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MARKETS, PRICES AND NUTRITION : EXPERIENCES FROM  
ANTIGUA/BARBUDA AND ST. VINCENT AND THE GRENADINES

by

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## FOREWORD

Food Policy issues arose at the very beginning of the history of man. The evolution of man has been inseparably linked to the basic essentials for survival - food, sex and shelter. As the process of evolution continues the nature of the problems changes but the goal of ensuring that all segments of the population get an adequate supply of essential nutrients at all times remains paramount for man's development.

The changing nature of the problems demands continuity in research, the results of which form the basis of developing strategies and action plans for redressing these problems.

This document reports on a study designed to assess the impact of food price and subsidy policies and practices and trade regime on food production, marketing, food consumption and nutritional status. The basic tenet underpinning the study is that food production and nutrition is linked through a series of markets which determine the behaviour of the participants in the system. The policies and practices of Governments with respect to food prices and subsidies have both positive and negative influences on the system. By understanding the nature of these, programmes could be developed which maximises the positive effects and minimises the adversities.

It is hoped that this report will contribute to the understanding of the food and nutrition system in the selected countries, Antigua/Barbuda and St. Vincent and the Grenadines and the development of policies in the interest of an improved food and nutrition situation.

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## EXECUTIVE SUMMARY

### 1. Study Objectives and Hypothesis

This study sought to evaluate the impact of food price and subsidy policies and practices and trade regime on food production, marketing, food consumption and nutrition. The study was undertaken to provide a better understanding of the ways in which food price policies and practices affect various constituents in the food and nutrition system and provide a basis for modifying current programmes or introducing new ones to improve the performance of the food and nutrition system.

The specific objectives of the study were:

1. To develop criteria against which food policies and programmes (particularly food price and subsidy policies and practices) could be assessed in terms of their economic and nutritional effects.
2. Identify and describe the food policies and programmes in Antigua and St. Vincent during the sixties to the present time.
3. Measure and analyse the effects of these policies and programmes on food production, imports and consumption during the same period.
4. Analyse the structure, conduct and performance of agricultural marketing systems.
5. Develop and refine a methodology for assessing the impact of food price and subsidy policies and food marketing systems on nutrition.
6. Improve the performance of the food and nutrition system.

It was hypothesized that the food price and subsidy policies and practices in the selected countries during the sixties to the present time have failed to:

- a) stabilize food prices;
- b) improve farm incomes;

- c) improve food availability;
- d) reduce import dependence; and
- e) improve the nutritional status of all segments of the population.

## 2. Methodology

The methodology adopted in the study addressed in turn the stated objectives. Literature reviews and analysis and interpretation of quantitative data from primary and secondary sources formed the basis of the approach.

The criteria for assessing the impact of food price and subsidy policies and practices were developed in the context of an overall development framework and focussed on adequacy of food supplies, food prices, levels of farm incomes, import dependence, foreign exchange issues, food consumption and nutritional status.

The type, rationale and scope of Government's food price, trade and subsidy policies were described following a review of Budget Speeches, Acts of Parliament and supporting documents from relevant Ministries.

An analysis of food imports and consumption for the period under study was undertaken as far as time series data permitted. Regression analysis using ordinary least squares highlighted the interrelationships among food imports, prices, gross domestic product, food exports, trade balances and remittances from abroad. Long-term food price inflation was also analysed.

A supply analysis relating production of selected crops to various input costs, acreage planted and sex of farmer was conducted. The data for this analysis were obtained from a survey of 80 farmers selected at random in each territory. Together with a random sample of 40 fishermen from each country, farmers' and fishermen knowledge and participation in subsidy schemes, their degree of satisfaction with the pricing arrangements for products and inputs, perception of agricultural problems and

approaches to their solution and incomes of farmers and fishermen were assessed.

The procurement and distribution practices of samples of food firms, both private and public, were ascertained through personal interviews with the aid of pre-tested questionnaires. The data permitted an analysis of market channels for selected foods, market structure, conduct and performance. The important dimensions of market structure addressed were:

- a) The degree of buyer and seller concentration as measured by numbers of buyers and sellers, and percentage of sales by individual firms or group of firms.
- b) The degree of product differentiation.
- c) Conditions of entry and exit of firms.

The conduct variables included:

- a) Pricing practices.
- b) Product and sales promotion practices.
- c) Adaptive tactics in the face of pricing, product and sales promotion practices of competitors.

The performance variables included:

- a) Product characteristics including quality, safety and nutritive value.
- b) Extent of excess capacity.
- c) The profitability of the enterprises.
- d) The extent to which firms adopt social marketing goals, e.g., the nutritional effects of their products.

An analysis of food consumption in relation to incomes, food expenditure, family size, sex and education of head of household, sex of individual, age, weight and height was conducted. Nutritional status assessment was based on weight for height. This analysis rested primarily on survey data

collected during March - July 1984. The survey covered 299 households in Antigua and 286 in St. Vincent as indicated in Table I.

Respondents	Antigua	St. Vincent
Farmers	80	80
Fishermen	40	38
Vendors/Traffickers	30	26
Consumers	51	51
Importers/Wholesalers	14	7
Supermarkets	10	8
Food Shops	58	61
Butchers	16	15
TOTAL	299	286

Food consumption and anthropometric data were collected from a member of the households of farmers, fishermen and food firms as well as consumers. A comparative analysis of nutritional status indicators among different categories of households was conducted. The consumption analysis focussed on individual products as well as product groups and energy and protein.

In terms of quantifying the interrelationships among food intake, incomes, food expenditure, family size, sex of head of household, educational status of head of household, age, weight and height, several regression models were tested using primarily a semi-log or double-log specification incorporating dummy variables as appropriate.

Food intake was that for the selected individual of the household surveyed. This was determined by estimating food consumed over a 24-hr period based on data provided by the individual respecting kinds, form, quantity and method of preparation of food. Quantities were converted to

energy and protein using the publication "Food Composition Tables for Use in the English-Speaking Caribbean" compiled by CFNI.

Household incomes were based on the summation of stated monthly income for each member of the household. Per capita income was calculated by dividing total household income by household size. Where weighted income is used, it refers to the per capita income multiplied by the ratio of the recommended dietary allowance of the individual and the average for the household. The recommended dietary allowances were based on the document "Recommended Dietary Allowances for the Caribbean" published by the Caribbean Food and Nutrition Institute.

Heights and arm circumference were measured using the French Nivotoise Portable Height Measure. Weights were recorded using a Field Type Survey Scale by CMS Weighing Equipment Ltd., 18 Campden High Street, London, NW1.

Based on the results of the analyses, guidelines for developing more effective food price and subsidy policies were formulated in terms of the positive effects on nutrition and health status of the population. In this connection, particular emphasis was placed on policies that lead to greater self-reliance through stimulation of income-generating projects with high employment opportunities and community participation.

3. Conclusions, Policy Implications and Recommendations : Antigua

Food Availability: The food price, subsidy and trade policies applied to the food and nutrition system were inimical to local production and fostered a high import dependence on relatively cheap high energy foods. Low acreage planted and low levels or improper use of inputs limited the contribution of the local production sector to food availability and foreign exchange earnings. Incomes of farm households were generally low although some product prices relative to input costs were quite high. The limitations on the use of inputs may have prevented farmers from taking advantage of the high revenue potential. Greater input subsidization is indicated.

The competition from cheap food imports could be addressed through

the application of higher duties and taxes where they are now in force and extending or applying them to other products to which duties and taxes are not now applied. A devaluation of the currency is not crucial for Antigua at this stage although it would improve the position of farm households to some extent. A restriction of some imported food items especially at certain times of the year when production is high could have positive effects.

Food Prices: Food prices were generally high and increased during the period under study. Even products that are basic to the diet experienced high levels of inflation. Products under price control did not escape the rapid inflationary trend though price control prices were stable for relatively long periods before major increases.

A common system for establishing price controls should be established to replace the dual system of a percentage mark-up for imported foods and a fixed dollar mark-up for locally-produced items. The fixed dollar mark-up is preferred. The Prices Division should be strengthened to monitor prices and prosecute offenders. Alternatively, price controls could be abolished.

Input Subsidies: Farmers' and fishermen's knowledge and participation in subsidies were quite low except for credit facilities, cultivation services, duty-free concessions on certain inputs (tractors) and ice at subsidized price. The level of subsidies, therefore, provided for fishing and agriculture, was low. There was a high degree of dissatisfaction with product prices and input prices among farmers and fishermen.

Farmers' perception of principal constraints to agricultural development included lack of water (rain or irrigation), damage to crops by stray animals and inadequate markets and low prices. Provision of dams, subsidized water and dealing with the problem of stray animals were the principal solutions to the problem of agricultural development. Input subsidies were considered best for improving production among farmers and

fishermen.

The major focus of agricultural policy should be in the area of subsidization of irrigation water. This could be in the form of provision of dams and ponds at a reduced cost and duty-free concessions on pumps and irrigation lines after installation on farm holdings. Consideration must be given to providing protection to farmers crops through provision of fencing material and zoning of grazing areas.

Although not specifically stated by farmers as a significant constraint to agricultural development, the analysis point to acreage planted as being of significance in enhancing local food production. A policy aimed at increasing land availability to farmers together with security of tenure could be effective in stimulating production.

The issue of improper input mix might be addressed through a more aggressive Extension Division and farmer training programmes. This should be supported by the conduct of appropriate research designed to rationalize resource use in agriculture.

Market Structure, Conduct and Performance: There was high concentration among importers/wholesalers and supermarkets relative to other food distributors. Entry into the importer/wholesaler and supermarket business was impeded by the availability of capital, while lack of alternative investment and employment opportunities impeded exit. Although reported profits were low, the high concentration levels observed may imply high profit levels among a few.

The position of the Central Marketing Corporation in handling farmers' produce was relatively weak except for a few products. The impact of a policy for direct involvement in the distributive sector could be greater if the Corporation competed more directly within the food import sector while maintaining close cooperation with the farm production and distribution sector for local foods. Such a policy would put the Corporation on a stronger financial footing.

Food Consumption and Nutritional Status: Food consumption on average was quite high. However, a significant proportion of the sample consumed less than 80% of the recommended dietary allowance for energy. Although this might have reflected a certain level of dieting to control obesity, a shortfall in caloric intake among farmers and fishermen may limit productivity.

The nutritional status is characterised by a high level of obesity particularly among females. The associated health problems of diabetes and hypertension already have a high prevalence and undoubtedly take a heavy toll on productivity.

The problem of obesity in Antigua supports the notion of targeted programs to only the needy cases. To the extent that farmers' productivity is limited by sub-optimum food intake, a Supplementary Feeding Programme to this group might be warranted. The overall responsiveness of caloric and protein intake to individual food expenditure was estimated at 0.5. At the mean of 381 kilocalories per dollar expenditure, this estimate implies that additional food expenditure of 10 cents would increase caloric intake by a mere 19 kilocalories or 190 kilocalories per additional dollar expenditure. Most basic foods consumed in Antigua provide far in excess of 190 calories per dollar thus making a transfer payment less effective than a food supplement or food coupon for particular foods in increasing caloric intake.

Foreign Exchange and Exchange Rates: The foreign exchange earning position in the agricultural sector is weak and would remain so in the foreseeable future. The strategy adopted should be one of foreign exchange conservation through stopping leakages for the purchase of food and greater self-reliance on local food production. Devaluation would improve farmers competitiveness but a tax on imports along with restrictions might be more effective at this stage. The taxes could be used in subsidy programmes.

4. CONCLUSIONS, POLICY IMPLICATIONS AND RECOMMENDATIONS  
ST. VINCENT

Food Availability: The import dependence on food in St. Vincent is high but not as high as has been observed in many other Caribbean countries including Antigua. The contribution to the economy by the Agricultural sector is quite high as is the contribution to foreign exchange earnings. Farm incomes were generally low and the relative decline in the Pound Sterling would worsen the situation of farm households.

The present impact of the agricultural sector could be improved if more land and other inputs were made available together with an improved food marketing system. The competition from cheap imports would continue to depress demand for locally-produced items. This could be addressed to the imposition of higher duties and taxes. Import restrictions on some food imports could have a positive impact. The peculiar position of St. Vincent in respect of its exports to the United Kingdom suggests that a devaluation of the dollar would have a formidable impact on farm households. Such a policy would have to be weighed carefully against the overall impact on the economy as a whole.

Food Prices: Food prices increased during the period under study - well above the suggested criterion of six percent per annum. The increase in prices among economical food sources was also high and tended to be higher for local products than for imported commodities. Products under price control, e.g., fish, did not show any significant difference from items not under price control as far as the inflationary trend is concerned.

The method of a percentage mark-up applied to imports vis-a-vis a fixed dollar price for local products should be rationalized in favour of a fixed dollar price. The abolition of price controls does not appear to be counter-productive and should be seriously considered.

Input Subsidies: Farmers' and fishermen's knowledge of and participation in subsidies were quite low. The better known subsidies among

farmers were credit facilities and planting material, while for fishermen only credit was outstanding.

Given the competition by food imports, extension of the input subsidies could be effective in improving agricultural production. Any subsidy scheme should be supported by improved farmer education concerning the scheme and extension education on the appropriate use of subsidized inputs.

Market Structure, Conduct and Performance: There was high concentration among supermarkets, importers/wholesalers and traffickers. There was a high degree of dissatisfaction among farmers in respect of pricing arrangements for their products. The principal problem farmers perceived as limiting agricultural development was the lack of markets and improved guaranteed markets was suggested as the main move for enhancing agricultural development. The St. Vincent Marketing Corporation played a limited role in handling the farmers' produce selected, except peanuts. Closer cooperation needs to be established between the Corporation and the farmers. The retail outlet of the Corporation is effective in moderating prices and further expansion of the import/wholesale activities should enhance its financial position.

Food Consumption and Nutritional Status: The nutritional status was characterised by obesity among females and a tendency toward underweight among men based on weight for height measurements. There was evidence of inadequate consumption of both calories and to a less extent protein among households.

The responsiveness of caloric and protein intakes to food expenditure was estimated at 0.6% and 0.4% respectively, thus making calorie intake more sensitive than protein intake as food expenditure increases. The responsiveness of calorie intake to food expenditure at 0.6% at the mean of 285 calories per dollar expenditure imply an increase in calorie intake of 171 for an additional dollar expenditure. Barring significant differences in administrative costs, a food supplementation or food coupon program on particular foods would be more effective than a transfer payment.

Such programs should be targeted specifically to people in need, given the tendency towards obesity among certain segments of the population.

An education programme aimed at restructuring the consumption pattern among the obese could stimulate local production, in that most local products are higher in fibre and less energy dense than the imported items.

Foreign Exchange and Exchange Rates: The agricultural sector has demonstrated a high foreign exchange earning capacity which could be improved with appropriate incentives including better marketing arrangements for exports. The loss in earnings from the relative decline in the Pound Sterling could be addressed through devaluation. The negotiations would certainly be delicate since devaluation would affect participation in the currency system differently.

