL	PHS	PHS	PHL
c. Food stamp	NLL	PHS	PLS	PLL	PHL	PMS	PLS
4. Income and employment							
a. Public works	PLL	PLL	PLL	PHS	PHS	PLS	PLS
b. Credit	PLS	PLS	PLS	PHS	PLS	P/N	PLS
5. Health and education							
a. Education	PHL	PLL	PLL	PHL	PHL	PHL	PML
b. Health	PHL	-	-	PHL	PHL	PML	-
6. Food institutions							
a. Food security safety net	PHL	PHL	PHL	PHL	PHL	PHL	PLL
b. Social security system	-	-	PLL	PHL	-	PHL	PHL
c. Laws and regulations	-	PHL	-	-	PHL	PHL	PHL
7. Non-agricultural sector development	PML	-	PML	PHL	P/N	P/N	PLL
8. Macro policies							
a. Exchange rate overvaluation	MMS	PHS	PHS	MMS	-	NHS	-
b. Infrastructure investment	PHL	PHL	PHL	PHL	PHL	PHL	PHL

PHL = Positive High Long-term
PML = Positive Medium Long-term
PLL = Positive Low Long-term
NHL = Negative High Long-term
NML = Negative Medium Long-term
NLL = Negative Low Long-term
PHS = Positive High Short-term
PMS = Positive Medium Short-term
PLS = Positive Low Short-term
NHS = Negative High-Short-time
NMS = Negative Medium Short-term
NLS = Negative Low Short-term
P/N = Positive/Negative

The two main types of food security strategies are growth-mediated food security and support-led food security. The growth-mediated food security strategy entails no specific programmes. Food security is pursued by promoting economic growth and transformation. A support-led food security strategy, on the other hand, includes special programmes through which food security is pursued (Table 2). The government provides assistance to remove or mitigate destitution without waiting for a transformation of the economy and a subsequent rise in the level of general affluence. The two strategies are connected, especially in the long run.

Table 2 Typology of food security interventions.

Type	Country Example	Cost per Intended Beneficiary	Benefit-Cost Ratio	Infrastructure Required	Leakage to Non-needy	Improvement in Nutrition Habits of the Malnourished
Untargeted food subsidies	Egypt, Morocco	High	Low	Minimal	High (60-70%)	Low
Untargeted food rations (that is, ration shops)	India, Pakistan	Moderate	Low-Moderate	Minimal	High (50-60%)	Low-Moderate
Ration shops targeted geographically	India, Brazil	Moderate-Low	Moderate-High	Minimal	Low (5-10%)	Moderate
Self-targeting food rations	Pakistan, Bangladesh	Moderate-Low	Moderate-High	Minimal-Moderate	Low-Moderate (10-30%)	Low-Moderate
Food stamps - targeted by income	Sri Lanka (post 1979), United States, Colombia	Moderate	Low-Moderate	Minimal-Moderate	Low-Moderate (10-30%)	Low-Moderate
Food stamps - targeted by health status	Colombia, Indonesia	Low	Moderate	Moderate	Moderate (30-60%)	Moderate
Supplementation schemes on-site or take-home preschooler plus mother	India, Indonesia	Moderate-Low	Moderate	Moderate	Moderate (30-60%)	Low-Moderate
Supplementation schemes on-site, most vulnerable group targeting	Tamil Nadu, India	Moderate-Low	High	Moderate	Low (3-10%)	Moderate-High
Supplementation schemes take-home, nutritionally vulnerable	India	Low	High	Moderate	Low	High
Food-for-work programmes	India, Bangladesh, Indonesia	Moderate	High	Moderate-High	Low (3-10%)	Low-Moderate

Source: Adapted from Mateus (1983). It should be noted that this typology might not be indeed encompassing now.

Measurement and analysis

A food bundle for households in South Pacific island countries includes all food commodities that are commonly used for daily consumption, with a special emphasis on roots and tubers. The commodity coverage includes domestically produced native crops (e.g. roots, tubers, leafy green vegetables, bananas, breadfruit) and introduced crops (e.g. rice, vegetables) as well as imported commodities in unprocessed, semi-processed and processed form (e.g. rice, flour and flour-based products, canned meats, fresh fruits and vegetables).

The nutritional values of foods eaten in diets are computed by summing the nutritional contents of the respective food items. The necessary information for this computation is the amount and nutritional content of the food items. National experts consulted nutritionists or references to obtain the nutritional contents of the food items. Where available, national food balance sheet statistics were used to obtain information on energy and protein availability in the country. Nutrient contents of food available or food intake were computed as follows:

$$N_i = f_{i1}F_1 + f_{12}F_2 + \ldots\ldots + f_{in}F_n = \sum_{j}^{n} f_{ij}F_j \ldots\ldots \quad \text{(Equation 1)}$$

N_i = total amount of nutrient i, i = calories, protein, micronutrients
F_j = amount of food item j, j = (1 for taro), (2 for rice), 3, ---, n
f_{ij} = nutrient i content of food item j (e.g. amount of calories per unit of taro).

Standards of food nutrition adequacy for energy, protein and micronutrients vary by country and region within a country as well as by sex, age, job and ethnic group. The national experts consulted nutritionists and references to obtain these standards.

A more meaningful measure than total nutritional content of food available or food intake is nutritional intake per capita. Nutritional intake per capita was computed as total nutrients divided by the total population:

$NC_i = N_i/POP$ (Equation 2)
NC_i = Per capita availability or intake of nutrient i
POP = Total population

A food adequacy indicator was computed as the ratio of nutritional contents of food availability or actual consumption to their respective standard requirements:

$FAI_i = 100 * NC_i/NR_i$ % (Equation 3)
FAI_i = Food adequacy index for nutrient i
NR_i = Nutrient requirement standard for nutrient i

Food availability or intake is insufficient to meet nutrient i if $FAI_i < 100\%$, and it is surplus or over-consumed if $FAI_i > 100\%$. Graphical analysis of food security was conducted by plotting the food adequacy index over time where time series data were available. If the food adequacy index is always above 100%, there has been no food security problem (Figure 3a). If the food adequacy index is always below 100%, there has been a persistent food security problem (Figure 3b). If the food adequacy index periodically or irregularly falls below 100, the food security problem is temporary (Figures 3c and 3d).

Figure 3a No food security problem.

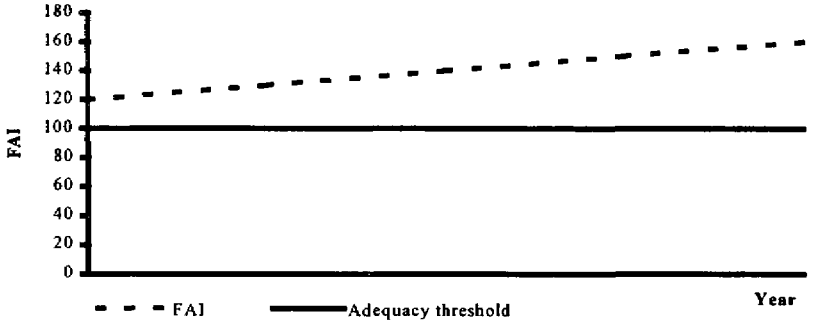


Figure 3b Persistent food security.

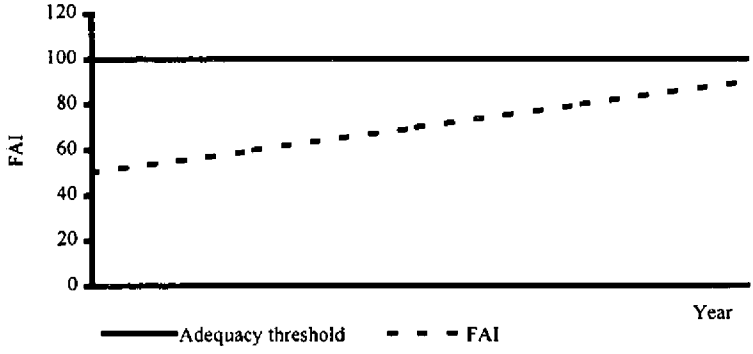


Figure 3c Periodical food insecurity.

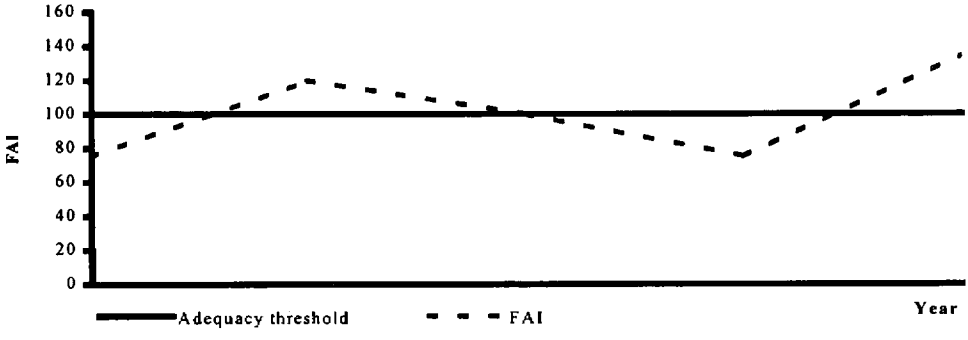
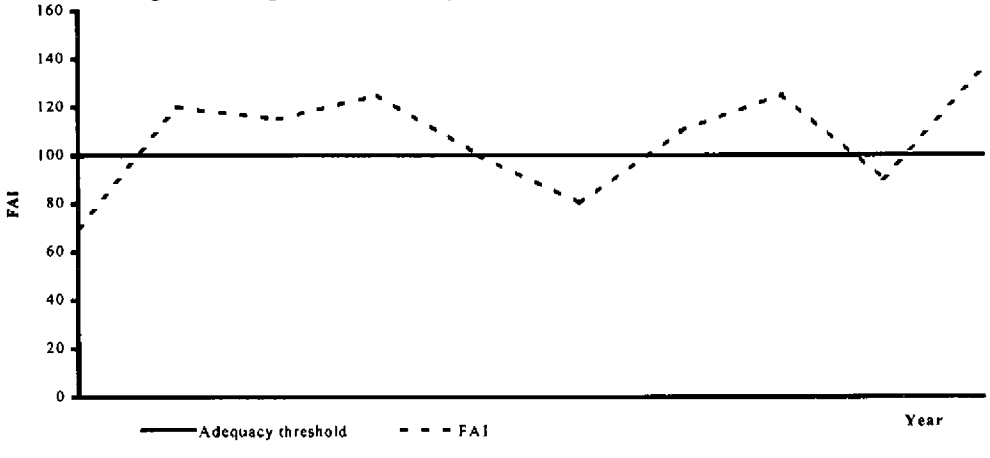


Figure 3d Irregular food insecurity.



National food availability by individual food items is computed as consumable domestic production plus commercial imports and transfers (notably, aid and remittances):

$NFA_i = CDPF_i + CIF_i + TRF_i + SO_i$ (Equation 4)

NFA_i = national availability of food item i
$CDPF_i$ = consumable domestic production of food item i
CIF_i = commercially imported food item i
TRF_i = food item i transferred from abroad
SO_i = opening stock of food item i

Consumable domestic production (CDP) is the amount of a domestic food item in production readily available for non-farm utilization. It was computed as:

$CDPF_i = GDPF_i - SEED_i - LOSS_i$ (Equation 5)

$GDPF_i$ = gross domestic production of food item i
$SEED_i$ = seed and planting material utilization of food item i
$LOSS_i$ = post-harvest losses of food item i

Food availability per capita for each major staple was computed by dividing CDPF by the total population. Nutritional adequacy of food availability was computed by using the procedure outlined in (Equations 1-3). The vulnerability of food availability was evaluated by analyzing its variability within a year by season and by years over time. The analysis was conducted by using a standard deviation indicator and/or graphical analysis. Sustainability was evaluated by analyzing the long-term trend in food availability. It should be noted that vulnerability and sustainability analysis would be more meaningful if conducted not only on total availability (NFA) but also by its sources (CDPF, CIF and TRF). In this regard, the degree of reliance or dependence on a particular source affects vulnerability. The reliance indicators were computed as follows:

(i) Domestic Production Reliance (DPR)
Domestic production reliance is measured by the ratio of consumable domestic production (CDPF) to national food availability (NFA):

$DPR_i = 100 * CDPF_i/NFA_i$ % (Equation 6)

DPR is generally considered positively related to security of national food availability.

(ii) Import Food Reliance (IFR)
Import food reliance is measured by the ratio of commercial food imports (CIF) to national food availability (NFA):

$IFRi = 100 * CIFi/NFAi$ % (Equation 7)

IFR is generally considered negatively related to security of national food availability.

(iii) Transfer Food Reliance (TFR)
Transfer food reliance is measured by the ratio of food transfer to national food availability (NFA):

$$TFR_I = 100 * TRF_i/NFA_i \quad \% \qquad \text{(Equation 8)}$$

TFR is positively related to insecurity of national food availability.

The right-hand side of equation 8 identifies the sources of food access. Food access at the national level, therefore, was evaluated based on national capability to obtain adequate food. Adequacy of food access (entitlement) was evaluated on the basis of:

(i) national capability to produce foods: planted area, productivity and competitiveness;
(ii) national capacity to import foods: foreign exchange availability and import price; and
(iii) a country's opportunity to obtain food aid and other transfers.

Vulnerability and sustainability of food access were evaluated according to three means of gaining entitlement to food in the following manner:

(i) Domestic food production

- Vulnerability was evaluated by analyzing seasonal (within-year) and cyclical (over years) variability of domestic production, using standard deviations, frequencies of production shocks and graphical analysis. The causes (risk factors) of vulnerability and government coping policies were identified and analyzed.
- Sustainability was evaluated by analyzing long-term trends in domestic production, planted area, land productivity and labour productivity.
- Survivability of domestic farming systems was evaluated by analyzing the competitiveness against alternative farming systems and competitiveness of their output against imported products. Competitiveness with alternative farming systems was evaluated by comparing their profitability with that of alternative farming systems. Competitiveness against imported products was evaluated by comparing domestic unit cost with the product's import parity price.

(ii) Capacity to import

- Vulnerability was evaluated by analyzing the burden of food importation. Two relevant indicators for the burden are:

  Import-GDP ratio = IYR = Value of food import/GDP
  Import-export ratio = IER = Value of food import/value of total export

- International price variability and trend, availability of food supply in international markets and constraints on the importation process may critically affect import vulnerability.
- Sustainability may be indicated by long-term trends in both IYR and IER. Increases in IYR and IER indicate unsustainability.

(iii) Food aid or transfers

- Vulnerability was evaluated by analyzing the reliability of food aid and transfers, especially remittances. Is there an institutionalized system or merely incidental giving? Are they personal transfers, transfers by private agencies or state gifts?

Total (gross) utilization (NFU) of food item i is composed of domestic use (DUF), exports (EXF) and change in stocks (CSF). Total utilization is always equal to total availability:

$$NFU = DUF_i + EXF_i + CSF_i = NFA_i \quad \text{(Equation 9)}$$

Where information on DUF and CSF was not available, the two were combined to get apparent domestic utilization (ADC):

$$ADC_i = NFA_i - EXF_i = CDPF_i + (CIF_i - EXF_i) + TRF_i \quad \text{(Equation 10)}$$

Domestic use (DUF) or, alternatively, apparent domestic consumption (ADC) was used as a proxy for gross national food consumption, the ultimate measurement unit of food security at the national level. Consumption per capita (in items of food items or nutrient content) was computed by dividing DUF (or ADC) by the total population. Nutrient adequacy was evaluated by constructing and analyzing a food consumption adequacy index. The computation procedure is similar to that explained earlier in equations 1 to 3.

Vulnerability of domestic food consumption is reflected by its variability, which was evaluated by using standard deviations, frequency of abrupt shocks and graphical analysis. It was decomposed into its sources. In this regard, degree of reliance on the respective sources and utilization structure affect the vulnerability of domestic food consumption. Some important reliance and utilization ratios are:

(i) Self-Sufficiency Ratio (SSR)
The self-sufficiency ratio was computed as the ratio of consumable domestic production to apparent domestic consumption:

$$SSR_i = 100 * CDF_i/ADC_i \quad \% \quad \text{(Equation 11)}$$

SSR_i is commonly considered positively related to national food security, although many commentators have questioned the validity of this supposition.

(ii) Trade Dependency Ratio (TDR)
The trade dependency ratio was computed as the ratio of net imports to apparent domestic consumption:

$$TDR_i = 100 * (CIF_i - EXF_i)/ADC_I \quad \% \quad \text{(Equation 12)}$$

TDR_i is negatively related to personal food security.

(iii) Aid Dependency Ratio (ADR)
The aid dependency ratio was computed as the ratio of food transfer to apparent domestic consumption:

$$ADR_i = 100 * TRF_i/ADC_I \quad \% \quad \text{(Equation 13)}$$

A positive ADR_i indicates the absence of self-sufficiency.

Provincial food security was evaluated using a similar procedure to that for national food security where data on provincial food balance sheets were available. Otherwise, the national expert had to resort to secondary information from previous studies or expert opinions. Time series data on food production and prices, regional domestic production and population were used with data on common dietary patterns in the province. The dietary pattern may vary by ethnic group. Demographic information is therefore also important for this estimation.

Another important piece of information is the food crisis incidence by province. Frequency over time and geographical distribution of the food crises may indicate vulnerability of provincial food security. The underlying cause, surveillance and forecast, contingency plan and coping mechanisms are relevant for discussion.

Where household survey data were available from previous studies, households were classified into socio-economic class by region (rural versus urban), ethnic group, job (farm versus non-farm), etc. The basic principles for analyzing household food security are similar to those for national food security.

References

Byron, W.J. 1988. On the protection and promotion of the right to food: an ethical reflection. *In* B.W.J. LeMay (ed.), Science, Ethics, and Food. Smithsonian Institution Press, Washington, D.C. and International Rice Research Institute, Manila. p. 14-30.

Chung, K.; Haddad, L.; Ramakrishma, J.; and Riely, F. 1997. Identifying the Food Insecure: The Application of Mixed-Method Approaches in India. International Food Policy Research Institute, Washington, D.C.

FAO. 1998. Guidelines for National Food Insecurity and Vulnerability Information and Mapping Systems (FIVIMS): Background and Principles. Committee on World Food Security CFS: 98/5, 24th Session, 2-5 June 1998. Food and Agriculture Organization, Rome

Kendall, A.; Olson, C.M.; and Frongillo, E.A. 1995. Validation of the Radimer/Cornell measures of hunger and food insecurity. Journal of Nutrition 125(11):2792-2801.

Mateus, A. 1983. Targetting Food Subsidies for the Needy. The Use of Cost Benefit Analysis and Institutional Design. Staff Working Paper 617. World Bank. Washington, D.C.

Maxwell, D.G. 1996. Measuring food insecurity. The frequency and severity of coping strategies. Food Policy 21(3): 291-303.

Maxwell, S.; and Frankenberger, T. 1992. Household Food Security: Concepts, Indicators, Measurements: A Technical Review. UNICEF and IFAD, New York and Rome.

Radimer, K.; Olson, C.; and Campbell, C. 1990. Development of indicators to assess hunger. Journal of Nutrition 120:1544-1548.

Sen, A. 1989. Food and freedom. World Development 17(6):769-781.

Sen, A. 1981. Poverty and Famines: An Essay on Entitlement and Deprivation. Oxford University Press, Oxford.

Simatupang, P. 1999. Toward sustainable food security: the world for a new paradigm. *In* Simatupang, P.; Pasaribu, S.; Bakri, S.; and Stinger, B. (eds), Indonesia Economic Crisis: Effects on Agriculture and Policy Responses. CASER-CIES University of Adelaide, Australia, p. 141-167.

Swaminathan, M.S. 1995. Population, Environment, and Food Security. Issues in Agriculture No. 7. Consultative Group on International Agricultural Research. Washington D.C.

Timmer, C.P. 1997. Farmers and markets: the political economy of new paradigms. American Journal of Agricultural Economics 79(2):621-627.

von Braun, J.; Bouis, I.H.; Kumar, S.; and Pandya-Lorch, R. 1992. Improving Food Security of the Poor: Concept, Policy and Programs. International Food Policy Research Institute, Washington, D.C.

von Braun, J.; McComb, J.; Fred-Mensah, B.K.; and Pandya-Lorch, R. 1993. Urban Food Insecurity and Malnutrition in Developing Countries: Trends, Policies, and Research Implications. International Food Policy Research Institute, Washington, D.C.

Watts, M.; and Bohle, H. 1993. Hunger, famine and the space of vulnerability. Geojournal 30(2):117-126.

World Bank. 1986. Poverty and Hunger: Issues and Options for Food Security in Developing Countries. World Bank, Washington, D.C.

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The Economies of the Southwest Pacific and Food Security

John Williams[*]

The basic problem coming out of the 1990s for the countries of the southwest Pacific is to better manage future government expenditure. Large government borrowings from the Central (Reserve) banks, especially in the early years of the 1990s negatively affected the economies of Vanuatu, Papua New Guinea, Solomon Islands and Fiji. At times this led to unstable government structures that were reflected in back and forth changes in the ruling parties. Sometimes it led to political instability and ethnic tensions. In the late 1990s, a solution to the government expenditure problems of the southwest Pacific countries was linked to government structural reforms, especially for banking and government administration. The success of the government structural reforms is still debatable, but initial reports indicate declines in real GDP for several countries (Papua New Guinea by -3.7% from 1997 to 1999; Vanuatu by -2.2% in 1999; and Solomon Islands by 4.4% in 1998-99). Arguably, the declines in GDP experienced by the countries in the southwest Pacific could also be linked to negative vagaries in weather patterns that affected commercial agricultural exports or to a collapse in demand from trading partners due to the Asian crisis in 1997. Entering the new millennium, all countries looked to a brighter future after a better, but hardly dynamic, economic performance in 1999. Those hopes, however, became depressed in 2000 due to increased political tensions, declining agricultural prices for major export commodities such as copra and kava, and increasing prices for petroleum. Within this economic scenario, problems of food security have run their course. Food security has been affected in the short term by droughts, cyclones, earthquakes and tsunami. Food security has also been affected by disruptions in development efforts and by the increasing migration of rural people to towns.

This paper looks at the economies of the countries of the southwest Pacific with a view to understanding the structure of these economies that impact on food security. These economic structures and their current performance will be reviewed, after which their impact on food security will be considered.

Economies of the southwest Pacific

This section reviews the economic structure and performance of Vanuatu, Papua New Guinea, Solomon Islands and Fiji in the last few years of the 1990s, including data for the year 2000, where available.

All statistical information for Vanuatu comes from the Ministry of Finance and Economic Management, the Reserve Bank of Vanuatu, and the Vanuatu Statistics Office. For Papua New Guinea statistical data come from PNG Business, " Semi-annual monetary policy statement by the governor of the Bank of Papua New Guinea", August 2000 and the Quarterly Economic Bulletin, Bank of Papua New Guinea, March Quarter 2000. For the Solomon Islands, all statistical information comes from the Central Bank of Solomon Islands and the Statistics

[*] Senior Economic Affairs Officer, ESCAP Pacific Operations Centre (ESCAP/POC), Vanuatu.

Division of the Ministry of Finance. The statistical data for Fiji comes from the Reserve Bank of Fiji.

Vanuatu

Vanuatu's real GDP growth was weak during 1996-1997, due mainly to a slowdown in construction activity. A recovery in the construction industry and a boom in export sales of kava underlined an improvement in GDP growth to 3.4% for 1998. However, the economy slowed significantly in 1999 with GDP contracting 2.2% in real terms. The main cause of the economic contraction was a slump in the production of copra, Vanuatu's most important cash crop and commodity export. Decreases in cocoa and kava production also contributed to the downturn. Tourist arrivals were maintained at a fair level due to more visiting cruise ships, although disruptions in air services led to a significantly low rate of occupancy for hotel rooms. The fiscal deficit in 1999 was contained at 1.4% of GDP, and for 2000 it is expected to be 3.0% of GDP due to an expansion of the development budget. The third phase of the Comprehensive Reform Program (CRP) is expected to be initiated from the end of year 2000 to the end of 2002 with the hope that its implementation will improve investor confidence.

Due to the strong downturn in exports of some major commodities (copra, cocoa and kava), the trade deficit for 1999 widened to US$ 51.0 million, up 22.1% from 1998. Imports were US$ 77.3 million in 1999, up 5% from 1998, and exports fell 14.9% to US$ 25.9 million. Copra exports declined from 43 down to 31 thousand tons in 1999 compared to 1998. The world price for copra rose from US$ 411 to US$ 460/ton in the same period. World demand for kava sharply fell after the 1998 boom, resulting in Vanuatu's kava exports declining to less than half of the previous year's tonnage. Beef exports were slightly above their 1997 level, after the decline in 1998 owing to the effects of the East Asian crisis. For 2000, the trade deficit is anticipated to widen slightly compared to 1999. However, a sharp fall of world prices for copra since the third quarter of 1999 will negatively affect the overall trade balance for 2000. Food imports in 1997 amounted to US$ 16.4 million (Vatu 2,143 million), which represented 52% of the export value of copra, cocoa, beef, timber, kava and others for that year. In 1998 and 1999, food imports amounted to US$ 17.4 and US$ 18.5 million, respectively, representing 53 and 73% of the above-mentioned exports for those years (Reserve Bank of Vanuatu 2000). Average imports of food amounted to an average of only 19% of total imports for the years 1980 to 1999 (Vanuatu Country Paper 2000).

Vanuatu's main trade is in services. In 1999 the surplus in services trade declined by 13.4% to US$ 55.4 million. Tourism continues to be Vanuatu's most important foreign exchange earner with receipts of US $ 55.6 million in 1999 despite the disruption of air transport services in the second quarter. The receipts from tourism are expected to pick up sharply in 2000 as a result of the law and order problems in the neighbouring and competing destinations of Fiji and the Solomon Islands. Total services exports contracted 12.3% in 1999 compared to 1998, but are expected to increase 24% in 2000. The current account recorded a deficit of 6% of GDP in 1999, and is expected to show a deficit of 6.6% of GDP for 2000.

The capital account recorded a surplus for 1999 of US$ 16.7 million compared to a deficit of US$ 8.9 million for 1998. This is due to a slight increase in official capital transfers, and a significant reduction of private capital outflows following an improvement of the local political climate. The level of foreign direct investment in 1999 remained stable at US$ 26.7 million. Foreign direct investment continues to be low, but the better management of the Foreign Investment Board and improvement in standards of governance following the introduction of the CRP are expected to positively affect the inflow of foreign direct investment

in the years ahead. However, it remains to be seen whether better governance will offset non-competitive factors of Vanuatu's economy to attract significant foreign investments.

A stable exchange rate and low inflation in Vanuatu's main trading partners have helped inflation remain low in recent years. Inflation peaked in 1997 at 5.1% following a 0.1% decline for 1996. Prices increased 4.1% in 1998 following the introduction of the value added tax. For 1999, inflation was 2.8%, and is expected to remain at 2.8% in 2000. By the first quarter of 2000 year-on-year inflation was running at 0.5%.

Responding to strong pressure on the exchange rate, the Reserve Bank of Vanuatu tightened monetary policy early in 1998 by sharply increasing interest rates. As exchange rate pressures eased, interest rates have steadily declined since the middle of 1998. However, in 2000 the interest rates were starting to slowly increase again owing to a tighter monetary policy designed to offset deterioration of the foreign exchange reserves, which represented about 5 months of import cover.

Papua New Guinea

GDP for Papua New Guinea grew by 2% in 1999 following a slight recovery in 1998 from a 1997 recession. The growth in both years was due to increased activity in the mining and petroleum sectors. Higher demand for logs following recovery from the Asian crisis in 1997 and 1998 assisted activity in the relatively subdued agriculture/forestry/fisheries sector. It is expected that the agriculture/forestry/fisheries sector will increase in 2000 due to higher agricultural production, particularly for cocoa, coffee, copra oil and palm oil, combined with higher log production. Real GDP is expected to grow by 4.5% in 2000.

First quarter 2000 saw an increase in the agriculture sector due to higher production and higher export prices for most of the major agricultural products and the resumption of cocoa and copra production in the North Solomons province.

The weighted average Kina price of exports was 60.6% higher in the March quarter 2000 compared to the corresponding quarter in 1999, due to an 80.8% increase in mineral exports, with higher Kina prices of gold, copper and crude oil.

For agricultural exports, the weighted average Kina price was 5.6% higher due to higher prices of coffee, copra, copra oil, rubber and log exports offsetting declines in cocoa, palm oil, tea, and marine export products. All international prices of agricultural products declined in 2000.

There was overall deficit of Kina 91 million in balance of payments in the first quarter of 2000 compared to a deficit of Kina 65 million in the corresponding period of 1999. The high deficit in the capital account was due to a combination of high net official outflows (higher loan repayments, lower loan draw down by government) and high private capital outflows (buildup of mineral companies offshore account balances and lower net foreign assets draw down by commercial banks). It was offset by a surplus in trade, lower net service payments and higher net transfers. The surplus in the trade account was Kina 785 million in the March 2000 quarter compared to Kina 311 million in the March 1999 quarter due to the higher value of merchandise exports. The level of foreign exchange reserves at end of March quarter 2000 was K460 million sufficient for 1.9 months of total import cover and 2.7 months of non-mineral import cover.

Inflation, as measured by the Consumer Price Index (CPI), increased 2.1% over the first quarter of 2000. In urban areas, the CPI in the March quarter of 2000 was 19.6% higher than the corresponding quarter of 1999. The Kina depreciated against all major currencies in the March quarter of 2000. In particular, it devalued by 6.7% against the US dollar and 4.9% against the Australian dollar. A tight monetary policy stance (with high interest rates) was maintained in the first quarter of 2000.

Solomon Islands

Starting mid-1999, a major ethnic conflict erupted in the Solomon Islands. The conflict extended and deepened through 1999 and 2000, dramatically affecting economic and social conditions. After a new Prime Minister was elected in Parliament in June 2000, the security situation remained fragile, with continuing acts of pillage, theft, and threats to the integrity of persons and property. The economy as a whole has been adversely affected by the closure of some of the major production operations in the country (palm oil, fishing, mining). Social services are also deeply affected. A thousand public servants have been sent home on unpaid leave. One result of the conflict is increasing pressure by provincial authorities to change the constitution to allow the creation of state governments.

For the first half of the 1990s, economic growth in the Solomon Islands averaged about 5% per annum, driven by forestry, fishing, and palm oil industries. Much like its neighbour, Papua New Guinea, the Solomon Islands fell sharply into recession in 1997 and 1998 as a result of the East Asian crisis and the drought caused by the El Nino weather phenomenon. During this period government finances collapsed, necessitating the introduction of the Policy and Structural Reform Program (PSRP). The Program was designed to rehabilitate public finances, streamline public services, and provide for a resumption of timely debt servicing. The notable policy measures implemented included the withdrawal of discretionary exemptions from customs duties, devaluation of the Solomon Islands dollar, relaxation of exchange controls, and the privatisation of a number of public assets. In the first years of the PSRP, GDP shrank an estimated 3.9% in 1998, and a further 0.5% in 1999.

During the early and mid-1990s agricultural sector output had not been particularly active. In 1998, however, it fell 4.9% and continued the decline in 1999 by an estimated 22.0%. By 2000 it had recovered from a reduction in demand for logs from the East Asian market. However, forestry sector output in 1999 had not returned to its previous output levels from 1995 to 1997. The closure of palm-oil operations on Guadalcanal in 1999, then the closure of fishing operations in the Western Province in 2000 are major contributors to the current fall of agriculture sector output. Civil unrest in 1999 and 2000 negatively affected output of the Solomon Island's other main exports – palm oil, coconut products, and cocoa. Mining operations resumed in 1999 with production from the Gold Ridge mine. This boosted industrial output in 1999 to a strong 30.5% growth. Security problems on the island of Guadalcanal, where the mine is situated, forced the Gold Ridge mine to close in July 2000.

In recent years, forestry exports, particularly logs, have taken over from fish as the Solomon Island's most important export, making up more than 55% of all exports in 1997. The boom in log exports supported a gradual appreciation of the real exchange rate through the 1990s, and enabled the Solomon Islands to record surpluses on its trade balance. The impact of social unrest on the forestry sector during 1999 was not as severe as on other sectors and overall output increased by 3% over 1998 because logging operations are remote from trouble spots. The annual log production in 1999 exceeded the estimated sustainable production rate by a factor of more than two.

Fish exports continue to have favourable access to European and Japanese markets, but the volatility of tuna prices in 1999 pushed one of the two major fishing companies in the Solomon Islands to cease operations. In 2000, the other major fishing company also decided to suspend fishing operations.

The current account balance in 1999 was positive at US$ 21.1, or 1.3% of the GDP, after being in deficit of more than 5% of the GDP in the previous years. Strength in forestry and gold exports contributed to the positive outcome in 1999, but such strength is not expected to be sustainable in 2000. The capital account was in deficit in 1999 by US$ 5.5 million. Total

external debt was estimated at US$ 128 million by the end of 1998, most of which was long term debt provided to the public sector on concessional terms. Debt servicing costs are relatively low at just 1.7% of GDP.

Inflation has been a significant problem for the Solomon Islands throughout the 1990s, averaging in excess of 10% a year. After the 20% devaluation of the Solomon Islands dollar in 1998 and the introduction of a tighter monetary and fiscal policy by the Ulufa'alu government, inflation decreased sharply in 1999. The exchange rate was stable through 1999; inflation was kept as low as 7.5%. The Central Bank of the Solomon Islands estimates inflation for 2000 not to exceed 8.0%.

Fiji

Fiji's GDP in 1999 is estimated to have grown by around 8%. This rebound comes after a recession from 1996 and 1997 that led to an average GDP contraction of 1.5% in each year. The recession was caused by adverse external shocks, notably the El Nino-induced drought and, to a lesser extent, the Asian crisis. The current political crisis, however, has heavily impacted on the economy leading to another economic contraction perhaps by an estimated 8 to 10% for 2000.

The strong rebound in economic performance in 1999 was largely driven by a recovery in the sugar sector as weather conditions improved to normal, a buoyant tourism industry, increased production of garments and goods as well as favourable economic conditions abroad. The 2000 contraction is broad based with severe falls in tourism, construction, garments, and wholesale and retail trade.

Merchandise exports for 1999 rose by 0.2% compared to the previous year after deducting one-time re-export earnings for an aircraft. Prospects for exports in 2000 and beyond are not bright due to events surrounding the coup of May 19 and trade sanctions. Merchandise imports for 1999 rose by 5% compared to the previous year on the back of increases of mineral fuel, machinery and transport equipment. For 2000, it is expected that imports will fall. The trade deficit narrowed by 38% in 1999 from the figure in 1998, because the growth of merchandise exports (13.8%) significantly outweighed the growth of merchandise imports (6.1%). In 1999, the merchandise trade balance was in deficit by US$ 119.6 million.

In 1999, net services trade credit, mostly driven by tourism, rose by almost 3% to US$ 158 million. By August 2000, however, visitor arrivals had decreased by 60% over the pervious year and prospects for the sector looked gloomy for 2000 and the next year.

The current account balance for 1999 was in surplus by US$ 27.8 million as net services outweighed the trade balance deficit. The surplus was 2% of total GDP for 1999. This compared favourably with the current account deficit of around 0.4% of GDP in 1998. Foreign exchange reserves at the end of 1999 were at a comfortable level of US $ 827 million, adequate to cover 4.8 months of imports of goods and non-factor services. The current account balance for 2000 will be greatly affected by the imposition of trade sanctions and the renewal of various preferential trade agreements, particularly for the textile and footwear industry.

Investment in 1999 was estimated at 11% of GDP. This figure is much lower than the average investment rates for developing countries. A foreign direct investment outflow of US$ 69 million was recorded in 1999 for expenditure on equity investment, return of aircraft, and private and public sector loan repayments. This outflow comes on the heels of a foreign direct investment inflow in 1998 of US $ 70.4 million. It is expected that total investment will fall to as low as 8% of GDP in 2000. Major investment projects, such as hotel construction, have been placed on hold as a "wait and see" attitude has engulfed the business community.