5. Methodology The methodology applied to the study was effective in establishing linkages among food production, distribution, food consumption and nutritional status within the context of Government's policy regarding markets, prices and nutrition. Despite this, a number of weaknesses could be identified. Perhaps the most significant limitation was the reluctance of interviewees to provide information. Information on income was particularly limiting as well as procurement and distribution costs of food distributors.

The 24-hour recall was a simple method of estimating food consumption while the inclusion of a price variable allowed the conversion to food expenditure.

Despite the limitations, the study achieved its objectives satisfactorily. The co-efficients relating food imports to prices, food exports, gross domestic product and remittances could be useful in food surveillance activities. The analysis of distribution channels, market structure and conduct point to areas for change in policy. The consumption coefficients could be used in planning effective intervention programmes.

The food and nutrition system is dynamic and as programmes are implemented, co-efficients will change. As new data are collected further analyses would be needed to measure these changes. Having had a broad view of the whole area, smaller indepth studies of particular segments are recommended.

## Chapter 1

### INTRODUCTION

#### 1.1. Evolution of the Study

Good nutrition and health status is a function of four basic inter-related variables. These include an adequate food supply, effective demand, income and the level of health care. Adequate food supply is dependent on the level of local production, importation, storage capacity, processing facilities and the overall performance of the food marketing system. Effective demand is related to income and prices which are themselves determined by an interplay of supply and demand forces exerted by agents within the food marketing system. Income levels depend partly on education and skill of the worker, which is the end result of training. Health care depends on income, health education status of the population and Governments' health policies.

In 1977, the World Health Organization along with its member Governments adopted the social goal of Health For All By The Year 2000 and in 1978 emphasised the Primary Health Care approach as being crucial to the achievement of this goal. Food and nutrition constitute a major component of this strategy.

A basic prerequisite for attaining Health For All By The Year 2000 is that of ensuring availability and access to all individuals of an adequate and stable supply of nutritious, safe and acceptable food. Several health problems have a direct relationship to levels of food consumption and the quality of the food consumed. PEM, anaemia and vitamin and mineral disorders are more often than not a consequence of under-consumption of nutrient imbalances. Obesity, hypertension, diabetes and cardiovascular disorders arise as a result of excessive intakes of food and/or imbalances in nutrient intake. Addressing the problems of food supply along with associated problems of food distribution within the population and households in relation to nutrient needs should make a significant contribution to realising the goal of Health For All By The Year 2000.

Ensuring an adequate food supply to all segments of the population is a complex task involving several agencies having a relationship with food production, food import/export, food demand, food consumption and biological utilization of foodstuffs. Food production must increase to reduce import dependency and provide for a reasonable supply of foodstuffs. The food marketing system must develop in a manner to allow for a more equitable allocation of resources and foodstuffs to all segments of the population.

The food system consists of three major components. These are:

1. The direct production of food crops from the land for both humans and livestock and including fishing and hunting, e.g., corn, bananas, potatoes.
2. The conversion of crop and livestock products to meat animals and their products, e.g., milk, beef, poultry.
3. The distribution and marketing of all foodstuffs.

Inputs (factors of production) are essential to the production process. In order to produce, farmers must procure and organize three basic factors of production - land; labour and capital. The farmer himself usually provides the fourth essential ingredient - management. In large operations this input must also be purchased. The marketing of agricultural inputs could be regarded as a fourth component of the food system (Breimyer, 1978).

Food marketing is concerned with the performance of all the business activities necessary to get foodstuffs from their origin of production to consumers in the quantity, quality or form, time and place desired by them and the development of a system of transfer, pricing and communication among participants within the marketing system. The activities that are performed during the marketing process include:

1. The exchange functions of buying, selling and price determination.
- 2.. Functions relating to supply comprising assembly; and transportation, storage, food processing and preparation.
3. Synergistic functions consisting of market information and news, financing and risk acceptance, grading and standardization, product development, demand creation and supervision.

These activities are performed with varying degrees of sophistication, depending on the stage of evolution of the marketing system (Stout 1970).

While the concept of food marketing gives explicit recognition to the physical and technical aspects associated with enhancing the place, quality and form and time utility of foodstuffs, emphasis must be places on the pricing and communication activities which determine the manner in which resources are organizes in providing the products and associated services. However, the physical and technical aspects of food marketing are important in their own right since they constitute a group of activities within which great leaps towards industrialization could be made.

The food marketing system in the Region is made up of a complex of private and public agencies performing the varied business activities involved in getting foodstuffs from their point of production to the consumer. The system includes all the traditional market firms of producers, processors, whol salers and retailers and those public agencies involved in the supervision, regulation and the provision of State services. Through this system, producers and consumers are interlocked by a series of markets so that a wide variety of goods and services would be available to the consumers and information on what and how much to produce would be passed on to producers.

The current pattern of food production and marketing in the Region today was influenced by the period of colonialism during which was developed the plantation system. The Consequences of this system are:

- a. The agricultural sector is geared towards the production of export crops at the expense of foodstuffs for local consumption.
- b. Agricultural production inputs have a very high import components.
- c. An industrialized agricultural sector with internal backward and forward linkages is lacking.
- d. There is a heavy reliance on imported food supplies.

In a wider context, the product and trade patterns which developed have important implications for the manner in which food is distributed.

The best lands having been used for the production of export crops—sugar, bananas, cocoa, etc., meant that the production of crops and livestock for local consumption or for animal feeds had to be relegated to poorer lands usually in small parcels on hilly and mountainous terrain inaccessible by modern transportation methods. The consequences of such a production system were low production at high cost compounded by high marketing costs occasioned by the low volumes moved over long distances, high spoilage due to the inadequate transport methods and the low product demand due to high prices. The net effect was a low return to the producers and an inability to purchase nutritional requirements over and above what they themselves produced. The movement of large segments of the rural population to the urban centres, without the appropriate skills for employment, resulted in a growing number pockets of urban slums characterized by intolerable nutritional levels.

Paralleling the development of the export agriculture sector was the development of an import food marketing sector dominated by a few firms at the import/wholesale level, becoming less so at the level of retail. The control of the import/wholesaler sector by a few firms implied greater bargaining power in pricing and control and thus a greater share of the profits. Like the retailers of imported foodstuffs, the indigenous group of marketers which linked local producers with the consumers was handicapped by a low bargaining power.

This low bargaining power on the part of non-export enterprise farmers and small-scale food markets may have created adverse income disparities which constrained their ability to procure for themselves and their families, sufficient food to ensure a satisfactory level of nutritional status and dietary well-being.

The food marketing system is thus of crucial importance in stimulating food production in relation to consumer demand and in achieving better equity in the distribution of gains from the development process. The procurement and distribution policies and practices of food marketing agents, both private and public, have a profound influence on food supplies and the ability of consumers to obtain those supplies. But food marketing systems are not without imperfections and cannot be expected to perform satisfactorily without appropriate regulatory measures and support programmes applied by the State and its institutions as part of their overall development strategy. Both production and consumption can be influenced through active, guided changes of the system (Jones, 1970).

Cognisant of the imperfections of the food marketing system and conscious of the need to provide consumers with cheap staples, Governments in the region have enacted price control legislation empowering Ministers responsible for food marketing to set maximum prices or percentage mark-ups for selected foodstuffs. Further, through agricultural marketing agencies some Governments have attempted to regulate the marketing of locally produced and imported foodstuffs. Subsidies in one form or another have been provided to farmers to stimulate production and thus ensure abundant food supplies at low cost. Other intervention strategies include:

- a. The direct importation of basic foods,
- b. The regulation of imports of foodstuffs and the levels of duties and taxes.
- c. The establishment of minimum guaranteed prices as well as contractual arrangements with farmers by State-controlled marketing agencies.

The policy actions taken by Government, though often well-intentioned, may have negative effects. For example, price controls to maintain low prices for low-income persons applied by Government agencies might be so low as to eliminate any surplus over cost to marketers, thereby leading to scarcity of foodstuffs and illicit market operations which could have serious nutritional consequences on the poor. Further, price controls applied to certain agricultural products may act as a disincentive to production, thus reducing the total food supply.

### 1.2. Objectives

Against this background a study was conducted to evaluate the impact of food price and subsidy policies and practices and trade regime on food production, marketing, food consumption and nutrition. The study was undertaken to provide a better understanding of the ways in which food price policies and practices affect various constituents in the food and nutrition system and provide a basis for modifying current programmes or introducing new ones to improve the performance of the food and nutrition system.

The specific objectives of the study were:

1. To develop criteria against which food policies and programmes (particularly food price and subsidy policies and practices) could be assessed in terms of their economic and nutritional effects.
2. Identify and describe the food policies and programmes in Antigua and St. Vincent during the sixties to the present time.
3. Measure and analyse the effects of these policies and programmes on food production, imports and consumption during the same period.
4. Analyse the structure, conduct and performance of agricultural marketing systems on nutrition.
5. Develop and refine a methodology for assessing the impact of food price and subsidy policies and food marketing systems on nutrition.

6. To improve the performance of the food and nutrition system.

### 1.3. Hypotheses

Food price and subsidy policies may have both positive and negative consequences or may even be neutral in their impact. The specification of a general hypothesis could therefore take any of these three forms. It seemed more appropriate in this study to address the positive or negative aspects within the context of a hypothesis with multiple components. The general hypothesis was stated succinctly as follows:

The price and subsidy policies and practices in the selected countries during the sixties to the present time have failed to:

- (a) stabilize food prices;
- (b) improve farm incomes;
- (c) improve food availability;
- (d) reduce import dependence; and
- (e) improve the nutritional status of all segments of the population.

Subsidiary hypothesis in the form of regression models were tested. These included:

- (a) Food imports as a function of gross domestic product, visible trade balance, food exports and remittances from abroad.
- (b) Selected food imports as a function of price.
- (c) Total production as a function of acreage planted and various input costs.
- (d) Individual caloric intake and individual protein intake as a function of per caput household income, individual food expenditure, sex of the individual and head of household, family size, educational status, age, weight and height of the individual.

A linear food expenditure model showing how individual food expenditure was allocated among staples, legumes, fruits and vegetables, foods from animals and fats and oils was also tested.

#### 1.4. Methodology

This study addressed broad policy issues and as such the methodology incorporated a macro-analytic component. However, the responsiveness of food producers and marketers and the effects were at the level of the firm and household. Addressing these issues required a micro-approach. Thus the methodology combined macro- and micro-analytic approaches. These two approaches can only be partially separated since the macro-elements are but a summation or aggregation of the micro-components (Quirk and Saposnik, 1968).

In keeping with the objectives, the first task is the development of an appropriate set of criteria against which the impact of food price and subsidy policies could be assessed. This was achieved by a review and analysis of current economic and nutrition considerations. The criteria were developed in the context of an overall development framework and focus on the macro goals of adequacy of food supplies, satisfactory nutritional status, foreign exchange earning capability, price levels, levels of farm incomes and employment contribution, reduction in import dependence and equity in the distribution of profits.

The food price and subsidy policies of Government are documented in the Budget Speech, statements by Ministers and in enabling legislation respecting such matters. In the selected countries, data were collected on the type, rationale and scope of the policies through a thorough review of these documents.

Against the background of Government's food price and subsidy policies the procurement and distribution practices of samples of food firms, both private and public, were ascertained through personal interviews with the aid of pre-tested questionnaires. The data collected focused on the firm's response within the constraints of the policies and practices. The strategies of firms in ensuring the best combination of resources for technical and operational efficiency within and outside the bounds set by the policy directions were analysed. In aggregate, the data revealed structure, conduct and performance characteristics within the market system.

The important dimensions of market structure that were addressed are:

- (a) The degree of buyer and seller concentration as measured by numbers of buyers and sellers, and percentage of sales by individual firms or group of firms.
- (b) The degree of product differentiation; and
- (c) Conditions of entry and exit of firms.

The conduct variables included:

- (a) Pricing practices;
- (b) Product and sale promotion practices;
- (c) Adaptive tactics in the face of pricing, product and sales promotion practices of competitors.

The performance variables included:

- (a) Product characteristics including quality, safety and nutritive value;
- (b) The extent of excess capacity;
- (c) The profitability of the enterprises; and
- (d) The extent to which firms adopt social marketing goals, e.g., the nutritional effects of their products.

Similarly, from samples of farm firms and with the aid of pre-tested questionnaires, data on farmers' and fishermen's responses to food price and subsidy policies and practices were collected and analysed to measure their impact.

Food price and subsidy policies and practices impact on levels of food production, exports and importation, food consumption patterns (kind, quality, quantity, form and source of food), levels of employment and income generation, balance of payments, prices and so on. These variables are however affected by a host of other factors. Any analysis to assess the impact of food price and subsidy policies and practices should attempt to isolate the relevant systems affected by such policies and practices and subject them to indepth study.

This study addressed:

- (a) The food imports/exports system by analysing the interrelationships between food imports, prices gross domestic product, food exports, trade balances and remittances from abroad;
- (b) Supply response by farmers through analysis of production in relation to acreage planted to selected crops and input costs, and sex of farmer;
- (c) Farmers/fishermen's knowledge and participation in subsidy schemes, degree of satisfaction with the pricing system for products and inputs, their perception of agricultural problems and their solutions and farm incomes;
- (d) An analysis of market channels for various foods, market structure, conduct and performance;
- (e) Food price inflation over time;
- (f) Educational status of household head, age, weight and height of the individual.
- (g) Nutritional status based on weight for height; and
- (h) Foreign exchange and exchange rates.

The data for the analyses were collected from a review of the relevant literature, analysis of time series data using regression analysis and analysis of survey data using tables and regression and correlation analysis.

The survey data are the principal source of information. The survey was conducted using pre-tested questionnaires. Two Hundred and Ninety-nine households in Antigua and 286 in St. Vincent were surveyed as follows:

Respondents	Antigua	St. Vincent
Farmers	80	80
Fishermen	40	38
Vendors/Traffickers	30	26
Consumers	51	51
Importers/Wholesalers	14	7
Supermarkets	10	8
Food Shops	58	61
Butchers	16	15
<b>TOTAL</b>	<b>299</b>	<b>286</b>

Food consumption and anthropometric data were collected from a member of the households of farmers, fishermen and food firms as well as consumers. A comparative analysis of nutritional status indicators among different categories of households was conducted. The consumption analysis focussed on individual products as well as product groups and energy and protein.

In terms of quantifying the interrelationships among food intake, incomes, food expenditure, family size, sex of head of household, educational status of head of household, age, weight and height, several regression models were tested using primarily a semi-log or double-log specification incorporating dummy variables as appropriate.

Food intake was that for the selected individual of the household surveyed. This was determined by estimating food consumed over a 24-hour period based on data provided by the individual respecting kinds, form, quantity and method of preparation of food. Quantities were converted to

energy and protein using the publication "Food Composition Tables for Use in the English-Speaking Caribbean" compiled by CFNI.

Household incomes were based on the summation of stated monthly income for each member of the household. Per capita income was calculated by dividing total household income by household size. Where weighted income is used, it refers to the per capita income multiplied by the recommended dietary allowance for the household. The recommended dietary allowances were based on the document "Recommended Dietary Allowances for the Caribbean" published by the Caribbean Food and Nutrition Institute.

Heights and arm circumference were measured using the Nivotoise Portable Height Measure and weights were recorded using a Field Type Survey Scale by CMS Weighing Equipment Ltd., 18 Campden High Street, London, NW1,

Based on the results of the analyses, guidelines for developing more effective food price and subsidy policies were formulated in terms of the positive effects on nutrition and health status of the population. In this connection, particular emphasis was placed on policies that lead to greater self-reliance through stimulation of income-generating projects with high employment opportunities and community participation.

#### 1.5. Data Collection and Analysis

The secondary data was collected from published and unpublished statistics from the Department of Statistics and other Ministries and Departments in the selected countries. The data in a number of cases were suspect and a number of gaps existed.

The primary data were collected during a national survey. An attempt was made to obtain a representative sample of the various firms and consumers. Different strategies were adopted, given the data base for the populations to be sampled. The procedures were developed by a qualified Biometrician.

Farmers: In each country the sample of farmers to be surveyed was set at 80. In Antigua, 1223 farmers were listed. A random sample of 1 in 13 was taken to allow for non-respondents and non-existence. The first was selected at random and every thirteenth thereafter.

In St. Vincent, estimates of the total number of farmers vary from 5,000 to 6,000. In the absence of an up-to-date list of farmers, 8 farming communities were selected at random - one from 8 agricultural areas consisting of 9 - 27 farming villages. A random sample of 10 farmers was taken from each of the eight farming communities as follows:

Farming Community	Number of Farmers	No. in Sample
Claire Valley	25	10
Rilland Hill		
Chauncey		
Vermont	48	10
Choopins	30	10
Evesham	61	10
Biabou	47	10
Park Hill	53	10
Calder	30	10
Stubbs		
Mt. Pleasant		
Dickson	35	10
TOTAL	329	80

Fishermen: In St. Vincent a sample of 40 fishermen - 10 from each of four fishing villages was surveyed. The procedure was similar to that for farmers.

In Antigua the sample of forty fishermen was drawn at random from a compiled list of 420 fishermen, 280 of whom are registered with the Department of Fisheries.

Food Shops, Supermarkets, Importers/Wholesalers: In Antigua the Prices and Consumer Affairs Division lists 253 food shops, 33 supermakets and 15 importers/wholesalers. Sixty foodshops and 15 supermarkets were

selected at random using their list. An attempt was made to interview all importers/wholesalers.

In St. Vincent a random sample of 61 food shops was selected from the eight farming communities and the Capital, Kingstown. An attempt was made to survey all 16 supermarkets and 14 importers/wholesalers but only nine supermarkets and seven importers/wholesalers responded.

Vendors/Traffickers: In St. Vincent a random sample of 30 vendors/traffickers were selected from a check list of 135. In Antigua, a random sample of 30 vendors/traffickers was taken from a check list of 300.

Consumers: In St. Vincent and Antigua fifty consumers were selected by taking the first consumer to enter a selected food shop.

Butchers: All 15 butchers operating in the Kingstown area were interviewed. In a random sample in Antigua, 16 of the 46 butchers check-listed were interviewed.

In Antigua the survey was conducted by a team of two Senior Officers from the Ministry of Agriculture and six interviewers. The Senior Officers training was in agriculture, food and nutrition and both had food research experience. The background of the interviewers was agriculture, nutrition and health and most of them served as interviewers in the 1981 National Food, Nutrition and Health Survey for which a 1-week period of training was conducted. Additional training was conducted during a 3-day workshop and subsequently in preparation for the survey for this study.

In St. Vincent, two Senior Officers from the Ministry of Finance and Agriculture respectively and seven interviewers with training in the fields of Health, Agriculture and Nutrition, conducted the survey. The Senior Officers are qualified in Statistics and Home Economics respectively. The team leaders and interviewers were trained during a 3-day workshop and they were tested for accuracy of measurements.

The interviews were conducted with the aid of pre-tested and pre-coded questionnaires.

The questionnaires were edited by three graduates of the Faculty of Agriculture of the University of the West Indies, who participated in Course 363: Human Nutrition and Food Planning. The editors were under the guidance of the Principal Researcher and the Public Health Nutritionist at the Caribbean Food and Nutrition Institute, Trinidad Centre.

The data were keyed into an ICL Computer by the Computer Centre staff and verified. The programming was done by the Biometrician who assisted in questionnaire design and sampling procedures. The analyses were done on an International computers Limited (ICL) ME29 Computer.

#### 1.6. Study Limitations and Usefulness

The most serious limitation of the study is the lack of a consistent set of time series data on local production, prices and incomes for use in demand analysis, with income data being the worst. This precluded any application of sophisticated techniques of analysis. Other limitations included (a) the lack of response by some firms regarding the procurement and distribution practices, and (b) difficulties experienced with estimating the energy and protein composition of unfamiliar dishes. This latter problem was addressed by computing an estimate based on the description of the constituents.

Despite these limitations, the study revealed a great deal of information on the enunciated policies of the Government vis-a-vis actual practices. Data on the structural features of the production and distribution system should provide a better understanding of the existing interrelationships and thus guide policy-makers on the kinds of intervention that would result in an improvement of the system in terms of better food, nutrition and health status. The analysis of the data on food consumption patterns and the associated nutrition indicators point out the differences in status among different groups and socioeconomic classes and makes a justification for the adoption of different strategies depending on socioeconomic status.

## Chapter 2

### CRITERIA FOR ASSESSING THE IMPACT OF FOOD PRICE AND SUBSIDY POLICIES

Issues of food price and subsidy policies arise from the dual role of prices in determining food consumption levels on the one hand and farm incomes on the other (Timmer, et al., 1983). The direct intervention by Governments in the pricing of foodstuffs is primarily for the maintenance of low and stable prices of consumers or to improve or stabilize farm incomes. The application of a subsidy attempts to lower input costs, thereby causing an increase in the use of these inputs and thus production or improved farm incomes by means of higher prices for farm products relative to input costs. Import restrictions are designed to protect local enterprise by reducing import demand in favour of local demand, thus improving farm incomes.

This Chapter reviews the basic concepts of markets, prices and nutrition and develops a rational set of criteria against which food price and subsidy policies could be assessed.

#### 2.1. Concepts of Markets, Prices and Nutrition

Put simply, a market is the context in which voluntary exchange of goods and services takes place among individuals or groups within private enterprise economies. Market transactions usually involve the transfer of goods and/or services for the payment of a sum of money agreed upon by the buyer and seller. A farmer who sells yams to a higgler or huckster enters into a market transactions. Similarly, the higgler who sells to a housewife concludes another market transaction. Although the farmer and the housewife did not enter into a market transaction the two are linked via the higgler and thus operate within the same market (Lancaster, 1969).

Excluded from the market are transactions such as the direct consumption of yams from the farm by a farm family or the compulsory extraction of taxes by the State. However, such transactions affect the operations of markets.

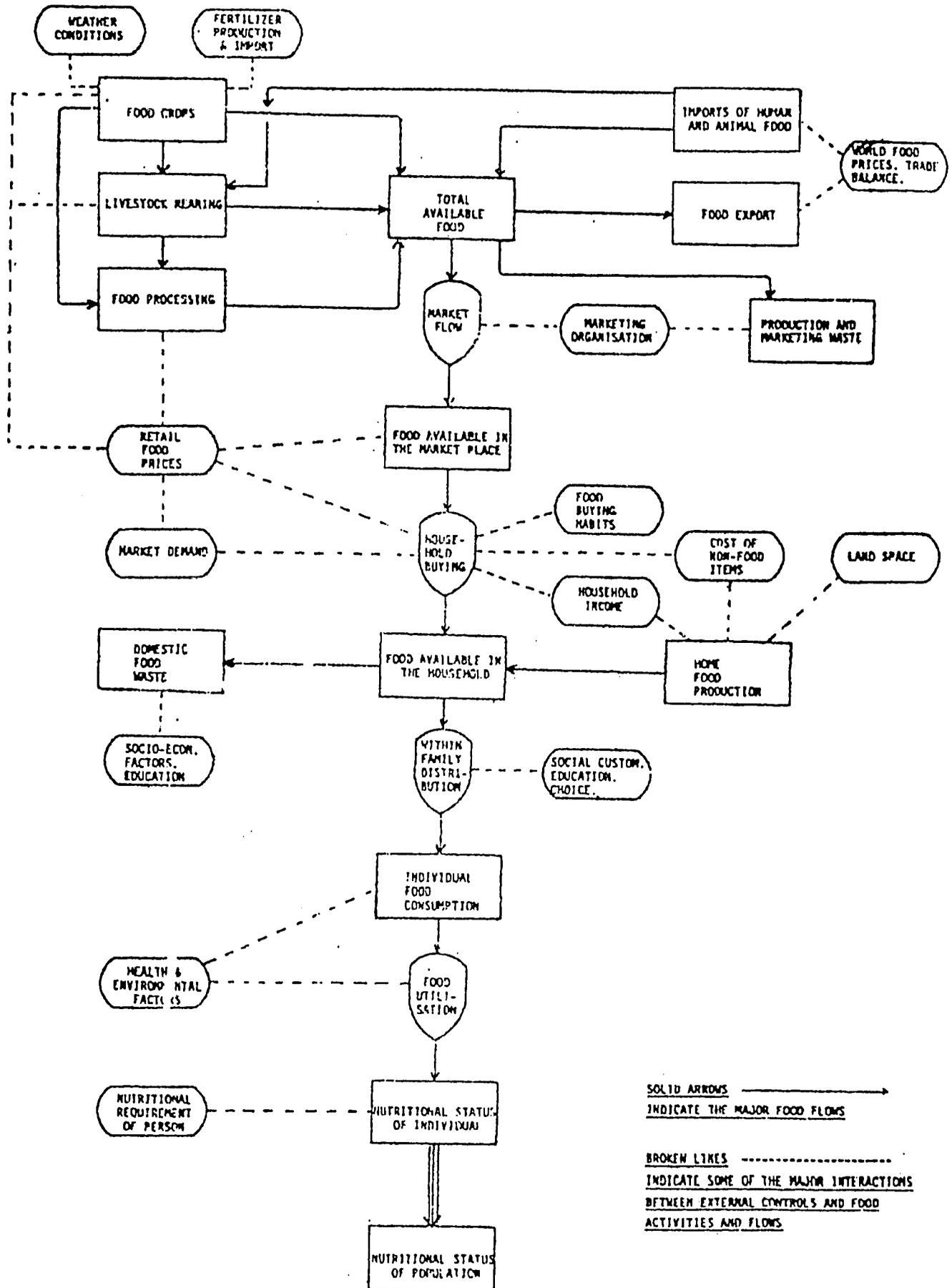
Markets operate within a legal framework. However, though laws constrain markets and indeed prohibit some, they cannot ensure their non-existence. The traffic in drugs is an example as well as the sale of food-stuffs above controlled price levels. Markets are classified on the basis of numbers of buyers and sellers, the nature of the products, degree of information flows and the ease of entry and exit to and from the market. A market in which (a) there is a free flow of factual information; (b) products are homogenous; (c) buyers and sellers are many and free to enter and leave the production/distribution system is described as a perfect market.

In such a market the interplay of supply and demand forces determines a price at which excess supply and excess demand equal zero. This price is regarded as the equilibrium price for any given period, the price fluctuates only momentarily and then returns rapidly to the same or new and stable equilibrium in response to supply and demand changes.

The existence of a perfect market ensures that no one is made worse off by any transaction on the market. However, any violation of the above conditions represents a sufficient condition for the disturbance of prevailing equilibrium established by a perfectly competitive market model. In the real world situation, most if not all of the conditions are violated to some degree and dis-equilibrium within the private enterprise system prevails. Demand, supply and price manipulations are frequent and lead to certain undesirable development consequences. Perhaps the most significant of these is the inequity in the distribution of resources, goods and services manifested by poverty, malnutrition, poor health and low productivity among certain segments of the society - the greater the inequality the more severe the manifestation.

The behaviour of buyers in a food market is geared towards obtaining a sufficient quantity of food for satisfying the consumption needs of themselves and their households. But food consumption is not an end in itself but a means for attaining a satisfactory nutrition and health status.

FIGURE 1 : SIMPLIFIED MODEL OF THE FOOD AND NUTRITION SYSTEM



The nutritional status of humans is the sum total or net effect of food consumption, digestion, absorption and assimilation in relation to physical activity, health status and growth and development potential. The human body is unique and requires certain essential nutrients in specific combinations for proper growth and development and the conduct of normal functions. These nutrients are obtained through the consumption of food.

Food consumption levels are influenced by availability of food, household income and income distribution among households, product prices, population size, household size, age and sex distribution of the population, taste and preferences and so on. Digestion, absorption and assimilation are influenced by genetic factors, past and present dietary, the flora and fauna in the digestive system and health status. Nutrition and health problems usually arise when nutrient imbalances beyond tolerable ranges occur but the human body generally exhibits remarkable adaptations to different levels of nutrient intake. The interrelationships among food availability, prices, food consumption and nutrition status is depicted in Figure I.

The final price of a food item to the consumer reflects two components of demand. The first is the demand for the product for its intrinsic value as an item of consumption. The second is the demand for marketing services necessary to transform the farm product from its original state to the form in which it is finally consumed. The demands for the product at the farm level and for marketing services are derived demands resulting from the consumer demand for the product.

The difference between the price paid for a product at the retail level and the farm price of an equivalent amount of the product is called the marketing margin. This marketing margin represents the total of the charges for marketing services made by the intermediary firms within the channel of distribution. As such the marketing margin is influenced by the structural features of production and consumption, Government regulations or controls, the level of technology applied to marketing services, and the pricing practices of the intermediate firms. The retail price of a commodity is a summation of the farm gate price and the marketing margins

of the intermediate firms.

A satisfactory nutritional status could be assured by the judicious selection of foods from the following six food groups:-

- a) staples (cereals, starchy fruits, roots and tubers);
- b) dried legumes, nuts and oil seeds;
- c) dark green leafy and yellow vegetables;
- d) foods from animals;
- e) fruits; and
- f) fats and oils.

In attempting to satisfy the inclusion of all these groups, care must be taken to avoid over-consumption. The nutritional consequence of over-consumption is obesity with which is associated a number of chronic diseases including diabetes, hypertension and cardiovascular dysfunction. At the opposite end of the scale are the problems of under-consumption resulting in protein-energy malnutrition, anaemia, vitamin and other mineral deficiencies.

## 2.2. Food Price and Subsidy Policies Criteria

The level of prices has always been a concern for development planners. Because of its close relationship with the ability of consumers to buy basic food requirements, food prices have been afforded an even deeper concern for policy-makers. In general, policy-makers have been grappling with how to maintain reasonable prices to consumers while ensuring that producers and marketers of foodstuffs receive a level of return consistent with costs and the supply of an adequate quantity of foodstuffs equitably distributed among all segments of the population. This concern has arisen from the problems faced by certain segments of the population in obtaining adequate food supplies at prices they can afford to those faced by producers in acquiring a fair return for their efforts and to the supra-normal or sub-normal profits made by marketers for their service.