Inflation fell in 1999 as the effects of the sharp 20% devaluation of the Fiji dollar subsided. The year-on-year inflation rate for December 1999 was 0.2%, down 8.3% from a year earlier (January1998-99). The lowered inflation rate was due to several factors, the most important of which were the excess capacity in the economy, moderate wage increases and reduction of duty on food products.

The impact of southwest Pacific economies on food security

Several features about food security in the southwest Pacific Islands can be learned from the study of their economies. The most obvious feature of the economies of the southwest Pacific is that they are structured to export high value agricultural products, manufactures and mineral products and import low value agricultural food products in the form of grains (wheat and rice) and capital goods. For instance, in 1997 the Solomon Islands exported SI$ 129.8 million in fish products, SI$ 290.6 million in timber products, and SI$ 142 million in copra, palm oil, palm kernels, cocoa, coconut oil and marine shells. In the same year it imported SI$ 94.9 million in food, SI$ 59 million in mineral fuels, SI$ 33.6 million in chemicals, SI$ 138 million in manufactured goods, SI$ 258 million in machinery and transport equipment and, SI$ 67.5 million in miscellaneous manufactured articles. Food imports accounted for 13.8% of total imports. This figure can be compared to 1980 when food composed 10.7% of total imports at a time of lower population. In effect, the trade-off of high value products for low value food has proved to be a successful way of expanding the food supply for the Solomon Islands and, as we have seen, for the other countries of the southwest Pacific. The success of this trade contributes to the view of experts on food supply that there are no problems on food availability for these countries, except when shortages are due to drought, cyclone, earthquake and tsunami (UN 1999).

A second feature of the economies is that the structure of the economy can finance the import of food grains with funds to spare for capital imports, even when the economy is less than dynamic. Data indicate that the economies of the southwest Pacific do not have a pattern of sustainable expansion over the past decade. Rather they are affected by external shocks that collapse and expand their GDP. It seems as if these countries float just above the budget water line, financing their way through difficulties by exports, remittances, loans and aid. In this economic environment, imported food grains have already become a permanent fixture in the diet of the people, financed by the current and capital account of the balance of payments. These grains augment the traditional root crops of these countries while adding nourishment to people's diets. It should be noted that no evidence is available suggesting that the availability of imported grains affects the production of traditional crops. Indeed, FAO forecasts suggest that the production of total roots and tubers for Papua New Guinea in 1995 were slightly above the average production in 1989-91 (Papua New Guinea Country Paper 1999).

The third feature that can be noted about the southwest Pacific economies is their small size and openness. With small size and openness, however, come external shocks that can heavily impact on these economies. For instance, the Asian crisis impacted on all of the economies in 1997 by collapsing demand for their products and sent each one of them into a recession until 1999 or 2000. Decreasing prices of their agricultural products, such as the current collapse in the world market price of copra, is another example where global economic changes impact on these economies. The recent increase in oil prices drains revenue from the countries. Weather pattern changes reflected in the El Nino/La Nina phenomenon brought drought in 1997 to these countries, which resulted in economic downturns in each and every one of them.

Food security in the southwest Pacific countries, however, seems to be unaffected by the vagaries of the global market system. As noted above, their GDP, although not strong, weathers the economic storms and allows financing of food grain imports to augment existing supplies of traditional crops. The size and openness of the countries of the southwest Pacific, however, indirectly affect food security through curtailing the inflow of investment capital, often called foreign direct investment. The small size and openness of these economies is reflected in high costs for domestic factors of production. High costs are also promoted by the remote location of the economies from major markets, the oligopolistic nature of small markets, and the relatively few modern skills that the people possess. High cost, small market size, and openness that increases external threat risks, curtail the flow of foreign direct investment into these countries. The effect on food supply is seen in a complex system where limited investment cannot create enough employment for workers entering the urban workforce. This situation has the potential to skew the distribution of food to urban dwellers away from those who are partially or fully unemployed. The problem of food security lies not with the import or availability of food but in its maldistribution in urban areas due to the nature of the countries themselves that curtails the growth of jobs that support a more equal distribution of food.

Conclusion

Food security issues are generally analyzed these days in terms of amelioration of acute shortages and access to food supplies, a practice that is followed below.

Amelioration of acute food shortages

Acute shortages of food in southwest Pacific countries are due to catastrophic circumstances, usually caused by cyclones, drought or earthquake. Development or improvement of food distribution systems that can move food supplies quickly to distressed areas is the usual prescription for ameliorating the crisis. The current view is to decentralize the food distribution systems to the village level. Preparation for disaster would, then, extend from supply centers to villages and would be supported by local mobilization and preparation. In this scheme, food distribution systems are supported by development of gene banks that can quickly re-supply seeds and seedlings to effected areas to re-start a new round of agricultural activity after the food shortages are ameliorated. These systems are well known and well described in many FAO publications and deal more with management and organization than economics (FAO 1999; Ti 2000).

Access to food supplies

As we have seen, there is no problem of food availability in the countries of southwest Pacific. The economies of these countries function efficiently to export high valued products and import low valued grains, leaving a good proportion of the net value of exports to purchase capital imports. In addition, there is no evidence that production of traditional root and tuber crops has fallen as a result of grain imports. Global markets, it may be said, are effective in supporting food availability and security to the countries of the southwest Pacific.

Unlike the effectiveness of global markets for providing food availability and security, global capital markets are unfavourable to inflows of investment and the creation of jobs, through which urban workers purchase food. The unfavourable flow of investment to the countries of the southwest Pacific is due primarily to high costs, small markets, and excessive risks associated with these economies. In effect, investors do not view these economies as sound competitors for investment funds, except perhaps for investment in exploitive industries

(logging, mining) and tourism (hotels and recreation). Industries and jobs, then, are not created and as time goes on these countries' relative competitiveness for investment is further reduced. In this harsh economic environment accompanied by increasing migration to urban areas, unemployed workers are created, workers whose access to food is limited by their limited purchasing power. Urban incomes become skewed, favouring those who have jobs and income and disfavouring those who are partially employed or unemployed. Evidence suggests that the urban unemployed workers in the countries of the southwest Pacific are growing. For instance, a recent unpublished World Bank report on the Pacific indicates that the growth of economically active population exceeds the growth of formal wage employment by a ratio of nearly 8:1 in the Solomon Islands and 6:1 in Fiji. The urban economy of Vanuatu generates only 500 new formal sector jobs for the additional 3,000 urban migrants each year.

Few options are available to policy makers for improving food availability and security for the urban unemployed worker. One option, which gives flexibility to policy makers in the southwest Pacific, is to allow the unemployed worker to become discouraged and return to the rural areas. The migration of people from and to rural areas is a common pattern in the countries of southwest Pacific. Another option, which seems to have been rejected by the policy makers of the southwest Pacific, due to its exorbitant costs, is to create a dole for unemployed workers. More aggressive and sound options fall directly on the shoulders of government and are related to (a) stimulating business, especially small businesses that create relatively more jobs, (b) improving fiscal and monetary policies, and (c) stopping corruption, nepotism and cronyism. Above all, governments of the southwest Pacific must come to the realization that only limited investment (foreign direct investment) will be available to them to create or improve industries and create jobs. Government, then, must find new ways to stimulate development, mindful of the constraints imposed by limited investment availabilities.*

The subject matter of food security has expanded with each passing decade since the 1970s. Modern food security studies started in the 1970s as a response to the potential collapse of grain stocks particularly in the United States, which, in fact, did not happen. In the 1980s the subject matter of food security expanded to encompass agricultural production and improvement. By the 1990s its subject matter had transmogrified to envelop general development, including distribution of food grains to all groups within a country. With each expansion of food security's subject matter, there was a concomitant loss in the ability to tackle problems associated with the unavailability of food for people. This situation is highlighted in this report where amelioration of acute food shortages due to adverse circumstances is related to mobilization and management of the distribution of food to distressed areas. It is also highlighted in the need to develop and use economic instruments, such as fiscal and monetary policy, that fall outside the parameters of food security specialists. Perhaps a reassessment is warranted that would return food security to simpler themes, where practical projects focusing on food availability could be implemented.

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* One such employment generating, but low investment cost opportunity, is the creation of back offices that are linked to corporations by telecommunications and function as throughput offices for accounting, customer services, data processing and so forth. The development of back offices requires active support from government to stimulate education and technical skill programmes that output workers who can be employed by them.

References

FAO. 1999. Report of the Seminar on the Follow-up to the World Food Summit: Sharing information and experiences among Pacific Island Countries in Translating the World Food Summit Plan of Action into national plans of action, FAO Sub-regional Office for the Pacific Islands (Samoa), 6-9 April 1999.

Papua New Guinea Country Paper. 1999. Assessment of the food security situation, policies, strategies and plan of action at country level, Papua New Guinea country paper. Paper read at the Seminar on follow-up to world food summit: Sharing information and experience among Pacific Island countries in translating the WFS plan of action into national plans of action (Samoa, 6-9 April, 1999).

Reserve Bank of Vanuatu. 2000. Quarterly Economic Review, June 2000.

Ti, T.C. 2000. Strengthening of national capacity for emergency disaster preparedness and mitigation in agriculture, FAO Regional Office for Asia and the Pacific (Bangkok), 27 February-11 March 2000

UN Department for Economic and Social Affairs. 1999. Disasters and Agriculture in the Pacific Islands, New York, September 1999.

Vanuatu Country Paper. 2000. Food security strategies for selected South Pacific island countries. Paper read at the Regional Workshop on Food Security in the Southwest Pacific Island Countries, 12-13 December 2000, Sydney, Australia.

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Food Security Strategies for the Republic of Fiji

Hiagi M. Foraete[*]

Introduction

The Republic of Fiji consists of some 320 islands, located between 15 and 22 degrees south latitude and 177 west to 175 east latitude with a total land area of 18,376 square kilometres and a 1996 Census population of 772,655 where 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.

In 1996, about 54% of the total population lived in rural areas, which showed a decline of 5% (23,826) compared to 1986. The Indian component of the rural population showed the greatest decline as a result of urbanisation and emigration.

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.

Unemployment is estimated at 6% for 1996. Nearly 80% of the work force has been educated to secondary school level and 4% through to tertiary training at an academic or specialist skill level.

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 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, deregulated approach with less direct government involvement.

The last 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.

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 of attaining self-sufficiency is like putting all the eggs in one basket, because in case of any natural disaster, crops of a country can be ruined.

Fiji and other South Pacific countries have a lot of things in common. We share the same tropical climate, we have limited resources (except PNG) and agriculture in general is the backbone of our economies.

Furthermore, our traditional cropping system is very much village or subsistence based, and we grow and cultivate virtually the same crops e.g. taro, kava, coconuts, breadfruits, banana etc. primarily for home consumption.

Fiji has the advantages of a tropical climate without undue extremes of temperature and humidity. The cooling south-east trade winds blow from May to November, the driest period of the year. Between December to April, it is hotter, the winds are more variable and temperatures may rise to about 32o C, with relatively high humidity.

[*] Principal Agricultural Officer Central, Extension Division, Ministry of Agriculture, Fisheries and Forests, Fiji.

Fiji's current food security status

Food Security as defined by the Food and Agriculture Organisation 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 meets their diet needs and food preference 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 Fiji to make this a reality its people must first fullfil 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 with low incomes.

A much higher proportion of the population now live in urban areas (46%) than ten years ago (38%).

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

An increase in marketable food surplus is required to feed Fiji's increasingly urbanised population and Fiji's farming community responded to this need. Fiji's farmers produce an impressive quantity and range of traditional food crops. Traditional food crops are grown throughout the country and were known as the "hidden strength of the Fiji economy". The nations food security is dependent on the continuation of subsistence farming and its on-going transformation to semi commercial farming of crops for which Fiji has a competitive advantage. Until 50 years ago most of the population had sufficient quantities of their traditional foods. The Fijian people had excellent systems for ensuring a sufficient supply of nutritious food.

Fiji's farmers produce an impressive quantity and range of traditional food crops. These include a wide range of root crops, coconuts, traditional rice varieties, leafy vegetables (both Fijian and Indian), other traditional Indian vegetables, and fruits.

In addition a significant volume of the production of traditional crops is surplus to subsistence requirements and sold. For example based on the Agricultural Census, it is estimated that 120,000 tons of root crops are traded for a farm gate value of $F 60 million.

Fiji's level of food imports remains comparatively low suggesting that domestic food supply has been able to expand with rising demand from the increasingly urbanized population. Some features of domestic food supply are:

- In 1996, a total of 3,011 kilocalories were available per capita per day. This represented an increase of 2.4% from the previous year, which was 2,939 kilocalories.
- Calories from imported foods increased from 57% in 1995 to 58% in 1996.
- Root crop availability has reversed the declining trend observed in the past decade to an increasing trend, which has continued from 1993.
- Nuts and oil seeds showed an increase in availability after an improvement in the market price for copra.
- Oil and fat, both vegetable and animal, have shown increasing tends since 1994. This was a result of increasing production of coconut oil.

While ill health caused by poor nutrition has always been present amongst the Indo-Fijian population, over the years there has been very little improvement. However, there is now concern over the rapid rate of increase of these diseases amongst Fijians.

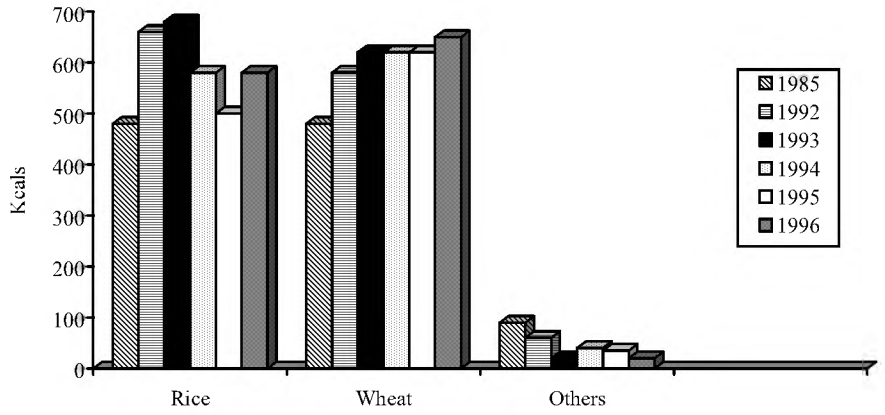
A brief summary of findings from each major food group is discussed below and compared to the previous year's findings.

Cereals

Availability of cereals for consumption per capita per year increased slightly from 124 kg in 1995 to 125 kg in 1996 (Figure 1). This was a direct result of an increase in rice imports from 24,000 mt in 1995 to about 26,000 mt in 1996. On the other hand, its sharp declining trend continued from 7,902 mt in 1993 to 4,941 mt in 1996, was not enough to offset the total increase in calorie availability from cereals.

Calorie availability in cereals increased from 1,224 kcals in 1995 to 1,234 kcals in 1996. Overall, cereals contributed 41% (compared to 42% in the previous year/capita) to the 3,011 total kilocalories available in 1996 and remained the major contributor of food energy in the diet.

Figure 1 Availability of calories from different cereals: 1985-1996.

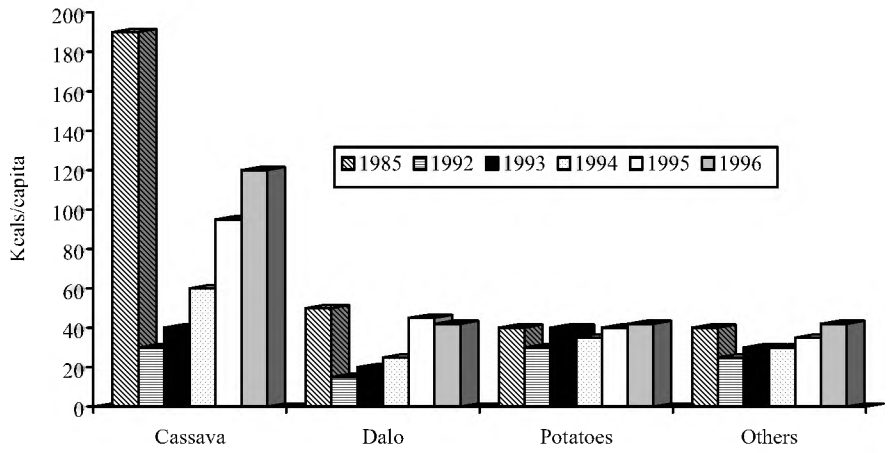


Roots

Per capita availability of root crops increased sharply to 98 kg in 1996 from 75 kg in 1995 (Figure 2). As a result, an increase of 31% in kilocalories obtained from root crops was recorded, from 193 kcals in 1995 to 252 kcals in 1996. This is the highest increase recorded for root crops in the past four years. Such an increase can be attributed to the outcome of the strong drive by MAFF to increase planting of root crops to meet the demand both in the local and the established export markets overseas. The change in agriculture policy from subsistence to a more cash oriented enterprise may have also contributed to this increase in root crop production in Fiji.

In spite of these recorded increases in production, absolute amounts remain well below the amounts that were available eleven years ago. Thus, there is still a marked dependence on cereals as a source of calories: 316 kcals was obtained from root crops in 1985 compared to 252 kcals in 1996. The observed shift in consumption pattern from traditional root crops to a cereal - based diet may be due to changing consumer preference (based on the economics and convenience of cereals).

Figure 2 Sources of calories from rootcrops: 1985-1996.



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.

Pulses

A slight increase in imports of pulses contributed to the increase in consumption level from 73 kcals in 1995 to 79 kcals in 1996. Pulses especially dhal, are widely used as part of the diet for Fiji families not only in urban areas but also in rural parts of the country.

Nuts and oil seeds

Coconut production increased from 69,313 mt in 1995 to 86,940 mt in 1996. This is the second and highest increase recorded in the past four years and may be attributed to the increase in prices of copra during this period. Other nuts, however, recorded slight increases in local production (peanuts) and imports.

It is important to note that 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.

Vegetables

In the past two years, extension efforts have been made to increase off-season vegetable production, but there has been slow adoption of the required technology. Calories available from vegetables in 1996 remained at almost the same level as in 1995.

Fruits

The extension division of the Ministry of Agriculture has been focussing on increasing fruit production such as pawpaw and pineapple for export markets. Fruits available for local consumption increased from 20 kcals in 1995 to 25 kcals in 1996.

Alcoholic beverages

This year, alcoholic beverages saw their first increase in calories availability since 1992. This was a direct result of an increase in beer production, which had reported a declining trend in the past three years.

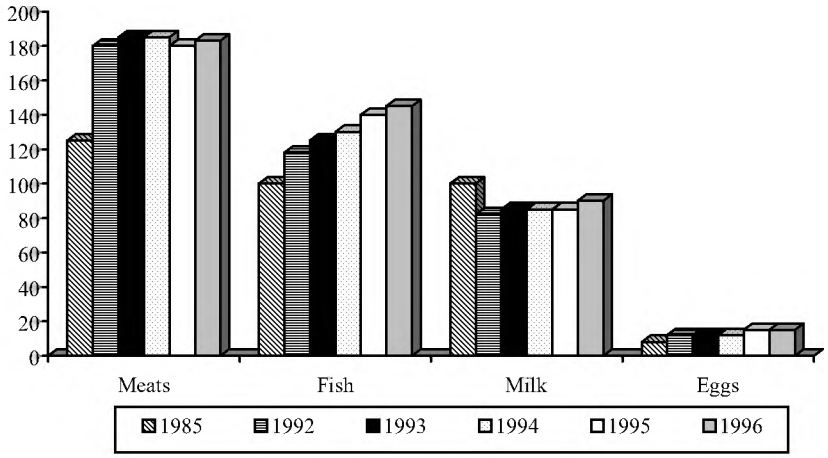
Meats

Consumption of meat and meat products slightly increased in 1996, from 173 kcals in 1995 to 175 kcals in 1996 (Figure 3). Protein availability in meats slightly increased from 11 g in 1995 to 12 g in 1996.

Performance of our local beef industry showed some signs of recovery during the year after a decline for over a decade. An increase in price of sheep meat due to the decline in the importation of lamb/mutton made it more attractive for consumers to increase their beef consumption. For the third year in a row, the level of imports for mutton and lamb declined from 10,381 mt in 1995 to 9,550 mt in 1996. This was largely attributed to the increase in price overseas, which made other types of meat particularly locally produced beef and poultry very competitive.

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

Figure 3 Availability of calories from animal protein: 1985-1996.



Milk

Availability of dairy products increased from 79 kcals in 1995 to 84 kcals in 1996. This increase was mainly contributed by an increase in imports of powdered milk from 2,645 mt in 1995 to 2,900 mt in 1996.

Eggs

The level of egg supply in 1996 virtually stabilised compared to 1995. As a result, availability of calories from eggs remained at the same level as in 1995.

Fish and sea foods

An increase in calorie availability was recorded from 136 kcals in 1995 to 140 kcals in 1996. This increase was attributed to an increase in tinned fish production during the year.

Vegetable oil and fat

A 1.7% increase in the availability of vegetable oil and fat for human consumption was recorded from 290 kcals in 1995 to 295 kcals in 1996. The increase in this category was recorded for coconut oil production, which increased from 5,530 mt in 1995 to 6,154 mt in 1996.

Animal fat

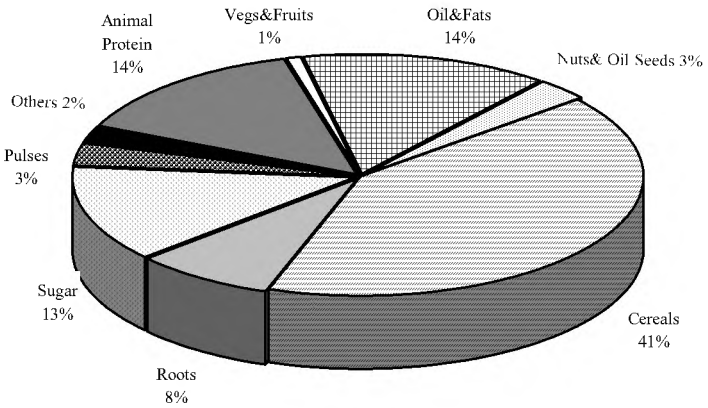
Availability of calories for this category increased from 124 kcals in 1995 to 130 kcals in 1996. This was the result of an increase in imports of ghee and ghee substitutes.

Availability of kilocalories from major food sources - 1996

Cereals continued to be the major contribution (41%) of kilocalories available per capita per day (Figure 4). This was followed by animal protein, oils and fats with 14% each, sugar at 13%, while root crops and other food groups each contributing 8% or less to the total kilocalories available.

The situation is very similar (especially for cereals and root crops) to what was observed in the past three years, but there is a marked shift in consumption pattern when compared with the situation in 1985 (Figure 5). In that year, cereals contributed 39% while root crops contributed 11% to the total kilocalories available.

Figure 4 Availability of dietary calories – 1996.

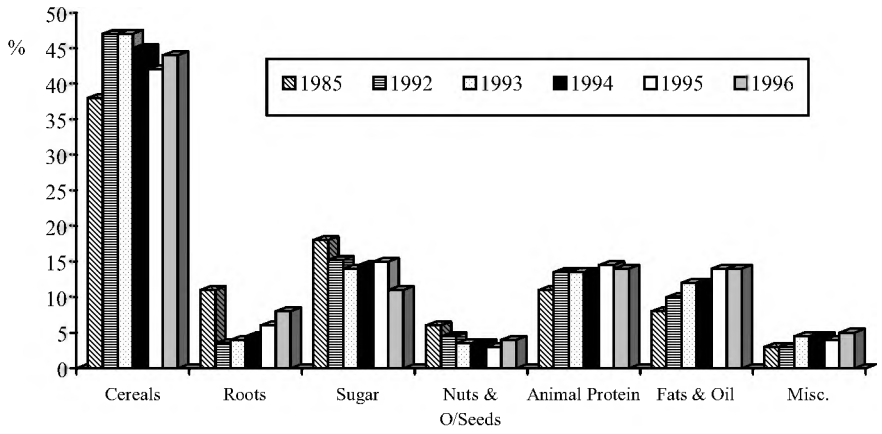


Total nutrient availability

Total daily per capita energy availability has shown a steady increase over the past decade at a rate of approximately 10 kcal annually reaching a new peak of 3,011 kcal in 1996. This is 783 kcals 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 urbanisation and number of pregnancies within Fiji's population.

The contribution of specific macronutrients towards total energy supply has also undergone changes during the period of observation. Generally the contribution of each macronutrient is within the broad population nutrient goals recommended by WHO. 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 10 years. The significant over-supply of dietary energy as well as qualitative changes in the energy contribution of specific nutrients may help to explain the rapidly rising incidence of non-communicable diseases in Fiji.

Figure 5 Percentage of total calories contributed by major food groups: 1985 - 1996.



Fiji as a small island economy faces obstacles in the 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 is 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 nutritional, traditional foods. Fiji's appropriate long-term agricultural strategy should be focused on minimising the disadvantages of size and isolation and maximising the advantages of Fiji's 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 location 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.

Aim of the report

The objective of the project is to assess food security problems in Fiji, identify effective strategies and formulate appropriate policy options for solving the respective problems. This will be broken down as follows:

- To analyse food availability and its related risks, distribution institutions, uses, commodity balance aids, related strategies and policies at the national level.
- To analyse household food availability, access, consumption pattern, nutritional quality and sufficiency, risks and related government policies.
- To identify strategies and formulate policy options to improve food security in the Republic of Fiji Islands.

Methodologies

The output from this research and study are a review of relevant previous studies and analysis of government development policies and strategies.

Ministry and institutional action plans, information/data from surveys and census were reviewed and the impacts on the status of food security at the National and household levels were estimated to facilitate the identification of problems and improve the food security status in Fiji.

The Food Balance Sheet for Fiji has been one of the major sources of information and data in Fiji's current status on food security. Most of the statistics used in the compilation of FBS are from official government publications and reports. In instances where there are no official statistics available, efforts were made to collect data from other sources eg. the producer or distributor of a particular food or food product. Otherwise, no data are recorded for that particular commodity.

The Ministry of Agriculture, Fisheries and Forests supplied most data on local food production. Data were supplied for all agricultural commodities included in the FBS. It should be noted that data from MAFF only include commercial production, and exclude subsistence production data. The Bureau of Statistics also supplied some data for locally manufactured food products. Efforts to collect data from private sectors such as food producers, exporters, importers and re-exporters failed.

Trade figures were collected from Bureau of Statistics annual trade reports available in their office.

Method of FBS compilation

Compilation of data based on computerised FAO standard FBS worksheet using Microsoft Excel software 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.

Methods of compiling each worksheet column and definitions for relevant terms used in the calculations are given below:

(a) The Local Food Production figure added to the Gross Imports (I) minus Gross Exports (E) plus or minus change in stock (CS) gives Total Available Food Supply (TAFS).

$$[P + I \pm CS - E = TAFS]$$

Where:

P = Production
All food production including estimates of home produced food supplies are defined as production but in this report subsistence data on production are excluded.

I = Imports, E = Exports
Gross exports includes 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 or others.

CS = Change in Stock
Stocks are of considerable importance in estimating the available food supply since the total supply can be influenced by stock. Stocks include all food in storage including that in warehouses and that awaiting exports. Stocks for sugar is calculated from the FSC Annual Report. 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 (-).

TAFS = Total Available Food Supply
Total supply represents the quantity of food available to the country for consumption and other non-food uses.

(b) Total Available Food Supply (TAFS) minus Animal Feed (AF), Seed (S), Manufacture (M) and Waste (W) gives Total Gross Food (GF).

[TAFS-AF-S-M-W = GF]

Where:

AF = Animal Feed
Feed identifies the quantity of agricultural products, which are usable as food but fed to livestock.

S = Seed
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.

M = Manufacture
This includes: (i) all foods that are used for the manufacture of products such as vegetable oils for paints, (ii) some that may be used to produce other food products which 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.

W = Waste
Waste includes all quantities of foods lost from the first stage of production up to the stage when the food reaches the kitchen.

GF = Gross Food
Gross Food is simply the residual of the available food supply after accounting for feed, seed, manufacturing of non-food products and waste.

The estimate of gross food represents the quantity available to the population before the primary food commodities are processed into edible food products.

(c) Gross Food (GF) minus Extraction Rate (ER) gives Net Food (NF).

[GF – ER = NF]

Where:

ER = Extraction Rate
The extraction rate is the ratio of specific processed products to the primary product from which they originated. The ER reflects the rate at which the commodities are converted through processing to processed food and food by-products.

NF = Net Food
Net food is the actual quantity of food directly available to the country for human consumption.

(d) Net food (NF) in metric tons multiplied by 1,000kg divided by the mid year population (derived from BOS) gives per capita supply per year in kilograms (PCS).

[NF x 1,000/Population = PCS in kilograms]

Where:

PCS = Per Capita Consumption
Per Capita consumption indicates the national average per capita supply of foodstuffs available, in kilograms per year and grams per day. It does not necessarily correspond to the quantities of food people actually eat. The reliability of the figures depends on the accuracy of the figures on production, stocks, population and extraction rates.

(e) Per Capita Supply in kilograms per year (PCS) divided by 365 days multiplied by 1,000 g gives per capita supply in grams per day (PCS).

[PCS in Kg per yr/365 days x 1,000g = PCS of grams/day]

(f) Daily Per Capita Supply in Calories, Protein and Fat are calculated as follows:

Calories: Per Capita supply of grams (gm) per day multiplied by FAO FCT value for calories for that particular food item divided by 100g (FCT value are given per 100gm) gives the per capita supply of calories per day.

[(Gm/day * FAO FCT Value)/100 = Calories/Day]

Protein: Per Capita Supply of grams per day multiplied by FAO FCT value for protein for that particular food item divided by 1,000 milligram (mg) [to change mg to gm] gives the per capita supply of protein per day.

[(Gm/day * FAO FCT Value)/1,000 = Protein/Day]

Fat: Per Capita Supply of grams per day multiplied by FAO FCT value for fat for that particular food item divided by 1,000 milligram (mg) [to change mg to gm] gives the per capita supply of fat per day.

[(Gm/day * FAO FCT Value)/1,000 = Fat/Day]

(g) Percentages of calories, protein and fat imported were then calculated for each sub-food group by the following steps:

[i] determine the percentage of food imported from food availability. This is done by taking imports (I) divided by total food available (TFA) then multiplied by 100.

[X = (I/TFA)*100]

Where:

X	=	PERCENTAGE OF FOOD IMPORTS
I	=	Imports
TFA	=	Total food Available

[ii] use the percentage calculated above to find out the actual amount of calories, protein and fat imported for each food. This is done by multiplying the percentage of food imported with the amount of calories (or protein or fat) per day then dividing by 100.

[Y = (X*C)/100]

Where:

Y	=	Amount of calories (or protein or fat) Imported for each food
C	=	Calories (or protein or fat)

[iii] finally, find out what percentage of calories, protein and fat is imported. This is done by taking the total amount of calories, protein and fat imported divided by the total calories, protein and fat then multiplied by 100. This is done for each food sub-group.

$[Z=(\sum Y/\sum C)*100]$

Where:

Z	=	Percentage of total calories, protein and fat imported
Y	=	Sum of calories (or protein or fat) imported
C	=	Sum of total calories (or protein or fat) for each sub-food group.

Findings

Population growth

According to the 1996 Census, the estimated population at 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 live in rural areas.

The Fijian population increased at an average annual rate of 1.8% over the ten years from 1986 to 1996 compared to a rate of 2.4% over the previous decade. The Indian population grew at an average annual rate of 1.8% over the ten years from 1976 to 1986 and then declined by negative 0.4% per annum from 1986 to 1996, due mainly to emigration and a lower rate of natural increase.

Fiji's population in 2001 is projected to reach 821,000. This increase will represent an average annual growth of just under 1% when emigration is taken into account. The increasing density of the urban population and extensions of urban boundaries have contributed to an overall increase in the urban population between 1996 by 29%. The urban population in 1986 was 277,025 or 39% of the total population and in 1996 the number was 358,131 or 46% of the total population. Almost 50% of the total increase in the urban population occurred in the Central Division. The Fijian urban population grew by 4%, more rapidly than the Indians (1%) and other ethnic groups (2%).

The total rural population declined by 23,826 or about 5% in 1996 compared to 1986. The Indian component of the rural population showed the greatest decline as a result of urbanisation and emigration.

The Central and the Western Divisions account for about 38% each or a combined 76% of the total population.

Poverty

Fiji has a relatively high Human Development Index of .863 (1997) and life expectancy at birth of 71.8 years. The parameters, which are by far the highest in the South Pacific, indicate a general absence of hunger and under-nutrition. 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. Differences exist between area and ethnic group, but food poverty is a problem for some people

in all places. According to the NFNC in 1980 malnutrition severely affected 6% of children and moderately affected a further 21%. The situation has, however, been improving. By 1993 there was a significant decline with only 1% of children severely malnourished. Anaemia remains a major public health problem affecting 40% of young children and 30% of women. It is particularly prevalent in urban areas and is associated with the lack of dietary intake of iron.

Poverty is not concentrated in rural or urban areas nor in any ethnic group. It is an undercurrent in all communities in Fiji. Poverty is more than just a matter of incomes and expenditures and studies have provided information about non market factors which constitute the coping strategies of the disadvantaged. These many sources consistently pointed 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 agricultural and subsistence oriented, 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.

Health status

It is firstly of interest to note that survey conducted in 1950 on the State of Nutrition of Fijians and Indians in Fiji found no evidence of widespread anaemia in the country and made no reference to a problem of obesity or the incidence of diabetes or other non-communicable diseases. The nutrition situation in recent years is very different. The first National Nutrition Survey (NNS) in 1980, identified problems of infant malnutrition, underweight children, anaemia, and overweight adults leading to heart disease and diabetes. Findings from the 1993 NNS indicated that in spite of many health programmes directed at prevention, these health conditions have not improved.

The 1993 NNS found that only 40% of the population had "healthy" weights. Obesity, was found to be a serious health problem amongst women of both races from 35 years of age onwards. Obesity is a major risk factor for coronary heart disease and maturity onset diabetes, and is associated with both the diet and lifestyle.

About 10.5% of children under 5 years and 16.3% of children between 5 and 9 years are underweight for their age. However, some children under 5 years are overweight, predominantly in 'Fijians' and 'Others'. 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 non-communicable diseases.

Anaemia was found in 27% of the population. The rate amongst children under 5 years was 40%, adults 20% and pregnant women 57%.

Low birth weight is currently estimated at 11.4%, with Indo-Fijian babies accounting for 80.8%. Babies born with low birth weights are susceptible to a host of childhood diseases, and are at risk for growth failure.

Acute respiratory infection remains the commonest cause of morbidity and mortality in children under 5 years of age, 30-50% of visits to health facilities and 20-40% of hospitalisation of children nation-wide.

Diarrhoeal diseases are responsible for 14% of all childhood deaths and 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 school children found that 45% of those studied suffer from the condition, and it was more common among Indo-Fijian women.

Ischaemic heart disease and high blood pressure caused 41% of all Indo-Fijian and 28% of Fijian deaths in 1990. Between 1982-1990 death rates in people over 20 years of age increased by 30% in Fijians and 40% in Indo-Fijians. High blood pressure is more common in urban populations, for both groups.

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

However, the 1993 National Nutrition Survey showed some positive trends that impact on nutritional status. A significant proportion of rural as well as urban families have 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 first day of birth. It is of concern though that after 3 months, only 47% of mothers were still breast feeding, and for children aged 12 to 17 months only 27% were breast-fed. Also 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 non-communicable diseases and nutrient deficiency diseases has been the change to a poorer quality diet and more modern lifestyle than previously experienced in the traditional way of life.

Results of a longitudinal study at Naduri Village in the Sigatoka Valley indicate a marked decrease in the consumption of root crops between 1952 to 1994. Whereas root crops contributed 61% of energy in the diet in 1952, this 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 5% dietary energy contribution in 1952 to 26% in 1994.