The emerging policy issues centre around food availability, food prices, input subsidies, market structure/conduct/performance, market margins, food consumption and nutritional status, consumer subsidies and foreign exchange and exchange rates. These issues are discussed in turn and appropriate criteria established.

2.2.1. Food Availability: Total food supply is a composite of local and imported food adjusted for changes in stocks and leakages through exports, animal feed, planting material, industrial uses and wastage for the period under consideration. The production component is influenced by a host of factors including availability of land, labour, capital, management, the vagaries of soil and climatic factors and expected prices over costs. Government's pricing, trade and subsidy policies and practices have an important role in determining farmers' choices of products and production levels.

The importation of food is influenced by the availability of foreign exchange, world food prices relative to local substitutes and Government's import policies. Where local producers are in direct competition with

imported supplies, there is a tendency towards low prices and low production. The superior technologies and subsidies of the more advanced countries lower the competitiveness of local producers.

The distribution of the available food is primarily determined by the income position of consumers - the greater proportion going to the higher income groups while low-income groups receive the least. A rational food price and subsidy policy should achieve:

- a) a level of food availability that ensures a sufficiency to meet the nutrient needs of the population;
- b) the distribution of the available food should be such that all segments of the population share equitably in the available supply; and
- c) a progressive reduction in food import dependence.

The last objective could hardly be achieved without trade restrictions against food imports. In this connection, careful consideration must be given to the kinds of products restricted so as not to jeopardise total food availability and the nutritional status of certain segments of the population.. Given the age and sex distribution of Caribbean populations, the climate and activity patterns, food distributional problems and the need for a reserve supply, it has been estimated that national food availability should approximate 2700 kilocalories of energy and 75 g protein per person per per day - these energy and protein levels are used as the national food availability criterion (Criterion I).

In terms of distribution within households, no individual should achieve a level of food consumption below 80% of recommended dietary allowance (Criterion 2).

In the Region, import dependency on food supply has been estimated at 34-90 percent in the case of energy and 42-79 percent in the case of protein. Given the history of food dependency and the constraints to increasing agricultural productivity, a 3 percent reduction per annum in import dependence would be acceptable (Criterion 3).

2.2.2. Level of Food Prices: Prices in general and food prices in particular have a major effect on the ability of consumers to obtain an adequate food supply. Basically, the higher the price of food income remaining the same, the more difficult it is for households to purchase their requirements. Fortunately, a wide range of foodstuffs exists and although the general level of food prices might be on the increase, certain basic foodstuffs may remain available at reasonably low prices. Also, by changing consumption patterns in response to price signals, an appropriate combination of nutrients could be obtained at a reasonable cost. A rational food price and subsidy policy should therefore ensure that all segments of the population face food prices that do not constrain their ability to purchase adequate food supply of basic foodstuffs from the six food groups.

In an attempt to keep food prices down Governments have instituted price controls on certain foodstuffs. Where controlled prices are such that producers and/or marketers incur losses, the impact could be counter-productive and limit household food availability.

For a long time Development Economists regarded as non-inflationary, price increases in the order of three percent per annum. Few market economies in recent times have been able to keep price increase below 5 percent and many have difficulties in limiting it to a single digit number. The food price index is a readily available statistic used in monitoring food price levels. Another approach utilises price changes over time for foods that are economical sources of energy and protein. Which-ever approach is used the level of price increase should not exceed six percent per annum (Criterion 4).

2.2.3. Incomes: Income levels have a decisive role in food purchasing. Coupled with prices, the income variable limits the upper boundary for the purchase of all goods and services including foodstuffs. As incomes increase, a less and less proportion is devoted to food - other things remaining equal. Given the level of prices, a basic income level is necessary to ensure the purchase of a sufficiency of nutrients from an

appropriate combination of foods.

Price and subsidy policies should achieve improved incomes to participants in the food sector with equity in its distribution. This criterion implies that wages, salaries and profits should reflect fair returns for efforts and risks. Excess profits by any segment of the food sector cannot be countenanced.

In the Caribbean, about 50 percent of incomes are spent on foods. Among low income consumers, the proportion is as high as 80 percent and some survey results indicate greater than 100 percent of income being spent on food - a virtual 'eat now, pay later' situation. A target income could be that level of household income that would permit purchase of adequate nutrients with 50 percent of the household income.

2.2.4. Input Subsidies: The rationale for the subsidization of inputs rests on the marginal product value relative to the marginal cost involved in the use of the subsidized inputs. When the marginal product value is greater than the marginal cost subsidization may lead towards optimal use of the input. A subsidy is not warranted if the input subsidy leads to over use of the input or distorts the national resource balance - for example subsidized machinery causing greater unemployment in a labour surplus economy.

Farmers use of inputs is influenced not only by the prices of the inputs but also by their level of knowledge about the use of those inputs, associated risk factors and their financial status. An input subsidy policy should take cognisance of these factors as well as the structural features of the input market. Where monopoly elements exist, subsidising inputs may result in increasing monopoly profits.

Given the above considerations, inputs should only be subsidised when there is clear evidence that distortions in the use of resources are unlikely to occur (Criterion 5).

2.2.5. Market Structure, Conduct and Performance: Theoretically there is a sequential causal relationship between structure, conduct and

performance. The goal of maintaining a competitive market structure could be eroded by food price and subsidy policies that transfers income to monopolistic entities. Where such elements exist, participation by the State in the decision-making process may be warranted.

The direct participation by the State in the food marketing system through institutions such as marketing corporations could change the structural relationships provided that the activities of such corporations are focused in the right direction. From a theoretical point of view, it is suicidal for marketing corporations to compete in a market structure characterised as being almost perfectly competitive (e.g., agricultural products market) while allowing monopoly profits to be made in other sectors (e.g. Import Sector).

Food price and subsidy policies should enhance the competitiveness of markets (Criterion 6).

2.2.6. Marketing Margins: Limiting the size of the marketing margin where supra-normal profits are being made is acceptable, but care must be taken to ensure that marketing margins are sufficiently high to allow for a reasonable return on investments. Given the dynamic nature of the economy, price controls over long periods are unwarranted except when adjusted regularly in the light of changing circumstances.

Marketing margins should allow for normal profits and improved marketing efficiency (Criterion 7).

2.2.7. Consumer Subsidies: The use of a consumer subsidy on foods is, as is the case with an input subsidy, to encourage increased consumption of the subsidized foods thereby improving the nutritional status. A number of problems arise from such a policy.

The choice of food products as well as the choice of the groups that should be subsidised create enormous administrative problems. The continuing budget allocations to meet the cost of the subsidies present another problem. The problem of leakages to individuals and groups who should not qualify for consumer subsidy must also be considered. The existence of protein-energy

malnutrition side-by-side with obesity in Caribbean populations even in the same household, highlights these problems.

An objective criterion in relation to consumer subsidy is that it should be targeted to the at-risk groups and be cost effective (Criterion 8).

2.2.8. Exchange Rates: An emerging concern for food policy analysts is the issue of exchange rates. Theoretically, high exchange rates make for lower cost of foreign exchange and encourage the importation of foreign goods including food. The opposite is the case with a low exchange rate. From the perspective of local producers, their products are at a disadvantage both at the local and export market. At the local market, farmers' products face strong competition from cheap imports, while at the export level their products are under-valued. This disincentive to export increases supplies to the local market with a consequent depressing of the foreign exchange earning potential. Thus, while consumers are assured of relatively cheap food supplies, the farmers bear the burden.

The extent to which a currency may be under or over valued is indicated by exchange rates established by illicit currency transactions and the long-term differential in levels of inflation between the country and its principal trading partners. Where inflation is high relative to the principal trading partners or a high rate of exchange is established vis-a-vis foreign currencies, a case for devaluation can be made.

In considering changes in exchange rates, consideration must be given to the overall development effects on the economy and the question of an initial devaluation triggering off other devaluations resulting in a total loss of confidence in the currency.

A criterion in respect to exchange rate is that level which maintains the competitiveness of the countries exports (Criterion 9).

### 2.3. Policy Implementation:

A policy statement declares intention to take action to achieve certain goals. However, in order to attain those goals, the policy statement must be translated into programmes and action plans which must be implemented. Here

consideration has to be given to the institutional arrangements for policy implementation, the communications strategy, the financial implications, the manpower resources, community participation and mechanisms for resolution of conflicts that inevitably arise in the planning and implementation process.

It is of utmost importance to monitor the implementation process respecting specific policy statements. The acid test is the extent to which a policy statement is translated into practice. The literature is replete with examples of statements of policy that remain essentially statements.

## Chapter 3

### REVIEW OF FOOD POLICIES AND PROGRAMMES

The sixties began with Antigua and St. Vincent being members of a West Indies Federation while remaining Colonies of the United Kingdom. The food policies and programmes were essentially extensions of British colonial policies and programmes - cheap sources of raw material and markets for food exports. With the demise of the West Indies Federation in 1962 and the movement of the larger territories towards independence, there was a call for greater autonomy among the smaller countries. In 1967 Antigua and St. Vincent along with the other East Caribbean Islands became States in association with Britain, creating the necessary conditions for internal self-government.

This review relies heavily on the Speeches from the Throne and Budget Addresses. It attempts to highlight the policy statements which impinge on the food and nutrition system. The review will focus in turn on Antigua and St. Vincent.

#### 3.1. Antigua

The policies and programmes during 1971-83 were geared toward increasing local food production, and decreasing the dependency on imported food. There was no direct subsidy on food but subsidies were given to farmers and fishermen in the form of reduced taxes and duties on materials and equipment for agricultural purposes. This was done to encourage the local production of food and fish.

In 1971 efforts were made to reduce the quantity of meat imported. To that end, large sums were allocated to develop the livestock industry. Some of the money was to be used to develop communal grazing areas, clear and fence grazing lands and construct pens and sheds for goats. In 1971 the Ministry of Agriculture, Lands and Fisheries was established with a view to expanding the agricultural sector. Formerly, agriculture was under the portfolio of the Ministry of Trade and Production. In 1972 the Ministry of Agriculture was organized. A Livestock Division was created and the necessary staff was recruited.

After the closure of the Sugar Factory in 1971, it was decided in 1973 to implement a diversification programme to create employment for displaced sugar workers and to produce large quantities of food which were then being imported. The Agricultural Development Corporation (ADC) was established in 1973. The primary objectives were:

- a) To prepare, implement and administer agricultural development schemes.
- b) To engage in direct production.
- c) To provide mechanical services to all farmers.

The Central Marketing corporation (CMC) was established in September 1973 to control, rationalize and coordinate all aspects of agricultural marketing.

In 1974 the Department of Agriculture was reorganized into four Divisions - Specialist Services, Fisheries, Veterinary and Animal Husbandry and Agricultural Extension. An intensified soil conservation programme was launched in 1974 to repair damages caused by Hurricane Christine. The Antigua and Barbuda Development Bank was also established to provide credit to farmers, fishermen and livestock and poultry farmers. A pond clearing programme was launched to provide water for irrigation purposes. In an effort to stabilize consumers' prices, the Central Marketing Corporation was requested to import basic food items in bulk for retail sale. In order to promote agriculture, all agricultural enterprises were exempted from paying Income Tax in 1975. Similarly, all Pioneer Industries were exempted from Income Tax.

The Budget Speech of 1975 focussed again on import substitution as a major policy objective as follows:

1. "To encourage the development of local industries and investment in agriculture which in effect will promote a greater level of import substitution".

In elaborating this objective, the Budget Speech continued:

"Government will pursue policies to protect local industries by imposing higher levels of duties and taxes or imposing quantitative restrictions on those goods which offer competition".

There was a change of Government in 1975 but the policies and programmes aimed at increasing local production and decreasing the dependence on imported food continued.

As an incentive to boost local production, in 1976 duty free concession was offered to farmers and fishermen on vehicles, machinery and equipment engaged in agricultural enterprises. Loans were made more easily available to small farmers who qualified for assistance. Protection was offered to local poultry producers from similar imported goods. The Collector of Customs is asked to use his discretion in issuing licences for whole chicken". However, "Government has lifted the ban on chicken legs, backs and necks and chicken breast" (Budget Speech 1976). The Government was also prepared to encourage the establishment of a poultry feed plant.

The 1978 Throne Speech re-emphasized the Government's commitment to "pursue an active agricultural policy with renewed vigour and energy towards achieving self-sufficiency in food".

A more comprehensive and meaningful price control measure was introduced in 1978 to prevent mere market forces from determining prices in order that the cost of living be kept under control. A single tariff system was also introduced and the preferential tariff system abolished. This policy measure made goods from the United States much cheaper to the consumers.

The Food Processing Unit was completed in 1978 and the Government received assistance to set up an integrated production, processing and marketing system which would reduce losses in vegetables and fruits, and increase gains in import substitution. In order to influence price levels and provide the consumers with a wide range of low-priced essential

commodities, a supermarket was established at the CMC. The Fisheries Project which suffered several setbacks in 1977 was opened in 1978. The role of the project was to market fish caught by local fishermen and provide a central distribution point. The expansion of the Government's livestock herd at Paynters and Olivers in 1978 was organized to increase milk production and the expansion of the milk programme which was in process to provide school-children with a glass of milk daily.

In 1979 all programmes were geared toward fulfilling the goals of the Agricultural Policy in attaining self-sufficiency in food. In 1980 the Government announced the provision of mechanisms whereby small farmers' crops can be insured. In 1981 the Government continued to assist those engaged in agriculture and fishing by allowing equipment and materials into the country free of duties.

1982 was declared Agro-industry Year and all the programmes for that year were aimed at strengthening domestic agriculture by increasing food production in those areas where there was a ready local demand.

In 1982 an Agricultural Policy was drafted. The objectives of the policy were:

- i. to increase the production of food from the land and sea to achieve the greatest measure of self-sufficiency;
- ii. to reduce, and where possible, eliminate the importation of food items in order to retain foreign exchange;
- iii. to ensure the production and distribution of foods of high nutritional value at reasonable prices;
- iv. to raise the productivity and income levels of the agricultural community, particularly the small farmers and their families;
- v. to promote the widest utilization of locally-produced foods;

- vi. to ensure that the commercial sector more actively distributes locally-produced foods;
- vii. to ensure security in food supplies;
- viii. create confidence in the agricultural sector, specifically with the objective of attracting young people as farmers, technicians and skilled labourers;
- ix. to stimulate employment through greater linkages of agriculture to industry and tourism;
- x. to fully exploit and protect the waters of the nation's exclusive economic zone for the benefit of the population;
- xi. to promote the development of new rural communities and improvement of villages by stimulating the growth of agriculture especially at the farm family level;
- xii. to promote proper land use and natural resources conservation measures;
- xiii. to promote the development of new agricultural crops for export;
- xiv. to promote the commercial exploitation of inland waters, i.e., lagoons, dams, ponds for the production of fish and crustacea;
- xv. to protect and promote the development of forest lands and to encourage the preservation and expansion of wild life.