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

Import/export and local food production

Fiji's trade by commodity in 1996 showed that food items made up to 63% of the total exports.

The total export value generated from the CDF commodity for the year was estimated to be $ 295m, showing an estimated increase in revenue of $ 185 million when compared to 1997 export value figures. The fisheries sector contributed 61% of the total export revenue generated from the CDF commodities. Export value generated from yaqona showed a significant increase of $ 35.7 million compared to 1997.

In 1996 the nation's food imports made up to 15% of the total national imports which included rice, maize, sorghum, dairy products, beef products, poultry, meat and pigs.

Market Infrastructure and marketing

The fresh produce 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. 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 may become 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. 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.

The Fiji Plan of Actin for Nutrition proposes an investigation of how to strengthen production and marketing co-operatives for local food produce as a means of encouraging and supporting community based food production enterprises.

Farmers are becoming more market oriented in supplying domestic markets for roots and tubers, horticultural produce and other foods. However, it was widely recognised that production remains a major constraint. Supplies are inadequate, prices are high and production tends to be 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, countries the value of agricultural production for export far exceeds that of produce sold on the domestic market, although it does not exceed the value of produce consumed domestically as subsistence production remains very important in Fiji.

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 demand is a major problem for farmers seeking to increase production and this is exacerbated by high marketing costs and by poor infrastructure, which causes significant post-harvest losses. 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 necessary economies of scale.

Policy and strategies

In the late 1980s and early in the millennium there were major political and economic upheavals following the coups of 1987. The political adjustment process 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, deregulated approach with less direct government involvement. Large currency depreciations significantly improved the terms of trade in favour of locally grown food. There were restrictions on nominal wage movements and the promotion of a tax free factory scheme (TFF).

After decades of protection and government led investment projects, the private sector has grown dependent on government. Farming had been, and largely still is driven by the need for food (subsistence), or in response to government direction. During the last decade circumstances have changed, and this has led to a growing awareness within government of the importance of facilitating rather than directing the growth of the sector. Starting in 1989, the agriculture sector became a part of the national policy of deregulation.

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 government to continue to assume a direct leadership role and dependency on government remains pervasive. The private sector is finding itself suddenly faced, sometimes

with reluctance, with unfamiliar responsibilities – 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 rises funds for industry support. Deregulation means that the private sector (farmers, processors and exporters) has to lead the way, and set the course for the sector (which crops, which markets). The role of government, and its ancillary organisations such as the Development Bank, is still very important. It is to facilitate the private sector's efforts, 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 overseeing their enforcement, facilitating the development and transfer of appropriate technologies, providing access to credit for viable projects, and maintaining a stable economic environment. The process of change is still taking place and there have been reversals, such as a recent decision to purchase (government guarantee) a large tract of land at Navua near Suva to be run as a commercial youth training farm by a government corporation. However, the continued transition to private sector led development is central to the future success of the sector.

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 taro 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 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.

National food security should be a priority objective for any nation. However, complete self sufficiency in food is unlikely to be an achievable or a desirable objective particularly when faced with inevitable urbanisation. For Fiji increasing food imports should not necessarily be seen as a bad thing from a food security viewpoint. Increasing food imports are an inevitable consequence of agricultural and economic transition.

Attempts to maintain national food security via protectionist policies to encourage self sufficiency in food for which the country does not have comparative advantage have proven to be ineffective and costly and often counter productive in terms of food security.

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

1. Enhancing quality and consistency of supply
   - Support for industry directed extension efforts.
   - Legislation to support industry determined and enforced quality standards.
   - Full commitment for bilateral quarantine agreements.

2. Safeguarding and commercially exploiting Fiji's favourable quarantine status
   - Strengthening of MAFF quarantine.
   - Reducing the incidence of smuggling plant and animal material through increased surveillance and education programs.
   - Ensuring the ongoing sustainability of the SPRFFP.
   - Gaining maximum commercial advantage from SPRFFP and the HTFA facility.

3. Ensuring and commercially capitalising on environmental sustainability
   - Concerted educational programs on the negative consequences of burning.

- Enforcement of existing laws and regulations relating to environmental protection.
- Creating awareness of the adverse consequences of the excessive use of chemicals.
- Ensuring and commercially capitalising on environmental sustainability.

4. Improving export market access
   - Proactive approach by government in negotiating quarantine agreements with importing countries.
   - Reasonable (not subsidised) freight rates by Air Pacific, particularly to Japan.
   - Improved trade representation in overseas missions.
   - Development of export insurance coverage.

5. Encouraging the continued transformation of subsistence to commercial farming
   - Improvement in road access.
   - Education in the value of growing and eating traditional foods.
   - Encouragement of small markets in urban and peri-urban areas.

6. Revitalisation of agricultural research and access to technology
   - Corporatization of MAFF Research Division.
   - Making available food technology and other specialist expertise for industry.
   - Public funding of non-government research.

7. Rationalising and focusing extension efforts
   - Extension support for quarantine efforts.
   - Supporting industry associations and nucleus processors and exporters
   - An emphasis on on-farm demonstrations.
   - Provision of organic agriculture SMS.

8. Improving supply and effectiveness of credit
   - FDB to review outlook and polices for agricultural lending.
   - FDB to be more proactive in discussions with industry at senior levels. Utilisation of proven exporters, processors, and management companies to resolve working capital constraint.
   - Support for development of informal credit sector.

9. Public investment in critical infrastructure
   - Savusavu port and further strategic road development.

10. Support for industry organisations
    - Facilitate the establishment of industry organisations.
    - Legislation to allow industry self management.

11. Attracting investment in agriculture
    - Promotion of the incentives available to the agricultural sector.
    - Implementation of an Investment Act.
    - Promotion of horticultural agro processing export opportunities to overseas investors.
12. Promoting farming as a business
    - Utilising distance education programs via radio.

- As part of existing youth training programs
- As part of programs promoting Fijians in business.
- A focus of FCA on training commercial farmers and farm managers.

While responsibility for expanding the agriculture sector lies firmly with the private sector other agencies have important, and sometimes critical, supporting roles to play.

Land and land use

About 60% of the total land area is suited to some form of agricultural activity, but only 16% is suitable for sustained arable farming. Along with the 240% increase in area used for agriculture in the last 35 years there has been a considerable expansion into marginal and steep grass and forestry lands. As reported in the 1991 Agricultural Census 95,400 farms existed in Fiji covering 591,407 hectares an increase of 54% from 1978. In 1991, about 93% of farms were in rural areas and the remainder in peri-urban or rural-urban fringe areas.

Actual land use at the national level in 1991 was classified as follows:

- 39% or 230,881 ha as cultivated land (under temporary or permanent crops with fallow of <1 year. The major agricultural commodities include sugar, copra and coconut oil, cocoa, ginger and rice.
- 29% of 173,406 ha as pastures and grazing areas.
- The remaining 32% of 187,120 ha was classified as fallow of >1 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 allocated to housing and industry due to increases in population, especially the urban population.

In rural areas economic development has been largely devoted to cash crops for exports. Often land previously used for food gardens has been put under cash crops. For Fijian and Indian communities there has been an overall reduction in 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.

Risks and limiting factors to food security

The risks and limiting factors to food security include poverty, natural calamities, urban drift and change in diet.

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. 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 are without basic nutritious meals. Unemployment is estimated at 6% for 1996.

Cyclones are the most prominent and widespread natural disaster that afflicts Fiji. The main hurricane season is from November to March. However, major cyclones have occurred as early as October (Cyclone Oscar Fiji 1982). For the Fiji group 136 cyclones were recorded between 1880 and 1997.

River Flooding is a common disaster on the larger islands of Fiji. In Fiji severe incidences of river flooding are usually associated with cyclones. The most recent severe

flooding occurred with Cyclone Wally (1980) and Kina (1993). 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.

Farming on excessive slopes continues to cause serious soil erosion problems in traditional ginger/root crop areas and marginal sugar lands. Some of this land is now becoming obsolete in agriculture due to a combination of land degradation and economic pressures.

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. Most parts of the region experience a normal dry season drought (May to October) to which cropping patterns have fully adjusted to and depend on. However, in some years such as 1987 and 1992 the dry season can be very pronounced and extended, putting agricultural activities under severe pressure. The 1987 Fiji drought was considered to be one of the worst in the century beginning in the 1986 dry season and extending through the 1986/87 wet season. A particular compounding and increasing problem for the agricultural sector resulting from drought is uncontrolled fires. In the 1987, and 1992 droughts in Fiji were associated with El Nino episodes.

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.

There are environmental disasters that impact significantly on the agricultural sector in Fiji. These can be externally induced such as sea level rise, 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.

The increasing "rural to urban" migration is of considerable concern. According to the 1996 population figures the rural population has been declining over the last ten years by an annual average of 0.6% per annum.

The current food situation is typified by:

- Over dependence on imports to meet at least national nutritional needs.
- High cost of local root crops compared to imported processed cereals.
- Reduced production of local root crops.
- Increasing preference for cheap and convenient processed foods.

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 taste and preference 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 under nutrition for low income groups, and over nutrition for higher income groups, both of which lead to poor health.

Recommendations

Fiji stands at an important crossroad. It is faced with decisions that will determine the future growth and prosperity of the nation in terms of food security and standard of living for its people for the next 10 to 20 years.

The Government of the Republic of the Fiji Islands is firmly committed to the moral and philosophical principles of the World Food Summit Plan of Action, despite the change in government and recent political upheavals. The Government 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 budget of key Ministries towards the eradication of hunger and poverty in the rural areas.

The 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 potentials, and continuing the transition from subsistence to semi and commercial agriculture. Fiji's ability to meet this challenge is greatly enhanced by it's long term comparative advantage in the production of traditional food crops. If grown in the traditional manner, without chemicals and in rotation, these are highly sustainable activities.

Provided the issue of expiring land leases and resettling of displaced farmers from expired ALTA land leases can be satisfactorily resolved, a significant sector of the sugar industry and food production for the local and export markets can remain viable and achieve a high level of production in the future even at world and domestic market prices.

The Fiji economy has a very narrow 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 Fiji's economy, accounting for almost 43% of foreign exchange earnings. It provides nearly 50% of total employment and contributes 20% of Fiji's GDP.

Poverty

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 rate 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. However, with the increasing transition from an agrarian to an urban society, traditional support systems are weakening. Government has a long standing 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 increasing attention to encouraging business participation of indigenous Fijians.

Household food security

No household is any longer self sufficient in its food supply. Most rural households continue to produce their traditional foodstuffs, however, no household depends entirely on their own produce. The proportion of food items purchased for family meals is high, even in rural areas. Foods purchased are mainly non traditional items. Indian households have a higher dependency on purchased food as their staples are more labour intensive to produce.

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 of home gardening in urban areas in their project design.

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

(i) develop national objectives to encourage increased production and improved marketing of local food;

(ii) encourage the growing of sufficient food at the household level for family needs;

(iii) promote the selection of nutritious food to satisfy every household member's nutritional requirements;
(iv) assist families to secure sufficient income to ensure access to available food; and
(v) 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. There needs to be some positive programme of agriculture extension to support local producers of traditional crops and the growing of these crops in household gardens, especially at village level. Co-ordination between agricultural production and nutritional requirements will require some agreed definition of important concepts between MAFF and nutrition planners, eg. food security, self-sufficiency.

Traditional food production and post harvest issues

The post-harvest quality of local food crops should be improved by introducing simple food processing techniques at the village level and more effective marketing systems.

There is a need for the Extension Department in the MAFF to develop standardised practices for the promotion of sustainable food security.

Government considers agriculture as the priority sector for the creation of remunerative employment opportunities. The broad food security goal in the Mission Statement of MAFF should be translated into meaningful and practical programmes and activities to promote and improve national and household food security in Fiji.

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

Government can support traditional food crop development 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 dalo beetle on Viti Levu and the 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 planting of food crops as past roading 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 the NFNC can be very beneficial.
- Farmers need to be made fully aware of the devastating consequences of indiscriminate burning of food gardens waste. The rapid expansion in commercial taro production has brought with it unsustainable production practices which need to be addressed through education and in some cases through 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 programs currently being promoted by 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 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.

Human resource development

Fiji is fortunate to have received assistance for nutrition and health related projects and programmes from several donor countries such as Australia (AUSAID), Britain, Canada (Canada Fund), United States of America, European Community (EC); as well as from international organisations such as the United Nations Development Programme (UNDP), United Nations Childrens Fund (UNICEF), Food and Agriculture Organisation (FAO), World Health Organisation (WHO) and overseas volunteer groups. The assistance has been in the form of resources such as human, special technical and monetary. These have been invaluable. Many of the programmes and activities could not have been implemented without them. It is important that their support continues.

Future support may need to be rationalised. Assisting and encouraging the development of local professional expertise in the field of nutrition should be considered so that the country is able to draw on them when needed.

Multi-institutional/multi-disciplinary approach

With the Government now committed to developing and adopting a National Plan of Action for Nutrition for Fiji, the NFNC Secretariat is the appropriate body to undertake its development and co-ordinate and monitor its implementation. Therefore, the role and functions of the NFNC Secretariat should be strengthened to effectively undertake this task. The role and functions of this Department would be to focus on the priorities of the Fiji Plan of Action for Nutrition (FPAN), service a high-level committee of representatives of Ministries to co-ordinate the implementation of the FPAN, 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 the FPAN. The scientific expertise in the proposed department 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, eg. nutrition education by the National Centre for Health Promotion.

The involvement of the private sector and non-government organisations (NGOs) has been welcome and badly needed. The co-operation and good will of the private sectors should continue to be cultivated. The roles of NGOs as implementing agencies for nutrition programmes in the future could be explored further.

It is also recommended that every effort be made to integrate the development policies into multi and inter-sectoral activities so that they become a component of the respective ministry's larger collective concerns, objectives, priorities and programmes.

Policies and strategies

In view of the current nutrition situation in Fiji, there is a need to continue and strengthen the resolve by Government to improve the living standards and the quality of life of its people by addressing nutritional health problems.

The following policies are, therefore, recommended:

1. Promote equitable distribution of wealth among all sectors of the population.
2. Promote food security.
3. Promote healthy diet, environment and lifestyle.

4. Promote multi-and inter-sectoral co-operation.

In support of the above policy goals, some of the strategies that could be undertaken include:

(i) Macro economic policies should continue to be directed towards price control, generating income, and employment opportunities.
(ii) Encourage and promote more local food production.
(iii) Research efforts towards reducing post harvest losses (to include all foods) should be expanded to increase availability of food primarily for increasing food consumption at the household level.
(iv) Food distribution systems to alleviate chronic and seasonal household food insecurity need to be strengthened and target oriented.
(v) National system to control food quality and safety should be strengthened with multi-sectoral co-operation.
(vi) Reduce the incidence of micro nutrient deficiencies.
(vii) Reduce the incidence of non-communicable diseases through a healthy lifestyle and the consumption of nutritionally adequate diet.
(viii) Develop/strengthen nutrition and health education programmes for specific target groups with specific problems eg. anaemia in women, cardiovascular diseases in adult males, obesity in women etc., in addition to the general public.
(ix) Provide technical assistance through international agencies for the alleviation of household food insecurity, and strengthen food quality safety.
(x) Review and strengthen the co-ordinating role of the national Nutrition Committee among government sectors, international agencies, NGOs, academia and industries for developing, planning, implementing, monitoring and evaluation of nutrition related programmes.
(xi) Develop and implement national nutrition monitoring system.
(xii) Encourage and support health promoting environmentally friendly practices.
(xiii) Strengthen nutrition and healthy life style education in the formal education system and the curriculum in tertiary institutions and at the workplace.
(xiv) Develop a food assistance programme for the vulnerable groups.
(xv) Strengthen MCH programme delivery through mobilising NGOs.
(xvi) Encourage active involvement of food industries to support nutrition education programmes.
(xvii) Develop entrepreneurial capacity of the NFC through the provision of services at cost.

In Fiji, there is a need to continue and strengthen the resolve by government 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 programmes into multi and inter-sectoral activities so that they become a component of the respective ministry's/institutional collective concerns, objectives, priorities and programmes.

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Food Security Strategies for the Republic of Fiji: Comments

Sakiusa Tubuna[*]

Introduction

Food security implies three different aspects of food production, ie availability, stability and access. At the national level, it implies a satisfactory balance between food demand and food supply at reasonable prices. The position paper on Fiji's food security strategies is a comprehensive document and covers all aspects of food security at both the household and national level, the risk coping institutions and government policies and actions to improve food security in Fiji.

In this short paper, I will try to comment on some of the findings of the study under the main headings of:

(i) Food security performance and determinants;
(ii) Food security risk coping institutions; and
(iii) Government policies and action plans to improve food security.

The paper by the consultant on Fiji's position attempts to provide an overview of the food security situation in Fiji, and perhaps concentrates more on the availability aspects with less emphasis on the access and stability components, which are perhaps the main sources of food insecurity in Fiji.

This short paper attempts to critically comment on the country paper and to offer some other views.

Food security performance and determinants

As highlighted by the author, Fiji's farmers produce an impressive quantity and range of traditional food crops and the statistics collected indicate that domestic food production is sufficient to cater for domestic demand. While this implies that availability is not a problem, access and stability aspects must also be taken into account, as they represent the main sources of food insecurity in Fiji.

It must be clear that food security at the national level does not imply food security at the lower level of aggregation. There are certain groups in the population who suffer from severe food insecurity, but these groups have not been specifically identified in the study. These groups will be generally identifiable in regional or socio-economic terms and require specific sectoral or targeted policy initiatives, if we are to solve the growing problem of food insecurity.

Food distribution to individuals and household members could still be a problem. The 1996 Poverty Study findings showed that 25% of Fiji households were living below the poverty level. The national poverty line value adjusted in 1998 was $ 104 for rural households and $ 126

[*] Principal Agricultural Officer, Ministry of Agriculture, Fisheries and Forest, Fiji.

for urban households. This may mean that these poor households face food security problems given that approximately 50% of the households' income is spent on food.

A recent study by the National Planning Office indicated that the amount needed for a family of five to have low cost nutritious meals has risen by 20% within the last decade.

Local food production and particularly subsistence production have been highlighted in the study as the hidden strength of the economy. However, imports will be significant in the future with deregulation of the economy. A large proportion of the population still derives its protein from imported meat such as mutton, and the convenience of imported food together with the influx of rural people into urban areas will further undermine the availability of local food. The value of imported food significantly increased from F$ 136.2 million in 1992 to F$ 204.3 million in 1998.

Integration of the subsistence economy into the market economy is necessary to achieve a satisfactory level of food security in Fiji, because of the subsistence sectors' responsiveness to export orientation policies. The continued transformation of the subsistence economy to a market economy will certainly improve the terms of trade such as exports and also enhance the status of food security at the national level.

The role of the private commercial sector in the food chain and in achieving food security has not been significantly highlighted by the author. With market liberation and privatisation being key elements of the economic reform programme that has been implemented in Fiji, the private sector's role will be further strengthened. This is true for all stages of the food chain, from production up to the retailing level, especifically to all types of marketing functions involved in the food system, such as input supply, procurement, transport, storage, wholesaling and retailing.

Local and community organisations also play a highly important role in ensuring social security of their community members specifically in rural areas of Fiji. These local communities provide social security in many respects, including food security. This can occur at various levels, from spontaneous actions of neighbourhood support, if a family or member of the community suffers destitution, up to different forms of community-based social security institutions.

The principal advantage of community structures is their close relation to the community members. The community is best aware of its members suffering destitution and is able to respond spontaneously. These capacities are always used in implementing targeted policy interventions to improve food security in various ways:

- Identification of the people in need of food assistance
- Determination of the type and volume of assistance needed
- Distribution to the beneficiaries (eg. through community kitchens, schools and health centres).

Communities also take an important role in organising agricultural activities, such as the management of local irrigation schemes, the digging of shallow wells and the management of village seed banks. Microfinance schemes in some rural Fijian villages are community based. The greatest advantage of these communities is the extent to which they can develop to meet local needs. Also, it is possible to mobilise resources at the local level because people clearly see the benefits to themselves if projects go ahead, whereas there is less immediacy when projects are organised and operated from the national level.

Another important institution which is also involved in food security is the non-government organisations (NGOs). NGOs are a potential vehicle for supporting or complementing public sector measures in achieving food security objectives. Due to their presence in the field and their de-centralised approaches, NGOs play a particularly effective role

in targeted assistance to vulnerable groups. This refers in principle to international as well as local NGOs, depending on their objectives, experience and scope of activities.

Food security risk coping institutions

In order to analyse risk coping strategies, one must understand the type of food insecurity that is highly prevalent in Fiji. The study does not really distinguish between the types of food insecurity, which are chronic, seasonal food insecurity and transitory or temporary food insecurity. All the above types of food insecurity are prevalent to some extent in Fiji, with the most common types being temporary or transitory food insecurity and seasonal and cyclical food insecurity. The paper did not fully define the extent that these types of food security are prevalent in Fiji, but it describes the symptoms and indications of their occurrence.

While the paper briefly examined coping institutions, it does not investigate coping strategies and mechanisms at the household level. Coping strategies or short term responses are often misleading as they imply that households are, in fact, coping whereas often the strategies employed are not sustainable. Common coping strategies adopted based on recent experience in Fiji involve the following:

- Crops and livestock adjustment
- Diet change
- Consumption of food donated by government
- Animal sales
- Sale of assets
- Migration to other areas particularly urban areas.

Government policies and action plans to improve food security

The paper outlines broad strategies for implementation, but could have included specific measures aimed at eliminating food insecurity not only on the supply side but also on the demand side, which include the access and availability components.

In analysing policies to improve food security, a distinction should be made between supply and demand based approaches. Food supply determines availability, food demand is an expression of the ability to gain access to food, and both availability and access have to be ensured at the same time to achieve food security.

Factors determining food availability are:

- The volume and stability of food production (subsistence and market oriented production)
- Available food stocks (farm level, commercial or government stocks)
- Food imports (commercial and concessional imports).

Factors determining access to food are:

- The purchasing power, or level of real income, for those that depend on the market for their source of food supplies. The level of real income depends, again, on other factors such as wage levels, employment, etc.
- Productive assets available to those who depend on subsistence production as their source of food supply.

Policies covering food production and supplies comprise in principle, the whole set of measures falling under the category of agricultural sector development. They comprise measures in the following fields:

- Agricultural research, training and extension

- Agricultural input supply
- Mechanisation
- Irrigation
- Rural infrastructure and institutions
- Land reform
- Agricultural marketing and pricing policies
- Agricultural credit.

Supply instability is the main cause of temporary food insecurity in Fiji. This results from acute production shortfalls due to unfavourable weather conditions, or may be characteristic of inter-seasonal variations in food supply, which often critically affect the country as a whole or certain areas or specified population groups. Some of the measures mentioned above will also have positive effects in terms of stabilizing food supplies. This is particularly true of measures aimed at improving rural infrastructure, research, storage and food marketing such as:

- Irrigation, which reduces susceptibility to rainfall variations
- Research into drought/pest resistant varieties
- Investments in storage on farm, local, regional and national levels
- Technical improvements to reduce storage losses
- Construction and maintenance of rural roads
- Improvement in the marketing system, to promote inter-regional transfer from surplus to deficit areas.

A pre-condition for food security is, therefore, not only the availability of adequate and reliable food supplies, but also sufficient access to food supplies for the households to meet their requirements. Access to adequate food as a prerequisite for food security applies to the national as well as the individual household level. At the national level, sufficient food for the country will depend on availability of foreign exchange for the necessary food imports.

At the household level access to food depends on the means available to the household to obtain the food and other essential items required for a decent living. Targetted approaches are required to support those groups of the population that, due to poverty and insufficient access to food, are exposed to food insecurity. Targetted assistance may consist of measures to enhance the capacity of the people to gain access to the food they need or of direct food transfers to vulnerable groups. Types of interventions that may be required include:

- Targetted asset distribution and production support eg. land tenure reform, technology, water, import subsidies
- Public work programme
- Targetted food subsidies
- Direct food transfer.

Food Security Strategies for Papua New Guinea

Passinghan B.K. Igua[*]

Introduction

Food security is defined as a state of affairs where all people at all times have access to safe and nutritious food in sufficient quality and quantity to maintain a healthy and active life. National food security includes adequate domestic production of food (self-sufficiency) together with the capacity to import in order to meet the needs of the population. Household food security on the other hand refers to availability and stability of food supply together with the purchasing power of the household.

One of the aims of the study is to collate the fragmented food security data into a cohesive manner that the government can use for policy formulation. The objectives of this study are as follows:

- To analyze food availability and its related risks, distribution institutions, uses, commodity balance, food aid, and related government policies at the national level.
- To analyze household food availability, access, consumption pattern, nutritional quality and sufficiency, risks and food aid
- To identify strategy and formulate policy options to improve food security in Papua New Guinea, including prospects of regional cooperation.

Food security is basically determined by food availability, access (entitlement) and utilization. There are two modes of transactions that may be effective as the operating system for the three basic determinants: market transaction and institutional transfers. In general food security can be divided into elements:

- Market economy systems - characterized by institutional transactions
- Social safety net systems - institutional setting designed as risk coping mechanisms.

It should be made clear from the onset that food security is not the same as self-sufficiency, as commonly mistaken. There are a number of ways and combinations of ways that Papua New Guinea can achieve food security and no one of them will necessarily be the best.

General background

Environment

Papua New Guinea is a very mountaineous country, with the mainland rising to 4,500 m. The country has a total land area of 463,000 square kilometers; however, a significant part is not suitable and therefore unavailable for agriculture. It is reported by the Department of Agriculture and Livestock that even if marginal land is included, only 123,000 square kilometers of the country is suitable for agriculture. More than 50% of the land is at an elevation of more than 600m.

[*] Soil scientist, National Agricultural Research Institute, East New Britain Province, Papua New Guinea.

Population

In 1995, PNG's population was estimated at 4.03 million (excluding the populations of North Solomon and PNG citizens abroad), with a sex ratio of about 1.104 (Jorari and Laisa 1996). The majority (85%) of the population lives in the rural areas deriving their employment and livelihood from agricultural activities. The urban population makes up the remaining 15%. The average population growth of Papua New Guinea between 1980 and 1990 was 2.3%. At this rate the population will double in 30 years.

It is also important to note that the distribution of the population is very uneven. Information from the Mapping of Agricultural Systems in Papua New Guinea (MASP) database shows that of the national land area mapped, only one-third is inhabited, while the other two-thirds are uninhabited. The MASP database also indicates that there are a number of agricultural systems that support human population density of more than 100 persons per square kilometre. For example in the Manus Province, Farming System 1603 which is located on the small fringe reef island off the north and south coast has a population density of 331 person/sq km. There is a general increase in the demands and pressures on land and other renewable resources.

Overview of the economy

PNG is rich in natural resources, with gold, copper and agricultural products comprising the most important sources of export earnings. Despite the potential offered by its rich natural resource base, Papua New Guinea's economic development has fallen short of expectations. In the two decades since independence in 1975, the economic development of PNG has been driven by a small modern enclave sector, mainly based on mineral resource extraction, commercial logging and tree crop plantations. Government policies have almost exclusively focused on fostering the development of these activities. Because it is heavily based on natural resource extraction and plantation agriculture, the performance of PNG's economy is substantially driven by world market commodity prices. Overall, PNG's enclave economy experienced significant but fluctuating growth in output and exports throughout the last two decades, with little impact on the rest of the economy, particularly the agriculture sector.

A preliminary estimate of Papua New Guinea's Gross Domestic Product (GDP) in 1998 was K 7.7 billion, equivalent to about K 1700 (approximately US$ 825 or A$ 1,310) per head. The total real GDP grew by 2.5% in 1998 compared to 1997. This growth was mainly due to increased activity in the mining sector. The increase in activity reflected a turn-around from the decline in 1997, when activity was adversely affected by severe El Niño related drought and frost and the Asian financial crisis.

The traditional sector, mainly subsistence farming, supports more than 80% of the population. Most villages are self-sufficient and only a small surplus of produce is available for trading. The growth of towns has, however, encouraged small-scale cash cropping in nearby villages, and these crops are sold by village people in town markets.

Traditionally, shifting cultivation was the driving force behind food production in the country. This was based on the long natural fallow, which was possible because of the low population densities. This, however, has changed due to increasing land area coming under cash crops and settlement leaving very little land for shifting cultivation. This consequently has led to short fallow periods and a decline in soil fertility and an encroachment onto marginal land such as sloping land. These changes have threatened the sustainability of the traditional farming system and hence food security and livelihood of the people.

Interventions are therefore necessary to ensure sustainability of farming systems and food security for the people. Most farmers are resource poor and investing in a highly intensive farming system that requires high inputs of agro-chemicals and mechanization is not a

possibility at the present time. It is clear that fallow periods are getting shorter, soil fertility is declining and problems of pests and diseases are increasing.

Social indicators

Papua New Guinea's social indicators are well behind those of other members of the group of lower income economies, close to those seen in the lower income group (Table 1). A number of reasons suggest that the benefits of economic growth may have been unevenly distributed and that poverty remains a development problem in PNG. Life expectancy is at 58 years and the literacy rate is 63%. Women remain at a fundamental disadvantage due to cultural factors, heavy workload associated with subsistence production, relatively poor health conditions and historically poor access to educational opportunities and training.

Table 1 Comparative social indicators.

Indicator	PNG	Lower-Middle Income Countries	East-Asia and Pacific Region
Infant mortality (per 1000 life birth)	61	38	57
Life expectancy at birth (years)	58	68	69
Primary school enrolment (gross)	80	103	117
Population with access to adequate sanitation (%)	22	58	29
GNP/Capita (1998 US$/capita)	890	1,710	990

Source: World Bank, World Development Indicators, 1998.

Food security issues

When the first Food and Nutrition Conference was held in 1983, the national policy on food production and nutrition had two primary objectives:

- To reduce the country's dependence on imported foods
- To improve the nutritional status of the population.

Papua New Guinea produces enough starchy food tuber crops and bananas, but imports a lot of cereal-based products. Domestic pork and chicken production is adequate, however, to satisfy the current requirements, but the industries still depend on imported feeds. Food imports have escalated from over K 200 million in 1994 to K 325 million in 1995 to the current value of almost K 600 million in 1999. Aggregate current demand for rice and grain imports in the country is estimated at 303,000 tons with a total sale value of K 526 million per annum. This translates to a per capita consumption of 70 kg per annum and that contributes approximately 20% to the total national caloric intake.

Papua New Guinea is one of the seventy-seven countries classified as a Low Income Food Deficit Country (LIFCD) by the Food and Agriculture Organization of the United Nations (UN). This categorization is based on the increasing quantities of food imports, particularly cereals as well as per capita dietary energy supply.

The self-reliance of Papua New Guinea was undermined as it became more and more dependent on food imports. The increasing dependence on food imports has real and serious implications for food security of the nation. Rice is now a staple for most people who can afford it. Its importance has increased significantly over the years.

It is becoming more evident that as the purchasing power of the rural people increased due to income from production of cocoa, copra, oil palm and coffee, and there was a corresponding increase in the consumption of rice by the rural population. For example in 1976-78, monthly sales of rice in the highlands showed a close relationship to monthly coffee deliveries (Bourke et al. 1981).

In the early 1960s cash income in rural PNG was low and rice consumption was almost unknown, particularly in the highland villages. By the late 1960s the rural communities enjoyed

regular, even if not particularly high income from cash crops. This, combined with improved transport systems and expanding distribution systems through trade stores, allowed the rural population to slowly but surely participate in the cash economy. Although rice consumption was initially low, it appealed strongly to the locals for the following reasons:

- Widespread availability
- Storage capacity
- Efficient marketing
- Adaptive taste
- Low relative price
- Ease of preparation
- Status attributes.

If we take the highland case, rice was introduced into a subsistence setting in which food production was relatively labour intensive and seasonal food shortages sometimes occurred. At the same time coffee cultivation was on the increase providing a source of income, which allowed the people to participate in the cash economy. Coffee is still the only significant cash crop in the highlands. The relatively high prices over the years have resulted in substantial increases in real income for many non-urban highlanders. At the same time, rice, the status food which is easily stored and prepared, was readily available at low relative price. In addition, highland men returning home after stints as labourers on coastal plantations brought back their acquired taste for rice consumption. In these circumstances it is not surprising that a food of this type should achieve such rapid and widespread acceptance and that a taste for it was acquired (Bourke et al. 1981).

Changes in food consumption patterns do not occur in isolation - they occur with, and are influenced by, the prevailing economic and social climate. In this case, the climate in PNG and in particular, the highlands, has been particularly conducive to a rapid change in food consumption behaviour. If this change in food consumption were to be modified, it would be imperative to alter the social and economic climate. The net effect of the changes in food consumption behavior which have already taken place has been to increase the dependency of PNG on imported foods (Bourke et al. 1981).

The growing dependency of PNG on imported foods has the following detrimental effects:

- Since these imported foods come from overseas, the supply is dependent upon events outside PNG control.
- It will generate a huge food bill.
- Consumption of imported staples means a loss of production and marketing opportunity for local food producers.
- Long-term dependence on imported food will mean that most subsistence farmers will lose the ability to produce their own food.
- Increasing consumption of imported foods is a threat to basic cultural values in Papua New Guinea, which are built on customs and traditions relating to root crop gardening.
- Once established, trends towards greater imported food dependence cannot be easily reversed.
- In most rural areas, an acceptable alternative, the traditional staple, is available.

Although the literature which has addressed the question of PNG's food supplies and rice imports has mostly seen the situation in an urban context, ignoring the 50% non-urban consumption of rice imports, it has been unequivocal on two points:

- To avoid further large increases in rice imports, considerable attention must be paid to lifting domestic market supplies of traditional staples, and
- PNG's capacity to replace imported rice with locally produced rice is very limited.

In support of the first point, the National Public Expenditure Plan is insufficient and it is doubtful whether a significant change will occur in the economic climate, while the second point remains unrefuted.

There is a lot of support for dependency or increased dependency on rice imports. The basic argument for this view is that trade is important for PNG. In addition, PNG is a growing producer of exportable cash crops, which can be readily exchanged for food. There is also the argument that it is cheaper to import rice than to grow it.

Rice imports increased marginally from 126,498 tons in 1988 to 130,352 tons in 1994, giving an annual growth rate of only 0.6%, but shifted drastically to 169,000 tons in 1998, with an annual growth rate of 6.1%.

There is a dilemma that the government faces. The government is understandably concerned about rising food imports and dependence on overseas suppliers of vital food items. The more so considering that PNG has extensive fertile land, and from a purely physical point of view can supply all its needs. However, the price and institutional conditions do not facilitate food production.

Food insecurity in Papua New Guinea is a result of many factors. For convenience these could be classified into the following groups:

1. Weak linkage and lack of collaboration between food programs and also between national departments that influence food security.
2. Insufficient domestic food production.
3. Inadequate support systems (infrastructure, credit and government support).
4. lnadequate down-stream processing and preservation of agriculture produce.
5. Lack of program(s) towards export drive for food crops for which Papua New Guinea has physical and economic advantages.
6. Inefficient research-extension and farmer training programs geared towards promoting food production.
7. High production costs of some of the introduced cereals, fruits and vegetables.

Lack of food, due either to inability to produce or to purchase, invariably leads to poverty. This in turn contributes to lawlessness and social disorder, as hungry people seek illegal ways to feed themselves.

The health and nutrition status of Papua New Guinea has been classified as very low. Foods that are prepared and sold by street vendors have been condemned by the World Health Organization (WHO) as unsafe for human consumption.

Consumption of monotonous diets has led to many nutrition related diseases and disorders. This pattern has not changed for years, resulting in low life expectancy, which has been stagnant for a long time. A high rate of infant mortality at birth and low birth weight are also associated with mothers not having access to nutritious foods.

However, with respect to food diversity, Papua New Guinea is blessed with a wide range of food. Papua New Guinea is diverse in landform, language and culture and also in the food. The type and degree of diversity change with altitude, climate, soil and other socio-economic factors.