In 1983 a National Food and Nutrition Policy was formulated, which incorporated the essential components of the Agricultural Policy and linked them to the nutrition and health related programmes. The Policy was adopted by Cabinet in 1984.

This overview has described broad policy statements and objectives. A description of the specific policy instruments adopted to achieve the policy goals follow:

3.1.1. Price Policy: A dual price policy is maintained - free market pricing and price controls. The institution of food price controls dates back to 1958 when the Government of Antigua enacted legislation to regulate food prices. This instrument was introduced to enable low income persons to purchase basic and essential food items for balanced diets at reasonable cost.

Two basic methods of price controls are applied. A specific maximum dollar level is applied to local products under price control. This maximum which is revised from time to time is arrived at after consideration of production cost with an allowance for profits. In the case of imported products a variable percentage mark-up over landed cost is allowed at the wholesale and retail levels depending on the product. Imported meat (not chilled or frozen) is allowed a maximum mark-up of 12½% at the wholesale level and 22½% at the retail level. Frozen or chilled meat is allowed a maximum of 15% and 22½% at the wholesale and retail level, respectively. Trading above those maximum constitutes an offence, punishable by a fine on summary conviction. Other imported foodstuffs are allowed maximum percentage mark-ups of 10% and 15% at the wholesale and retail level respectively. A list of the food items under price control is presented in Table 2.

Products not under price control are traded without restrictions - buyers and sellers making the best deals given the prevailing market conditions.

TABLE 2: List of Price Controlled Items - Antigua

FOOD GROUP	LOCAL	IMPORTED
<u>STAPLES</u>		
	-	Flour
	-	Sugar
	-	Biscuits
	-	Oats
	-	Irish Potatoes
<u>LEGUMES &amp; NUTS</u>		
	-	Peanuts
	-	Cashew Nuts
<u>FOOD FROM ANIMALS</u>		
	Beef	Meats (Chilled and Frozen)
	Mutton	
	Pork	Corned Beef
	Goat Meat	Luncheon Meat
	Fresh Fish	Milk (canned)
		Cheese
<u>VEGETABLES</u>		
	Fresh Vegetables	Canned Vegetables
		Onions
<u>FRUITS</u>		
	-	Canned Fruit Juices
<u>FATS &amp; OILS</u>		
	Edible Oil	Edible Oil
		Butter
		Margarine
		Shortening

TABLE 2: List of Price Controlled Items - Antigua (Cont'd)

FOOD GROUP	LOCAL	IMPORTED
<u>MISCELLANEOUS</u>		
	-	Tea
	-	Coffee
	-	Cocoa
	-	Salt

3.1.2. Producer Subsidies: The subsidies provided by the Government take several forms. Basically these could be classified as credit facilities, duty free tax concessions on production inputs, services at subsidized prices, and provision of planting material.

Credit facilities are in the form of loans to farmers and fishermen at rates of interest below commercial levels. The interest on loans foregone the cost of administration and the non-compliance in respect of repayment represent the cost of the subsidy. The Antigua and Barbuda Development Bank is the prime credit facility.

Duty free and tax concessions are applied to boats and engines for fishermen, farm tractors, animal feed and other inputs to farmers.

Services at subsidized prices include storage facilities for fish and sale of ice for fishermen. Farmers receive veterinary, cultivation and soil conservation services at less than commercial rates.

The provision of seeds, vegetable seedlings and fruit trees below economic costs of production constitutes another form of subsidy to the agricultural sector. The production of planting material requires the establishment of propagation stations and the maintenance of appropriate

germ plasm., the associated costs of which could be quite high.

3.1.3. Consumer Subsidies: The basic consumer subsidy is in the form of a Supplementary Feeding Programme for at-risk mothers and children. The food consisting of wheat flour, milk and margarine is provided by the World Food Programme and distributed by the Government through the Child Welfare Clinics. The storage and distribution costs represent a subsidy to the target group.

The establishment of the Central Marketing Corporation represents Government's direct participation in the distribution of foodstuffs. The extent to which continuing deficits in the trading operations of the Corporation are cleared by Government subventions could be considered subsidies, partly to producers and to consumers.

### 3.2. St. Vincent

Except for matters of detail, the review of the policy objectives and instruments in the area of food prices and subsidy show a marked similarity. Like Antigua, the information was gleaned from the Budget Address and Speeches from the Throne.

In 1967 the Chief Minister lamented the fact that the value of imports in 1965 was more than double the value of exports valued at \$5.97M, of which the imports of food and beverages constituted 34.3%. The need to reduce dependence on imported food was emphasized and a licensing system to restrict the importation of all starches and peanuts as well as peas, cabbages, carrots, pepper sauce and ice cream was announced. A concern for malnutrition and gastroenteritis in infants led to advocating the removal of import duty on skimmed milk along with price control to ensure that the remission of the duty went to the consumer. The establishment of an Agricultural Cooperative Bank was also announced.

The 1968 Budget Address focussed on the diversification of the agriculture sector and the establishment of a baby food industry based on arrowroot. Peanut development was emphasized as a means of increasing the export of non-traditional crops. A two-way trade in rice and sugar from Guyana and peanuts from St. Vincent through the St. Vincent Marketing Board was highlighted in keeping with the Agricultural Marketing Protocol.

- i) make recommendations to Government on any matter directly or indirectly relating to the production and marketing of produce;
- j) recommend to Government, measures whereby external trade can be promoted for the benefit of the community; and
- k) engage in such trading activities as would be beneficial to the community.

The Marketing Corporation has been the sole importer of rice and sugar since its inception. Traders then buy their supply of these commodities from the Corporation.

In 1977 the Corporation went into the operation of a supermarket. The aim of this supermarket is not so much the profit motive, but mainly to give consumers a better pricing deal without competing unduly with other supermarkets in the private sector.

By 1978/79 Government policy was directed to the resuscitation of the sugar industry through Government contribution of \$2.8M and loans of \$1M from Trinidad and Tobago and \$8.1M from the Caribbean Development Bank (CDB). Another project - the Diamond Dairy Project estimated to cost \$14M with support from CDB of \$2.7M was announced.

The Diamond Dairy Project was designed "to stimulate local production of fresh milk and to augment it with reconstituted milk solids for supplying the needs of consumers in St. Vincent. This substitution will improve the health and nutritional standards of small babies and infants, especially as more people in the lower income group and rural sections of the community will be able to utilize the low-cost locally-produced food". Other projects announced included conservation, artificial insemination and fisheries development.

3.2.1. Price Policy: A similar dual price policy is maintained in St. Vincent as is the case in Antigua. The control methods are essentially the same. The essential differences are the maximum values or percentage mark-ups and the price differences between different areas in St. Vincent.

The list of goods under price control is also similar (Table 3).

TABLE 3: List of Price Controlled Items - St. Vincent

<u>FOOD GROUP</u>	<u>LOCAL</u>	<u>IMPORTED</u>
<u>STAPLES</u>		
	Flour	White Potatoes
	Bread	Rice
	Sugar	Sugar
		Biscuit
<u>LEGUMES &amp; NUTS</u>	-	-
<u>FOOD FROM ANIMALS</u>		
	Fresh Beef	Meats (Chilled and Frozen) including Poultry (whole or parts).
	Milk and Cream	Canned Milk
		Milk Powder
		Sardines
		Fish (Salted, dried or smoked)
		Corned Beef
		Luncheon Meat
		Bacon, Sausages
<u>VEGETABLES</u>		
		Onions
<u>FRUITS</u>		
		Fruit Juices
<u>FATS &amp; OILS</u>		
	Edible Oil	Edible Oil

Maximum wholesale price for imported food range from 7½% to 17% over landed cost while at the retail level, the maximum allowable mark-up ranges from 11½% to 20%. In some instances there is a basic change of a fixed amount to the landed cost before the percentage mark-up is applied. The difference between areas range from ½ - 1½ cents per pound.

3.2.2. Producer Subsidies: The producer subsidies in St. Vincent include credit facilities at less than commercial rates, duty-free concession on boats and engines for fishermen, a range of services at subsidized cost, provision of planting material below economic cost and from time to time a number of specific projects.

Credit facilities are provided to farmers and fishermen by the Agricultural and Cooperative Bank. This facility was set up in recognition of the difficulties faced by farmers and fishermen in securing loans from the regular commercial banks. Interest rate is 7% which is well below the commercial rate of 12% and over. Credit worthiness (creditors' ability to service the loan) is the basic condition required for acquiring a loan. Loan repayment is related to the harvesting of the crops - the longer the gestation of the crop, the longer the repayment period.

In the early sixties, Government made loans available to individual fishermen and Fishermen's Cooperative Societies for the purchasing of gear and tackle for their fishing boats. With the establishment of the Agricultural Cooperative Bank in 1966, the fishermen received their loans through that institution. Duty-free concession on boats and engines are also granted to fishermen.

A number of services are provided by the Government at subsidized prices. These include cultivation, soil conservation services and animal health and veterinary services.

Planting material (seeds, seedlings and fruit trees) are provided to farmers. Propagation stations have been established to maintain a ready supply of planting material. It has been the practice of Government

to maintain Livestock Improvement Centres better known as 'Stud Centres' where animals such as cattle, pigs, goats and sheep are kept for breeding and service to improve the quality of stock for greater productivity. The service offered by these Centres are greatly subsidized. Farmers normally have to pay more than double the price for these services outside the Centres.

Even before 1960 the Campden Park Station was producing eggs for sale to housewives at subsidized prices. In 1960, 19,277 eggs were sold to the public. Chickens for rearing were also sold at subsidized prices. This practice was afterwards discontinued. However, Government is currently concerned about the need for producing more local chickens, as can be seen from the 1982/83 Budget Address:

"The Livestock Division recognized that local poultry rearing should be given some encouragement in order to reduce the State's dependence on imported chicken parts. Backyard poultry production, therefore, has been one of the areas concentrated upon in recent times to get our people self-sufficient in chicken meat".

In 1977 Government introduced a Rabbit Project. Rabbits were kept at different Centres throughout the country for distribution to households. Partners of America is giving support to this project. The aim is to encourage consumption of rabbit meat and thus reduce the import of chicken.

In 1980 the Department of Agriculture introduced a sheep and goat revolving scheme. Under this scheme the animals are given to farmers who breed them and give back one to the Department which gives it to another farmer. In some areas stud animals are even loaned to farmers.

Government gave subsidies both to small farmers and to the estate owners in the early sixties in the growing of pangola grass for the feeding of cattle. Pangola grass which is believed to be originally from Africa is very nutritious to cows for the increase of milk production. The subsidy scheme came to an end before the end of the sixties because the small farmers did not make full use of the scheme and the estates which made use of the subsidy did not make full use of the pastures. They were kept

in poor states and were allowed to be invaded by weeds.

For almost two decades Government has maintained a policy of producing local milk. In 1966 the Campden Park Dairy began its operation. The dairy maintained some cows but the greater portion of milk came from private farmers who sold their milk to the dairy. The Campden Park Dairy faced many problems and by 1977 it was operating only at 25%. It was superseded by the Diamond Dairy, which started operation in April 1980. This Dairy is much larger and more modern than its predecessor. It produces not only UHT milk, but also chocolate milk, milk cream, orange and grapefruit juices.

3.2.3. Consumer Subsidies: The establishment of the Diamond Dairy Company and the St. Vincent Marketing Corporation represent a direct participation by the Government in the production and distribution sectors. The contributions of Government in maintaining the operations of these agencies constitute a subsidy to both producers and consumers.

Target groups of at risk mothers and children receive foods similar to Antigua from the World Food Programme, Government contribution to the distribution and storage represents a subsidy.

## Chapter 4

### DATA ANALYSIS AND INTERPRETATION : ANTIGUA

#### Introduction

The basic tenet underpinning the study is that there exists a sequential causal relationship among national food availability determined by imports and local production, household food availability determined by prices and incomes, individual food allocation, consumption and biological utilization and nutritional status determined by custom and health status. The presentation of the data and interpretation maintain the basic structure described by this relationship. The hypotheses specified in the previous discussion on methodology are kept in focus as well as the criteria developed for assessing the impact of food price and subsidy policies and practices.

Against this background, this Chapter presents and discusses data analysis interpretation and policy implication. This and the following Chapter addresses Objectives 3 and 4. The analysis begins with a brief review of past trends and then focuses on the quantitative results from the time series and survey data.

In addition to tables and figures, ordinary least squares regression analysis was the principal technique used in quantifying relationships among variables. Various functional forms were tested for goodness of fit. The equations presented combine the more plausible forms and satisfactory statistical properties. In all equations the standard errors of the coefficients are in parentheses ( ) below the coefficients, N refers to the number of observations,  $R^2$  is the coefficient of multiple correlation, and SEE is the standard error of the estimate and F is the regression test statistic. The critical F value was taken as the .05 level as was the t-statistic used to measure the significance of coefficients. The logarithms are to base 10.

## Food Availability

The total food supply for any given year represents a summation of total domestic production plus imports (including donations as food aid) less export plus or minus stock changes for that year. This supply adjusted for food losses, industrial uses, animal feed and planting material, is a good estimate of the available food for human consumption. (Further adjustments for home food losses, plate waste, food feed to pets, give a closer approximation to actual consumption.) The per caput availability of various nutrients could be calculated using the population for that year and appropriate food composition tables. The total available nutrients are then compared with the nutrient requirements of the population (given its age structure, sex distribution, fecundity and activity characteristics) to assess levels of satisfaction. The results of these computations, when set out in a table, constitute a food balance sheet. The basic limitation of this approach is its high demand for data which are often unavailable or suspect, its lack of consideration of seasonal variation in the available food supply and inequity in the distribution of available food.

Statistics on food availability in Antigua, particularly local food production, are not readily available. The available data for 1977 suggest a slight shortfall of total per caput energy per day - 2213 kilocalories compared with an estimated requirement of 2250 kilocalories. Protein availability - 73 g per caput per day - was well above the estimated 43 g per caput per day required (Gurney, 1975). Of the estimated energy and protein available, approximately 89% of the former and 74% of the latter come from external sources.

A provisional assessment of national food availability in Antigua and Barbuda for the period 1979-1980 indicates an average per caput per day availability of 1979 kilocalories of energy suggesting a 12% shortfall based on recommended dietary allowance for the population. Protein availability amounted to 55 g per caput per day - 28% above the recommended dietary allowance for the population. The majority of the food was imported.

Import dependence was estimated at 82% for energy and 70% for protein (FAO).