The coastal people live on starchy staples of sago and taro and marine food such fish and shellfish, while in the highlands sweet potato is the dominant starch staple with pigs providing the main protein source.

The replacement of traditional food staples with processed food, combined with a reduction in physical activity and the introduction of the cash economy have all contributed to the present day epidemic of unhealthy behaviour and lifestyle. It was not very long ago that people derived 95% of their food energy from complex carbohydrates and 2% from fat. Modern diets increase dietary fat and reduce complex carbohydrates and fiber. Rice, flour and tined fish/meat have replaced the root tubers and green vegetables.

Adoption of a modern lifestyle by those with ready access to cash leads to an increase in prevalence of over-nutrition and non-communicable diseases. This is not only the case in urban areas, but also in rural areas where people receive royalties from mining, logging and other projects or have high income from cash crops.

The change in lifestyles has also been accompanied by incidences of non-communicable diseases in the country. There is a definite need to establish an information network on diabetes mellitus, coronary heart diseases and hypertension and other non-communicable diseases in the country (Hiawalyer 1996).

Table 2 Morbidity of diabetes mellitus and cardiovascular diseases per 100,000 population.

Year	Diabetes Mellitus	Congenital Heart Disease	Rheumatic Diseases	Coronary Plumonale	Hypertension	Coronary Artery Diseases
1979	2.8	0.9	0.5	26.3	5.2	0.2
1984	3.5	3.6	1.0	22.4	6.4	0.4
1989	5.0	1.9	1.1	19.8	11.4	0.5
1993	7.1	1.6	2.1	20.1	9.6	1.2

Source: Hiawalyer (1996). Note: The numerator is the morbidity data from discharges from the hospital, while the denominator is the population estimated from 1970, 1980 and 1990 census.

Communities situated in the vicinity of major mine development sites have undergone a change in diet. For example, when work on Ok Tedi started, the nearby tribes were still nomads living in the stone age. Nowadays they have a modern life with all the advantages and disadvantages (Taufa 1996).

These changes are similar to those experienced in urban PNG and other mine sites. Non-communicable diseases like diabetes and heart diseases, are now prevalent, whereas they were hardly known before mine development (Taufa 1996).

In Papua New Guinea, growth is slow and the adult size is small. This is often considered an adaptation to the low energy and nutrient densities of the diet, in which tubers and root crops predominate. The pattern of weight loss for rural adults is now familiar. There is substantial reduction of weight with age, associated initially with a decline in fat reserves and eventually with a decline in lean body mass and a minor reduction in height with age. This is especially true for rural women, and to a lesser degree for rural men. The National Nutrition Survey (1982/1983) estimated that the provincial prevalence of children less than 80% of the reference weight-for-age ranged from 19.4 to 56.3%.

Improving food security will mean addressing the malnutrition problem in the country. Since more than 80% of the people live from subsistence agriculture, more emphasis should be focused on improving and sustaining the agricultural system.

Despite the advances made in providing services and income opportunities to the population over the last decades, malnutrition remains a significant problem in many areas and appears to be increasing in others (Marks 1992). This is indicative of the government's failure to move towards the National Goals contained in the Preamble to the Constitution. These stress the primacy of "integral human development", and "equality and participation" in national development.

The issue of malnutrition in Papua New Guinea is not as dramatic and severe as in many other countries. Nonetheless, it affects a large proportion of the population, in some areas the majority. Malnutrition is having a significant impact on the well being of the population leading to an unnecessary burden of sickness and early death (Marks 1992). In Papua New Guinea, the causes of malnutrition are complex and subtle, thus no single program will overcome the problems, and action is needed in several sectors to provide a range of services. Indeed, nutrition can be used as an indicator of the standard of living in an area and as a measure of

development (Marks 1992). The main nutritional problems of Papua New Guinea and their roots are reported by numerous authors (Hide et al. 1992; Jenkins 1992; Douner and Villacorta 1992; Marks 1992; Heywood et al. 1986; Heywood et al. 1988; Heywood 1991; and Gillet 1990).

Protein-energy malnutrition (PEM)

Protein-energy malnutrition (PEM) is regarded as the most important form of malnutrition in Papua New Guinea affecting both children and adults (Marks 1992). The 1982-83 National Nutrition Survey (NNS) found that PEM, as reflected by growth retardation of children under 5 years of age, was widespread. However, there was great variation in the extent of the problem between different areas. The provincial prevalence of children less than 80% of the reference weight-for-age (W/A) ranged from 19.4 to 56%, and within provinces there was also considerable variation between estimated prevalence for different districts. For example in Morobe PEM varies from 30.8% to 64.7% for different districts

Medical records from maternity and child clinics showed the prevalence of PEM increased by 50% from the 1970s to the early 1980s. There has been a steady rise in percentage of low W/A children attending clinics over time, while the attendance rates have been fairly steady (Marks 1992).

The most significant proximal causes of PEM in Papua New Guinean children are (i) low birthweight, (ii) inadequate nutrient intake, and (iii) illnesses due to infectious diseases. These are caused by circumstances related to (i) food availability, (ii) access to cash, (iii) the household and role of women, (iv) custom, (v) knowledge, and (vi) education. The relative importance of these is different for different areas.

Table 3 Percent of children underweight amongst children attending maternal and child health clinics, 1980-1990.

Year	Percent less than 80% weight for age; Under I year.	Percent less than 80% weight for age; 1-4 years.	Clinic coverage Under I year.	Clinic coverage 1-4 years.
1980	14.0	18.0	-	-
1981	13.4	20.0	-	-
1992	12.3	20.0	-	-
1983	13.1	21.0	-	-
1984	13.8	23.2	-	-
1985	17.5	25.6	-	-
1986	15.8	24.4	89.3	9.7
1987	19.6	27.2	94.2	13.5
1988	15.6	27.0	93.2	9.2
1989	16.1	25.8	87.4	9.2
1990	16.0	27.6	91.1	10.1

Note: The data were extracted from Department of Health Annual Report for these years.
Source: Marks (1991).

Acute PEM is not common among adults. However, weight loss with age is common in some rural areas, particularly in women during pregnancy and breast-feeding. As well as placing the women's health at risk, this is an important contributing factor to postnatal growth retardation and high infant morbidity and mortality rates.

Nutritional anemia

Anemia is known to be widespread in both adults and children. Precise estimates of its prevalence are not available. Studies of particular population groups have reported prevalence as high as 90%. Amongst adults, the most affected appear to be women (over 14 years of age) in the mainland and lowland areas. Women of childbearing age are considered vulnerable. The

main contributing factors to anemias include low dietary iron intake, malaria and intestinal parasite.

Non-communicable diseases

There are no data to indicate the exact extent of these disorders in Papua New Guinea. However, the number of cases of heart disease and diabetes is increasing. By far the largest numbers of cases are reported in the National Capital District and East New Britain Province, though case reports from other centres are increasing. NCDs appear to be a problem mainly of urban areas due to the change of diet and lifestyle that often accompanies urbanization.

Iodine deficiency disorders

Goitre and endemic cretinism are known to occur in many provinces of Papua New Guinea. Anecdotal evidence suggests that the occurrence of IDDs is decreasing. However, surveys carried out in villages in Madang and Morobe provinces in 1985 showed visible goitre rates amongst adult females ranging from 0.5 to 54.2% and cretinism ranging from 1.1 to 6.5%. There is little systematic documentation of the extent and distribution of the disorders. Research has shown that IDDs in Papua New Guinea are primarily a problem of iodine-deficient soils in the affected areas resulting in low iodine levels in locally produced foodstuffs.

The locations of particularly vulnerable groups and classification of districts with the highest level of malnutrition are given in Table 4.

Table 4 Locations of particularly vulnerable groups.

Region/Province	Classification of districts with the highest levels of malnutrition. Incidence of Malnutrition		
	Very High	High	Moderate
Milne Bay	Eas'ala	Misima	Samarai
	Losuia	Rabaraba	Alotau
Central		Goilala	Kokoda
Western		Kiunga	
West Sepik	Lumi	Amanab	Telefomin
	Nuku		
Madang	Ramu	Madang	Rai Coast
Morobe	Menyamya		Kabwum
East Sepik	Maprik		
S. Highlands		Nipa	
		Tari	
		Koroba	
E. Highlands		Okapa	Kainantu
		Wonenara	Lenganofi
Enga			Lagaip
			Wabag
W. Highlands			Jimi
Simbu			Karimui
			Gembogl
			Sinasina
East New Britain	Pomio	Lamet	
New Ireland		Namatanai	
West New Britain			Talasea
			Kandrian
			Ewasse

Source: Heywood et al. 1988.

The consumption of imported food is higher in the urban and peri-urban communities than in the rural areas of Papua New Guinea. The most critical and vulnerable areas for malnutrition are the remote areas with very poor or no access to basic government services. As a

general rule it can be said that, with every additional hour of surface travel (land or sea) to the nearest point of public service, there is usually a reduction of 10% in the availability of protein rich foods. The national daily consumption of protein is 55 grams per person per day, while the average daily consumption in the National Capital District is as high as 82 gram, which is approximately 50% higher.

Access to safe water is another example of the factors that contribute to the malnutrition problem. Approximately 25% of the population has access to safe water. This is water from wells and rainwater stored in tanks or other enclosures. The majority of people still depend on creeks, and ponds and that may be contaminated with bacteria causing diseases such as typhoid and cholera. In towns and urban areas a higher proportion of the population has access to safe water. For example in the National Capital District 92.3% of the population has access to safe water.

Very broad strategies as well as specific strategies were suggested (Marks 1992) to tackle the malnutrition problem (Table 5).

Table 5 Broad and specific strategies.

Broad Strategies	Specific Strategies	Who	How
Design and develop information on education curriculum (IEC)	• More use of existing materials on NCDs	• DOH and DOE • NGO	Develop working group
Promote healthy lifestyle	• Improve sporting facilities and encourage sporting authorities	• DOHY • Urban	Construct and upgrade sports facilities
More emphasis on consumption of traditional food and healthy diet	• Increase use of local foods in hotels, restaurant and airlines. • Design and promote use of dietary guidelines • Develop a policy favouring locally produced healthy foods	• Town Auth. • DOE • NGO • DOH and DOE • DOFP and DPI • DAL and DOH	Include traditional foods in the catering school. Develop working group Cabinet decision
Need for system of monitoring	• NCD Unit of DOH • Obtain baseline information on the extent of obesity in urban areas • Need for urban dietary surveys to determine nutrition factors related to NCDs	• DOH • DOH • University (Comm. Med). • NSO • DOH	• Survey • Research
Improve detection and management of obesity, hypertension and diabetes	• Include management guidelines in standard treatment manuals	• DOH	
Increase consumer protection	• Discourage use of tobacco and excessive use of alcohol • Revise and update existing food laws	• DFP • DOH • DOH and Justice	• Impose export tax and use this for health and education
Reduce urban drift and migration	• Increase use of existing IFC materials	• DOE and DORY • Population Unit	• Social research • Encourage job opportunities

There are three nutritional problems that are relatively independent of income: the extent of iodine deficiency, anemia and other non-communicable diseases. These are not likely to be

substantially changed if access to income were increased rapidly. Protein-energy malnutrition (PEM) was the major nutritional problem for which lack of access to income was a primary cause.

The health services should be a priority in the push for rural development. This is particularly true for the remote rural areas where the rate of malnutrition is often high. Better support and supervision needs to be given to health workers and teachers working in remote poor rural areas. In exchange for improved support, they should agree to deliver a minimum standard service to the people of the area.

Children in most isolated areas have adequate intake of energy. The matter of how to provide them with greater intakes of protein should be examined.

Malaria

The third leading cause of death in health centres in PNG is malaria. The two leading causes of death in health institutions are pneumonia and conditions originating in the perinatal period (DOH 1986). Malaria is increasing as people originally from non-malarious areas (highlands) move to the lowland malarial areas. This movement occurs due to economic activity and development.

Spraying programs which began in the late 1950s proved successful. However, administrative problems, opposition from the villagers and behavioural changes of the mosquitoes caused the number of malaria cases to rise in the 1970s. By 1976, spraying operations were almost halved and by 1979, the level of malaria returned to that of the 1950s (Gillet 1990). In 1983 an assessment was carried out the status of in the country. Following the assessment three recommendations were made:

- Spraying be limited to areas of economic importance
- Spraying be limited to areas with severe outbreaks
- Spraying be limited to areas with easy access.

There are three high-risk groups in PNG. The first are young children between the ages of 6 months and 5 years. This is the period in which they build up immunity to malaria. The second group is non-immune people of all ages for obvious reasons. These people are highlanders and expatriates who have moved to malarial areas. The third group is pregnant women.

The national policy for malaria control 1986 to 1990 had the following objectives: (i) to reduce and eliminate death from malaria; (ii) to reduce the number of severe cases of malaria; (iii) to shorten the period of suffering from malaria; and (iv) where possible, to reduce the influence of malaria.

The current approach to prevention and control has an emphasis on educating communities and individuals. Research is being done to develop a vaccine. It has been suggested that prevention and control should include drug treatment and prophylaxis, mosquito control, and reduction of person-mosquito contact.

Sexually transmitted diseases

Sexually transmitted diseases (STDs) are causing grave concern for the country's development. The first reported case of Human Immuno-Deficiency Virus in Papua New Guinea occurred in 1987. It is also estimated (Malau 2000) that there are currently 16 new infections per 100,000 people. The official estimate of people affected by the epidemic is now 10,000 to 15,000 people (Malau 2000). The virus is spread predominantly through unprotected intercourse, although an increasing number of infants are infected during pregnancy. The very high rate of other sexually transmitted diseases is a major factor for HIV transmission in Papua

New Guinea. The AIDS epidemic has wide-ranging implications for development and food security.

Rural development

Cash income is very limited in the rural areas and the government is challenged to provide and increase income-generating opportunities. Low-income areas must be properly identified and formally recognized at the national level, probably at the census division rather than the district level.

Transport and access to markets are often major constraints. If these constraints can be overcome there are possibilities for increasing cash production. Building roads randomly into poorly accessed areas is not the solution. The national road network needs to be planned and funded nationally and rationally. Too often money is thrown away trying to provide cheap access to isolated areas using the bulldozer driver as surveyor-cum-engineer approach. This leads to badly aligned and constructed roads that do not survive the first wet season.

Government services are very poor in the rural areas and continue to deteriorate. Health, education and agricultural services are non-existent for a majority of these rural communities. Even if these services exist, they operate at very low efficiency, providing services only to the station population and not to the surrounding population.

Past development projects should be examined for what worked and what did not. This does not need to be a major exercise in cost-benefit analysis but largely a qualitative assessment of the project objectives and achievements. This should be carried out in close consultation with the people who were supposed to benefit. A lot of rural development projects have failed and left almost no trace. It is important to know why these projects failed to avoid making the same mistake in the future.

The long-term sustainability of national food security m Papua New Guinea is precarious if the present trend of over-dependence on food imports continues. In order to reverse the trend Papua New Guinea should seriously look at developing its own capacity to increase the domestic quota of its food supplies with proper supportive resources and structures.

Some major economic and trade policies

There are some major economic and trade policies that have some bearing on the achievement of food security. Firstly it is important to consider reliability as a component of food security. The reliability component of food security refers both to reliability and access however it is often confused with stability. Weather and other natural phenomena affect the stability of supply, abrupt changes in demand affect the stability of price, and the interaction of macroeconomic and sectional policies within and across countries can affect both (Noah 2000).

A disproportionate impact on prices of a commodity will occur if there are fluctuations in the supply side of the production of that commodity. This happens because of the relatively small short-term price elasticity of demand for that commodity in the aggregate. Climatic phenomena (e.g. droughts) and fluctuating oil prices are major causes of instability.

With the backdrop of changes occurring in the global village, Papua New Guinea needs to appreciate that future strategies for national food security should differ from those of the past. The Food Security Policy should also be clear on its responses to short-term and long-term trends. The question that remains is: what policy measures will ensure reliability of food availability and access, both in response to short-term fluctuations and over the long term?

The trade related economic policies of Papua New Guinea influence food security indirectly through their effect on the growth of the economy as a whole and of particular sectors. They have a more direct impact on food security and nutrition status by affecting such factors as: (i) rural and urban incomes, (ii) ability to import food to meet domestic short falls

and demands for food items not produced locally, and (iii) earning of foreign exchange to finance the varying share of food imports in total.

Agricultural trade is a generator of income and provides for the welfare and livelihood of the people who are directly or indirectly involved in it. The expansion of agricultural trade has helped and provided greater quantity, more variety and better quality of food to an increasing number of people at lower prices. In Papua New Guinea and many other countries, agricultural trade has been the major source of foreign exchange necessary to finance imports and development. Copra, cocoa, coffee and oil palm are traded on the open market. The sugar industry on other hand is protected by the Infant Industry Policy, which ensure there is no competition for the product by banning all sugar imports. This policy was put into place by the government in 1980 to allow the establishment and growth of Ramu Sugar. Due to its importance and vulnerability, Ramu Sugar was protected right from the onset from the rigors of international competition, thus avoiding political, social and economic consequences.

The relationships between the urban and rural economies and the macroeconomic policies that affect the two sectors must be clearly understood before measures can be mooted for food security. An understanding of economic linkages between rural and urban areas sheds light on the effects of the policies on households in the respective areas. Of particular importance are issues of income, employment, taxation and public expenditure.

The bulk of the population is in the rural areas and, therefore, to achieve food security, it is imperative to implement policies that will encourage the rural economy. The rate of urbanization is also increasing and policies are needed to address this concern.

The livelihood of the rural community is based on agriculture. The growth of agriculture and other rural enterprises is the main vehicle by which employment and income can be increased on a large scale. An increase in agricultural production generates effective demand for goods and services produced by the domestic non-agricultural economy and, as a result relative prices (terms of trade) shift in favor of the non-agricultural sectors, while resources including labour and capital, are transferred from agricultural to non-agricultural uses, which stimulates growth in the non-agricultural sectors.

To fully address rural food insecurity, development should not focus on agriculture alone but on the development of the rural economy as a whole. The government must make provisions for the basic service of health, education, transport infrastructures and marketing in order to realize rural development.

Long-term growth is a pre-requisite to improving food security. As stated earlier it must involve the development of the rural economy as a whole. With greatly improved linkages within the rural economy, the agriculture sector will grow. However, while growth is important and necessary, it is not sufficient. Growth needs to be equitable for all the population, both rural and urban.

Ideally, long-term growth should be equitable for all populations. This would require the food insecure to acquire more control over resources so that benefits of growth are shared more equitably, which would lead to immediate growth. There are policies that can be implemented to improve the position of the poorest group of people.

With respect to taxes, when the government makes changes m the tax base in order to increase revenues, the poorest group of people in the country is worst affected. These changes in the tax base can be through the imposition of direct or indirect tax. It is the indirect taxes rather than the direct taxes that generally have a disproportionate effect on the poor. Direct taxes tend to be progressive, while indirect taxes are regressive. The indirect taxes become regressive if they are imposed on goods and services commonly purchased by the poor (basic food items, public transport, fuel for cooking, etc.) or if inputs into such goods and services are taxed. Indirect taxes can be designed to be progressive if they are levied on luxury goods and services. The removal of the disproportionate direct or indirect tax burden on the agricultural sector can

improve the situation in the rural areas. It must be stressed that implementation of any inappropriately designed taxes can lead to widespread bias against the poor.

In recent years due to financial constraints, the government made massive cuts in public expenditure. Although cuts must be inevitably made, expenditures on the vital services (primary education, primary health care, etc.) must be maintained. It is of paramount importance not to allow negative growth into the economy because it will pose more intractable difficulties. There is often a bias in favour of the upper and middle-income earners, with expenditures on hospitals, secondary and tertiary education being accorded higher priority than the provision of free access to basic services for the poor. Most often the poor cannot afford these basic essential services which are critical for their human development.

Rural farmers are often seen as food producers and benefits given to them must be in the form of high agriculture prices. However, rural farmers are net food purchasers, and any increase in food prices will outweigh the income effects of farm gate prices for agricultural produce. Thus the provision of food subsidies and the form they take are important determinants of food security.

The biggest resource the poor people have is their labour and often this is limited by factors such as: (i) unskilled or semi-skilled labour; (ii) low productivity due to malnutrition and ill health; and (iii) lack of affordable education and training.

Nevertheless, employment base growth offers the most effective way of tackling poverty in both urban and rural areas. This requires government policies that can improve labor productivity, enabling the poor to access labor opportunities, removing or avoiding anti labour bias in the factor market, and in the sequencing of policy reforms, allowing for the slow adjustment of markets relative to capital markets.

Any policy to improve food security should contain the following basic information:

- Who has food security problems?
- Where is the food security problem?
- How can the implemented policies alleviate the problem?

Poverty and agriculture

The relationship between poverty and agriculture is reported by Allen and Bourse (1997) in an in-depth description of six agricultural systems. In most cases these systems had low cash incomes, poor market access, high child malnutrition, extreme pressure on the available land, limited development potential, difficult physical environmental (flooding, high rainfall, very high temperatures and high humidity) and poor government services.

The government has the responsibility of monitoring and decisions are made in light of its national circumstances and assistance given by international agencies.

Agriculture is the engine of economic growth in Papua New Guinea, however the level of government commitment to the sector has been very dismal. Successive governments have penalized agriculture through a variety of mechanisms, including export and import taxes, foreign exchange control, export licensing requirements and controls and bureaucratic marketing boards. The lack of competition and heavy government regulation, along with structural factors such as inadequate institutional and physical infrastructure and underdeveloped research and extension systems, has resulted in low productivity and hence poor rural development as a whole. Structural Adjustment Programs (SAPS) have been instituted in Papua New Guinea and many countries partly in response to these and many other market failures. SAPs seek to reallocate resource use in order to improve the economic efficiency and social welfare. Among other things, the programs have devalued exchange rates, the immediate effect of which was more expensive imports, which in turn have increased the farmers' costs markedly. Farmers growing export crops have benefited from the restructuring of

the currency from the higher price paid on their export produce. However, most of Papua New Guinea is subsistence agriculture and the changes of SAPs have serious consequences for food security particularly for the poor majority.

Economic growth alone, even growth with equity is not the answer to the problems of poverty, food insecurity and malnutrition. I believe there must be a political will to compliment economic growth. It is true to say that redistribution of resources is easier when the whole economy is growing. Experience indicates that there will be increased political support for measures that benefit the poor as well as those that are better off. Papua New Guinea can learn from the experience of other countries that have made substantial achievements in the last 200 years.

Informal social security safety nets (extended family, etc)

Wantok system

The *Wantok* system is an informal support system that operates in PNG. It is quite complex. *Wantok* is Melanesian pidgin and when translated literally, it means "one talk". "Wan" means the same or similar, and often implies, solidarity, unity, a common link a shared interest. Toktok would mean "talk" or "to talk".

In the urban context, the meaning of the word has been elaborated further to include people that came from the same district, or sub-district, even though they may not share the same language. The term is not used as frequently in rural areas as in the urban centers, where there is felt a need to distinguish one's own group from the others. In the rural areas, immediate family or clan is more important.

True Wantoks imply a relationship where obligations of reciprocity and rights to expect certain things. *Extended Wantoks* suggest that the individual has more freedom to choose whether he she would help or not.

The Wantok system allows for income transfers and other support from members of a particular W*antok* to needy members of the same *Wantok* system. A household survey (Gibson 1995) reported that inter-household income transfers remain a very important means of assisting households in need across all income groups, although informal transfers do not appear to improve the income distribution in rural areas. The system has adapted relatively well to the changing economic environment and is quite important in urban as well as the rural areas.

Results from the 1996 PNG Household Survey (Table 6) show that more than 90% of households received transfers and more than 90% of household of households made transfers. Income transfers (receiving and giving) were important in all income groups and regions in PNG.

In communities characterized by a high level of poverty and despair (in times of natural disasters), the *Wantok* system may be ineffective. Therefore the system requires interventions such as targeted income transfers (subsidized health and education service, etc.) and improved provision of government and NGO funded emergency and relief services. The establishment of self-targeted work fare schemes should also be explored as a means to help alleviate poverty and improve food security. Schemes such as these would provide publicly financed unskilled work on demand at a wage rate low enough to guarantee that only those in real need are willing to participate. Such schemes would be useful since they would be providing labour to build and maintain high priority community infrastructure in the poor areas.

Table 6 Households giving and receiving private inter-household cash (%) and in-kind transfers in Papua New Guinea.

	Receiving Transfers			Giving Transfers		
	Cash	In-Kind	Total	Cash	In-Kind	Total
Consumption Quartile						
I (poorest)	25.3	88.6	90.1	22.7	79.4	81.2
II	28.3	89.0	90.0	30.5	90.1	92.1
III	38.8	92.9	93.1	38.5	91.8	95.0
IV (richest)	46.7	92.2	94.5	57.8	926	96.8
Region						
National Capital District	45.6	84.5	89.1	71.9	82.2	90.9
Papuan South Coast	40.8	94.3	96.3	29.9	93.7	93.7
Highlands	43.3	93.4	94.2	46.6	89.0	92.2
Momase/North Coast	20.9	84.8	86.6	25.3	87.0	90.5
New Guinea Islands	38.4	96.3	96.3	44.6	89.9	91.4
Papua New Guinea	35.6	90.9	92.1	38.6	89.4	91.8

Source: PNG household Survey, 1996.

Wage linked social insurance

A small proportion of the population benefits from the country's wage linked social insurance scheme. These include the following: (i) National Provident Fund; (ii) Public Officers Superannuation Fund; and (iii) Defense Force Retirement Benefit.

These wage linked social security schemes provide an effective safety net for wage earners and their families in the formal and public sector. Although this is only small, it is an important safety mechanism that will grow in importance as the country develops, resulting in a larger share of the labour entering the formal labor market as wage earners. This of course will depend on the government's ability to implement a series of measures, which can strengthen the financial performance of these funds.

Over the years these schemes suffered from a number of factors such as: (i) the lack of prudential supervision and regulation, (ii) poor investments (iii) government use of pension funds for capital investment of questionable quality, (iv) political interference - such as the frequent replacement and appointment of high office holders for political reasons rather than for their qualifications and expertise, and (v) large government arrears to the fund for the public sector employees.

It is therefore very important that these schemes be reformed to guarantee their effectiveness in the future. It is important to establish a body to regulate and supervise these funds, the adoption of superannuation legislation, improve governance and accountability and revoking the power of the government to issue investment guidelines to these funds.

Price support schemes

The price support schemes for major agricultural export crops have had a long history in PNG. They were designed primarily to protect the producers of these commodities from fluctuations in the world market prices to allow a smooth flow of income. During times of low world market prices, the schemes were to pay growers a bonus. This bounty was to be collected during times of high commodity prices. These schemes were essentially self-financing from their establishment up to the end of the 1980s. However, with the collapse of the world market commodity prices in the late 1980s, the stabilization funds became essentially insolvent and were replaced with government-assisted export price support programs. The government-assisted export price support schemes were extremely costly and ill targeted. During the first half of the 1990s, the average annual expenditure of the Department of Agriculture and Livestock was more than two-thirds of the overall budget in support of agricultural development

(World Bank 1997). These schemes provided unsustainable due the enormous burden of maintenance. Although these schemes did help smooth the income of some export crop producers, most of the small holders benefited little. The bulk of the benefits accrued to owners of large estates/plantations rather than the small holders. With respect to poverty prevention, these price support schemes were not very effective. Results from the household survey and numerous other studies (e.g. Posonai 1986; Allen and Bourse 1997) show that poverty remains widespread among the small holders. These funds could be used more effectively to boost agricultural and rural development through investments in rural infrastructure and basic social agricultural support services.

Social development schemes

In the late 1970s a social development scheme was established, known as the Village Development Fund. It was meant to provide financial assistant to rural people. The assistance was through grants and loan based assistance to villagers with viable prcjects where they made 30% contribution. The scheme was, however, transferred to a fund for parliamentarians who distributed resources to their electorates at their own discretion. More recently the fund has been put under the administration of the District Planning Committee, of which the local parliamentarian is the chairman. There was no accountability of these funds as the managers of the funds were not obligated to report on the use of the funds. Allocations have been made to those in need in the following forms: (i) income subsidies; (ii) assistance with education expenses; (iii) assistance with medical expenses; (iv) assistance to disaster stricken families; and (v) community development projects.

However, this scheme fails as a social safety net mechanism, as there are no clear criteria to define target beneficiaries and guidelines for access to these funds and what the funds can finance. For this scheme to be effective it must be a social assistance scheme in the true sense, where its administration is based on well-defined, transparent rules and criteria.

It could be changed into a fund where the benefits are communal. For example it could provide those in need with support through self-target work fare schemes. Such programs would provide unskilled low-wage work on demand at a wage rate low enough to guarantee that only those in real need are willing to participate. The labour would be used to build and maintain high priority community infrastructure in poor areas. If the scheme is properly designed and funded, it can be an effective safety mechanism to help alleviate chronic and transient poverty (e.g. economic problems, natural disasters).

Disaster relief mechanisms

In times of disasters, both government and non-government organizations have to provide relief to affected communities. The National Disaster and Emergency Service is responsible for the government's disaster relief program, while the NGO program is carried out by the Red Cross, Salvation Army and St John's Ambulance. Much needed assistance has been provided through these disaster relief mechanisms, however their operations often suffer from: (i) limited technical know-how; (ii) lack of well developed emergency relief operational plans; and (iii) financial constraints.

Assistance in times of disasters will remain critical in PNG unless support is given to the areas highlighted above. In times of disaster, the *Wantok* system does provide assistance, but it does not appear to improve rural income distribution.

National food security policy

The primary objective of the National Food Security Policy, launched in 2000, is to create awareness and seek support, increase and diversify food production, processing and preservation, marketing and distribution in order to achieve greater self sufficiency in food and attain security at national, provincial, district and household levels by the year 2015. This can be realized through agricultural production and productivity, income earning through domestic agricultural production and productivity, income earning through domestic marketing and exports and a rise in living standards.

The National Food Security Policy Goal is: "To ensure that all people at all times have access to safe nutritious food in adequate quality and quantity to maintain a healthy and active life." Under this policy goal are six sub-goals as follows:

1. To increase food production and to improve access to food at the household level as a means toward eradication of food insecurity and rural poverty.
2. To improve the nutritional status and standards of living of the people of Papua New Guinea.
3. To improve production, downstream processing, marketing, and utilization of food.
4. To strengthen institutional linkages to ensure that cross-sectoral policies compliment the Papua New Guinea National Food Security Policy.
5. To ensure the integrated management and sustainable use of land, water, fisheries, forest and genetic resources.
6. To ensure maximum participation of women in all aspects of agricultural development, research, extension and policy planning and implementation, education and training, and voluntary and formal organizations.

Although the policy strategies and recommendations are directed at individual departments and agencies, food security is an outcome of interactions of many influences, including agricultural, health, education and social factors. The policy pays attention to education, nutrition, health and environmental interactions with food security.

The Medium-Long Term Strategic Plan of Action (2000-2015)

The Medium-Long Term Strategic Plan of Action (2000-2015), will cut across the interdisciplinary programs and border on sectoral activities such as forestry, agroforestry and fisheries (aquaculture). The action plan will mobilize inter-institutional, across-organizational and multi-disciplinary input to attacking food security and poverty and achieving nutritionally better food for all.

The Food Security Work Program

The strategic framework for the National Food Security 2001-2015 will comprise fourteen (14) sub-components, viz:

1. *Traditional staple crops:* This strategy will seek to promote, develop and where necessary conduct adaptive research to address the production, marketing and post-harvest related problems of traditional root and tuber crops and sago.
2. *Rice and Grain Industry Development and Promotion Programme:* This program will aim to improve the national self-sufficiency in rice, grains and other crops, livestock production in PNG, and the integrated farming systems approach. The strategy will seek to develop and apply suitable research, extension, processing and development methods for increased productivity and production of rice, grain crops and other associated crops and livestock in favourable areas of PNG.

   It is proposed that PNG put about 100,000 hectares (ha) of rainfed lowland rice into production to produce 150,000-170,000 tons of milled rice (the equivalent of 240,000

tons of paddy rice). This should be done over the next 10-15 years or longer, in a systematic and orderly manner, by harnessing the local resources and population gradually in developing a viable rice industry. Alternatively, rice imports could be met by production from 45,000 ha of double-cropped irrigated rice land or by harvesting from 200,000 ha of rainfed upland fields. PNG should aim at 20% import reduction by 2010, by shifting the production system from the predominantly rainfed upland towards rainfed lowland production with supplementary irrigation and fully irrigated double cropped fields.

3. *Irrigation and water management:* The drought of 1997 has shown how vulnerable and food insecure PNG is as nation when none of the traditional staples are used to feed those who are hungry. Papua New Guinea had to rely on imported rice and flour to feed the affected communities.

   Where rainfall is inadequate, supplementary or full irrigation is required. There is currently hardly any irrigation system in Papua New Guinea. It is time Papua New Guinea started to develop irrigation to support food production. The development of irrigation will ensure the growing of two or more crops in any growing season rather than only one crop or none. Thus access to water is essential for food security.

   On the other hand, seasonal floods have been a worry in some environments. This also puts agricultural land out of cultivation. There is also the need to look at and develop drainage systems to control and manage excess water.

4. *Horticultural fruit trees*

   The program will address the issues related to the production, development and promotion of fruit trees.

5. *Integrated vegetable production: the special case of high altitude agriculture*

   This program concerns the production, development, marketing and researchable problems connected with the cultivation of both traditional and introduced vegetables above the cut-off point for coffee in the high altitude highlands between 1800-2400 m above sea level.

6. *Urban and peri-urban gardening*

   The establishment of this particular program is in response to the spontaneous reaction to the increasing urban population, which has led to the intensification of peri-urban and urban gardening around major cities and towns in the country. The program will aim at the eradication of food insecurity and urban poverty. It will promote sustainable urban livelihoods focusing on utilization of the idle urban labour pool, and promote equitable and morally acceptable access to resources. Indirectly, it aims at attacking the problems of social law and order and other prevalent problems associated with urbanization.

7. *Downstream processing, preservation, storage and utilization*

   Efficient home-based processing, distribution and marketing systems can make a vital contribution to food security and employment and improve incomes for urban families. This sub-program will initiate and develop small downstream processing projects for food preservation, storage and home utilization. These projects will target rural and urban families in the suburbs.

8. *Agroforestry*

   The social and economic consequences of wholesale deforestation, especially devegetation around the country, for example the Bulolo valley, Simbu Province and the outskirts of Port Moresby have become major concerns. The spontaneous upsurge of hillside gardening in the city has not only contributed to devegetation, but also to soil erosion and increased the sediment deposits in the city drainage systems. This sub-program will seek to deliberately forge an alliance with city and town authorities (eg.

NCDC) to address the problem of devegetation through agroforestry and other land management interventions.