TABLE 4: Per Caput Energy, Protein and Fat Availability  
by Source - Antigua, 1979-1981 Average

	Energy		Protein		Fat	
	Total	% Import	Total	% Import	Total	% Import
Cereals						
Wheat	678.0	100.0	18.1	100.0	2.3	100.0
Paddy Rice	473.0	100.0	13.7	100.0	1.7	100.0
Roots & Tubers	130.0	100.0	2.6	-	0.2	100.0
White Potatoes	28.0	68.0	0.6	83.3	0.1	100.0
Sugar & Honey	344.0	100.0	-	-	-	-
Raw Sugar	333.0	100.0	-	-	-	-
Pulses	7.0	100.0	0.4	100.0	-	-
Nuts & Oil Seeds	-	-	-	-	-	-
Vegetables	13.0	80.0	0.6	92.0	0.1	-
Fruits	122.0	9.0	1.5	13.0	1.9	5.0
Meat & Offals	151.0	74.0	11.6	73.0	11.2	-
Eggs	15.0	60.0	1.1	59.0	1.0	60.0
Fish & Sea- food	39.0	26.0	6.7	21.0	1.1	24.0
Milk	255.0	45.0	13.9	52.0	11.0	45.0
Fats & Oils	253.0	99.5	0.2	100.0	28.5	99.5
Animal Sources	103.0	96.0	0.1	100.0	11.6	96.0
Vegetable Sources	150.0	95.0	0.1	100.0	16.9	95.0
Alcoholic Beverages	53.0	100.0	-	-	-	-

Per Capita Energy, Protein and Fat Availability by Source - (Cont'd)  
Antigua, 1979-1981

	Energy		Protein		Fat	
	Total	% Import	Total	% Import	Total	% Import
Others	149.0	100.0	0.4	-	3.0	100.0
TOTAL (of food classes only)	1929.0	82.0	55.0	70.0	58.7	78.0

Source: Provisional estimates from FAO.

4.1. Food Imports

In general there was a steady increase in food imports both in quantity and value. Total imports showed wider fluctuations (Table 5).

TABLE 5: Value of Food Imports, Total Imports and  
Balance of Visible Trade - Antigua, 1972-1980

YEAR	FOOD IMPORTS	TOTAL IMPORTS	VISIBLE TRADE DEFICITS
	----- EC\$M -----		
1972	16.4	91.0	-
1973	14.9	94.5	35.1
1974	21.9	143.7	77.3
1975	24.5	145.1	85.2
1976	20.9	91.8	68.2
1977	25.3	92.9	75.2
1978	31.3	125.0	69.7
1979	70.3	197.4	150.5
1980	90.2	305.1	180.6

Source: Department of Statistics.

An analysis of time series data (1973-1980) relating food imports (FI) to gross domestic product (GDP) and visible trade deficit (VTD) in millions of dollars yielded the following equation and other statistical properties:

$$\begin{aligned} \text{Log FI} &= -1.85 + 1.03 \text{ Log GDP} + 0.57 \text{ Log VTD} + e && (4.1) \\ & && (0.29) \quad (0.20) \\ R^2 &= 96.5 && N = 8 && F = 68.29 \end{aligned}$$

The model explained 96.5% of the variation in imports. As might be expected, there was increasing food importation despite an increasing visible trade deficit since tourism generated significant foreign exchange earnings for the State.

A breakdown of the food imports into its various constituents shows variation in trends.

4.1.1. Meat and Meat Products: The value of imports of meat products moved from \$1.4M in 1968 to around \$11.9M in 1981. There was a steady increase in quantity and value during the 1968-1972 period and again during 1978-1981. The quantity and value fluctuated in the intervening period.

4.1.2. Milk and Milk Products: This category followed a similar pattern to the meat and meat products category. In 1968 imported milk and milk products was 1.3 million pounds valued at \$0.8M compared with 3.5 million pounds valued at \$5.7M in 1981.

4.1.3. Cereal and Cereal Products: The cereal and cereal products category accounts for a substantial portion of the imported foodstuffs, the major contributor being wheat flour. Import quantities in this category have fluctuated during the period 1968-1980. There was a decline from 11.1 million pounds in 1968 to 9.9 million pounds in 1970 and a slight increase to 10.0 million in 1973 (data for 1971 and 1972 were unavailable). The increase continued reaching 15.7 million pounds in 1977 and then declined sharply to 5.6 million in 1981.

Wheat flour and rice are the most important cereals consumed. The relationship between per caput rice imports (RI) and the CIF price (PR) for six years during 1973-1980 is portrayed in the following equation:

$$\text{Log RI} = 1.025 + 1.889 \log \text{PR} + e \quad (4.2)$$

(0.014) (0.093)

$$N = 6 \quad R^2 = 99.04\% \quad \text{SEE} = 0.031 \quad F = 414.27$$

Since rice represents a basic staple in the diet of Antiguans, the positive price relationship is understandable. Unavailability of data on wheat flour precluded a similar analysis but the results are expected to be the same.

4.1.4. Starchy Fruits, Roots and Tubers: The major contributor to imports in this category is white potatoes. Over one million per annum were imported between 1968 and 1981, except in 1977 when 0.6 million pounds were imported. Other important products in this category imported were bananas, plantains and sweet potatoes.

4.1.5. Sugar: After the closure of the Antigua Sugar Factory in 1971, sugar imports rose sharply and then fluctuated both in quantity and value. Despite efforts to resuscitate the sugar industry, the impact on sugar importation remains minimal.

An analysis of granulated sugar imports on a per caput basis (SI) in relation to the C.I.F. price (PS) for five years during 1974-1980 yielded the following equation:

$$\text{Log SI} = 0.759 + 0.856 \log \text{PS} + e \quad (4.3)$$

(0.033) (0.078)

$$N = 5 \quad R^2 = 97.55\% \quad \text{SEE} = 0.024 \quad F = 119.56$$

The positive price elasticity of 0.86 shows how important a commodity sugar is in the diet of Antiguans. Price increases do not depress consumption.

4.1.6. Legumes: Importation of dried legumes was erratic during the 1968-1980 period. A little less than 0.18 million pounds valued at

\$64,713 was imported in 1968 compared with 0.14 million pounds valued at \$91,689 in 1973. By 1977, 38,927 pounds valued at \$54,890 was imported. The 1980 estimates are 0.44 million pounds and \$0.47M respectively.

The analysis of per caput legume imports (LI) in relation to the CIF price (PL) for five years during the period 1974-1980 yielded the following equation:

$$\text{Log LI} = 1.044 + 2.109 \log \text{PL} + e \quad (4.4)$$

$$(0.031) \quad (0.212)$$

$$N = 5 \quad R^2 = 98.59\% \quad \text{SEE} = 0.067 \quad F = 98.59$$

Here again the positive association between legume imports and the price reflect a diet pattern that is somewhat inflexible.

4.1.7. Fats and Oils: Margarine imports increased from 0.3 million pounds in 1974 to 0.5 million pounds in 1978 and 1980, with minor fluctuations during the whole period. The available data suggest a sharp downward trend in edible oil imports from 98,527 imperial gallons in 1974 to 38,369 imperial gallons in 1978.

An analysis of the relationship between per caput margarine imports (MI) and the CIF price (PM) for five years during 1974-1980 yielded the following equation:

$$\text{Log MI} = 0.950 + 3.363 \log \text{PM} + e \quad (4.5)$$

$$(0.035) \quad (0.190)$$

$$N = 5 \quad R^2 = 99.05\% \quad \text{SEE} = 0.045 \quad F = 311.95$$

The positive association between margarine imports and its CIF price reflects the importance of this product in the diet.

4.1.8. Fish: Fish imports in 1968 of just under 1.0 million pounds was a little more than the quantity imported in 1981 at six times the value. Imports fluctuated during the 1968-1981 period. The largest quantity - 1.2 million pounds was imported in 1975.

TABLE 6: ACREAGE PLANTED, PRODUCTION, SALE, VALUE AND HOUSEHOLD CONSUMPTION  
FOR VARIOUS COMMODITIES - ANTIGUA FARMERS 1984

COMMODITY (No. OF OBS.)	ACREAGE PLANTED	PRODUCTION	TONS/ ACRE	SALE VALUE	SALE VALUE/LB.	HOUSEHOLD CONSUMPTION	
						lbs.	%
CORN (4)	0.59 (0.19)	887.50 (304.39)	0.67	715.00 (235.96)	0.81	51.25 (17.12)	5.8
SUGARCANE (12)	1.39 (.15)	40111.0 (7365.1)	12.88	1302.50 (194.1)	0.03	-	-
SWEET POTATOES (63)	0.48 (.41)	806.61 (102.82)	0.75	1018.30 (132.01)	1.26	70.24 (9.85)	8.7
GREEN BANANAS (32)	0.55 (0.10)	1061.60 (309.41)	0.86	675.16 (172.38)	0.63	50.18 (5.77)	4.7
PLANTAINS ( 3)	0.25 (0.0)	1083.30 (469.34)	1.93	1891.70 (673.35)	1.75	36.67 (6.67)	3.4
YAMS (38)	0.35 (.33)	417.42 (78.02)	0.53	668.33 (108.06)	1.60	103.03 (16.13)	24.7
CASSAVA (36)	0.27 (.02)	483.14 (81.45)	0.80	434.64 (76.40)	0.90	33.06 (3.87)	6.8
EDDOES (15)	0.28 (0.05)	270.42 (116.92)	0.43	614.37 (239.18)	2.27	20.42 (2.98)	7.6
PIGEON PEAS (13)	0.25 (0.03)	281.54 (61.71)	0.50	757.50 (120.07)	2.69	25.39 (6.94)	9.0
PEANUTS (7)	0.27 (0.07)	447.86 (146.97)	0.74	1820.00 (596.67)	4.06	90.71 (28.29)	20.3

Source: Survey Data

ACREAGE PLANTED, PRODUCTION, SALE, VALUE AND HOUSEHOLD CONSUMPTION  
FOR VARIOUS COMMODITIES - ANTIGUA FARMERS 1984 (CONT'D.)

COMMODITY (NO. OF OBS.)	ACREAGE PLANTED	PRODUCTION	TONS/ ACRE	SALE VALUE	SALE VALUE/LB.	HOUSEHOLD CONSUMPTION	
						lbs.	%
BEEF (15)	-	1728.86 (251.24)	-	3454.00 (1210.50)	2.00	65.00 (15.00)	3.8
MUTTON ( 4)	-	527.50 (325.84)	-	1107.50 (638.21)	2.10	46.67 (26.67)	8.8
PORK (5)	-	642.50 (326.76)	-	1988.00 (746.55)	3.09	36.67 (8.82)	5.7
POULTRY (2)	-	150.00 (50.00)	-	325.00 (75.00)	2.17	17.50 (7.50)	11.7
CARROTS (40)	0.53 (0.07)	1701.40 (318.00)	1.43	3223.40 (612.08)	1.89	88.65 (13.33)	5.2
TOMATOES (44)	0.56 (0.08)	1506.90 (295.29)	1.20	3604.20 (689.02)	2.39	69.93 (12.23)	4.6
CABBAGES (24)	0.49 (0.13)	1198.00 (370.97)	1.09	2978.90 (668.91)	2.49	65.22 (24.61)	5.4

Source: Survey Data

TABLE 7 : Farmers Operating Expenses - Antigua 1984

(Averages are based on numbers of farmers reporting)

COMMODITY	LAND PREPARATION	PLANTING OPERATIONS	WEED CONTROL	FERTILIZERS	PEST CONTROL	HARVESTING OPERATIONS
	\$ per Acre	\$ per Acre	\$ per Acre	\$ per Acre	\$ per Acre	\$ per Acre
CORN	225.00	197.00	336.00	155.00	289.00	18.50
SUGARCANE	225.00	270.55	305.00	210.33	-	420.50
SWEET POTATOES	223.97	186.92	227.63	347.71	97.03	352.54
GREEN BANANAS	222.90	1228.40	315.03	357.26	142.86	464.31
PLANTAINS	225.00	1094.00	336.00	349.67	132.67	260.00
YAMS	220.92	1438.70	257.03	137.45	86.35	341.43
CASSAVA	223.89	252.92	267.39	97.33	108.67	357.14
EDDOES	225.00	500.20	302.40	66.75	50.00	308.27
PIGEON PEAS	211.15	390.77	235.85	180.50	261.00	371.92
PEANUTS	225.00	1604.90	343.43	265.71	362.57	479.43
CARROTS	226.92	259.18	267.08	139.21	114.11	379.15
TOMATOES	222.95	337.25	290.37	351.71	401.57	395.20
CABBAGES	221.09	356.22	272.09	318.61	391.57	313.65

4.1.9. Fruits and Vegetables: Small quantities of fruits and a wide range of vegetables are imported. The influence of the Tourist Sector is undoubtedly an important factor in the import demand.

4.2. Local Production

Antigua produces a wide range of foodstuffs of both plant and animal origin, particularly after the demise of the sugar industry in 1971. Available production estimates for selected products are presented in Table 5. Production levels of most crop and livestock species are low, necessitating the high importation described above.

The striking feature pertaining to the low level of food availability from local sources is the combination of small acreages planted and low yields for the various crops (Table 6). The small acreage and low yields are reflected in high production costs (Table 7). Farm household food consumption was well below 10% on average for the various crops/meats, with the exception of yams (24%), peanuts (20.3%) and poultry (11.7%). Sale prices were generally high, making for lower calories per dollar expenditure on local products by purchasers vis-a-vis imported products.

4.2.1. Supply Response: A supply response analysis relating production to acreage planted and various input costs using a double log specification showed a strong positive association between production and acreage planted for all the selected crops except cabbages (Table 8). Other things being equal it is expected that production would increase proportionately with acreage. The large production elasticities with respect to acreage 2.4 to 3.8 make acreage planted a crucial factor in the production system.

Fish production averaged 8,932.3 pounds with a sale value of \$20,397 (\$2.28 per pound). Total operating expenses amounted to \$8,003. Significant contributors to this total included gas and oil \$5,056.30, maintenance of boat (\$1,718.40) and ice and salt (\$1,100.60). Average household consumption was 4.2%.

TABLE 8 : Supply Response Analysis: Regression Coefficients and Other Statistical Properties for Selected Crops - Antigua - 1984

CROP (No. of OBS.)	Constant Term	Log Cost Fertilizer	Log Cost Weed Control	Log Cost Planting	Log Cost Land Preparation	Log Acreage	R <sup>2</sup>	F
SWEET POTATOES (62)	-21.816	0.176 (0.063)	-0.553 (0.409)	1.069 (0.419)	9.760 (1.535)	2.381 (0.518)	64.37	20.24
CARROTS (40)	2.538	0.008 (0.069)	0.995 (0.447)	-1.048 (0.443)	-	3.372 (0.502)	61.70	14.10
TOMATOES (44)	13.891	-0.128 (0.871)	-0.479 (0.303)	-4.105 (1.514)	-	3.772 (0.805)	44.33	7.76
CABBAGES (23)	15,636	3.926 (1.519)	-1.781 (2.195)	-7.318 (4.366)	-	1.052 (1.341)	36.36	2.57

Source: Based on Survey Data.

Basic function:  $\text{Log TP } f(\text{log } X_{i\dots n})$  where TP is total production and  $X_{i\dots n}$  are various input costs as specified.