9. *Livestock production including aquaculture and honeybees*
   There is considerable potential for expansion of livestock production. Livestock products contribute in a big way to household incomes. New species and breeds of livestock such as rabbits, turkey, geese, guinea pigs, village chickens, etc. need to be tested. This program will target livestock development, with special reference to small animals, inland fish farming and honeybee production.
10. *The Special Programme for Food Security*
    The Special Program for Food Security (SPFS), launched by FAO in 1994 in the Markham Valley of Morobe province will be accorded a special place. Phase I consisted of four interrelated and complimentary components of water control and management, which includes small scale irrigation, intensified crop production systems, diversification into aquaculture, etc. and socioeconomic constraints analysis.
11. *Information, publication and agricultural statistics*
    One of the biggest constraints in Papua New Guinea is access to information. It is hoped that an improvement in this area will result in a positive contribution to the overall improvement in rural development and the country as a whole.
12. *Improvement of extension methodologies and approaches*
    Another constraint in the delivery of service to the rural people has been the lack of extension. Even if there is extension service it is often very poor. An improvement in the communication links, particularly extension officers having access to information, is very critical. For example, agricultural scientists have not published experimental results and/or made them available to extension officers. In the agricultural research sector, publications of experimental results has been "scandalously low". This has also led to nil adoption of new technologies.
    An improvement of the extension methodologies and approaches is long overdue, and it is imperative that sufficient and continuous funding be found for this very important component
13. *Rehabilitation and redevelopment of farmer training centres*
    Due to lack of funding this important vocational training scheme was left to deteriorate. A lot of school drop-outs from the rural communities are joining the urban drift into the urban centres in the hope of finding menial work. There is no incentive to keep these disillusioned youth in rural areas. It is very important to revive the farmers' training schemes. Skills and techniques obtained from such institutions will go a long way in preparing students for a productive life in the rural communities. The rehabilitation and redevelopment of farmer centres will require a major injection of funds, management and technical manpower.
14. *Farm machinery and equipment*
    Farming in Papua New Guinea is a very physical exercise, with a relatively high labour input compared to the developed countries with mechanized agriculture and little labour input. Investment into appropriate simple farm machinery and equipment will certainly improve productivity. There is a need to carry out research and development (agricultural engineering research) into the manufacturing of simple farming implements to assist farmers in their routine operations. Assistance could be sought from the South East Asian experience. Such developments will definitely help women in particular. Women remain at fundamental disadvantage due to cultural factors, heavy workload associated with subsistence production, relatively poor health conditions and historically poor access to education and training. It is envisaged that

investment in farm machinery and equipment will improve general health and increase the life expectancy, which is currently 58 years.

Conclusions

In conclusion, the long-term sustainability of national food security in Papua New Guinea is precarious, based on the present trend of over-dependence on imported foods. To reverse this trend, PNG should seriously look at developing and strengthening its own capacity to improve domestic food supplies with proper supportive structures and measures.

However, food security does not necessarily mean that we have to grow all of our food. The proportion of imported food and locally produced food should depend on relative prices and what products Papua New Guinea can produce best. In planning for food security, the government has the role of providing research and development of food and cash crops. It is the markets and producers that will eventually determine the types of crops and the locations they will be grown in. Inefficient production of crops that Papua New Guinea is not good at will use up valuable resources that could be used better growing things that can be grown well.

Food security is a complex issue involving a wide range of social, environmental and economic factors. There is a need for greater integration of the different sectoral entities. Agriculture, forestry, fisheries, health, education and environment and conservation departments, NGOs, and others need to link their respective activities in a more collaborative and coordinated way.

It should also be recognized that the tragedy of widespread food shortages can not be eliminated through government action alone. Thus a broad mobilization of public and private sector commitment, as well as collective and individual investment, will be necessary to deflect the course of food insecurity in PNG.

The recent drought and frost of 1997 have shown how hard it is to attain food security and this will be almost impossible if the macro-economy is not run properly. In the future it should be possible for a well-run economy to borrow to get over such catastrophes. Papua New Guinea has to ensure that its farming systems are able to cope with the growth in the population, that it is not depleting the soil through overuse and that new systems being developed will be sustainable over time.

The improvement of food security will depend on the degree of cooperation and coordination between various government departments and agencies, NGOs, private sector, donors and other stakeholders. Improving the food security situation will certainly address some of the fundamental inequalities in the country. This could be seen as an important step towards meeting the National Goals contained in the preamble to the Constitution.

References

Allen, B.J.; and Bourke, R.M. 1997. Poverty and Agriculture in Papua New Guinea: An In-depth Description of Six Agricultural Systems. Department of Human Geography, Research School of Asia Pacific and Asian Studies, Australian National University, Canberra, ACT 0200, Australia.

Bourke, R.M.; Carrad, B.; and Heywood, P. 1981. Papua New Guinea's Food Problems: Time for Action. Research Bulletin No. 29. Department of Primary Industry. Port Moresby.

Department of Trade and Industry. 1999. Statistical Digest. 1998/1999.

Douner; and Villacorta, J.V. 1992. Sector Paper, Department of Education, Papua New Guinea, National Nutrition Policy Workshop, Madang, 17-21 February 1992.

Gibson, J. 1995. Food Consumption and Food Policy in Papua New Guinea. Institute of National Affairs Discussion Paper No. 65. Port Moresby, Papua New Guinea.

Gillet, J.E. 1990. The Health of Women in Papua New Guinea. Papua New Guinea Institute of Medical Research Monograph No. 9:55, Goroka. EHP, Papua New Guinea.

Heywood, P.F. 1991. Draft Report of a UNICEF Consultancy on Health and Nutrition of Women and Children in Papua New Guinea (13/3/91 to 27/3/91). Nutrition Program, University of Queensland. Gillet, J.E. 1990. The Health of Women in Papua New Guinea. Papua New Guinea Institute of Medical Research Monograph No. 9:55, Goroka. EHP. Papua New Guinea.

Heywood, P.F.; Allen, B.; Fandim, T.; Garner, P.; Hide, R.; Joughen, J.; Junemberry, J.; Mathie, A.; Numbuk, S.; Ross, J.; and Yaman, C. 1986. A Rapid Rural Appraisal of Agriculture, Nutrition and Health in Wosera Sub-district, East Sepik Province. A report prepared by the Papua New Guinea Institute of Medical Research, pp 1-120.

Heywood, P.; Singleton, N.; and Ross, J. 1988. Nutritional status of young children - the 1982/83 National Nutrition Survey. Papua New Medical Journal 31:91-101.

Hiawalyer, G. 1996. Health Information System for Non Communicable Diseases. *In* Report on Course in Nutrition Education (Diabetes). 7-11 October, 1996. Port Moresby.

Hide, R.L.; Allen, B.J.; and Bourke, R.M. 1992. Agriculture and nutrition in Papua New Guinea: some issues. Paper prepared for the National Nutrition Policy Workshop, Madang, 17-21 February 1992.

Jorari, A.; and Laisa, M. 1996. Population Projection for Citizen Population of PNG for period 1990-2020. Research Project No. 4 of Project PNG/94/POI,NPO/NSO/UNFPA/ILO, Port Moresby.

Jenkins, C. 1992. Issues in the promotion of improved health and nutrition in Papua New Guinea. A paper prepared for the Interdepartmental Food and Nutrition Advisory Committee, National Nutrition Policy Workshop, Madang, 17-21, February 1992

Marks, G. 1992. Effectiveness of Current Nutrient Programmes and Action Plan for 1991-1995. Mission Report, WHO and Government of Papua New Guinea.

Malau, C. 2000. The HIV/AIDS Epidemic and Implications for Development and Food Security in Papua New Guinea. Papua New Guinea Food and Nutrition 2000 Conference. Food Security for Papua New Guinea. 26-30 June 2000, Rose Kekedo Covention Centre, Papua New Guinea University of Technology.

National Nutrition Survey (NNS) 1982-1983.

National Statistics Office. 1990. Population Census.

National Statistics Office, 1994. Report on 1990 National Population and Housing Census in Papua New Guinea. National Statistical Office, Port Moresby.

Noah, J. 2000. Food Security: Some macroeconomic dynamics in ensuring food security. A paper presented at the Papua New Guinea Food and Nutrition 2000 Conference. Rose Kekedo Convention Centre, Papua New Guinea University of Technology, Lae. 26-29 June 2000.

Posonai, E.P. 1986. Household Food Security: with Particular Reference to the Identification of Households with Food Security Problems in Four Selected Districts in Papua New Guinea. Monograph Series 2, Port Moresby: Department of Health.

Taufa, T. 1996. Changing lifestyle, mine development and its consequences. *In* Report on Course in Nutrition Education (Diabetes). 7-11 October, 1996. Port Moresby.

World Bank.1997. Papua New Guinea: Accelerating Agricultural Growth – An action Plan, Washington DC.

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Food Security Strategies for Papua New Guinea: Comments

R.D. Ghodake[*]

The concept of food security referred to here is a state of affairs where all people at all times have access to safe and nutritious food in sufficient quality and quantity to maintain a healthy and active life.

Even with a simple definition of food security, the issue of food security in Papua New Guinea becomes multidimensional and very complex to comprehend, appreciate, and resolve. The issue not only involves production, processing, distribution, marketing and consumption of quality and nutritious food, but also links to income, employment, income distribution, health, education, gender, infrastructure, environment, natural resources, and overall sustainability. The level of food security directly manifests through hunger, mal-nutrition, and poverty and indirectly reflects on law and order, unemployment, income disparities, isolation, resource degradation, social disorder and retarded human and national growth. This complexity is further confounded due to lack of adequate data and information covering cross sections and time series.

The country report for PNG analyzes and presents various dimensions of food security, including availability and access to food, institutional arrangements, agro-ecological and socio-cultural settings, bio-physical potential, environmental uncertainty, vulnerability of farming systems, research and technology, import and export, and government policies. It also looks at household food availability, access, consumption patterns, nutritional quality and sufficiency. Special coverage is provided to the PNG National Food Security Policy - 2000 -2010.

PNG is considered to be blessed with mineral, agricultural, forestry, fisheries and marine resources, a congenial climate for all-year agricultural production, and a small population relative to agricultural land-mass. However, malnutrition in PNG is one of the highest in the world, with key socioeconomic indicators, such as infant mortality, life expectancy, schooling, sanitation, and per capita income, being much lower compared to those for other lower-middle income countries and East-Asia Pacific region. The country is classified by FAO as one of the 77 low-income food deficit countries.

PNG produces adequate starchy food through root and tuber crops and bananas, but imports a high volume of cereals, cereal-based products, meat, oils, fruits, feeds and agricultural inputs Food imports have risen from over K200 million in 1994 to almost K600 million in 1999. An aggregate current demand for rice and grain imports in the country is estimated at 303,000 tons with a total sale value of K526 million per annum. This gives a per capita consumption of 70 kg per annum and that contributes about 1/5th to the total national calorie intake.

Furthermore, the food imports also show a drastic rising trend, and therefore have obvious and serious implications for food security and self-reliance of the nation. For example, rice imports increased marginally from 126,498 tons in 1988 to 130,352 tons in 1994, giving an annual growth rate of only 0.6%, but shifted drastically to 169,000 tons in 1998, giving an annual growth rate of 6.1%.

[*] Deputy Director-General, National Agricultural Research Institute, Papua New Guinea.

Policies, programmes and strategies are suggested and envisaged to ensure long-term food security at individual, household and national level in PNG and these are considered to be basic to addressing fundamental inequalities and to improving human rights and welfare in PNG.

Food Security Strategies for the Kingdom of Tonga: Strategies and Challenges

S. M. Halavatau and N.V. Halavatau[*]

Introduction

Geographical background

The Kingdom of Tonga is located in the South Pacific between latitudes 15°and 23° south, and longitudes 173° and 177° west (Figure 1). The Kingdom embraces a large area of the Pacific Ocean (362,000 km^2) but has a land area of only 750 km^2 distributed over 171 islands, 41 of which are inhabited. The Tongan archipelago may be divided into four island groups – Tongatapu in the south, which consists of Tongatapu and 'Eua islands; Ha'apai in the center; Vava'u in the north; and the Niuas which consist of Niuatoputapu, Tafahi, and Niuafo'ou in the extreme north. Tongatapu, which is the main island, lies about 1,900 km northeast of New Zealand and about 760 km southeast of the Fiji islands.

The Kingdom has soils that are quite fertile with very good physical properties. With a subtropical climate, Tonga is endowed with natural resources which its people can utilize to meet their food needs while at the same time maintaining the balance of the environment.

The country is populated by 97,784 persons with a sex ratio of 103 females to every 100 males (Statistics Department 1999). About 30% of the population lives in the capital area of Nuku'alofa, in the main island of Tongatapu. Most households (54%) are involved in agriculture, fishing, or making handicrafts.

What is food security?

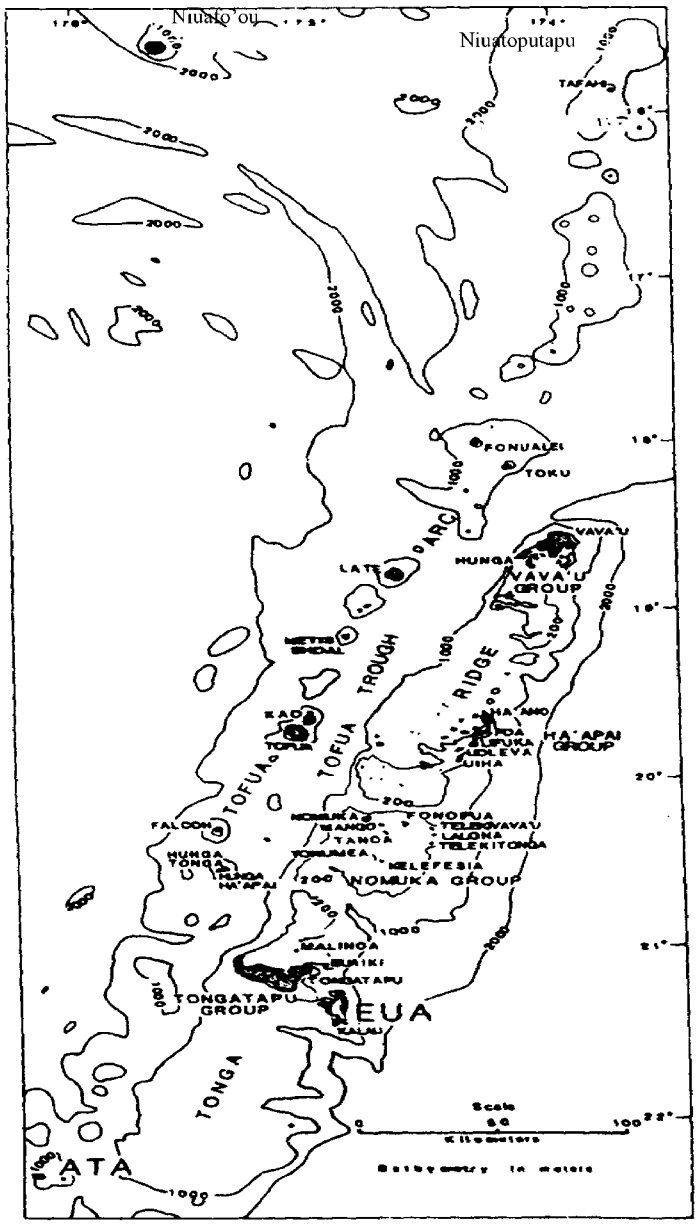
In 1996, the World Food Summit agreed that: food security exists when all people, at all times, have physical and economic access to sufficient food to meet their dietary needs and food preferences for an active and healthy lifestyle. Food security requires an available and reliable food supply at all times. At the national and regional/provincial levels, food supply can be affected by natural disasters (cyclones, and droughts), lack of effective agricultural practices, and restrictions on trade. Government policies that create an environment for economic growth with equitable distribution and competitive markets can improve food availability.

At the community/household level, food security is essentially a matter of access to food. Insecurity can be temporary/transitory or chronic. Individuals need access to sufficient, safe and nutritious food, both in quantity and quality. They also need adequate health services, and a healthy and safe environment, including a safe water supply.

This paper will discuss the results of a study of the food security situation and strategies in the Kingdom of Tonga. The general objectives of the country study were to assess the food security situation in Tonga and the problems faced, identify effective strategies, and help formulate appropriate policy options for solving the respective problems.

[*] Chief Soil Scientist and Chief Executive, Extension, Ministry of Agriculture and Forestry, Tonga.

Figure 1 Map of Tonga showing the different island groups.



Government's policy approach to food security

The Kingdom of Tonga's main objective over the years has been to achieve a sustained increase in economic growth, employment, and the promotion of equitable distribution of

income within the context of price stability. The government also maintained a special emphasis on the development of health services and access to education.

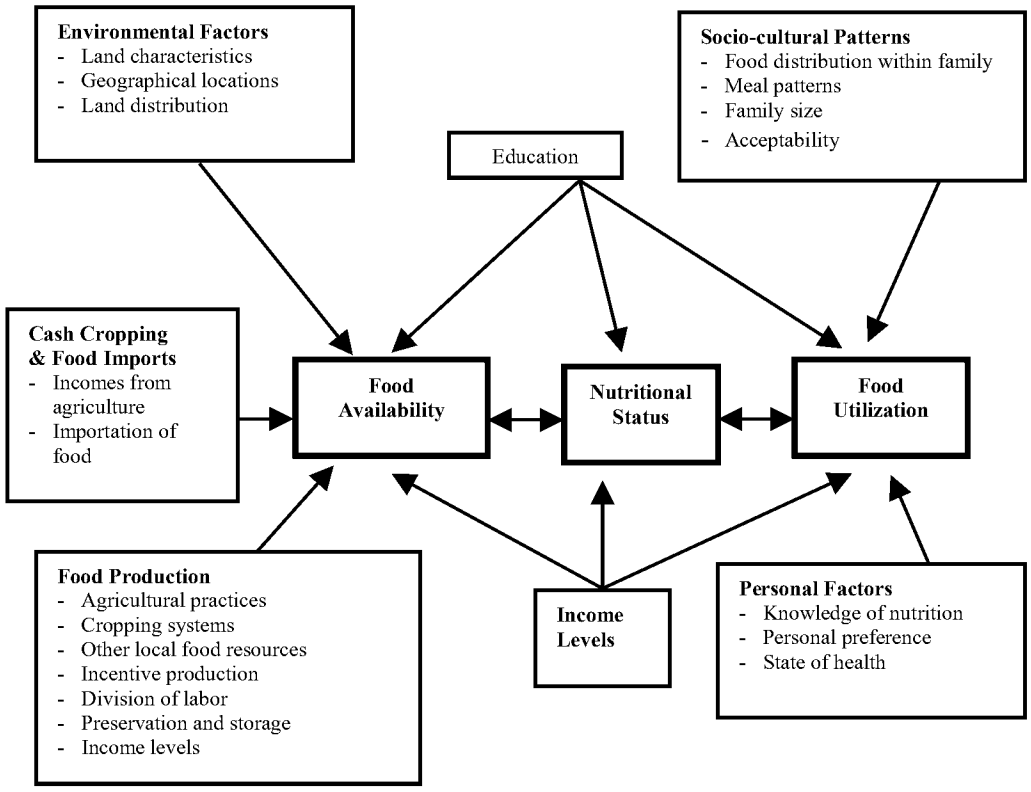
At the sectoral level the Ministry of Agriculture and Forestry is mandated with agricultural production for export and food security; the Ministry of Fisheries for the development of fisheries for export and domestic consumption; the National Food and Nutrition Committee for food and nutrition; the Ministry of Health to make health services available and readily accessible to all; and the Ministry of Labor, Commerce, and Industries in the area of trade and increased employment opportunities.

Progress in ensuring food security

Availability of staple crops

There are several factors that determine the kind and amount of food produced, accessed, and consumed by Tongans. Figure 2 shows the food supply systems in Tonga and the factors influencing the supply/availability and utilization of food and consequently the nutritional status of the people.

Figure 2 Food supply systems in Tonga.



It is very clear from Figure 2, that the availability of food is determined by (i) food production factors; (ii) cash cropping (including export) and importation of food; and (iii) environmental factors. Food utilization is influenced by socio-cultural patterns and personal

factors. The nutritional status of the community is then, influenced by the food available, which is also dependent on people's income levels, level of education and how food is utilized.

Farming systems

Staple crops are produced in several farming systems. The traditional Tongan farming systems are complex and have proven to be robust and productive (World Bank 1990). They are fundamentally agroforestry systems utilizing bush or grass fallow followed after several years by a series of root crops intercropped with coconuts and other trees to create a rotational, multistoreyed fallow system (Kunzel 1989; World Bank 1990).

Halavatau and Asgher (1989) characterized cropping systems of Tonga in terms of the R-factor of Ruthenberg (1983) [R=cropping period/cropping + fallow period x 100]. On this basis the farming systems of Tonga could be divided into sedentary shifting cultivation systems (R<33%), fallow systems (33<R<66%), and permanent cultivation systems (R>66%). Schroder et al. (1983) reported that in Tonga, a piece of cultivated land should revert to fallow at a land utilization index (R-factor) of 37.5%.

Livestock is an integral part of all the above systems. They provide sources of protein for the households and are also used for cultural presentations and social obligations. Pigs and chickens are left free ranging or are penned. Goats, cows, and horses are either tethered or kept in paddocks. In the outer islands, fishing is also an integral part of household food production systems.

Halavatau (1992) and Halavatau and Asgher (1989) discussed sustainability of traditional farming systems. These studies reported that the features which ensure ecological stability in the indigenous cultivation systems include:

- Resilience to variable weather conditions that is achieved by phased planting (staggered planting). This assures that different age structures of the same crop exist on the same field, spreading the risk of damage due to adverse weather conditions.
- Resilience to pest, disease and weed infestations is achieved by multiple cropping, since crops differ in their susceptibility to these threats.
- Minimized soil degradation through practices such as limited ploughing (once per crop or per crop rotation), mulching (e.g. vanilla), leaving selected trees in the site, and maintaining ground cover through combinations of sequential and relay intercropping.
- Conservation of soil fertility through the recycling of organic matter such as weeds, crop and other residues, left *in situ*, and the use of fallow to regenerate fertility
- Conserving water by using mulch and maintaining ground cover.
- Multiple cropping also serves as protection against soil erosion.

The data for domestic staple crop production vary in accuracy and coverage of the whole country. Tables 1a and 1b give data on crop production for 1986 and 1996.

Tables 1a and 1b show that in most years (unless there is a cyclone or drought) there is enough staple root crop production to provide the energy requirements of Tongans. The yield estimations took into consideration the waste, amount sent overseas and the amount used for seed. The decline in production for Tongatapu and Niuas in 1996 compared to 1986 can be attributed to an error in the estimation of the cropped areas during the crop surveys. For Tongatapu, the decline in area of root crops can also be seen as an effect of the production of export crops like squash. The crop surveys were conducted towards the end of the squash season (before December), at a time when many squash growers had not planted their staple root crops.

Table 1a Crop areas and production by island types for 1986.

Crop	Tongatapu		Vava'u		Ha'apai		'Eua		Niuas		Total	
	Acres	Tons	Acres	Tons	Acres	Tons	Acres	Tons	Acres	Tons	Acres	Tons
Yam	5,050	6,060	1,636	1,963	754	905	829	995	259	311	8,528	10,234
Colocasia	1,114	1,501	102	137	27	36	149	201	83	111	1,475	1,987
Xanthosoma	5,090	6,617	841	1,093	554	720	773	1,005	80	104	7,338	9,539
Sweet potato	462	835	17	31	67	121	49	88	2	4	597	1,079
Cassava	6,894	17,235	1,522	3,805	1,616	4,040	413	1,032	163	407	10,608	26,519
Alocasia	3,148	5,666	2,442	4,395	668	1,202	643	1,157	555	999	7,456	13,419
Musa family	2,340	9,584	341	1,397	387	1,585	234	958	93	381	3,395	13,905
Total	**24,098**	**47,498**	**6,901**	**1,282**	**3,723**	**8,609**	**3,090**	**5,436**	**1,235**	**2317**	**39,397**	**76,682**
Population	63,794		15,175		8,919		4,393		2,368		94,649	
Capita/year	0.34	0.744	0.45	0.845	0.42	0.965	0.70	1.24	0.52	0.978	0.42	0.810
kg/capita/day	-	2.04	-	2.31	-	2.64	-	3.39	-	2.68	-	2.22

Table 1b Crop areas and production by island types for 1996.

Crop	Tongatapu		Vava'u		Ha'apai		'Eua		Niuas		Total	
	Acres	Tons	Acres	Tons	Acres	Tons	Acres	Tons	Acres	Tons	Acres	Tons
Yam	2,768	6,090	1,600	3,520	505	1,111	589	1,295	75	165	5,537	12,181
Colocasia	665	1,995	100	300	20	81	123	369	31	93	939	2,838
Xanthosoma	1,153	7,495	840	4,200	550	2,216	677	2,001	9	54	3,229	15,966
Sweet potato	1,684	4,210	17	43	67	167	681	1,702	18	45	2,467	6,167
Cassava	2,237	17,896	1,500	7,500	1,600	6,400	226	1,356	27	105	5,590	33,257
Alocasia	400	2,800	2,400	7,200	600	2,400	27	189	15	105	3,442	12,694
Musa family	584	3,000	340	2,000	380	2,280	353	2,110	100	600	1,757	9,980
Total	**9,491**	**43,486**	**6,797**	**24,763**	**3,722**	**15,175**	**2,676**	**9,002**	**275**	**1,167**	**22,958**	**93,083**
Population	66,979		15,715		8,138		4,934		2,018		97,784	
Capita/year	0.14	0.649	0.43	1.57	0.46	1.86	0.54	1.83	0.14	0.578	0.23	0.952
kg/capita/year	-	1.78	-	4.30	-	5.09	-	5.01	-	1.58	-	2.61

Availability of livestock

Table 2 gives the number of livestock by type and by island group. The data show that there are enough domestic livestock animals in Tonga. Some of the animals like cattle and pigs are mostly slaughtered for social (weddings, birthdays, and funerals) and religious functions. In a week of church conferences, 250 to 500 piglets can be slaughtered in a day. Such mass slaughtering has impacts on food availability.

Table 2 Number of livestock animals by type and by island group.

Livestock	Tongatapu		Vava'u		Ha'apai		'Eua		Niuas	
	1986	1999	1986	1999	1986	1999	1986	1999	1986	1999
Cattle	6,083	3,927	1,533	1,680	374	638	1,274	856	54	91
Pigs	49,387	12,706	13,715	9,071	8,341	7,200	494	6,404	4416	3,819
Horses	5,148	800	2,587	323	1,387	433	986	535	467	309
Goats	7,061	1,868	2,942	224	2,421	350	900	112	615	146
Chickens	170,817	34,500	42,193	14,270	31,339	4,233	10,508	13,127	11,254	8,470

The decline in livestock numbers in 1999 can also be attributed to underestimation of the different livestock populations.

Availability of seafoods

Fisheries data were, however, difficult to obtain both at the national as well as at the regional level. There are no available statistics on fish and shellfish landings for the whole of Tonga or by island group. Table 3, however, shows the fish and shellfish landings at two sampling sites in Tongatapu. The fish caught throughout the Kingdom in a year was estimated at over 3,000 tons.

Table 3 Fish and shellfish landings (tons) at Faua and Vuna wharf in Tongatapu.

	1993	1994	1995	1996	1997	1998
Fish landing	165	318	170	78	137	190
Shellfish landing	100	75	47	45	-	-

The difference in catch between the years is partly due to the occurrence of bad weather and missing days in which fishermen did not go to sea.

The food availability from local production is adequate in terms of quantity. There is more than enough staples available in a normal year. Local meat and fish are also estimated to provide enough protein; however, socio-cultural demands may threaten the adequacy of protein sources.

When all foods were considered (including imported foods), the average per capita food availability was shown to have grown from 3,200 kcal per day in 1983 to 4,053 kcal per day in 1999 (Table 4). Increased domestic production is not solely responsible for the increased food availability but regrettably high levels of food importation are also involved.

Table 4 Nutrient availability.

Year	Nutrients			Crop Production			Animal Production		
	Energy (kcal)	Protein (g)	Fat (g)	Energy (%)	Protein (%)	Fat (%)	Energy (%)	Protein (%)	Fat (%)
1983	3,200	67.3	105.8	83.0	55.6	58.0	17.0	44.4	42.0
1986	3,394	93.0	46.0	83.9	37.0	12.7	16.1	63.0	87.3
1999	4,053	108.0	73.2	79.6	43.6	9.2	20.4	56.4	90.8

It is interesting to note that in 1983, the protein availability was more from crop/plant origin. At the national level, nutrient availability is more than adequate. If food adequacy indices for energy and protein were worked out, they would both come to over 100%. The recommended daily intakes for energy and protein are both below the national average for Tonga. It is also interesting to note that the per capita root crop per day for the various island groups of Tonga (Table 1a and 1b) ranged from 1.58 kg to 5.01 kg. This accounted for a large percentage of the daily energy requirement not counting the other sources eaten everyday like bread type foods.

The other important aspect of food availability in Tonga is the change in diet composition (dietary habits), indicating a rise in the share of low quality imported foodstuffs. Table 4 shows that in 1996 and 1999, the shares of animal protein and animal fat were quite high. A large percentage of the animal source is fatty meat (mutton flaps, forced-fed chicken) and tinned meat and fish. This dietary change and more sedate lifestyles have resulted in high incidences of overweightness, obesity, and their associated non-communicable diseases.

The availability of clean, and safe water for cooking and drinking is very vital for food security in Tonga. People access water either as rainwater harvested in tanks, or as groundwater from a thin lens of freshwater on highly porous limestone substrate. The bigger islands like Tongatapu, Vava'u, and 'Eua access both groundwater and rainwater, whereas smaller islands with no water lens, access only harvested rainwater. In the bigger islands, groundwater is chlorinated, and is mostly used for cooking and other household uses but is not commonly drunk by people. Most Tongans have access water but during prolonged droughts, water is distributed to the people in smaller outer islands. The question of clean and safe water is very important, especially since much diarrhea in children is caused by unclean water.

Stability

Tropical cyclones, droughts and disease outbreaks are the major threats to agriculture and food production. On average, Tonga is hit by a tropical cyclone every four years. Recovery from the aftermath of a cyclone is usually quite rapid, and food production can return to the pre-cyclone level within 6 months. It is when two cyclones hit the country in consecutive years that agriculture and food production take longer to recover and can be compounded by disease outbreaks such as anthracnose in yams. Droughts have a longer-term impact on agriculture and food production than cyclones due to impacts on production as well as on supply of planting materials. There are also instances when a cyclone follows a drought as in the case of Cyclone Cora in December of 1998 causing severe damage to the remaining crops after the drought. The damage to agriculture was estimated at US$ 10 million.

The supply of domestic food items in the local markets can be used as an indication of the vulnerability of production. Figures 3 and 4 show that the fluctuation in supply of crops to the market is related to the effects of the prolonged drought followed by Cyclone Cora in 1998. Figure 3 clearly shows a sharp drop in supply of the 3 selected crops in 1998 because of the prolonged drought. Because of the good weather following the aftermath of the cyclone, there was a quick recovery in production and supply to the market in 1999.

Figure 3 Supply of crops at Talamahu market by year.

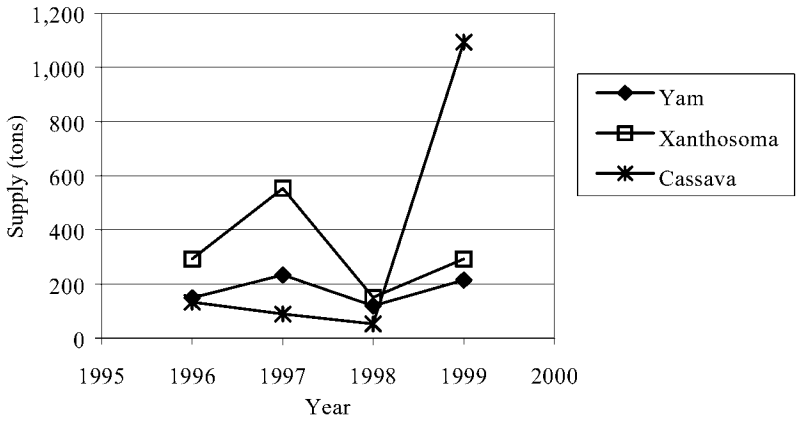
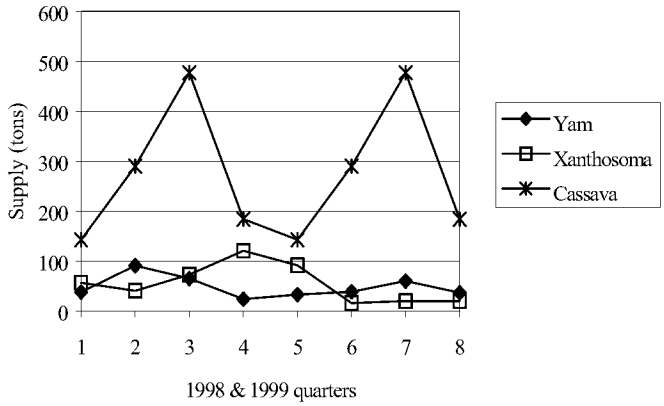


Figure 4, however, shows that the supplies of the three root crops were lowest between the last quarter of 1998 and the 2nd quarter of 1999 laying support to the theory that the decline in supplies of these were caused by the drought and the cyclone.

Figure 4 Quarterly supply of crops to Talamahu market in 1998 and 1999.



Role of agricultural trade in the economy

Agricultural production is still the predominant activity in the economy of Tonga and continues to dominate the value-added contribution to GDP. The contribution was more than 40% in the 1980s, but it fell below 40% from 1993/94 to the present.

Depicted in Table 5 are the percentages each sector contributes to GDP. The contribution of agriculture to the GDP is falling from a peak of 34% achieved in 1994/95. The services sector, on the other hand, has recorded increases in its contribution to the level of GDP, indicating a gradual diversification from the agricultural sector to the services sector. This gradual diversification from the heavy reliance on one sector will assist in diversifying and broadening the economic base in order to strengthen the economy against future exogenous shocks. Moreover, with services the problems associated with isolation, weather and economies of scale are mitigated.

Table 5 Annual share of GDP (%) at constant prices, by industries.

Sector	1993/94	1994/95	1995/96	1996/97	1997/98	1998/99
Agriculture, forestry, and fishery	32.2	34.0	32.0	31.5	30.8	29.9
Mining and quarrying	0.3	0.5	0.4	0.4	0.4	0.4
Manufacturing	3.2	2.7	3.1	3.2	2.9	3.2
Electricity and water	1.7	1.7	1.8	1.8	1.8	1.8
Construction	5.6	5.6	6.0	5.2	4.9	5.3
Commerce, hotels, and restaurants	11.7	10.8	10.5	10.1	10.8	11.0
Transport and communication	6.1	6.0	6.3	6.5	6.7	6.9
Finance and business services	5.4	5.4	5.3	5.5	5.9	6.1
Government administration and community services	14.6	14.6	15.6	16.5	16.5	16.2
Ownership of dwellings	3.0	2.8	2.9	3.0	3.0	2.9
Entertainment, recreation and personal services	4.0	3.8	4.0	4.2	4.2	4.2

The contribution of agricultural exports can be seen from the foreign currency earned from exports between 1994 and 1999 (Table 6). It is quite clear that squash has dominated exports for quite some time. However, the export of staple crops and other traditional crops has contributed significantly to the export economy. Squash, vanilla, and recently kava are the main foreign currency earners.

Table 6 Agricultural exports for 1994 - 1999.

	T$ (000)					
	1994	1995	1996	1997	1998	1999
Export	16.29	16.68	11.94	11.23	7.56	16.61
Squash (net)	4.7	4.2	3.9	5.8	4.1	2.4
Squash (ton)	16,545	8,290	12,789	11,839	7,238	18,268

Source: Statistics Department, 1994 to 1999.

The effects of agricultural exports on food security are: (i) some of the money generated from export is used to procure food for the households; (ii) the large area lost to export crops like squash is a loss to staple crop production; and (iii) the large amount of waste (about 30%) represents potentially consumable food.

Domestic markets

The marketing chain for local foods is quite well established in Tonga as a whole. Tongatapu has two market centers and all other island groups have one market center each, except Ha'apai with no market center. The markets in Tongatapu and Vava'u operate every day, whereas the markets in the other islands operate only on the weekends. Apart from these markets, people put up their own stalls on the roadsides and sell agricultural produce.

The price of locally available agricultural produce is not regulated. This means that farmers can put up prices to outrageous levels whenever they want. This usually happens after a natural disaster or when produce is sold out of season. The prices are sometimes beyond the buying capacity of low to medium earners. The supply of local food in the domestic markets, especially in Tongatapu and Vava'u provides ready access to the communities every day. The supply is quite regular unless interrupted by natural disasters.

It is also interesting to compare the prices of local foods and their equivalent imported counterparts. Table 7 gives some of the local foods and their counterpart imported equivalents and their prices.

Table 7 Comparisons of the prices of local and imported foods.

Food Item	Energy		Food Item	Protein	
	$/kg	$/1000 kcal		$/kg	$/kg protein
Taro	$1-10	$1-22	Beef rump	$8-00	$24-26
Yam	$2-00	$2-50	Mutton flaps	$3-45	$15-40
Cassava	$0-41	$0.30	Corned beef	$8-20	$56-55
Rice	$1-50	$1-22	Fish	$4-00	$17-24
Cabin biscuits	$3-40	$1-03	Octopus	$3-00	$17-34

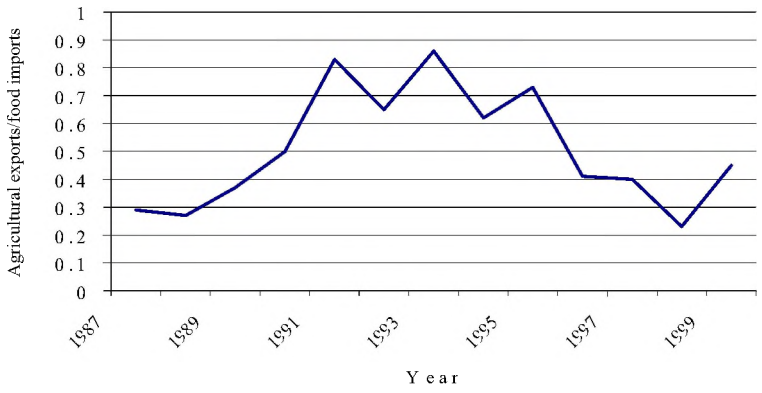
The prices show that imported foods are as cheap as the local food and most times are easily available. Even though mutton flaps may be inferior to fish many will buy them because they are easily available. Cassava is the cheapest source of energy, but it is also nutritionally the poorest.

Food imports

Food imports have been a concern in Tonga for many years and are currently over T$20 million per annum (Statistics Department 1999). In 1999 food imports accounted for more than the total export. Meat accounts for most of the food imports followed by cereal products, dairy products, and sugar and confectionery. It is the authors' contention that Tonga does not import according to food need but rather more because of luxury demands.

The ratio of the value of agricultural exports to the value of food imports is probably the most useful indicator of Tongan agricultural performance over time. The ratio further declined from 0.5 in 1986 (Hardaker et al. 1988) to 0.27 in 1988 (Figure 5), but picked up after that and peaked at 0.86 in 1993 and thereafter declined to a low of 0.23 in 1998 before picking up in1999. The recovery of the ratio after 1987 can be explained by the introduction of squash pumpkin to the economy. After 1989, squash became the major export for Tonga with an increasing contribution to the economy. The low ratio in 1998 was caused by the poor squash crop, because of the drought, and the very low contribution by vanilla to the export economy in that year. The Kava export was second to squash pumpkin in 1998 contributing over T$2 million. If the country imports foods in accordance to food needs, then the ratio will be higher, reflecting a better performance for agriculture.

Figure 5 Agricultural performance in Tonga, 1987-1999.



Risk coping systems

Improving food security has three dimensions: (i) to ensure a sufficient food supply both at the national level/regional level and at the household level; (ii) to have a reasonable degree of stability in supply of food both from one year to the next and throughout the year; and (iii) to ensure that each household has the ability to produce or procure food that it needs. The following are areas where some efforts have been taken to achieve food security:

- Overall development strategy and macro-economic policies: It has been the objective of government in its past development programs to promote economic growth with equity. These contributed to the sustainability of food security programs in the long run.
- Increasing food and agricultural production: Policies and strategies have been in place to increase and stabilize food and agricultural production of the population. These include programs that enhance productivity such as improving access to inputs, credit and other agricultural services and to markets through improved infrastructure. Strengthening of community participation in food and agricultural production, especially women, has been a major effort to date.
- Improving access to land: It is a fact of life that a large proportion of Tongan males are landless. However, a large portion of arable, agricultural land is lying idle due to owners not cultivating them or having left the country. Government has introduced

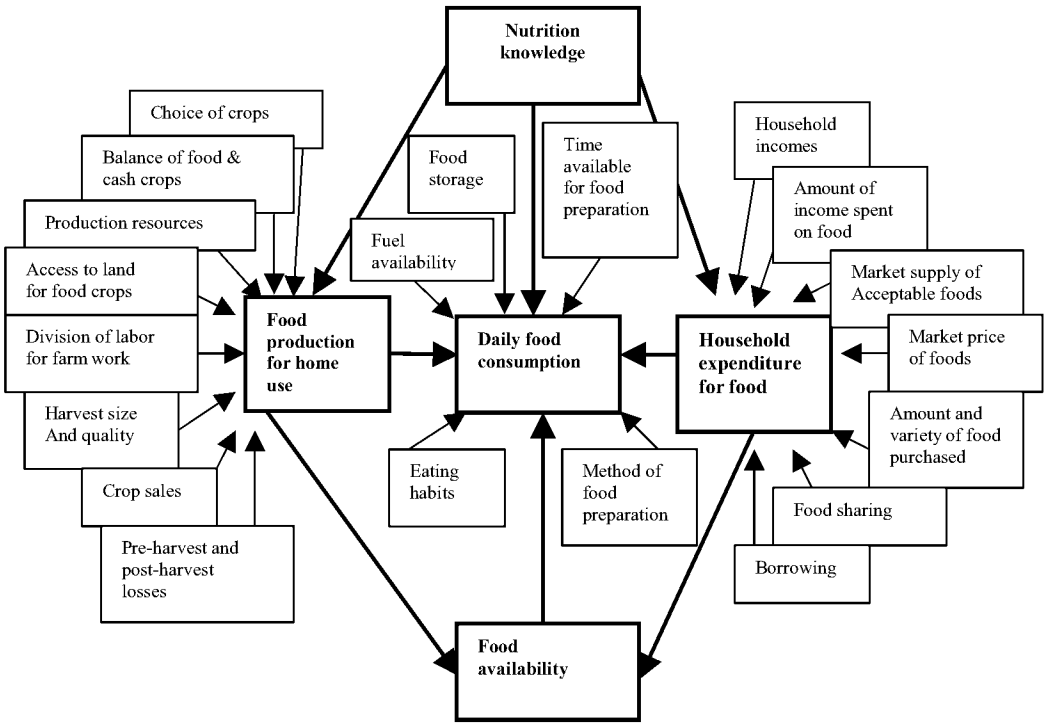
lease legislation allowing more flexibility for farmers to lease land by mutual agreement with landholders. This has opened up more land for more farmers for increasing food and agricultural production.

- Improving emergency preparedness planning. Natural disasters such as droughts and cyclones lead to food insecurity in the short run. Establishing an effective early warning system and a pre-determined contingency plan of action will strengthen the capacity to cope with emergencies. The Ministry of Works is mandated with this role and is now coordinating all government bodies and private sector participation in disaster preparedness.
- Food aid: Food aid can play a very important role in improving household food security during emergencies. This has been done in times of crisis only as a backstop, while farmers recover and replant their plantations.
- Strengthening the coping mechanisms of households to meet emergencies: Government has responded in times of crisis by providing households with seeds for growing short-term crops, livestock feed, water, and food aid.
- Proper use of soil: The soil is the main medium of food and agricultural production. Its proper, sustainable use is paramount to sustaining food security. To this end some categorization has been made to ensure proper utilization, namely (i) areas which can sustain intensive cropping and high levels of population and consumption; (ii) prevent areas, where agricultural development should be avoided; and (iii) restoration areas, where land has lost its productivity, and must be left undisturbed to allow natural recovery processes to proceed. A start has been made in Tonga by declaring certain areas as national and forest reserves. Policies are needed to put this land categorization into practice.
- Water management: Wise use of water is now being investigated. Where and when water is scarce, supplementary irrigation should be employed to sustain production. Irrigation policies are now being developed.
- Chemical awareness programs: The present agricultural export crops and some of the food crops demand the use of pesticides and fertilizers. Their potential drawbacks have raised concerns from the public, including (i) the runoff of N and P from excess use of fertilizers damage water resources; (ii) pesticides contaminating groundwater and surface water; (iii) health risks of chemical use to the people; (iv) chemicals traveling through the food chain; (v) off-site effects of chemicals on fish in the ocean; and (iv) chemical contamination of fresh produce and pesticide residues in food.
- Technology transfer: Sound crop protection techniques are traditionally generated in research stations and then transferred to farmers through extension systems. On-farm trials are also practiced where farmers are involved in the problem diagnosis, project planning and implementation. This will ensure sustainable production and a high degree of adoption since farmers feel that they own the project.
- Promoting healthy diets and lifestyles: Promoting better eating habits and positive health behavior is one of the most challenging tasks in overall efforts to improve nutrition. In addition, to access a variety of safe and affordable foods, people need accurate information on what constitutes a healthy diet and how they may best meet nutritional needs. Besides education, strategies to promote healthy diets must include providing motivation and creating opportunities for people to change behavior recognizing individual preferences, lifestyles and often time constraints.

Household access to food

The most important aspect of food security is household access to food. Access to food in the households can either be from own food production or purchased from the market (Figure 6). Most Tongan households are involved in agricultural activities either for export and/or domestic consumption. More than 50% of Tongans aged 15 years and above were stated as economically active in the 1996 Population Census. All Tongans have access to food whether from own farm production or from markets. The question is, if they do not produce their own food, do they have enough cash to purchase their food needs. Many of those in the work force (government or private sector) are paid about T$50 to $70/week. Unless these families grow their own food or receive remittances from overseas, they will be struggling to meet their household needs.

Figure 6 Food security mechanisms in Tongan households.



Household income

A comparison of household incomes in urban Nuku'alofa, rural Tongatapu and the outer islands revealed the following: (i) most households in the outer islands like the outer lying islands of Ha'apai, Niuatoputapu, and Niuafo'ou do not have much cash on hand; (ii) most households in rural Tongatapu earn from their farm but also have other incomes, like labor wages from working groups in the villages (toungaue), selling handicrafts, or wages from jobs in Nuku'alofa. Other sources of incomes for coastal rural areas and outlying islands of Ha'apai are fishing and handicrafts; and (iii) a large percentage of households whether in urban Nuku'alofa, rural Tongatapu, and the outer islands still receive money through foreign

remittances. There is a notion that there is decline in foreign remittances, but it appears to be still very much alive.

Expenditure patterns

The main expenditures by household irrespective of whether from urban, rural, or outer island communities are on food items. In urban Nuku'alofa, most households purchase most of their food needs. In rural areas, a large percentage of the food for households is from their own production, whereas households in the outer islands provide their own staples, but purchase some of their protein requirements as tinned fish and corned beef. Second in importance to purchasing food in expenditures for households in urban Nuku'alofa and rural areas is paying bills (electricity, water, and telecommunications). Many rural households and some from urban Nuku'alofa buy a substantial amount of production inputs.

For average households, expenditures are usually more than incomes, but remittances from relatives overseas supplement incomes. There are three other mechanisms that many households resort to in order to acquire food needs: (i) borrowing money from relatives or friends in time of need; (ii) food sharing with relatives and close friends; and (iii) a large proportion of households in Tonga have credit in retail shops in the villages. Having credit ensures that the household commands foods (mostly imported) all the time.

Food consumption

The true traditional diets of local foods are only found in the outer islands basically because they are not easily accessible compared to imported foods and bread/butter/sugar drink types of meals. A study on the availability and consumption of food/drinks/snacks by primary school children in Tonga (Halavatau 1999) is a good indication of how Tongans' dietary patterns have deviated from the traditional diets. The study found that about 60% of children in Tongatapu had bread, butter, and sugar drinks for breakfast, with children from the Central District (Urban Area) consuming more of these foods. However, only 8% of the students had Tongan staples for breakfast. The study also found that most students go home for lunch and more than half of them (52%) had mostly bread, butter, and sugar drinks for lunch. About 15% of the students had local staples for lunch compared to only 8% for breakfast. About 23% of students carry cash to school to buy lollies, sugar snacks, and bread type foods. For dinner, about 80% of students had Tongan staples and still some (about 14%) had bread for dinner. About 60% of the students had imported proteins for dinner and only 27% had local protein. The study also found 14% of the children were overweight and 12% were already obese. The results of the survey also reflect what households eat in Tongatapu. The students covered in the study were from all walks of life. What is important in diets of Tongans is that economic status does not influence much what is eaten. On the whole most people eat the same kind of foods for breakfast, lunch and dinner. The fact that most low-income households have credit in retail shops means they can also access foods that high-income households have access to. However, this mechanism of taking goods on credit puts many families in debt, even for life. The dietary patterns shown by this study are true for the other bigger islands like 'Eua, Vava'u, and the bigger and more accessible islands of Ha'apai. This is supported by the study by Adachi et al. (1991) comparing diets and health of the people of Kolofo'ou (urban Tongatapu) and Uiha Island in Ha'apai. The study was conducted for over 15 years and will continue again in the near future. They found that after more than a decade those in Uiha who were overweight but healthy at the beginning of the study were starting to be obese and to have heart problems. This is related to change in their dietary habits. People of Uiha can now easily access the poor quality imported food.

It is also important to note that there are households that do not have adequate food at times to meet dietary needs of individuals, but this happens only sometimes and not consistently.

Overall, the households of Tonga are food secure, but they may not be nutritionally secure. The1986 National Nutrition Survey found 10% of men and 39% of women were severely obese. The fact that there is increasing incidence of non-communicable diseases in Tonga is a manifestation of the insecure nutrition of some of the people. The unpublished 1992 Non-Communicable Diseases and Nutrition Risk Factor Survey found 32% of adults were overweight and 42% were obese. The current state of health of the people of Tonga has resulted from the change in dietary habits to include more imported low quality foodstuffs and also a change in the lifestyles into a less active mode of life. There is improved public transportation and most Tongans have vehicles to commute everywhere resulting in most people doing much less exercise than before. Many people also have more cash to purchase their needs and hence do not need to produce crops. This has resulted in many Tongans becoming less active, and with the kind of food eaten, they can only put on weight and burn off fewer calories and consequently they become overweight, obese, and ultimately have high blood pressure, heart disease, and diabetes.

Risk coping system in households

Households adopt a variety of coping mechanisms and strategies to offset the impacts of production shortfalls, market uncertainties, and nutrition insecurity. The other coping mechanisms will be discussed under private responses and community-based systems.

Most households have bank savings, accumulated assets (later sold if required), diversified incomes, and at times take loans to bolster any shortfalls in household food security. At the household level there is also a need to protect crops from vagaries of nature such as drought and cyclones. When there is a cyclone warning, farmers prune tall crops, prop any crops such as banana and harvest their food needs in case the cyclone arrives. The nutritional knowledge of most households in general is not enough to equip them to make a wise choice of good quality foods. It is also difficult to make a choice, when one knows that to purchase good quality foods means food will not be adequate for the household. That leaves many nutrition literate housewives with the dilemma of buying a small amount of quality food or buying enough poor quality food. Another undermining determining factor is taste i.e. many household for know that mutton flaps are of poor quality but because of taste they will still buy they. That leaves a big need to educate everybody in the household on nutritious food and balanced diets.

Households do not usually act in isolation but in the context of a community. Considerable diversity exists in terms of community-based actions to cope with food security risks. Common fields (toutu'u) are a community-based food production system in which youths or elders of the community grow crops for the households. This is a good system because it tends to pull along the lazy ones by peer pressure. Communities also have labor pools with the objective of making money from weeding people's gardens, but they also grow their own crops in their own allotments managed by their own labor pool. Some communities also have group farm enterprises in which the proceeds are divided amongst the members.

The women also have working groups for producing handicrafts such as tapas, mats, etc. These are primarily for social obligations but some are also sold to help cover some of the household needs. Many communities in the outer islands and also in the bigger islands have annual trade with Tongans from overseas. The locals make tapas, mats, etc. and the overseas Tongans will bring the money to buy the crafts. In this way, the local communities get some income to pay for household expenses. The women's community approach also spills over to the food production and nutrition aspects of the households. Many women's groups keep home

gardens and also conduct nutrition training workshops on food needs and proper nutrition, food storage, and food preservation.

Whenever there is a natural disaster, the community approach seems to be more effective. Households get together and help each other protect property against potential danger from cyclones. They may prepare a house or a church hall to house the community in case the cyclone reaches an emergency situation. After the cyclone, the community will work together in tidying up the damage and helping the households worst hit. They will also help each other with food needs after the cyclone, during the rehabilitation period. In times of drought, communities usually plan group activities to counter the effects of the drought.

Feeding Tongans: the challenges ahead

The challenges ahead for the Government of Tonga are to make available safe, nutritious, and healthy foods for all, through adoption of improved agricultural technologies and regulated food importation. The other challenge is to leave behind on environment with minimum degradation. Tonga has enjoyed adequate food availability, partly because the population growth had been quite low, less than 1% annually in the last two decades. The low growth rate reflects the high migration of people away from Tonga. Based on tighter immigration policies in New Zealand, Australia and U.S.A, the authors predict that the overseas emigration rate will decrease and the population growth will be higher. This is because about 33% of the total population is between the ages 10 to 24 years. We estimate that by the year 2015, the population of Tonga will grow by about 20% to a population of about 117,000 people. This will demand a lot more food than is currently produced and more employment opportunities.

Improved agricultural technologies

The current production of staple crops is adequate to supply energy requirements for all Tongans. The productivity is however quite low, at about 2.5 tons/acre. This was estimated from the total production and total acreage for each year surveyed.

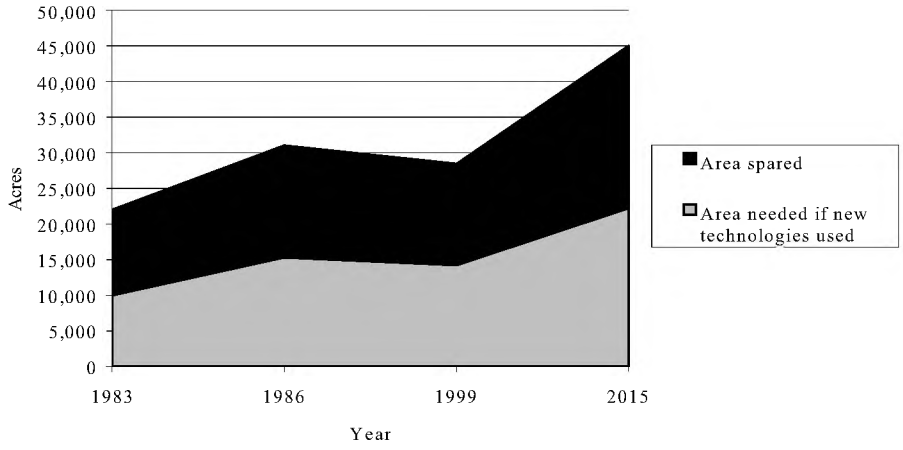
We believe without doubt that the single most important factor limiting crop yields in Tonga is soil infertility, which is compounded by water stress during droughts. Currently, farmers employ weed, insect pest and disease controls on most crops knowing what will happen to production if they do not. Although Tongan farmers have ready access to chemical fertilizers and use them on some export crops, fertilizers are not commonly used on traditional crops, in part because of a belief that yields would not be increased. Halavatau (1998) showed that sweet potato and taro responded significantly to application of nitrogen and phosphorus. Today, with continuing cropping in much of the arable land of the Kingdom, hundreds of tons of nutrients are being extracted annually, without replenishment. We are convinced that the most environmentally friendly action that can be taken, given available knowledge and technology transfer possibilities, is to promote moderate and proper use of chemical fertilizers in an aggressive manner. Sadly our view is not in "fashion" these days. A common assumption among some environmentalists, social scientists and some agricultural scientists, is that the way to improve soil fertility is to adopt low-input technologies, such as mulch farming and the traditional bush fallow systems. There is a lesson for Pacific island countries and poorly informed environmentalists and neo-agriculturists to learn from the decision to invest heavily in chemical fertilizers by China – the most skillful, efficient and extensive user of organic fertilizers.

It is our duty as agricultural scientists to stand up to the growing attack by extremist environmentalists who claim that consumers are being poisoned out of existence by the current

high input agricultural production systems and recommend reversion back to lower-yielding, sustainable technologies. Certainly both environmentalists and agriculturists have professional and moral obligations to warn political, educational, and religious leaders of the Pacific including Tonga about the difficulties of producing adequate, safe, and nutritious foods to feed the growing population of the region. But by the same token, we must realize the fact that we cannot turn the clock back to the 'good old days' of the 1930s, when the population of Tonga was much lower than it is now.

In 1983 22,000 acres were needed to produce 50,000 tons of root crops; 31,000 acres were required to produce 76,637 tons of root crops in 1986; and 28,457 acres produced 71,144 tons in 1999. By the year 2015, about 45,000 acres will be required to produce the estimated 111,150 tons of root crops that will be required by the projected population at the current level of food production technologies. If however improved technologies including fertilizer use were adopted, productivity per acre of 5 tons would be possible (this is still on the low side). Figure 7 shows the impressive savings in land use that could have been used for other agricultural purposes. For 2015, if improved technologies are used, the same area as that used to produce the root crop production of 1983 will be required.

Figure 7 Potential land spared if improved technologies are used.



Most of the increase in food production must be achieved through yield increases on land now under cultivation. Moreover, these increases must be achieved through application of improved technologies and not the so-called low-input technologies.

Food safety and quality

Food availability and access to food are not enough to determine food security of a country. The food must be safe, nutritious and healthy to consume. The most pressing food security problem in Tonga is the increasing incidence of overweight people, obesity and the associated non-communicable diseases, even in school children. The main causes as discussed earlier are people's tendency to overeat and changing dietary habits (tending to eat poor quality

imported food such as lamb flaps, fatty chicken pieces and white flour products) and the lifestyles of people.

To improve this situation, food quality and safety standards must be set-up for domestic and imported foods. The National Food and Nutrition Committee should look at this area and develop specific policies addressing specific areas important for the attainment of adequate nutritional well-being for all Tongans. Such policies will help protect consumers from the likelihood of developing NCDs.

Summing up

At the national and provincial levels, Tonga is food secure in terms of food availability, but may not be when the dimension of nutritional security is added to the equation. At the household level, there are certainly sectors of the population who are threatened by food insecurity. These groups include the landless low-income earners and some of the remote outer islanders.

The majority of rural Tongans and the outer islands still produce their own food whereas a substantial proportion of urban dwellers are net food purchasers. This is related to household incomes – most of Tongans employed are low wage earners and the trend for their expenditures shows that they spend more than they earn. Households also spend most money on food and paying bills. The expenditures of many households are moderated by remittances received from overseas relatives.

The main food security problems in Tonga are related to consumption of too much low quality foods (fatty mutton flaps, tinned food and sugary foodstuffs) and the associated nutrition related problems of overweightness, obesity and non-communicable diseases.

The high incidence of nutritional related diseases is associated with changing dietary habits and changing lifestyles. Most Tongan diets now have a substantial amount of imported low quality foods. Tongans now have access to improved public and private transport rendering them less active so they burn fewer calories and are consequently more prone to NCDs.

The priorities at the national level do not spell out attainment of food security, but objectives such as accelerated economic growth implies food security. Food security is strongly emphasized at the sectoral level in the agricultural, fisheries, nutrition, and the health sectors.

The main determinants of the vulnerability of food security at both the national/provincial and household levels are natural disasters (cyclones, droughts, and pest outbreaks). The government has established a disaster management committee and work is now underway to develop the national disaster management plan and also a disaster management plan for the agricultural sector.

Households also have various food security mechanisms to counter threats of food insecurity. The mechanisms include private responses such as bank savings, diversified incomes, loans, borrowing, and food sharing. The community-based responses include common fields (toutu'u), labor pools, women's working groups, and groups mobilized to act in times of cyclones and droughts.

The main recommendations of the study are:

National

- Government should recognize and prioritize the core issue in food security in Tonga i.e. too much food consumption especially of low quality imported food and the associated non-communicable diseases.
- Government should develop appropriate integrated mechanisms for the implementation of food security, nutrition, and health related activities.

- Key players for each identified policy should be identified and charged with the responsibility of developing the policy.
- Key players for each identified information and research requirement be should identified and given the responsibility for collecting the information and conducting the required research.

Regional

- The possibility of regional cooperation in food security activities should be explored. It could be a regional project on strategies for food security or regional projects on specific aspects of food security. Projects can be initiated in the areas of disaster preparedness and coping systems or in the involvement of youths in agricultural activities.

References

Adachi, M.; et al. 1991. 1991 Tonga Survey of 'The Outline of the Result of the Survey of Health and Nutrition as a Function of Urbanization in Tonga'. Monbusho International Scientific Research Program Project, Japan.

Central Planning Department. 1981. Kingdom of Tonga Fourth Five-Year Development Plan, 1980-1985. Government of Tonga, Nuku'alofa.

Central Planning Department. 1987. Kingdom of Tonga Fifth Five-Year Development Plan, 1986-1990. Government of Tonga, Nuku'alofa.

Central Planning Department. 1991. Kingdom of Tonga Sixth Five-Year Development Plan, 1990-1995. Government of Tonga, Nuku'alofa.

Halavatau, S.M. 1992. Key issues affecting sustainable land management in the Kingdom of Tonga. *In* The Proceedings of the International Conference on Sustainable Land Management (eds: P.R. Henriques). Napier, Hawkes Bay, New Zealand, 17-23 November 1991.

Halavatau, S.M. 1998. The Effects of Soil Fertility Factors on Root Crop Production in Tonga. A PhD Dissertation submitted to University of Queensland, Brisbane.

Halavatau, N.V. 1999. Report on the Study on the Availability and Consumption of Food/Drinks/Snacks by Primary School Children in Tonga. Central Planning Department, Government of Tonga, Nuku'alofa.

Halavatau, S.M.; and Asgher, M. 1989. Land use and conservation farming in Tonga. Alafua Agric. Bull. 14(3):41-47.

Halavatau, S.M.; and Hausia, S.F. 1999. Small Farmer Participation in Export Production:Kingdom of Tonga Case Studies. Paper submitted to IRETA/FAO.

Hardakar, J.B.; Delforce, J.C.; Fleming, E.M.; and Sefanaia, S. 1998. Smallholder Agriculture in Tonga. South Pacific Smallholder Project No. 2. University of New England, Armidale.

Kunzel, W. 1989. Agroforestry in Tonga: A Traditional Source for Development of Sustainable Farming Systems. Occasional Paper 12. South Pacific Smallholder Project. University of New England, Armidale.

Maclean, E.; Badcock, K.; and Bach, F. 1987. The 1986 National Nutrition Survey of the Kingdom of Tonga. Technical Report Prepared for National Food and Nutrition Committee.

Ministry of Agriculture and Forestry. 1997. Annual Report 1996. Government of Tonga, Nuku'alofa.

Ministry of Agriculture and Forestry. 2000. Annual report 1999. Government of Tonga, Nuku'alofa.

Policy and Planning Division. 1999. Talamahu Market Annual Report for 1998. Ministry of Agriculture and Forestry, Government of Tonga, Nuku'alofa.

Policy and Planning Unit. 2000. Talamahu Market Annual Survey Report for 1999. Ministry of Agriculture and Forestry, Government of Tonga, Nuku'alofa.

Ruthenberg, H. 1983. Farming Systems in the Tropics. 3rd Edition. Oxford Uni. Press, New York.

Schroder, P.; Brunold, S.; Muhlbauer, G.; Orth., M.; Peterson, A.; Preissler, R.; Rehfeldt, K.; and Schumacher, A. 1983. Investigation on Current Yield Potentials on Tax Allotments on Islands of Ha'apai and Vava'u, Kingdom of Tonga. Center for Advanced Training in Agricultural Development. Berlin, Germany.

Speremann, D. 1987. Analysis of Rainfall Patterns on Tongatapu, 1887-1987. Dissertation, Australian National University.

Statistics Department. 1988. Kingdom of Tonga Agricultural Census 1985. Government of Tonga, Nuku'alofa.

Statistics Department. 1993. Kingdom of Tonga Statistical Abstract 1993. Government of Tonga, Nuku'alofa.

Statistics Department. 1999. Kingdom of Tonga Population Census 1996: Administrative Report and General Tables. Government of Tonga, Nuku'alofa.

Statistics Department. 1999. Kingdom of Tonga Annual Foreign Trade Report 1999. Government of Tonga, Nuku'alofa.

Tonga National Food and Nutrition Committee. 1995. Tonga Plan of Action for Nutrition.

Tonga National Food and Nutrition Committee. 1995. National Food and Nutrition Policy.

World Bank. 1990. Kingdom of Tonga Agriculture Sector Strategy Review. Report No. 8544-TON. Asian Regional Office.

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Food Security Strategies for the Kingdom of Tonga: Comments

Manase Felemi[*]

Introduction

The paper by Halavatau and Halavatau on the Food Security Strategies for the Kingdom of Tonga is quite comprehensive in its coverage of the issues and the factors affecting food security in Tonga at the national, regional and household levels. The conclusion reached by the authors, that the most pressing food security problem in Tonga is not food insecurity or malnutrition, but one of over-eating is consistent with the views/findings of many development planners, economists and policy analysts.

The paper discusses in great detail the multifunctional aspects of agriculture and how it contributes/influences overall development, including employment generation, income generation and distribution, food security and investment. As pointed out in the paper, a large percentage of the economically active population of Tonga relies on primary production for their livelihood. The primary sector still provides the most important source of employment, foreign exchange earnings and food security.

The authors have has also established that the food security situation, whether of a nation, a region or a household, is a function of the food supply it is able to produce (domestic food supply), its level of income, and the nutritional value of the food consumed. Domestic food supply is influenced by a host of factors including environment, production systems, and access to productive resources. The rising problems relating to access to productive resources, the nutritional value of food consumed and negative impacts of social, cultural and religious values on food distribution and consumption have been also been elaborated by the authors.

This seems to give a gloomy picture (or a declining level) of the social welfare status of the Tongan population. The World Bank (1995), on the other hand, reported that with a per capita income of US$ 1,610 in 1993, Tonga ranks among the lower-middle income group of developing nations. Social indicators, however, reflect living conditions more akin to those prevailing in upper income nations. The infant mortality rate is 9 per thousand; life expectancy at birth is 66 years; 99% of the population have access to safe water; practically all adults are literate; and primary and secondary school coverage rates approach 100%.

This remarkable achievement in social indicators is attributed in part to the consistent private and public sector support for investment in human resources. What is less known to many, and a point that has not been discussed in great depth in the paper, is that religious and family ties play an important role in Tonga's social affairs. Christianity is the official religion in Tonga and religious organisations are deeply involved in providing education and community development services. Also, religion is firmly inter-twined with an elaborate system of extended family ties, which has an important influence on household saving and consumption behaviour.

Although religious, social and cultural values have certain negative impacts on food security as discussed in the paper, they also contribute to improving the food security situation

[*] Deputy Director (Corporate Services), Ministry of Agriculture and Forestry, Tonga.

of many households and in particular the less fortunate ones. The extended family ties and the social system facilitate the sharing of abundant food supplies, and the more equitable distribution of material wealth. Religious functions and obligations have also helped to increase food production and food distribution. Although annual church conferences involve a lot of food being consumed, almost every household usually plans ahead for these functions by planting more food crops or raising more livestock than their normal family requirements. There is more generous sharing and distribution of food and surpluses are often sold in the domestic market for extra revenues for the household.

The authors claim that traditional Tongan diets were considered to be remarkably healthy and nutritionally sound and that changes in the food consumption patterns have resulted in an increasing proportion of nutritionally poor quality imported food being consumed. While there have been changes in the dietary habits/intakes of most Tongans, it is debatable to say that their diets have worsened or that their "traditional" diets were superior in terms of nutritional value. Traditional diets were normally comprised of mainly starchy root crops with little fruit, vegetables and protein, and were not consumed as part of the normal everyday meals. It could very well be that the traditional diets were appropriate for the type of lifestyles people lived in those days, which required more energy to cope with the more labour intensive (physical) tasks they were required to perform. Changes in lifestyles have certainly been witnessed and, although there have been changes in dietary intakes, there is a mis-match between the two.

There is also an increased awareness of the importance of eating quality and nutritious food, particularly amongst the more educated and the younger generations due to better access to health awareness programmes. More and more people are participating in health and fitness programmes, and are more conscious of their health and overall appearance.

Although the paper has identified a number of important policy issues and areas, it has not offered clear strategic options to be pursued in order to ensure sustainable food security for Tonga. However, from the information outlined in the paper on the strengths and weaknesses of the agricultural sector and the food security system in Tonga, the following strategic options could be identified:

(i) In line with the national objective of achieving sustainable economic growth conducive to higher and more equitable distribution of income, a preferred strategy for agricultural development is one that builds on the strengths and potentials of the sector and at the same time helps reduce risks and dangers associated with the weaknesses and constraints it faces. The approach, therefore, should be on improving competitiveness in order to facilitate export expansion and diversification. This should help improve the income level of many households, which will in turn improve their food security situation. Priority should be given to research and development of high value crops that have promising market prospects, especially in niche markets. Niche markets, however, tend to have limited lifespans and thus there is a need for continued research and development of new crops and aggressive market research.

(ii) Root crops and traditional commercial crops continue to offer scope for expansion and should therefore be exploited. Despite their bulky nature, price differentials between the local and export markets, and their relatively low production costs make exports an attractive option. Increased production of root crops for export would also improve the food security situation of the country and households. For some of these crops, it would be a matter of identifying and developing the right variety that would meet the demand and preference of the export markets.

(iii) The realisation of Tonga's agricultural potential calls for the provision of effective and well-coordinated institutional and infrastructural support. Market research is vitally important to ensure the availability of markets for Tonga's export produce. Marketing

support is equality important particularly in relation to measures to provide adequate post-harvest facilities. Research into the viability of potential export crops, plant disease control, appropriate irrigation methods, breeding and planting materials and the productive capabilities of the farming systems is an important pre-requisite to the full exploitation of Tonga's agricultural potential.

(iv) Research into the viability of processing is a priority in order to obtain greater value-added from exports and better returns to the agricultural sector. This should go hand in with the development of high quality standards, to facilitate penetration into highly competitive markets, and the exploitation of opportunities that exist in new and distant markets.

(v) Comprehensive human resource development and training programmes should be launched as a matter of priority focusing on educating the population on the importance of food security and nutrition to overall development and its contribution to improving the productive capacity of individuals.

It is also worth mentioning that a household income and expenditure survey is currently being conducted by the Statistics Department, which should provide more valuable data and information on the consumption patterns of households, their level of income and expenditure patterns, which would help assess their food security situation. An agricultural census is also planned to be implemented towards the end of 2001 with funding and technical assistance from the FAO.

Another point of interest is that government has approved the establishment of a National Codex Alimentarius Committee which is tasked with the responsibilities of developing and coordinating policy matters in relation to the setting up of food standards and control systems for Tonga. This should help ensure that imported food items are safe and their qualities meet the minimum standards considered suitable for human consumption.

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Food Security Strategies for Vanuatu

Shadrack R. Welegtabit[*]

Vanuatu's alarming population growth rate of 3.0% and slow economic growth rate of less than 3% projected for this year must be viewed as a major concern for policy makers. In 1999, the population of Vanuatu was 186,678 with the majority (78.5%) of total population in rural areas. With the current growth rate, the population is expected to double in 23 years. The rapid increase in the general population presents a major concern for social and economic development of the country and its resources to support the people.

Low agricultural productivity compounded by both external and internal shocks continues to be a major concern not only for food security but also for other development issues as well. Economic growth was estimated at minus 2% in 1999 and is expected to recover to over 2% in 2000. Vanuatu's food import was estimated at 3.2% of GDP in 1999. In 1999, the ratio of food import to food export varied between 1.5 and 2.7. However, the trend seems to be increasing indicating greater reliance on imports to support domestic demand for food items.

Food Security means the ability to grow and purchase food as needed. Food security must also focus on other areas such as income levels, domestic and export markets and natural resources. Food security in Vanuatu, is not the case of inadequate food to feed the people. At present, it is more related to what can be termed as hidden hunger or deficiencies of vital micronutrients in people's diets. In rural areas it is more related to people eating unbalanced diets, while in urban areas, it is related to changes in people's eating habits, shifting away from nutritionally rich traditional staples to imported food items.