Another issue is the impact of inputs, which varied from one crop to another. In sweet potatoes land preparation, planting operations and fertilizer use were all positively associated with production. Better weed control would increase total production of carrots while greater fertilizer use would increase cabbage production. In the case of carrots and tomatoes, increased fertilizer use is not likely to affect production positively other things being equal.

The analysis thus suggests that particular attention should be paid to land availability (all crops) land preparation and planting operations (sweet potatoes and cabbage) and fertilizer use.

The results might be associated with the land tenure, age and educational characteristics of the farmers. Seventy-nine farmers reported having only one parcel of land at an average acreage of 2.7 and a mean distance from the household of 0.96 mile. One farmer reported a second parcel of land five miles from the household. Only five farmers owned the land on which they operated. Seventy-five farmers rented.

The distribution of farmers with respect to age was skewed towards higher age categories; only 14 farmers were in the less than 50 age group and 19 were 70 and over. Seventy-nine farmers had from 5-12 years of primary education and 2 had secondary education. None had technical or university education.

In the short-run, increasing the availability of land to farmers with secure tenure should result in production increases. In the longer term, educational status improvement and the establishment of young farmers should have positive effects on production and food availability.

4.2.2. Farmers' Perception of Problems and Solutions: The problems cited by farmers (numbers in parentheses) as crucial in the agriculture sector were lack of water and drought (62), damage to crops by stray animals (57), inadequate market and low prices (23), labour availability (13), finance (8) and praedial larceny (4). Mention was made of roads, poor transport, high input prices, cultivation service, security of tenure,

lack of training, improper planning by those in authority and backward agriculture system by 1 to 3 farmers.

Provision of dams and ponds (44) was the prime suggestion for tackling the agricultural problems in Antigua. Dealing with stray animals by shooting, providing separate grazing area, fencing, impounding and appealing to livestock farmers was high on the list (32). Other solutions included fencing (19), subsidized price of water (15), improved product prices (10), improved input prices (5), proper planning (6), better wages for labour (5), better markets (12), credit (10) and stiffer penalties for pradeial larceny.

Farmers' perception of their problems and solutions was quite informative. Land availability was not perceived as a serious constraint though the previous analysis indicated this.

4.2.3. Problems and Solutions of Fishermen: The major problems facing fishermen were loss of pots and nets through pilfering (7), damage by steamers (3) and bad weather (1); low fish prices (3) high input price especially fuel (3). Other problems cited were lack of ice in country areas (17), lack of nets (1) and fishermen not having an input when fish prices are being established.

The solutions to the problems ranged from the establishment of sea patrols (4), to the provision of credit for fishing nets (2), guaranteed market (2), increase in fish prices (2), subsidy on fuel, establishment of Fishing Cooperative (1), building ice plant in selected villages, having fishermen pay their loans so that others could get (1), and installation of equipment to hide pots in fishing ground.

4.2.4. Subsidy Knowledge and Participation: Despite the fact that many subsidies are offered by the State, farmers' knowledge of these and their participation in subsidy schemes are very low. The subsidies that are well-known are cultivation services, credit facilities and duty free concession on tractors and inputs. However, only cultivation services were participated in to any great extent. Duty free concession on boats and

engines was fairly well-known and participation fairly high among fishermen (Table 9). Because of the low level of participation, only few responses regarding positive production increase was in evidence.

Farmers' opinion concerning the type of subsidy (input or output) that would result in increased production was overwhelmingly in favour of input subsidies over output subsidies (55 to 1) with 23 not knowing. A similar response was given by fishermen (25 to 1) with 12 not knowing.

4.2.5. Pricing Practices and Degree of Satisfaction: The dominant method of price determination was free market pricing. Some farmers indicated that their method of pricing was that of price control for some products (e.g., bananas, sweet potatoes) for which there was no necessity, while others used free market pricing for products under price control (e.g., fish, beef, pork) (Table 10).

Thirty-six farmers were satisfied with the pricing arrangements for their products while 41 were not. The comparative figures for fishermen were 12 and 28 respectively.

Farmers/fishermen response to the type of pricing that would result in increased production favoured guaranteed prices. Free market pricing and contract pricing were also fairly popular. Price control had a very low rating (Table 11).

Most farmers purchased inputs which were either price controlled (44) or free market priced (41). The comparative figures for fishermen were 29 and 14. Fifty-eight farmers and 33 fishermen expressed dissatisfaction with the pricing arrangements for inputs. Fishermen's preference for input pricing was for free market pricing or contract (Table 12). Farmers' preference was also for free market pricing with guaranteed and contract arrangements following (Table 13). For most farmers and fishermen the Government or private agencies were the chief source of inputs (Table 14).

TABLE 9 : FISHERMEN AND FARMERS' KNOWLEDGE OF AND PARTICIPATION IN SUBSIDIES - ANTIGUA 1984

TYPE OF SUBSIDIES	FISHERMEN			FARMERS		
	A	B	C	A	B	C
	----- Number of Responses -----					
Credit facilities	24	9	1	69	16	10
Storage facilities for fish	12	1	1	0	0	0
Duty-Free Concession on Boats and Engines	36	23	7	1	0	0
Duty-Free Concession on Animal Feed	1	0	0	1	0	0
Duty-Free Concession on Tractors and Inputs	2	0	0	52	9	5
Ice at Subsidised Price	31	11	4	0	9	0
Animal Health/Veterinary Services	1	0	0	11	7	1
Planting Material (Seeds, Seedlings, Fruit Trees)	0	0	0	25	8	1
Cultivation Services	2	2	0	75	59	10
Soil Conservation Services	0	0	0	2	0	0

Source: Survey Data

Note: A = Know; B = Participate in; C = Increased Production.

Numbers represent farmers/fishermen in each category.

TABLE 10: PRICING OF PRODUCTS - FARMERS/FISHERMEN - ANTIGUA 1984

PRODUCT	PRICE CONTROL	GUARANTEED	CONTRACT	FREE MARKET PRICING
		<i>Number of Responses</i>		
SUGAR-CANE	0	11	0	0
SWEET POTATOES	5	1	0	48
GREEN BANANAS	6	0	1	25
YAMS	2	3	0	24
CASSAVA	4	0	0	30
EDDOES	1	0	0	7
PIGEON PEAS	0	0	0	9
PEANUTS	0	0	0	5
BEEF	3	0	0	3
PORK	2	0	0	2
MUTTON	2	0	0	1
WHOLE POULTRY	0	0	0	2
FISH (FRESH)	24	2	5	34
CARROTS	2	3	1	33
TOMATOES	1	3	1	39
CABBAGE	0	1	1	19

Source: Survey data

Note: Numbers represent farmers, fishermen utilizing various pricing methods.

TABLE 11: FARMERS' AND FISHERMEN'S PREFERENCE SYSTEM  
THAT WOULD RESULT IN INCREASED PRODUCTION  
ANTIGUA 1984

	PRICE CONTROL	GUARANTEED	CONTRACT	FREE MARKET PRICING
	----- NUMBER OF RESPONSES -----			
Farmers	12	57	36	21
Fishermen	7	25	13	19

TABLE 12: FISHERMEN'S PREFERENCE FOR INPUT PRICING SYSTEM  
ANTIGUA 1984

	PREFERENCE RANK			
	1	2	3	4
	----- Number of Responses -----			
Price Control	6	2	3	25
Guaranteed	12	11	14	1
Contract	1	21	14	0
Free Market Pricing	18	4	5	7

TABLE 13: FARMERS'/FISHERMEN'S PREFERENCE FOR INPUT PRICING  
SYSTEM - ANTIGUA 1984

METHOD	PREFERENCE RANK			
	1	2	3	4
	----- <i>Number of Responses</i> -----			
PRICE CONTROL	11	3	11	48
GUARANTEED	23	38	11	3
CONTRACT	7	28	33	3
FREE MARKET PRICING	36	5	16	10

TABLE 14: FARMERS'/FISHERMEN'S SOURCE OF INPUTS  
ANTIGUA 1984

	GOVERNMENT	SELF	PRIVATE AGENCY
	----- <i>Number of Responses</i> -----		
SEED	71	48	67
FEED	6	8	14
FERTILISERS	66	29	57
INSECTICIDES	67	10	62
WEED CONTROL CHEMICALS	50	8	47
NETS	27	0	1
ROPE	29	6	1
ICE	14	3	13
TWINE	27	2	28

#### 4.3. Farm Incomes

Only 42 farm households reported monthly incomes. On average, farm household income was \$974.71 per month. This was well below the average of the seven butchers reporting (\$1,708.60), the twenty fishermen (\$1,553.30), the two wholesalers (\$4,632.40) but slightly higher than the ten vendors and forty-one consumers whose reported monthly incomes were \$830.00 and \$836.22 respectively.

An analysis of farm production costs and revenues suggests negative to narrow gross margins per acre for some farm products to high gross margins per acre for others (Table 15 ). These figures must be interpreted in the context of the farming system practised in Antigua. The low acreage devoted to crops (0.25 - 0.56 acres) severely limits the earning potential of farmers to earn high incomes. At the same time, taxes are minimised for those crops with negative or narrow gross margins, e.g., yams and green bananas.

The positive relationship between acreage planted and total production combined with the high sale value for commodities (Table 15) suggests that a major contribution to improving farm incomes might well be improving the availability of land to farmers. It is well known that the State owns the vast majority of the arable land which it leases to farmers. More ready access to land could increase acreage devoted to crop with a consequent enhancement of production and farm incomes.

Another significant relationship is that between yield per acre and input expenditures - in general, an increasing input expenditure generating an increase in yield per acre. The low level of use of fertilizers and inadequate pest control were highlighted by the small proportion of farmers who reported expenditures on these inputs. Increases in production could be forthcoming were greater use made of fertilizers and better pest control methods observed. Input subsidies by way of fertilizers and pesticides may encourage greater use of these inputs. Caution must however, be taken against possible misuse or abuse of these inputs.

TABLE 15: Farm Production, Costs and Sale Value  
For Selected Products, Antigua 1984

PRODUCT	Average Acreage Planted	Production Tons Per Acre	Sale Value \$	Production Cost \$ Per Acre
Sweet Potatoes	0.48	0.75	2116.80	723.35
Green Bananas	0.55	0.86	1213.63	1203.29
Yams	0.35	0.53	1899.52	2398.87
Cassava	0.27	0.80	1433.60	1127.52
Eddoes	0.28	0.43	2186.46	1357.00
Peanuts	0.27	0.74	6729.86	3015.33
Pigeon Peas	0.25	0.50	3012.80	1560.69
Carrots	0.53	1.43	6054.05	1385.65
Tomatoes	0.56	2.39	6424.32	1999.05
Cabbages	0.49	2.49	6079.58	1873.25

4.4. Impact of Price and Subsidy Policy on Production:

Production of vegetables during a period of price control during the sixties and early seventies and subsequently after decontrol of prices furnishes a good example of the effect of price policy. During the period of price control, production was low and growth sluggish despite subsidized input incentives such as seedlings, cultivation services and land rental, together with an aggressive extension service. Even with the subsidies, the prices were too low to allow a reasonable profit margin and price controls were violated. With the decontrol of prices, production increased (Henry, 1984).

The case of fish landings during the sixties to the eighties highlights the impact of subsidies offered to fishermen. The package offered allowed expansion in this sector despite price control on fish in the sixties and early seventies. With the passage of time the existing subsidy in relation to the price structure does not allow for appropriate returns

to fishermen and fish landings are on the decline (Henry, 1984) (Table 16).

The cases presented show the close relationship between price and subsidy policies and the need for continuous monitoring and evaluation of impact of programmes. Another important aspect regarding price policies and programmes is the need for continuing communication between policy-makers and target groups. The low level of farmers/fishermen knowledge of subsidies, their lack of participation and their general dissatisfaction with the pricing system both for inputs and products, call for continuous dialogue in policy formulation, implementation and evaluation.

#### Food Distribution: Market Structure, Conduct and Performance

The food distribution system operates on the basic principles underpinning the private enterprise system but with some regulatory controls applied by the Government. This section describes the channels of distribution for foodstuffs from foreign and local sources and discusses structural elements of the system and the conduct of participants.

##### 4.5. Channels of Distribution

The main channels of distribution of imported foodstuffs are importer/wholesaler, supermarkets and food shops as shown in Table (17). The channels of distribution for locally-produced foods are more complex. However, a high proportion of the foodstuffs are sold directly to consumers as shown in Table 17.

##### 4.6. Structure

4.6.1. Concentration: There was high concentration in supermarket retailing and in importing/wholesaling. Concentration is lower for food shops and vendors (Table 18).

TABLE 16: Production of Selected Crops and Livestock Products  
Antigua, 1974-1983

	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983
	----- Metric Tons -----									
MAIZE	37	96	73	46	44	30	29	45	70	68
BANANAS	32	12	44	95	232	152	277	322	369	382
SWEET POTATOES	74	121	193	124	188	156	180	320	328	352
CASSAVA	18	38	44	33	70	96	47	107	68	44
YAMS	67	39	61	91	156	126	68	48	63	275
CABBAGE	15	10	20	9	32	45	81		18?	165
CARROTS	11	24	133	128	88	147	123	178	118	124
TOMATOES	51	96	108	138	423	161	96	131	172	284
PINEAPPLES	9	25	140	131	110	106	95	131	184	181
FRESH MILK	7237	6000	9000	11000	12000	13000	13000	13000	6000	6000
EGGS	120	124	128	130	132	136	140	140	145	150
BEEF AND VEAL	255	150	189	249	-	-	509	453	408	453
PORK	43	30	33	55	-	-	-	-	-	-
POULTRY	-	-	-	5000	5000	5000	5000	5000	5000	5000
MUTTON	6	5	4	4	10	-	14	10	7	8
FISH	1500	1474	1477	1646	1950	1453	1438	1106	904	1058

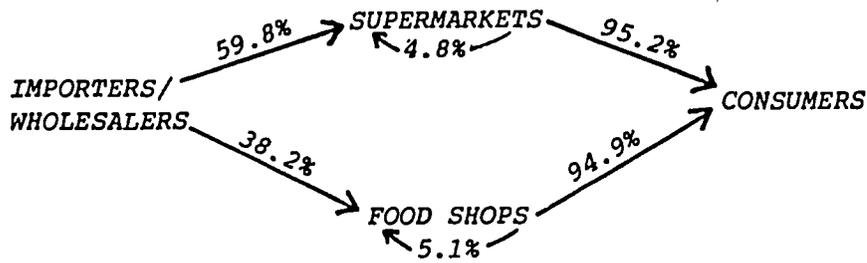
Source: UNECLAC: Agricultural Statistics - Caribbean Countries, Vol. VI, 1984.