Poverty as known in other parts of the world does not exist in Vanuatu. People are more or less financially poor, but not materially poor. This is due to many factors but more particularly to land ownership. Approximately 95% of land in Vanuatu is traditionally owned. Therefore access to land by the majority of the population in rural areas means food can be produced for home consumption, and cash crops and livestock can also be raised for cash income. However, with the current rapid population growth rate, more land will be cultivated for food and cash income. Therefore pressure on this fundamental resource is becoming a major concern, which requires addressing to remedy any long-term effects that might occur in the future.

At present sustainable practices play a vital role in safeguarding food security for all people. Farming practices should be adopted that not only boost individual household food production but also cash income to enable the purchase of other goods and services to improve the standard of living. Sustainable use of natural resources should be adopted to ensure that resources are not overexploited.

Food crops, livestock and marine food sources should be examined as sources of food, and income, while maintaining a balance with other life forms for the well being of all living creatures. It must be appreciated that many life forms are interconnected and some are even living a symbiotic relationship with each other such as dead plants and soil organisms that produce humus for other plants and crops. Therefore, any imbalance in their life cycles can adversely affect other life forms. Conservation of all food sources should be viewed as beneficial to all living organisms including food security in both short and long terms. Research

[*] Assistant Research Officer, Reserve Bank of Vanuatu, Port Vila, Vanuatu.

activities should therefore focus attention on developing new methods of food conservation, preservation, processing and marketing.

Past and present policy makers have not given a lot of emphasis to food production to feed the population. Feeding the population is not as simple as perceived by a lot of people. To appropriately address the issue of food security for all people, it must be recognised as complex and in many ways inter-linked with other disciplines within both the public and private sectors. Incorporating programmes and activities from both public and private sectors for food security needs of households and the general public should be seriously considered in light of present factors directly or indirectly affecting food security.

Therefore policy measures should not only target food systems (production to consumption) but also take a broader approach in addressing food security. It must be recognised that the current high population growth rate poses a direct problem for food security, both at household and national levels. There are other issues associated with population growth, such as unemployment, pressure on resources such as land and other life forms. Any future policy instrument undertaken for development purposes should seriously consider the food security needs of the people.

At present Vanuatu is undergoing many changes with its comprehensive reform programme (CRP). Therefore, it is highly desirable that policy measures are undertaken in areas that will accommodate the food needs of the people. Programmes and projects have been undertaken in the past to address the food needs of the people such as the FAO funded root crop project. At present research activities are being undertaken by the Vanuatu Agricultural Research and Training Centre (VARTC) into food crops under its crop diversification programme. Research activities are currently focussing on utilisation, processing and marketing of root crops. It is anticipated that further research activities should be undertaken into collection, production, utilisation, processing and marketing of other food crops, small livestock and marine food sources. Research activities into these other food sources should be investigated to assist food security and income earning capabilities of households.

Apart from research activities, sound economic development is also required for sustainable social development. As the majority of employed people are currently in the low income category, it is also important that inflation be controlled to a level whereby this vulnerable group is protected to some degree from rising food costs in urban centres. Development in the agricultural sector is also vital to generate income and food for the bulk of the population. To achieve some of the objectives of sound economic growth, all sectors of the economy must be addressed through good planning and implementation of programmes and projects.

Food Security Strategies for Vanuatu: Comments

James S. Wasi[*]

Food security is defined as the ability (of a nation, a household or an individual) to access adequate food under any conceivable circumstance.

Food security in the context of Vanuatu is more of a concern at the individual or household level.

Several factors associated with the food security status of Vanuatu were highlighted: (i) physical production factors such as soil and weather conditions; (ii) consumers' purchasing power; (iii) food marketing and distribution systems; (iv) food prices; and (v) food imports.

In order to ensure food security, households will need to either (i) have the capacity to produce their own food efficiently or (ii) have the capacity to purchase foods when required.

Given the definition of food security above, it would be assumed that Vanuatu is *food secured* as more than 90% of the land is owned by its indigenous people and about 80% of its population grow their own food.

However, locally produced starches are expensive compared to imported substitutes such as rice and flour. Several reasons are cited; (i) inefficient production systems leading to high costs; (ii) high cost of inputs; (iii) high transport costs; and (iv) poor economies of scale.

This leads to: (i) consumers buying more imported food items, often of lower nutritional value, (ii) lost income opportunity for food crop farmers, and (iii) a huge trade deficit.

The group mostly at risk of food insecurity is urban salary workers in the low-income bracket. This group does not have access to land and thus can not have access to land and could not grow their own food to supplement their food budget. They spend a high proportion of their income (40%) on imported food items compared to middle and higher income workers.

If prices of imported starches were to increase, the low-income group would not be able to access adequate food. Statistics on food imports show that the bulk of rice imports is consumed by rural households. If food prices were increased, the rural folk have a choice and would substitute their food requirements with locally produced foods, but the urban households will either have to pay the extra cost for food or reduce their food intake.

Another group at risk is rural producers on small islands of the country with very limited agricultural production capacity. With a high population growth rate of 3%, the agricultural production system practiced is fast coming under increased pressure. A survey of farming systems conducted in 1998 by the Lands Department indicated certain land stress, areas of which many are small islands.

The Food Security Program of the Agriculture Department aims to reduce dependency upon purchased foods, by increasing production of food crops in urban and peri-urban areas, and to reduce the price of locally produced foods, by employing more efficient food production techniques, promoting appropriate techniques to enhance soil fertility, introducing improved crop varieties, and facilitating supply of planting material e.g. yam *mini set* program, by improving marketing networks between islands and by introducing root crop processing in villages.

[*] Principal Agriculture Officer, Vanuatu Agricultural Department, Vanuatu.

Food developments toward greater household food security

There is great potential for processed root crop powder especially when everybody wants ready-made or fast-to-cook foods. Vanuatu people are fond of *laplap* which is produced from grated root crops baked over earth ovens. Laplap preparation is quite time consuming but, if it comes in the form of baking powder, then it would be much quicker to prepare.

In addition, it would be much easier to freight root crops in the form of powder to disaster stricken areas during emergencies, and excessive production could be processed and stored rather than have it rot away in the field.

Yam is an important root crop in many part of Vanuatu. In fact it is perhaps the most popular root crop because of its cultural importance. Yam is also a reliable crop for sustaining rural livelihoods even though it is a seasonal crop, which means it is unavailable five months of the year. Some characteristics are: (i) it is the most preferred root crop; (ii) it keeps well for months; (iii) it easy to grow; and (iv) it has cultural importance.

One of the disadvantages of growing yams on a large scale is the shortage of planting material. Unlike most other root crops, the edible portion of the yam is also used as planting material, so it seems a waste planting what can be eaten.

If yams are going to be a major focus for the food security program of the country, then planting materials in the form of mini-sets must be mass produced for distribution to farmers perhaps initially by government then privatized. Farmers could also be trained to produce their own mini-sets.

Consolidated Discussion

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Policy Priorities to Improve Nutritional Status and Food Security in Southwest Pacific Island Countries

Euan Fleming[*]

Some generalizations about food insecurity in southwest Pacific island countries

The purpose of this paper is to prescribe policy solutions to the perceived growing problem of food insecurity in southwest Pacific island countries. Governments of southwest Pacific island countries can make a myriad of policy interventions to alleviate food insecurity, but suffer from limited resources in implementing these interventions. Hence, every effort should be made to set policy priorities and thereby avoid a "shopping list" approach that lacks feasibility and credibility.

Empirical evidence on the nature and extent of food insecurity in four southwest Pacific island countries - Fiji, Papua New Guinea, Tonga and Vanuatu - is summarized by Foraete (2001), Igua (2001), Halavatau and Halavatau (2001) and Welegtabit (2001), respectively. From this evidence, it is possible to draw some generalizations for southwest Pacific island countries that should be taken into account when ordering policy priorities. An assessment also needs to be made of the rates of economic development and accompanying economic transformation of southwest Pacific island countries over the next two decades. This is undertaken in the next section.

Food insecurity in southwest Pacific island countries is best viewed as archetypical rather than as a stereotype of the food insecurity experienced in developing countries in general. Its emergence is a function of the history of development of their food systems and general economies. Four key features characterising the evolution of the food system are: (i) the overwhelming reliance on root crops as the staple foods around which sound diets have been developed, (ii) subsistence affluence (Fisk 1964), (iii) the early introduction of imported processed foods through trade stores concurrently with the development of plantation crops for export, and (iv) the disappearance of traditional food storage and processing methods, to be replaced chiefly by imports rather than the development of modern domestic food processing activities. Important features of the general economies are their openness and small size, uneven spatial development of infrastructure, the prominence of the bureaucracy, a heavy reliance on aid, relatively high wage costs and, particularly in the case of Polynesian countries, migration and remittances that have allowed high living standards by developing country standards. Some of these features have combined to place southwest Pacific island countries in a precarious position in respect to their ability to compete in the global economy now and in the future.

As a starting point, the proposition is put that no southwest Pacific island country is currently in a state of extreme food insecurity. Until now, food production systems that provide year-round output and, with the exception of a few pockets, feature low population-man ratios have ensured the availability of sufficient foods nationally. Hence, the need for emergency food

[*] Associate Professor, School of Economic Studies, University of New England, Australia.

policy action is not warranted. Rather, a long-term standpoint is taken. A recommendation is made for a food security strategy within which a set of feasible food security policies can be developed for long-term action. In this respect, it is acknowledged that southwest Pacific island countries could face significant deterioration in food security in the future. This deterioration is likely to increase unless government action is taken to prevent it.

While the national availability of food is not yet a problem, there is some evidence of provincial and household food insecurity in all southwest Pacific island countries. To varying degrees, the nature of food insecurity differs between rural and urban areas. In these respects, the distinction between food availability and entitlements to food (Simatupang 2001) is vital when considering policy interventions.

Some undernutrition is evident, strongly identifiable in certain socio-economic and geographical groups. It is more in evidence in Melanesia than in Polynesia. Strong informal social security mechanisms have been in place, and still exist, to keep undernutrition to low levels. However, their influence is waning somewhat. Malnutrition caused by consuming too much non-nutritious food and a lack of balanced diets is a much greater problem than undernutrition.

Natural disasters bring about some temporary food insecurity, but there has been considerable resilience within populations in coping with these disasters. This resilience might decline in the future with greater commercialization of rural activities, fewer plantings of "drought crops", and a gradual weakening or disappearance of the resourcefulness of local populations and their institutional resources to manage disasters.

Poverty significantly influences all types of malnutrition, but its impact is especially strong on undernutrition. Its influence is likely to become much greater with less effective community risk-coping mechanisms. As the poor generally suffer from lower health standards, the interaction effects of nutrition and health status on food insecurity are stronger for the poor.

Taxonomy for policy analysis

Assessment of the case for government intervention

The food security value chain[1] is sub-divided into four categories to examine the options for government intervention to improve food security: production, marketing (including post-harvest activities), processing and consumption. Two further subdivisions are made within the marketing category: imports and locally produced products. The extent of market failure in southwest Pacific island countries is examined within each category and sub-category later, and recommendations are made about the merits of different forms of government intervention to improve food security.

The scope and effectiveness of government intervention depend on the resources available in the public sector and the extent of institutional failure within national governments of southwest Pacific island countries. In particular, Timmer (1997) argued that government interventions that fail to understand the adaptive behaviour of rural decision makers in compensating for market failures "are often heavy-handed and misdirected [causing] a government failure that makes the outcome worse, not better".

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[1] The food security value chain is defined as the sets of activities in the chains from food production to nutrient intake and point of food import to nutrient intake that add value to the food security status of the people in south Pacific island countries.

The key role of development in enhancing food security

Development is defined as "the process of improving the quality of all human lives" (Todaro 1989). Todaro (1989) specified "three equally important aspects of development [as] (i) raising people's living levels ... through economic growth processes; (ii) creating conditions conducive to the growth of people's self-esteem ...; and (iii) increasing people's freedom to choose ...". Implicit in this definition is the proposition that economic growth should be accompanied by an equitable distribution of its benefits, and should be sustainable.

Periods of negligible economic growth in the past have not led to an alarming lack of entitlement to food in southwest Pacific island countries because of a pervasive communitarian ethos. This ethos has been put into practice effectively because strong informal social systems have been in place through family and village support mechanisms. Foraete (2001), Halavatau and Halavatau (2001), Igua (2001) and Welegtabit (2001) observed that these systems are now weakening, and they were never a universal safety net to ensure everyone always had enough to eat (Fleming and Lim 2000). It is likely, therefore, that a lack of development, which fails to eradicate existing poverty or results in greater poverty, would have deleterious effects on food security in the future.

Emphasis on the poor is warranted when analysing food insecurity, for three main reasons. First, as pointed out by Simatupang (2001), the poor are most susceptible to not having sufficient entitlements to food. Second, food accounts for a high proportion of the budget of poor households in southwest Pacific island countries. Therefore, food costs influence the ability of the poor to improve their situation through economic growth. High costs of purchasing food can cause chronic food insecurity among the poor even if the national food supply is adequate. Third, a strong negative correlation between poverty, on one hand, and education achievement and health status, on the other, implies that poor households lag behind in their knowledge of appropriate diets and awareness of food security, nutrition and health issues. This factor worsens the impact of a lack of economic progress on the food security of poor households.

It follows from the above observations that development is a prerequisite for - arguably, the driving force of - improved food security at all levels (household, provincial and national) in southwest Pacific island countries. It is not sufficient, however, for developing country governments in the southwest Pacific region to assume that development will automatically solve food insecurity problems in the long term, for two main reasons. First, as implied above, there is a symbiotic relationship between development and food security in that improved food security is a prerequisite for development. For example, improved nutritional status leads to increased labour productivity, expanding output. According to Timmer (1997), "little development can take place until there is a public perception that food security can be maintained". Second, a country has to overcome various forms of market failure through government intervention in order to develop. Some of these market failures impinge directly on the attainment of food security, as noted. It can be concluded from these two points that food security policies, form an integral part of the set of development policies for any southwest Pacific island country.

Economic development inevitably brings about a transformation of the agricultural and general economy, entailing difficult changes in the agricultural sector. The pain will be greater the less successful the agricultural sector is in bringing about productivity increases in production and meeting changes in food demand by domestic consumers (Fleming and Lim 2000).

Rates of economic growth and development in southwest Pacific island countries over the next few decades are difficult to forecast, and may well vary substantially between countries. There is a real risk that economies could stagnate. Given the openness of the

economies, much will depend on the world economy (particularly, export markets for primary commodity exports). But there are complications due to civil insecurity and political upheaval that have bedevilled some countries in the region in recent years (e.g. Papua New Guinea, Solomon Islands and Fiji) and which are not yet adequately resolved. Commitment to good governance and sound macroeconomic policies (especially fiscal responsibility) will be crucial to the attainment of sound rates of economic growth (Timmer 1997).

Market failure causing food insecurity

Market failure in food production

Sub-optimal levels of investment in food crops research and extension

The abiding importance of agriculture in the economies of virtually all southwest Pacific island countries means that local food production will continue to provide the bulk of food needs of their populations in the foreseeable future. Hence, increased domestic food output will be essential to meet the growing food demand, and higher productivity from improved production technologies from research will be the main source of this increased output.

The "public good" argument is relevant in three respects to explain why sub-optimal levels of private research into food production exist in southwest Pacific island countries. First, there is strong non-excludability from the benefits of research, which are spread over thousands of individual food producers and consumers. Second, research outcomes are non-rival in that use of a production technology by one food producer does not diminish the supply of this technology to other producers. Third, food crops research also has potential to contribute to the goal of poverty alleviation, which features in the development strategies of all countries.

The uncertain and often long-term payoffs of food crops research also cause socially sub-optimal levels of research activities. This is particularly so in the rural areas of southwest Pacific island countries where the private sector has not matured, discouraging private research investment in food production.

The small size of South Pacific agricultural economies militates against effective agricultural research programs. Eyzaguirre (1996) undertook a thorough study of what he termed the "small-country problem". He identified the following size constraints on national agricultural research institutions: diseconomies of institutional development; small production and markets; a fragile or restricted resource base; and the vulnerability of institutions. Eyzaguirre (1996) regarded a country as small if its population is less than five million-in other words, all southwest Pacific island countries - and his empirical work took in one southwest Pacific island country, Fiji.

A final factor reinforcing a situation of sub-optimal levels of food crops research is that resources (particularly labour) in the rural and general economies in southwest Pacific island countries are not fully utilized. Any innovation in food crop industries that lowers the unit cost of production is likely to yield secondary benefits elsewhere in the food marketing system and create greater income-earning and employment opportunities in the economy as a whole, thereby increasing social welfare and food security.

Much the same situation prevails for food crop extension activities as for research. Extension can also help to eliminate poor farming practices and management causing technical inefficiency in food production that leads to levels of food output well below what would be achievable with the widespread application of best-practice farming practices.

The outcome of these forms of market failure is a socially sub-optimal supply of production research and extension activities. This, combined with an ineffective extension approach, retards the adoption of better food production methods.

Environmental degradation in food garden areas

Foraete (2001), Halavatau and Halavatau (2001), Igua (2001) and Welegtabit (2001) noted that food producers in southwest Pacific island countries are encountering difficulties in maintaining crop yields as a result of greater population pressure and a dwindling supply of land available for food gardens. Manifestations of land degradation are deterioration in soil structure, declining soil fertility and soil contamination. Factors causing environmental degradation in food garden areas derive from poor farming practices and management. They are caused by various forms of market failure:

- a lack of knowledge by food producers of the damage they are causing to the land (e.g. uncontrolled burning in fallow periods), and of available options to prevent this damage.
- increased economic pressure to intensify food production caused by rising aspirations and poverty (measurable by the heavy discounting by producers of future outcomes), which is exemplified by shorter crop rotation.
- external costs arising from food production methods that create environmental damage, such as excessive use and misuse of chemicals in food production.
- loss of traditional farming knowledge, which has been persistently undervalued by agricultural policy makers.
- attenuated property rights that encourage people producing food to neglect the long-term condition of the land.
- an inability of future generations to negotiate with the current generation on the appropriate level of inter-generational transfer of rural resources.
- unequal distribution of the burdens of land degradation, with women suffering disproportionately because of their key roles in food production activities and determining household diets, child-rearing and care for the sick.

Researchers have made observations on the agricultural situation in Papua New Guinea that are relevant to the situations in all southwest Pacific island countries. Allen (1993) noted that any "intensifying agriculture system in which technical innovation is inadequate may exhibit observable symptoms of stress". Allen et al. (1995) observed that intensification "brings about changes that must be overcome by innovation ... intensification without innovation is likely to lead to land degradation". Such observations on intensification, innovation and stress suggest that there is a major research and extension effort needed in the future to monitor and maintain the sustainability of food cropping systems.

In a more general context of food production in developing countries, Anderson (2000) observed that the "problem of sustaining productivity growth has come about because of inadequate attention to understanding and responding to the physical, biological and ecological consequences of recent agricultural intensification".

Distorted price signals to producers

Foraete (2001), Halavatau and Halavatau (2001), Igua (2001) and Welegtabit (2001) all demonstrated that considerable volatility exists in prices of various food products in the fresh produce markets in southwest Pacific island countries. Such volatility can adversely affect the production decisions of producers supplying these markets. A possible outcome is sub-optimal levels of investment in food production and market supply. There is negligible evidence on the extent of this problem, but it is unlikely to be severe.

Market failure in food marketing

There are four potential areas of significant market failure in food marketing:

- socially sub-optimal provision of efficient food marketing infrastructure
- distorted market signals to marketers and product heterogeneity
- imperfections in post-harvest activities
- exertion of market power.

Socially sub-optimal provision of efficient food marketing infrastructure

As economic growth proceeds, greater specialization tends to occur in agricultural production. A feature of this transition is a reduced reliance by farm households on own-produced food for household consumption. Hence, food producers become increasingly disconnected from the consumers of their output by distance (Timmer 1997). As part of the same process, consumers become more demanding as to the time, place and form utilities of food products. Consequently, transport, handling and storage become increasingly important elements in the domestic food sector. The physical dispersion of the many small food-producing units that supply the domestic food marketing system amplifies the growing importance of these activities.

The inadequacy of proper infrastructure for marketing fresh foods has been a widespread constraint on the development of the domestic food sector in southwest Pacific island countries. The quality of infrastructure (and the services provided from its use, often by public sector organizations) is more important for fresh produce such as root crops and leafy vegetables than for most other agricultural products, and certainly imported processed foods. This is because these products have a short shelf life and are susceptible to damage in the absence of reliable post-harvest handling procedures, technology and cool storage facilities.

To date, local food suppliers in southwest Pacific island countries (commonly producer-sellers) have shown great ingenuity in getting their produce cheaply to the fresh produce markets that are mainly located in the national and provincial capital cities, in good condition and in a timely manner. This is a good example of the adaptive behaviour of rural decision makers to which Timmer (1997) referred that is often misinterpreted by the government. As economic growth proceeds, this ingenuity will be tested to the full, and suppliers will come to rely more heavily on the services associated with marketing infrastructure, particularly transport, communications, storage and handling services. If these local food suppliers are to remain competitive with importers, they will need improved infrastructure, the provision of which is predominantly a public responsibility.

The reason why it is a public responsibility is because infrastructure exhibits public good characteristics, being generally non-excludable and non-rival. It is not just the construction of new infrastructure that is needed. More often than not, the greater deficiency in southwest Pacific island countries lies in the parlous state of existing public capital items that are poorly constructed and suffer from a gross lack of maintenance.

Distorted market signals to marketers and product heterogeneity

The volatility in fresh produce market prices, noted previously, can also affect marketing operations. A complicating factor here is the difficulty of assessing prices in the presence of wide quality variations. Again, there is negligible evidence on the extent of this problem, apart from some hearsay of commercial marketers having difficulty in maintaining profit levels in the face of irregular supplies and sudden large swings in market prices, particularly for those products with thin trading volumes (e.g. Food Management Division 1995).

Variability in food quality can lead to lower than socially optimal levels of demand for locally produced foods. This is especially so where product quality is well below the standards

of competing imported food products, even though the latter are often in a more highly refined and less nutritious form, as noted by Foraete (2001), Halavatau and Halavatau (2001), Igua (2001) and Welegtabit (2001).

Tariffs and non-tariff barriers placed on food imports can distort domestic food markets. These forms of protection afforded to domestic producers tend to make food more expensive than would be the case in a fully liberalized market (e.g. Welegtabit 2001). Poor consumers suffer most in that food comprises a relatively high proportion of their budgets.

Post-harvest imperfections

Post-harvest matters have been neglected in agricultural research in southwest Pacific island countries, especially in respect of the staple foods (Fleming et al. 1998). Fleming and Lim (2000) observed that the main constraints at harvest occur at the nexus between the food production and marketing processes, namely inefficient harvesting methods, lack of uniform harvest maturity indices and poor crop removal procedures from field to shed. They noted that lack of uniform harvest maturity indices is more constraining in export marketing than in the supply of fresh produce for domestic consumption. This is because the fresh produce marketing system is generally well geared to handle produce at differing stages of maturity and of varying quality.

Information is lacking in southwest Pacific island countries on activities such as handling, quality assurance, packaging, grading, transport, storage, financial planning, training, equipment and machinery know-how, and sourcing of supplies and materials. According to Fleming and Lim (2000), this information has not been put to effective use even where it is available. At present, these information deficiencies cause problems mostly in export markets. But, as domestic food consumers become increasingly stringent in their product demands, the deficiencies are likely to become more binding and reduce the competitiveness of locally produced food with food imports.

Exertion of market power

Any exertion of market power in the food marketing systems in southwest Pacific island countries is most likely to be found in the supermarket sub-system. This is unlikely to be a sufficiently serious threat to food security to warrant government intervention. Fresh produce marketing sub-systems, on the other hand, appear highly competitive (e.g. Fleming and Lim 2000).

Market failure in food processing

Market failure in processing in small countries such as southwest Pacific island countries tends to be strongest in the fields of training, research and development.

Limited access to technology and training in food processing

Potential food processors in southwest Pacific island countries have limited access to technology and training in food processing, and research into food processing is well below socially optimal levels. Papers presented at this workshop have produced evidence of losses of food produce because of an absence of appropriate processing technology, with implications for food availability and hence food security.

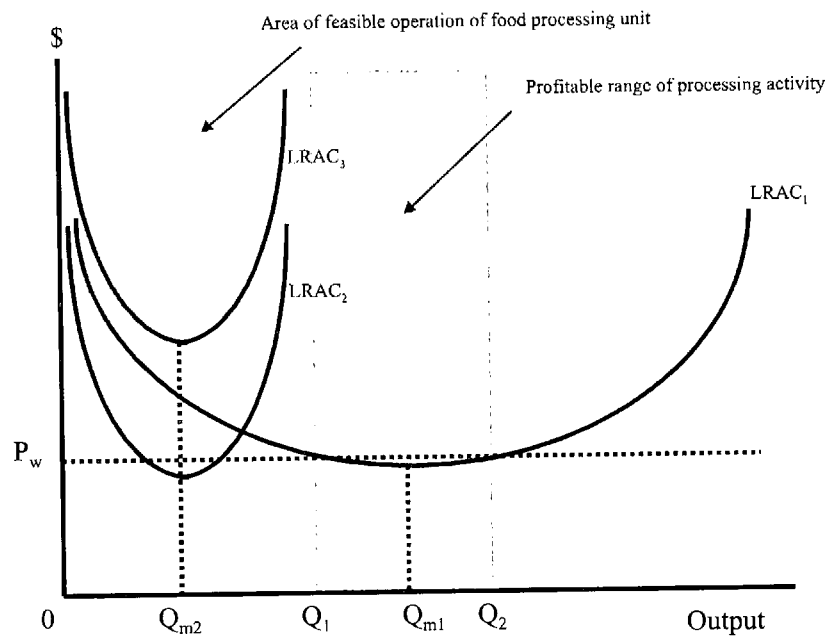
There is a lack of information on key elements of value-adding through the application of processing technology. This is because virtually no research work has been carried out in these areas in southwest Pacific island countries, with the slight exception of Papua New Guinea.

Constraints to the commercialization of processed products

Market failure is evident in the area of commercialization of processing innovations, constraining value-adding in the food industry. The Food Management Division (1995) observed that: "The food preservation and processing unit in Papua New Guinea had developed and adapted a wide range of processing techniques and shown them to be technically feasible for locally grown produce and under local conditions. However, adoption rates by the private sector and the development of viable processing industries based on fresh produce have been slow. While the technical aspects of processing appear to have been addressed, there is a need for increased outreach to make the processing opportunities known to a wide range of interested groups, individuals, and small companies. There is also a requirement to be able to more fully analyse the business prospects for potential processing industries and to advise on business management and marketing strategies."

The small size of the domestic market, lack of information on export market opportunities and limited access to capital are major problems facing local food processors. These features frequently result in diseconomies of small scale, exemplified by decreasing cost industries that mimic natural monopolies. This makes it difficult for the local processors to compete with large foreign food processors, as illustrated in Figure 1 where food processors face two alternative production technologies.

Figure 1 Food processing as a decreasing cost industry.



In the first case, it is assumed that the processor is using a large-scale modern technology. For industries in southwest Pacific island countries, the feasible section of the long-run average cost curve ($LRAC_1$) for processing a particular food product, given domestic market size and limited export opportunities, typically lies in the light grey-shaded area between 0 and Q_1. The long-run average cost throughout this section lies above the world price for the processed product (P_w), taken to be the relevant price to processors. It indicates that losses would be made unless the processing firm were able to expand production into the dark grey

area between Q_1 and Q_2. The only other plausible alternative for the firm is to merge its operations with much larger (typically foreign) processing firms. The latter can operate in the dark grey area where the world price is equal to or above long-run average cost, and which contains the point of minimum long-run average cost at Q_{m1}. Note that P_w would be equal to the minimum point of long-run average cost function in a perfectly competitive market. It is assumed here that some supernormal profits are still being earned.

The alternative approach is to adopt processing technologies suitable to small-scale operations, typically with sharply increasing long-run average costs beyond the minimum-cost point, Q_{m2}. It then becomes an empirical question whether such technologies are capable of competing in domestic markets without protection from imported processed products. Two examples of long-run average cost curves for small-scale processing are shown in Figure 1. The firm with a long-run average cost curve, $LRAC_2$, is able to make a profit at the point of minimum cost within the light grey-shaded area, whereas the firm with a long-run average cost curve, $LRAC_3$, is not. If a government believes it is possible for a domestic processing firm, currently at $LRAC_3$, to survive in the long run in competition with imported processed products (that is, it has a long-run average cost curve similar to $LRAC_2$), it might consider providing it with "infant industry" protection in its early years of development. This would last until the firm reaches the stage where it could compete with imports. The merits of such a policy are considered later.

Domestic firms in southwest Pacific island countries are disadvantaged in terms of their limited access to venture capital and information about technologies and export market opportunities. There would appear to be a prima facie case for government intervention by investing in processing research and development, assisting in the procurement of venture capital and providing market information.

Market failure in food consumption

Market failure in food consumption, leading to poor nutritional status, arises from four main sources:

- lack of information and knowledge by consumers of the nutritional aspects of food intake
- asymmetric information on nutritional aspects of food consumption
- divergence between social and private net benefits of food consumption
- risks to food security from volatility in food availability and entitlements.

Information transaction costs: imperfect information and knowledge of nutritional aspects of food intake

Consumers of food are almost universally placed at a disadvantage in evaluating the nutritional attributes of the foods they consume. The non-nutritional attributes of a food are not good indicators of its nutritive value, and the sophisticated devices needed to measure this value lead to economies of scale in measurement way beyond the capabilities of individual households or even groups of consumers (Godden 1997). Furthermore, consumers are seldom well informed about the risk and hazard of not following a good diet. Godden (1997) makes the same arguments in respect of all aspects of food safety.

Two alternatives to the individual evaluation of food nutrition attributes for individual consumers are experience – a cumbersome, imperfect and lengthy procedure – and information. Information can be provided either by firms within the food industry, such as by labelling, or by the collection, analysis and dissemination of public information. Difficulties arise in the former case because information transaction costs extend well beyond an evaluation of the nutritional value of a single food item. This is because the volume of total food intake plus dietary balance

are the keys to good nutrition, meaning that the consumer has to be able to evaluate the attributes of a complex set of foods that are consumed. Consequently, a broader and more detailed set of public information is needed for consumers to maintain or improve their nutritional status.

Lack of education can adversely affect the ability of consumers to evaluate the nutritional value of the food intake in their diets. Knowledge of, and information about, good diet is a public good in that it is non-rival and non-excludable. It is non-rival in that, like many forms of educational material, its use by one person does not prevent its use by another. It is non-excludable in that, once the knowledge is widely available in a community, people cannot be excluded from using it. However, there is a cost associated with its dissemination. The private sector in southwest Pacific island countries is unlikely to find it profitable to provide information about good diets, and individual consumers would find it too costly to collect it. Hence, a case can be made for government intervention to collect, analyse and distribute information and knowledge about good eating habits.

Negotiation transaction costs: asymmetric information on nutritional aspects of food consumption

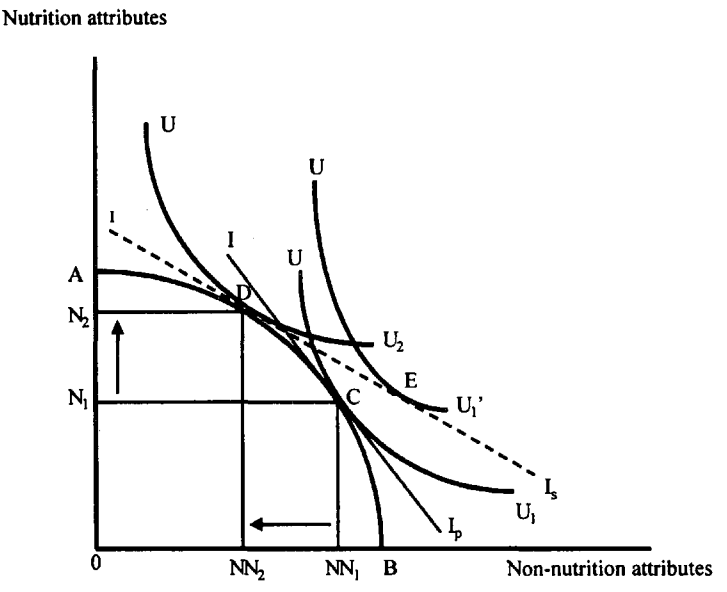
Public providers of information on how to improve nutritional status through food intake practices are not the only sources of information to food consumers. The public information competes with information received by the food consumers from advertising and other forms of promotion by private firms (often large multinational firms). Sellers of food generally recognize the existence of an asymmetry in information on the quality of food items between consumers and themselves by supplying information about the non-nutritional attributes of food that are appealing to the consumers. This information is sometimes at odds with the messages from public nutritionists who typically possess skills and resources inferior to those of private marketers in conveying their messages on food attributes to the general public.

External costs of nutrition deficiencies: divergence between social and private net benefits of food consumption

Perhaps the most intractable problem facing nutritionists and government policy makers promoting greater food security concerns food intake where consumers are aware that their diet could lead to a nutritional status that is lower than desirable, but they are not prepared to commit to a better diet. This situation is shown in Figure 2. Here, the consumer's private utility function (UU_1) is drawn for two sets of food attributes: nutrition attributes (e.g. dietary balance, high contributions of essential nutrients, low levels of anti-nutritional elements) and other non-nutrition attributes (e.g., taste, texture, aroma, social status, convenience). The production possibilities frontier for these attributes is represented by the curve, AB. The relative prices of purchasing bundles of nutrition and non-nutrition attributes of food are represented by the consumer's isocost curve, II_p, assuming no international trade in food products.

Divergences between the private and social utility functions derive from the external costs that deteriorating diets impose on society (Fleming and Lim 2000). The seeds of a vicious cycle are sown with these social costs, given that the poor are usually the most vulnerable people to food insecurity in a society.

Figure 2 Trade-off between nutrition and other food attributes.



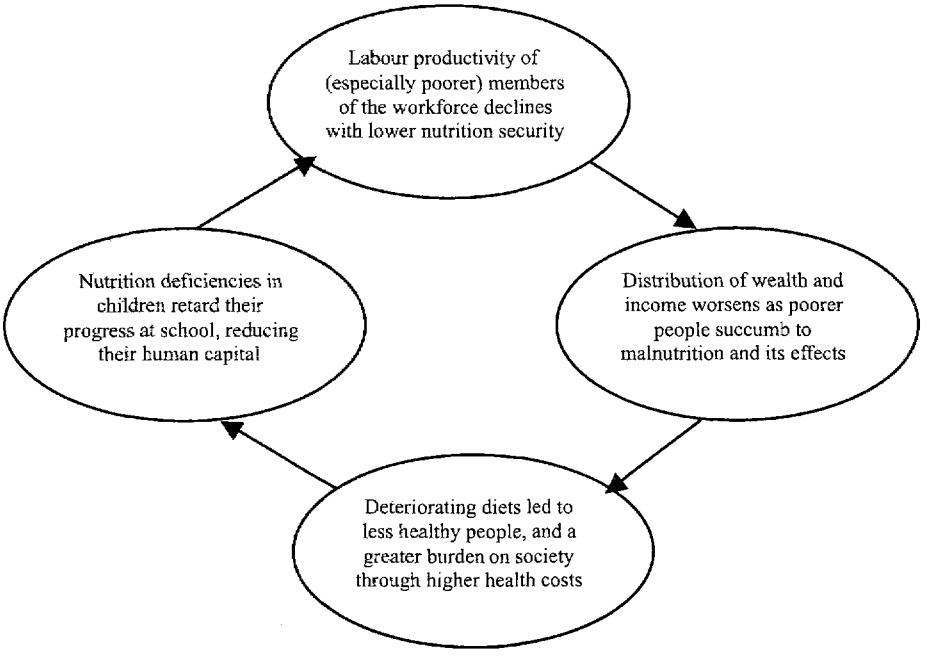
This vicious cycle is shown in Figure 3. The labour productivity of poorer members of the society is likely to decline with greater food insecurity. This will have an adverse impact on income levels of the poor, because they tend to be more vulnerable to malnutrition and its effects. Distribution of wealth and income is likely to worsen. Deterioration in diets can be expected to lead to a less healthy population and a greater burden imposed on society. This burden is felt through higher levels of government expenditure on health (assuming a causal relationship between nutritional status and health status, which appears to be reasonable). Poorly nourished women will be less able to look after the nutritional and health needs of their children effectively (Kitts and Hatcher Roberts 1996). As a consequence, nutrition deficiency in children will increase, retarding their progress at school, reducing the value of human capital in the society, and reinforcing the vicious cycle.

Risks to food security from volatility in food availability and entitlements

Simatupang (2001) pointed out that risks to food security from volatility in food availability and entitlements can be examined at different levels. The three main levels studied in this paper are the household, provincial and national levels.

National food insecurity from volatility in domestic food availability and entitlements to food imports has not been a major problem in southwest Pacific island countries. Barring major catastrophes within a particular southwest Pacific island country or in worldwide food supply, it is unlikely to become a major problem in the foreseeable future. First, all countries have demonstrated consistent ability to provide enough food at the national level for their populations. The major risk in the future is a long-term one of land degradation leading to a reduced ability to maintain food output levels as population increases. Second, as demonstrated by Foraete (2001), Halavatau and Halavatau (2001), Igua (2001) and Welegtabit (2001), food

Figure 3 Vicious cycle of low nutritional status.



imports have not been increasing significantly in relative importance in southwest Pacific island countries. Satisfactory levels of economic growth should ensure this situation does not change markedly in the future. Besides, a trend of rising food imports is not necessarily bad, or a sign of market failure; it is an inevitable consequence of economic transformation in small countries such as southwest Pacific island countries. It has to be viewed in relation to changes in export capability[2] and gross domestic product.[3] Government efforts to delay this transformation are self-defeating, and will cause greater problems in the long run. The only risk is that a country loses its ability to generate increases in GDP to pay for increased food imports. But, as indicated recently in Vanuatu, the propensity to import food is fairly stable so that a decline in GDP is likely to be accompanied by a decline in food imports (Welegtabit 2001) that are substituted by increases in locally produced food.

Provincial food insecurity is of slightly more concern as poorer regions of southwest Pacific island countries suffer from stagnant economic conditions and natural disasters such as droughts and cyclones that cause short-term disruptions to food availability. Volatility in household food availability and entitlements is probably the major concern, judging from anecdotal evidence. Unfortunately, a lack of adequate data has prevented adequate analyses of the extent of these problems at the provincial and household levels.

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[2] For example, Halavatau and Halavatau (2001) show that the ratio of agricultural exports to food imports has been well above the 1988 base level in every year bar one to 1999.

[3] DFAT (2000, p. 16) argued that it "is no accident that the economies with the best export performance are those that devote a large share of GDP to imports" and that "barriers to imports are a significant impediment to exports". It demonstrated this relationship for APEC countries that include Papua New Guinea.

Scope for government intervention

Strategic options for government intervention

It was mentioned previously that the strategic options for government intervention need to be considered because southwest Pacific island countries experience an archetypical type of food insecurity. Therefore, the strategic approach that is adopted needs to be tailored to the particular circumstances of these countries.

Governments can intervene at all levels in the food security value chain to improve food security, demanding an integrated approach to the selection of high-priority food security policies. As also mentioned previously, it is not feasible to implement properly anywhere near all of the possible policy interventions, given limited public resources, the pervasive presence of institutional failure in the public sector and diseconomies of small scale and scope in the provision of government services. Hence, it is important to avoid a "shopping list" approach to prescribing policies. Diseconomies of scope occur in the provision of government services, especially in small countries such as southwest Pacific island countries, when personnel responsible for providing the services have to cover such a wide range of activities requiring specific skills that the sum of their output is less than it would be were they able to confine their efforts to fewer activities.

Possibilities for selective intervention are now examined and prioritized at each level in the food security value chain. The prospects for success vary between levels of intervention. Referring again to Figure 2, it is possible to improve food availability by expanding the production possibilities frontier beyond AB. This might improve food security through an increase in the volume of food locally available. But it does not guarantee improved nutritional status, because higher consumption of non-nutrition attributes of food could be associated with declining nutritional status caused by people eating too much food that is bad for them.

Figure 2 shows that there are three ways to get food consumers to move from the socially sub-optimal point of consumption at C to the socially optimal point at D:

- Change the shape of the existing production possibilities frontier (AB in Figure 2) to lessen the severity of the trade-off between nutrition and non-nutrition attributes of food. The four main ways to achieve this are to:
  (a) make the product marketing services attached to food raw materials with favourable nutrition attributes more efficient.
  (b) improve the marketing infrastructure for food products with high levels of favourable nutrition attributes.
  (c) promote greater efficiency in the processing of foods with high levels of favourable nutrition attributes.
  (d) improve the technology of production of food raw materials with favourable nutrition attributes, make their production more technically efficient and/or change people's priorities in food production.
- Intervene in the domestic food market by altering prices to make foods with high levels of nutrition attributes cheaper than those with low levels of nutrition attributes. In Figure 2, this means changing the slope of the isocost line from Ip to Is. Domestically, it can be achieved either directly by setting prices or indirectly through taxes and subsidies on food products. This changes the optimal mix of attributes produced but not the combination of attributes that would be optimal for food consumers (namely, the point of tangency between the production possibilities frontier, AB, and the private indifference curve, UU1). Alternatively, trade policies could be introduced to liberalize the food market. This would allow for food imports, enabling consumers to increase their utility to point E, on a higher private indifference curve, UU1', at which

consumption is higher for both nutrition and non-nutrition attributes of food. It is assumed here that border prices for food attributes correspond to socially optimal prices, such that the international relative prices of nutrition and non-nutrition attributes are reflected by the isocost line, IIs. Even if they are not, trade policies could be introduced such that duties and other forms of protection placed on imported foods are altered in favour of those of high nutritional value.

- Shift the private utility function closer to the social utility function. In Figure 2, this is represented by a shift from UU1 to UU2. The social utility function represented by UU2 comprises more nutrition attributes and fewer other non-nutrition attributes. It means changing the tastes and preferences of food consumers, a tall order. Considerable effort has already gone into campaigns in all southwest Pacific island countries to educate people about balanced diets and to promote the consumption of locally produced nutritious foods.

The policy prescriptions detailed in the following sections begin at the level of food consumption and work back through the food system to production. It might strike production scientists as heretical to leave production until last, but there is a strong symbolic reason to begin with food consumption policies: decisions made by consumers about food choices "drive" the rest of the food system.

Food consumption

Moving consumers from their current food consumption patterns to socially optimal levels requires considerable planning and implementation. Constraints to this process are a function of the food purchase decisions and dietary considerations of households. Fleming et al. (1998) listed six factors with the potential to limit the domestic consumption of locally produced nutritious crops: (1) preferences for taste and variety; (2) convenience in consumption; (3) convenience in purchase; (4) status and changing social relationships; (5) relative costs; and (6) persuasion.

The preparation by producers, marketers and processors of food products for consumption needs to advance beyond concern merely with volume of output, because natural hunger is no longer the dominant force in people's food purchase decisions. Consumers need to be persuaded that it is in their best interests to purchase more locally grown nutritious foods.

Encouraging healthy food consumption through education

The most common approach adopted by governments in southwest Pacific island countries to encourage healthy diets has been through education campaigns. In most countries in the southwest Pacific region, national food and nutrition organizations have been established to spread the message about healthy diets and lifestyles. They have been aided by contributions of personnel and financial resources from regional and international development organizations.

Success has been limited so far as these food and nutrition organizations gloomily report continued dietary regress and increased incidence of diet-related diseases. But there is a sound case for their continuance, albeit with more highly developed methods and a better knowledge of consumption decisions. Success has been greater in Tonga than in other southwest Pacific island countries (Halavatau and Halavatau 2001), but most probably because of the idiosyncratic nature of the education campaign in that it has been influenced to a significant extent by the King of Tonga acting as a role model.

Public research into household food consumption decisions

Research is needed to understand better how people make their food purchase decisions. Most market research into why people purchase and consume products has taken place in the

private sector. Not surprisingly, the profit-oriented nature of this work has been directed towards gaining a competitive advantage in commercial activity. On the other hand, proponents of healthier diets in southwest Pacific island countries are overwhelmingly based in the public sector, and do not have a history of undertaking market research. Their approach to changing people's consumption habits has too often taken a high-minded stance that people need to be told what is good for them, rather than first trying to understand why food consumers do the things they do. The outcome of this approach has almost inevitably been a failure to bring about a permanent change in people's consumption habits.

The need to inject some market research into public activities to improve diets is overwhelming if they are to succeed in their goals. A start has been made in this direction in Fiji with a study of consumers' food consumption decisions and the nature and strength of factors influencing these decisions.

Scope for public promotion of foods with high nutritional value and healthy diets

There is considerable scope to promote foods with high nutritional value and healthy diets effectively in southwest Pacific island countries. But, as with nutrition education, success will ultimately depend on how well the promoters learn the lesson outlined in the previous section. That is, they need to understand how and why people make food consumption choices before attempting to promote changes in them.

Improving health, hygiene and lifestyles

There is a strong and complex interaction between factors influencing nutritional status. Apart from the direct impact of food intake, various health, hygiene and lifestyle factors interact to have an indirect impact. Fleming and Lim (2000) reported that health care and status, sanitation, weaning, exercise level, and smoking and drinking habits all have an indirect impact on nutritional status. They claimed that urbanization – a trend observed in all southwest Pacific island countries – influences all health factors and living styles.

A persuasive case can be put for public responsibility in the fields of health and hygiene, given the existence of gross market failure in the provision of health services. A case can also be made for the government to be involved in education campaigns to improve lifestyles in the public interest.

Reduction of short-term variability in food availability and prices to consumers

Government responsibility to ensure a stable food economy for food security stems principally from its actions in food marketing and production, as discussed previously. Attempts to control food prices directly are more likely to exacerbate food insecurity than mitigate it.

Food Marketing

Should governments be concerned about the relative merits of domestic and export marketing?

Governments should not concern themselves with attempting to alter the destinations of food produced domestically in order to improve food security. Evidence for Fiji casts doubt on the proposition that there is a sharp trade-off in supplying the domestic and export food markets (Foraete 2001). A substantial increase in the export of taro in recent years has not had any noticeable impact on the availability and price of taro in the domestic fresh produce markets. A similar situation probably prevails in other southwest Pacific island countries. Varying food exports (such as taro) can also help stabilize domestic food supplies.

Scope for institutional improvements to the domestic food marketing system

Most of the commonly heard criticisms of the inadequacies of fresh produce marketing systems in southwest Pacific island countries are misplaced. These systems are highly competitive, and probably as well adapted to dealing with and overcoming existing marketing constraints as they could be given the difficult conditions under which they operate. The market places are: "... well supplied on a regular basis with a range of produce at reasonable cost and quality, with minimal government support. Solutions to marketing constraints appear to lie not with significant changes in institutional structure or transformation of the fresh produce marketing system, but with research and development work that improves marketing services within the existing system" (Fleming et al. 1998).

Potential exists for food marketers to respond to changing nutrition requirements brought about by changes in food demand as producer-sellers become less prominent, to be replaced by increased wholesaling activities. Food marketers in turn could be expected to prevail on producers to change the ways they prepare food for sale in a form suitable for processing and marketing and in line with changing consumer preferences. The main role of government is to facilitate food marketers in these endeavours rather than intervene directly in food marketing or try to alter the existing institutional structure.

Scope for infrastructural improvements to the domestic food marketing system

Coordination of infrastructure investments is a key task of government in generating agricultural development in developing countries (Timmer 1997). In particular, improvements in roads and other transport facilities and services to the rural centres that add value to the raw food materials are inevitably a high priority for the governments in the region. Another area of high priority is the public provision of power and water supply in these centres (and perhaps some villages) to aid private marketers who wash, dry and cure produce. This provision should also enable these marketers to use cool store facilities that improve quality and durability of fresh food products.

Quarantine services

The public provision of quarantine services by the government yields benefits in food security by limiting the risk of pest and disease infestation that reduces the domestic capacity to produce food. It is recommended as a policy measure that should be retained in the public domain. This is because of the strong public good characteristics of these services.

Support of value-adding by food processing

Value-adding through food processing offers scope for improved food security in three main respects. They are by allowing food to be stored in more lasting forms, reducing short-term variability in its availability, improving the competitiveness of the domestic food industry, reducing reliance on the vagaries of price and availability of imported foods, and producing processed foods that are more nutritious than the imports they replace.

What can the government do to support food processing, given that food processing belongs primarily in the domain of the private sector? As noted previously, market failure in food processing in small countries such as southwest Pacific island countries tends to be strongest in the fields of training, finance, and research and development (especially the commercialization of food processing innovations). The arguments in favour of government intervention in research and development are quite strong, but less so than for food production and infrastructure in that benefits are generally excludable. Training programs for small local food processors (and producers who supply raw materials to them) can be a useful form of government intervention.

The infant industry argument for government protection of domestic food processing firms in the process of being developed, referred to previously, has some appeal, especially to politicians. However, infant industry protection is highly susceptible to abuse and could become an alternative form of industry protection that is difficult to remove. Direct government intervention in food processing industries and subsidies to promote processing activities have had a dismal history in the southwest Pacific region. The chief beneficiaries of such a policy would be the food processing industries, and the losers could include agricultural producers as well as consumers who are forced to pay higher prices for locally produced items that may also be of lower quality than competing imports.

It is preferable for the government to assist domestic food processing firms through training, research and development, as outlined above, as well as by improving the access of these firms to affordable commercial credit to finance their operations in the early stages of their development. An alternative approach to financing is for the government to act as an intermediary in encouraging investments in food processing by transnational food corporations in collaboration with local firms.

A government may decide that direct foreign investment is desirable to develop the food processing sector, through its ability to provide economies of scale, greater export market penetration, increased efficiency, and access to production techniques and knowledge spillovers from the investing firm's own and other research elsewhere in the world (Scholtès 1996). If so, it has a number of options it can pursue to encourage such investment, including fiscal incentives for research and development, and helpful foreign investment guidelines and procedures.

Food production

The scope for government intervention to improve domestic food production rests largely on increased funding of better research and extension activities (Timmer 1997).

Improvement in total factor productivity in agricultural production through research and extension

There is a very strong case for continued (perhaps increased) funding of food crops research and extension. At the same time, there is evidence that research and extension funds have not always been wisely used in southwest Pacific island countries, suggesting a need for closer scrutiny and monitoring. Much food crops research work to date has not focused sufficiently on the needs of smallholders. This could be partly overcome by more closely integrating research activities with those of the extension services and producers themselves than has occurred in the past. This is especially so in efforts to facilitate profitable farm-level diversification involving food crops. Halavatau and Halavatau (2001) documented the pursuit of such an approach in Tonga, which appears to be reaping benefits.

Public research into food production can increase output for given levels of inputs used, improving food availability – volume and quality – as well as reducing the cost of nutrients. The latter is likely to be a significant factor influencing dietary decisions by food consumers, and hence a reduction in production costs of locally produced foods can bring about an improvement in diets. Specific research into the improved production of crops and livestock with high nutritive value can lead to improved dietary balance by making these products available more cheaply to food consumers. It can also contribute to the improved quality of locally produced food products when they leave the farm. Extension efforts to expand local food production, for example by encouraging urban food gardens (e.g. UNICEF 1994), can also help in this respect.

While investment in food crop research is the most potent means of increasing the supply of food through the introduction of improved technologies, local production research alone is likely to yield only limited cost reductions. Large gains are more likely to come from international breakthroughs in research into high-yielding varieties of food crops, especially root crops. It is nevertheless important for there to be well-functioning research work in southwest Pacific island countries in order to benefit fully from any international advances.

Note that the food security benefits of public research into agricultural production are not confined to food production, especially given the important economic role of cash crop agriculture in southwest Pacific island countries. Two examples demonstrate this point. First, improved cash crop performance can lead to increased incomes (both on and off the farm), which in turn result in improved food security through increased entitlements. Second, research into improved production performance of cash crops on marginal lands can reduce the pressure on food gardening from alternative land uses on the better lands near villages.

The nature of the national agricultural research program is crucial. The innovative approach to strategic planning of agricultural research for small developing countries advocated by Eyzaguirre (1996) should suit southwest Pacific island countries. In particular, Eyzaguirre (1996) suggested a parsimonious approach to improve knowledge by processing information from similar production and marketing environments in other countries through external linkages. Eyzaguirre (1996) also foresaw an important role for external development agencies: "Partnerships with external agencies, such as regional research organizations, international research centers, neighboring national systems, and intergovernmental organizations are crucial if small countries are to acquire the essential research capacity they need. However, small countries that do not have clear policies and strategies of their own can easily be overwhelmed or bypassed by larger research institutions. What we propose is to treat the linkages with external research partners as a core part of the national agricultural research policy and planning process, subject to the same decisions as national investments." The partnerships with external agencies should go beyond agricultural research to embody all food security research issues.

Prevention of long-term deterioration in local capacity to produce food at internationally competitive prices

The ability of domestic food producers to remain competitive in the face of declining yields, increasing costs and cultivation difficulties will depend in part on their management skills. But, increasingly, they will depend on research into food garden sustainability to enable them to prevent their production systems from degrading.

Prevention of land degradation that leads to a growing inability to produce food at internationally competitive prices is related to the issues discussed in the previous section in that research is a key element in the implementation of prevention measures. Part of the research plan should be based on agroforestry and intercropping. According to Anderson (2000): "Knowledge is the key. The focus of research and policy ought to be, and indeed has increasingly been, shifting to a more holistic approach to the long-term management of the agricultural resource base ... . Appropriate policies will be needed to provide farmers and communities the incentives to invest in more sustainable land and crop management practices. Techniques for improving fertilizer-use efficiency ... are available but generally will only be viable at the farm level when fertilizer subsidies are removed."

Allen (1993) emphasized, among other matters, the continuing need to collect information on agricultural systems. He also considered it imperative to involve rural people in efforts to achieve sustainable agriculture. This is particularly so for women who, he noted, are disadvantaged in all aspects of rural life and would almost certainly suffer most from degradation of food cropping systems.

Improving total factor productivity in food production through land tenure reform

Land is obviously a key input in food production and should be subject to careful scrutiny in policy analysis given the potential for the private and social valuations of land resources to diverge markedly. Yet land tenure reform is without doubt the most politically and culturally sensitive policy option to improve the productivity of food production in southwest Pacific island countries. Furthermore, given the variations in land tenure systems between and within countries, it would be foolish to make any general policy prescriptions.

Most agricultural land in southwest Pacific island countries is held under a customary land tenure system, with only small areas of alienated land. Consequently, most efforts to improve land use in these countries have entailed changes to customary land tenure arrangements. In general, official attempts to develop customary land for agriculture within the existing systems have been unsuccessful. The reasons for this are lack of participation by those affected, reform decisions dominated by outsiders with little knowledge of existing tenurial arrangements, resistance to change by vested interests, lack of finance and skilled manpower, legal and administrative difficulties in transfer and registration, and the constraints imposed by the complexities of the land tenure systems themselves (e.g. Lakau 1985). On the other hand, informal land ownership and rental transactions, frequently not sanctioned under existing laws, have been more successful in improving land use (e.g. Halavatau and Halavatau 2001).

Views differ on the suitability of existing customary land tenure systems for agricultural development, in general, and development of food crop production, in particular. But governments of southwest Pacific island countries should be wary of casting aside customary land tenure systems in light of the findings of Bingswanger and Deininger (1997) for developing countries as a whole. In comparing the customary communal land tenure system with its main alternative of private property rights, Binswanger and Deininger (1997) concluded that: "... in environments where information costs are high and markets for finance and insurance are imperfect, private property rights do not always produce the most efficient farming arrangements. Abandoning communal land rights for fully tradable property rights may lead to the *loss of safety nets for the poor*, the use of economies of scale in herding, or *measures to diversify risk* ... [italics added]. Communal types of land tenure assign to community members clear inheritable use-rights to cropland, pastures, forests, and fisheries, and usually allow some degree of exchange (rental or even sale of land) within the community. They often provide security of tenure at low cost ... . Fully individualized property rights systems become superior to communal systems only once population growth and specialization increase the value of land and the efficiency losses associated with restricting transactions to insiders."

The current state of food crop production in southwest Pacific island countries suggests that it will be some time before conditions evolve that render private property rights superior to communal property rights. Nevertheless, there should be some scope for southwest Pacific island governments to persevere with modest initiatives that improve land use in food production within the existing customary land tenure systems.

Reliance on locally produced foods or imports?

There is not a strong case for preferring a food product on food security grounds purely because it is produced locally. There may be grounds for preferring a locally grown product to an imported one because of its nutritional superiority, but such a social preference needs to be based on the attributes of the product and not its origin.

Typically the most vexing issue for government intervention to reduce food insecurity in developing countries rests on the impact of instability of food availability and prices on consumers. Timmer (1997) argued that governments have a responsibility to stabilize the food economy to ensure food security. However, reduction of short-term variability in food

production and prices is difficult when relying almost solely on locally sourced food raw materials. This is because of the inherent uncertainty of food production and the extreme difficulty governments typically face in trying to introduce schemes to stabilize domestic food prices and supplies to producers. Such intervention also encourages rent-seeking.

Maintaining an open economy can facilitate the stabilization of food quantities available in the domestic market in that food imports can help even out supplies and also stabilize retail food prices in times of volatility in domestic food supply. Investment in research, extension and infrastructure, diversified food and cash cropping systems, and a good market reporting system are other means of reducing the ill effects on producers of variability in food output and prices.

These observations suggest governments should not rely heavily on tariffs and non-tariff barriers to food imports as a means to protect local food producers. Low tariff levels make food cheaper to domestic consumers, particularly favouring poor urban consumers.

Early-warning systems of natural disasters

Informal risk-coping systems have been well developed to deal with the natural disasters of cyclones, droughts and floods in southwest Pacific island countries. There is currently the prospect of imposition of more formal early-warning and response systems devised by international agencies, which were initially developed for other developing countries, particularly in Africa. Such an imposition carries with it the dual risks that these systems are quite expensive and inappropriate for southwest Pacific island countries, and substitute for the more suitable local systems currently in existence, which might then lapse.

Conclusions

The empirical evidence assembled by Foraete (2001), Igua (2001), Halavatau and Halavatau (2001), and Welegtabit (2001) points to increased food insecurity in recent times in southwest Pacific island countries. The main source of this increase has been deteriorating nutritional status, which has occurred simultaneously with a reduction in the share of locally produced nutritious crops in diets. These two trends are most likely related. However, research is still needed to determine the extent to which a deterioration in nutritional status is caused by reduced consumption of locally produced nutritious foods. The outcome of this research has important implications for future research to maintain or improve the balance in people's diets and food security.

The reason for the declining relative importance of locally produced nutritious crops in diets appears to be only partly caused by market failure in domestic food production. Various factors are operating throughout the food systems to cause this decline, particularly at the point of retail where changes in consumer demands are not being adequately met. Hence, the initial emphasis should be on understanding how food consumption decisions cause a decline in nutritional status and food security. Large gaps exist in knowledge about the relative importance of factors influencing food consumption decisions that lead to growing food insecurity, and the research and development needed in the domestic food industry in order to arrest it.

This is not to underestimate the continued importance of food production research. Its role is likely to remain important in two main respects. First, production and post-harvest research will be increasingly important in enabling producers to improve the presentation of their products and reduce their costs, better to meet changing demands for food attributes. Second, production research will become increasingly critical in preventing further environmental degradation that leads to a long-term decline in productivity in food production and the onset of a chronic inability to meet increases in aggregate food demand at the national level.

Governments in the region have limited financial and human resources to intervene in the domestic food sector, and should accordingly set stringent priorities for their intervention measures. Intervention is needed most where economic conditions naturally lead to market failure that will not be corrected without government action. Apart from the obvious task of getting the macroeconomic settings correct to encourage economic growth, the highest public priority is to provide efficiently those public goods that enable food production and marketing to be undertaken in an efficient manner and diets to approach their desired social level. Only after these issues have been adequately addressed should governments turn to other less crucial forms of market failure, noted in this paper as justifying government action.

References

Allen, B.J. 1993. Issues for the sustainability of agriculture systems in Papua New Guinea, 1990-2015. *In* AIDAB (ed.), Issues in Papua New Guinea Agriculture. Australian International Development Bureau, Canberra.

Allen, B.J.; Bourke, R.M.; and Hide, R.L. 1995. The sustainability of Papua New Guinea agricultural systems: the conceptual background. Global Environmental Change 5(4):297-312.

Anderson, J.R. 2000. Technological modernity, environmental correctitude, rural R&D policy, and imperative Asian rural development paths. Paper read at the Plenary Session on Technical Change and Implications for Sustainable Agriculture in Asia of the Third Asian Conference of Agricultural Economists, Sustainable Agriculture, Poverty Alleviation and Food Security in Asia: Perspectives for the 21st Century. 18-20 October, Jaipur.

Binswanger, H.P.; and Deininger, K. 1997. Explaining agricultural and agrarian policies in developing countries. Journal of Economic Literature 35(4):1958-2005.

DFAT 2000. APEC: A Decade of Progress. A Report Prepared for APEC Ministers Responsible for Trade, Department of Foreign Affairs and Trade, Canberra.

Eyzaguirre, P.B. 1996. Agriculture and Environmental Research in Small Countries: Innovative Approaches to Strategic Planning. Wiley, Chichester.

Fisk, E.K. 1964. Planning in a primitive economy: from pure subsistence to the production of a market surplus. Economic Record 40:156-174.

Fleming, E.M.; Lim, T.K.; Seniloli, S.; and Taukei, P. 1998. Assessment of the Nutritional Value and Competitiveness of Traditional Foods in Fiji. Project Report, Australian Centre for International Agricultural Research, Canberra.

Fleming, E.M.; and Lim, T.K. 2000. Ensuring nutrition security in the context of an export-led agricultural development strategy in Fiji. *In* M. Reddy and V. Prasad (eds), Agriculture Development in Fiji. Institute of Pacific Studies, Suva.

Food Management Division. 1995. Review of DAL Marketed Fruit and Vegetable Programme. Department of Agriculture and Livestock, Konedobu.

Foraete, H.M. 2001. Food Security Strategies for the Republic of Fiji. Working Paper No. 55. CGPRT Centre, Bogor.

Godden, D. 1997. Agricultural and Resource Policy: Principles and Practice. Oxford University Press, Melbourne.

Halavatau, S.M.; and Halavatau, N.V. 2001. Food Security Strategies for the Kingdom of Tonga. Working Paper No. 57. CGPRT Centre, Bogor.

Igua, P.B.K. 2001. Food Security Strategies for Papua New Guinea. Working Paper No. 56. CGPRT Centre, Bogor.

Kitts, J.; and Hatcher Roberts, J. 1996. The Health Gap: Between Pregnancy and Reproduction. International Development Research Centre, Ottawa.

Lakau, A.A.L. 1985. Land policies and practices to independence. Yagl-Ambu 12(1):104-114.

Scholtès, P.R. 1996. Capital inflows and technology transfer in developing countries. *In* P.R. Scholtès (ed.), Industrial Economics for Countries in Transition: Evidence from Eastern Europe and Asia Pacific. Elgar, Cheltenham.

Simatupang, P. 2001. Food security: basic concepts and measurement. *In* P. Simatupang and D.R. Stoltz (eds), Food Security in Southwest Pacific Island Countries, Proceedings of a Workshop held in Sydney, Australia, December 12-13 2000.

Timmer, C.P. 1997. Farmers and markets: the political economy of new paradigms. American Journal of Agricultural Economics 79(2):621-627.

Todaro, M.P. 1989. Economic Development in the Third World, 4th edn. Longman, New York.

UNICEF 1994. Report: Family Food Production and Nutrition Workshop, 21-25 November 1994. Suva.

Welegtabit, S.R. 2001. Food Security Strategies for Vanuatu. Working Paper No. 58. CGPRT Centre, Bogor.

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Closing Statement

Kiran Pyakuryal[*]

My overall assessment of the meeting is that it was fruitful and largely able to accomplish its stated goals. The discussions on the national studies as well as on the regional papers were analytical and lively. The comments made contributed to add further value to these studies. Also the deliberations contributed substantially in promoting mutual learning and developing conclusions and recommendations.

As the participants might know, this activity is the first such event organized by the CGPRT Centre to provide assistance to the island developing countries of this sub-region. Hopefully more activities could be implemented in the future as well within the resource constraints of the Centre.

Four useful points have come to the forefront during the deliberations in the workshop, which could be the basis of development of food security programmes in the future. Firstly food security in the Pacific Island countries is not, unlike in other Asian developing countries, a phenomena of acute food shortage. Secondly there is an urgent need to promote a balanced diet. This is basically a behavioral problem to address. Thirdly the share of domestic supply in national food demand is declining and is likely to worsen in the future. Fourthly the demand structure or diet paradigm is changing in the Pacific sub-region. These are the consequences of changing times, fast globalization, and explosion of information. The trend is not reversible.

Considering the above reality the countries in this sub-region face both challenges and opportunities. It is up to them to seize the opportunities for their benefits. It is not envisaged that in the longer run food security will be attained by being self-sufficient in all types of food products. These countries have comparative advantages in marine products. Thus trade seems to be the only mechanism to achieve effective food security. In that respect a network among the island countries could enhance their bargaining power and maximize the benefits.

While important activities will be carried out by the private sector, the role of government is extremely important to progress towards full food security. First of all governments need to be facilitators not the obstacles. Secondly they need to be regulators not players. Thirdly they need to enforce rules and regulations effectively and equitably. Fourthly the investment in human resources development particularly in education will be an necessary pre-requisite of all the above.

Finally, I wish to thank the resource persons and participants for kindly coming here to attend the workshop despite their busy schedules back home. And I wish for safe return journey.

[*] Chief, Rural Development Section, Population and Rural Urban Development Division UN/ESCAP, Bangkok, Thailand.

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Appendices

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Appendix 1 Programme

Regional Workshop
Food Security in Southwest Pacific Island Countries
12-13 December 2000
Sydney, Australia

		Moderator
Tuesday, 12 December 2000		
08:30-09:00	Registration	
09:00-09:15	Opening address by: Dr. Haruo Inagaki, Director, CGPRT Centre	
09:15-09:30	Framework of the project by: Dr. Pantjar Simatupang, Project Leader, CGPRT Centre	
09:30-10:00	*Break*	
10:00-11:00	Country report of Fiji by: Mr. H.M. Foraete, National Expert Comment by Mr. Sakiusa Tubuna	Dr. Euan Fleming
11:00-12:00	Country report of Papua New Guinea by: Mr. P.B.K. Igua, National Expert Comment by Dr. R.D. Ghodake	
12:00-14:00	*Lunch*	
14:00-15:00	Country report of Tonga by: Dr. S. Halavatau, National Expert Comment by Mr. Manase Felemi	Dr. Pantjar Simatupang
15:00-16:00	Country report of Vanuatu by: Mr. S.R. Welegtabit, National Expert Comment by Mr. James S. Wasi	

Moderator

Wednesday, 13 December 2000

09:00-09:30	Overview of South(west) Pacific Economy by: Dr. John Williams, ESCAP/POC	Dr. R.D. Ghodake
09.30-10:00	*Break*	
10:00-11:00	Consolidated discussion by: Dr. Euan Fleming, Regional Advisor University of New England	Mr. Kiran Pyakuryal
11:00-11:30	Plenary discussion	
11:30-11:45	Closing address by: Mr. Kiran Pyakuryal, Chief, Rural Development Section PRUDD, ESCAP	
11:45-13:00	*Lunch*	

Appendix 2 List of Participants

Regional Workshop
Food Security in Southwest Pacific Island Countries
12-13 December 2000
Sydney, Australia

Country/Institution		Name and Address
NATIONAL EXPERTS		
Fiji	1.	Mr. Hiagi M. Foraete Principal Agricultural Officer Ministry of Agriculture, Fisheries, Forests and ALTA P.O. Box 44, Nausori Fiji Phone no. : (679) 477066 and 479175 Fax no. : (679) 400477
Papua New Guinea	2.	Mr. P.B.K. Igua Soil Scientist National Agricultural Research Institute P.O. Box 204, Kokopo East New Britain Province Papua New Guinea Phone no. : (675) 9839145 Fax no. : (675) 9839129 E-mail : narilli@datec.com.pg
Tonga	3.	Dr. Siosiua Halavatau Chief, Soil Scientist and Chief Executive, Extension Ministry of Agriculture and Forestry P.O. Box 14, Nuku'alofa Tonga Phone no. : (676) 32125 Fax no. : (676) 24271 E-mail : vizo@kalianet.to

Country/Institution		Name and Address
NATIONAL EXPERTS		
Vanuatu	4.	Mr. Shadrack R. Welegtabit Assistant Research Officer Reserve Bank of Vanuatu Private Mail Bag 062 Port Vila, Vanuatu Phone no. : (678) 23333 Fax no. : (678) 24231 E-mail : shadweleg@hotmail.com
COMMENTATORS		
Fiji	5.	Mr. Sakiusa Tubuna Principal Agricultural Officer Ministry of Agriculture, Fisheries and Forests Robinson Complex Private Bag, Raiwaqa, Suva Fiji Phone no. : (679) 384233 Fax no. : (679) 385234 E-mail : stubuna@is.com.fj
Papua New Guinea	6.	Dr. Raghunath D. Ghodake Deputy Director-General National Agricultural Research Institute P.O. Box 4415, Lae 411, Morobe Province Papua New Guinea Phone no. : (675) 472 1751 Fax no. : (675) 472 2242 E-mail : nariddg@online.net.pg
Tonga	7.	Mr. Manase Felemi Deputy Director (Corporate Services) Ministry of Agriculture and Forestry P.O. Box 14, Nuku'alofa Tonga Phone no. : (676) 23038 (MAF Headquarters) Fax no. : (676) 23093 E-mail : MFELEMI@MAF.GOV.TO
Vanuatu	8.	Mr. James S. Wasi Principal Agriculture Officer (PAO) Vanuatu Agricultural Department Private Mail Bag 040, Port Vila Vanuatu Phone no. : (678) 22432 Fax no. : (678) 25265 E-mail : agrext@vanuatu.com.vu

Country/Institution		Name and Address
REGIONAL ADVISOR	9.	Dr. Euan Fleming Associate Professor School of Economic Studies University of New England Armidale, NSW 2351, Australia Phone no. : (61-2) 67 732775 Fax no. : (61-2) 67 733281 E-mail : efleming@metz.une.edu.au
ESCAP	10.	Mr. Kiran Pyakuryal Chief, Rural Development Section Population and Rural and Urban Development Division UN/ESCAP UN Buildings, Rajadamnern Avenue Bangkok, Thailand Phone No. : (66-2) 2881390 Fax No. : (66-2) 2881056 E-mail : pyakuryal.unescap@un.org
ESCAP - POC	11.	Dr. John Williams Senior Economic Affairs Officer ESCAP Pacific Operations Centre Private Mail Bag 004 Port Vila, Vanuatu Phone no. : (678) 23458 Fax no. : (678) 23921 E-mail : john.williams@escap.org.vu
CGPRT CENTRE	12.	Dr. Haruo Inagaki Director CGPRT Centre Jalan Merdeka 145, Bogor 16111 Indonesia Phone no. : (62-251) 356813 or 343277 Fax no. : (62-251) 336290 E-mail : cgprt@server.indo.net.id
	13.	Dr. Pantjar Simatupang Programme Leader, Research and Development CGPRT Centre Jalan Merdeka 145, Bogor 16111 Indonesia Phone no. : (62-251) 356813 or 343277 Fax no. : (62-251) 336290 E-mail : resdev@bogor.net

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