Table 17: DISTRIBUTION CHANNELS FOR SELECTED IMPORTED FOODSTUFFS AND PROPORTION OF DISTRIBUTOR SALES

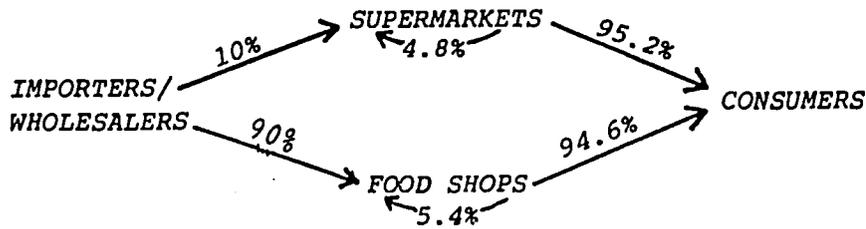
PRODUCT

Distribution Channels and Proportion of Distributor Sales

RICE:



WHEAT FLOUR:



CORNMEAL:



SARDINES:



CODFISH:

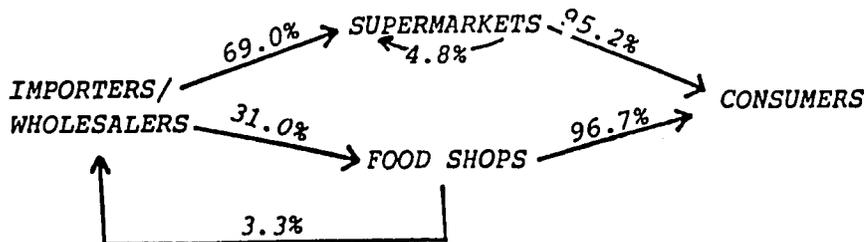
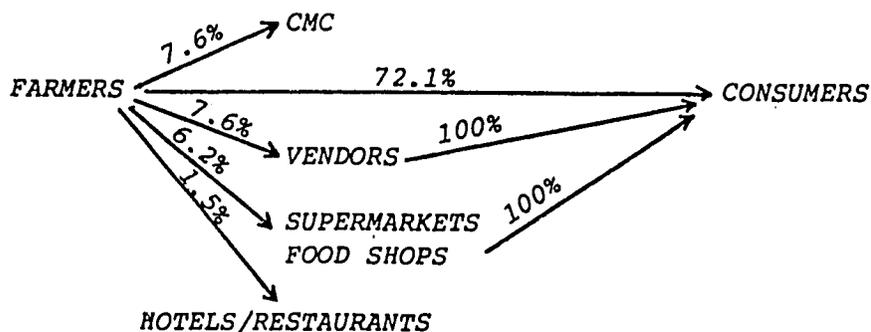


Table 17: DISTRIBUTION CHANNELS FOR SELECTED LOCAL FOODS AND PROPORTION OF DISTRIBUTOR SALES

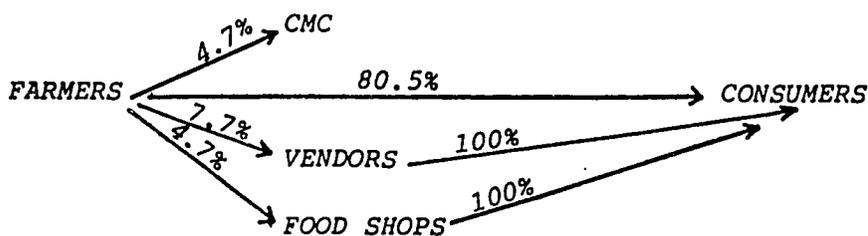
PRODUCT

Distribution Channels and Proportion of Distributor Sales

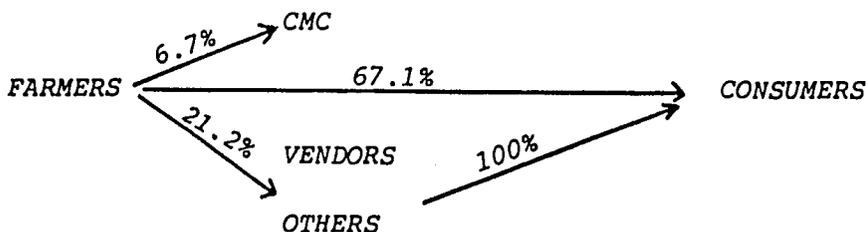
SWEET POTATOES



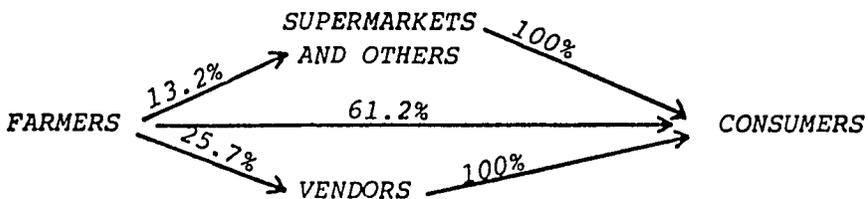
GREEN BANANAS



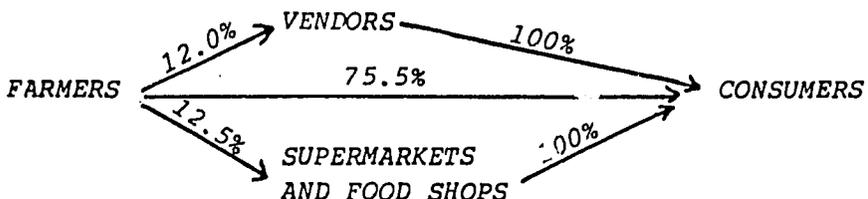
YAMS



EDDOES



PIGEON PEAS



BEEF

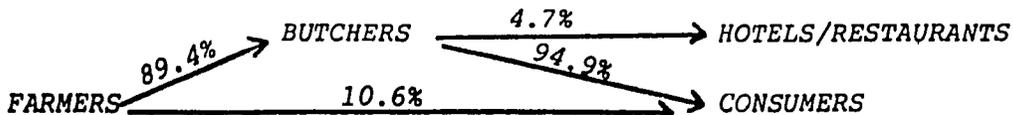
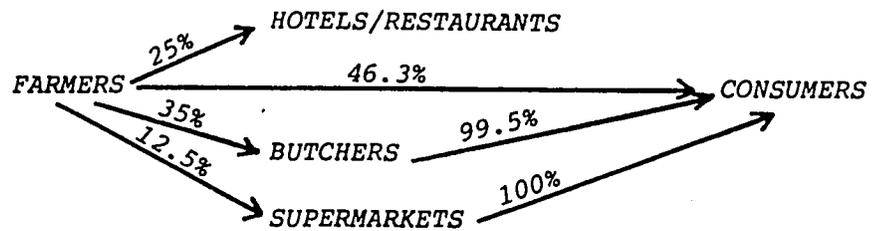


Table 17: Cont'd ...

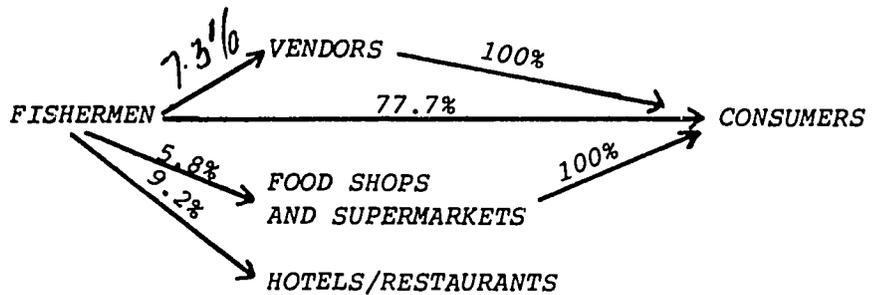
PRODUCT

Distribution Channels and Proportion of Distributor Sales

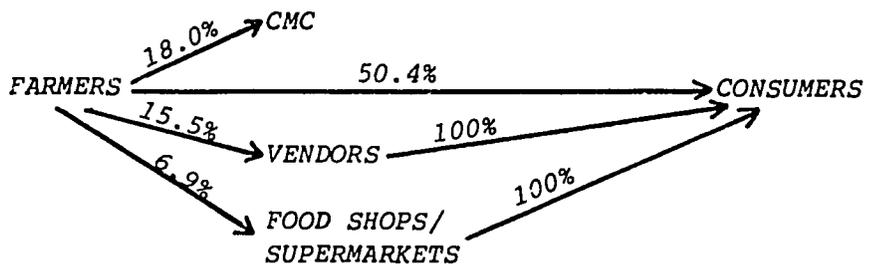
PORK



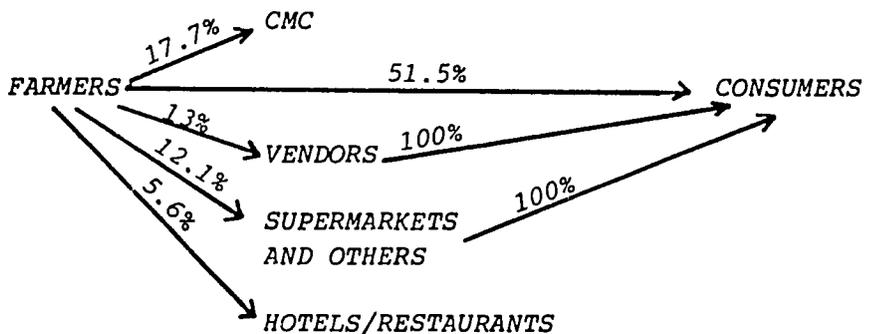
FRESH FISH



CARROTS



TOMATOES



CABBAGES

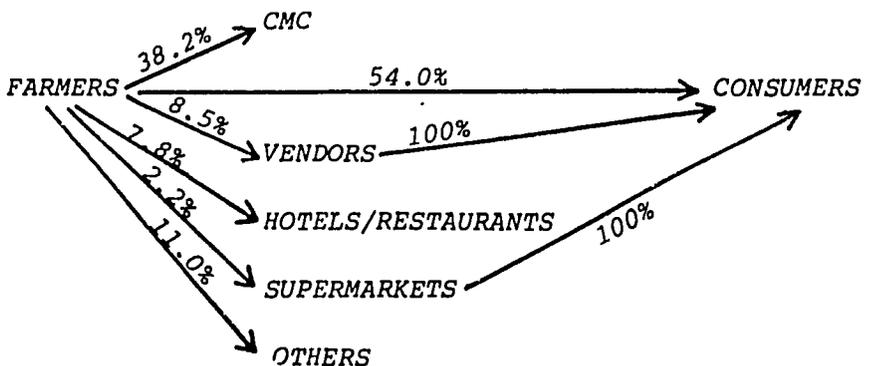


TABLE 18: CONCENTRATION IN THE FOOD DISTRIBUTIVE SECTORS  
BY CUMULATIVE PERCENTAGE SALES BY  
NUMBER OF FIRMS - ANTIGUA 1984

CUMULATIVE PERCENTAGE SALES BY TYPE OF FIRM				
NO. OF FIRMS	TRAFFICKERS	IMPORTERS WHOLESALEERS	SUPERMARKETS	FOOD SHOPS
1	9.2	29.7	49.5	12.4
2	17.2	53.5	68.2	19.4
3	24.7	66.3	79.9	25.5
4	29.5	78.9	84.9	31.2
5	34.1	88.4	89.6	35.6
6	38.1	93.8	94.2	39.6
7	41.8	97.2	98.0	43.3
8	45.4	99.9	99.1	46.6
9	49.0	-.	100.0	49.2
10	52.4	-	-	51.8

4.2. Entry and Exit: There is freedom of entry and exit to and from the distributive sector. However, finding capital to establish a business was a serious obstacle. For grocers (food shops) and vendors/traffickers, obtaining supplies also presented a problem (Table 19).

TABLE 19: Difficulties Encountered in Establishing Firm  
Antigua, 1984

Method	Importers/ Wholesalers	Supermarkets	Grocers/ Food Shops	Vendors/ Traffickers	Butchers
	----- Number of Responses -----				
Capital	9	6	35	29	2
Labour	3	2	4	3	2
Supplies	0	1	12	15	3
Plant and Equipment	1	2	0	0	1

Alternative investment and employment opportunities were the major constraints to leaving the industry (Table 20). Nearly all distributors indicated continuation in their present occupation.

#### 4.7. Conduct

Distributors were in general familiar with the import and pricing policies (Table 21). Subsidies on transactions were virtually non-existent. A percentage mark-up and adherence to price control were the principal pricing methods (Table 22).

Product promotion was generally low except for importers/wholesalers and supermarkets who used primarily radio and television for promotion purposes.

Reported unethical practices by competitors were minimal - false labelling and improper weighing being of some concern by vendors/traffickers, grocers and supermarkets.

TABLE 20: Difficulties Encountered in Leaving Firm  
Antigua, 1984

Method	Importers/ Wholesalers	Super- markets	Grocers/ Food Shops	Vendors/ Traffickers	Butchers
----- Number of Responses -----					
Disposal Plant and Equipment	4	1	1	0	0
Compensation	2	0	1	0	0
Liquidation Cost	0	0	1	0	0
Alternative Investment Opportunities	4	5	32	12	7
Alternative Employment Opportunities	1	6	31	27	7

TABLE 21: Familiarity With Import and Pricing Policies  
Antigua, 1984

Method	Importers Wholesalers	Super- markets	Grocers/ Food Shops	Vendors/ Traffickers	Butchers
----- Number of Responses -----					
Licensing Arrangements	14	7	36	13	9
Duties and Taxes	14	7	34	29	10
Price Controls	14	9	58	14	13

TABLE 22: Method of Determination of Selling Price  
by Type of Firm - Antigua 1984

Method	Importers/ Wholesalers	Super- markets	Grocers/ Food Shops	Vendors/ Traffickers	Butchers
----- <i>Number of Responses</i> -----					
Percentage Mark-up	13	9	41	7	3
Follow Control Price	13	8	44	22	15
Consultation	1	0	0	2	0
Follow Lead Firm	1	0	0	0	0

Price reduction and product promotion were the preferred methods of meeting competition among importers/wholesalers and supermarkets while offering improved services was popular with food shops and price reduction with vendors/traffickers (Table 23).

TABLE 23: Methods of Meeting Competition - Antigua, 1984

Method	Importers Wholesalers	Super- markets	Grocers/ Food Shops	Vendors/ Traffickers	Butchers
----- <i>Number of Responses</i> -----					
Price Reduction	11	5	9	28	3
Product Promotion	9	3	3	1	1
Improved Services	11	7	27	3	4
Other	4	0	1	0	2

#### 4.3. Performance

Distributors response to profit levels revealed a range of zero profits by supermarkets to 34% by grocers, 4% by importers/wholesalers, 8.6% by butchers and 23.4% by vendors/traffickers. The quantity and quality of the data obtained on procurement and distribution costs precluded any indepth analysis of profit and loss.

Excess capacity ranged from 3% for importers/wholesalers to 8% for supermarkets, 11% for butchers, 13% for food shops and 19% for vendors/traffickers.

Except for importers/wholesalers, distributors considered their product essentially similar to those of other firms. A high proportion (over 50% expressed concern about the nutritional quality and safety of their products and provided special service to the poor.

#### Price Stability

The Consumer Price Index (CPI) showed a fluctuating but general upward trend during 1975 to 1982 with an overall average of 12.6. The Food Price Index (FPI) showed a similar trend with an overall average somewhat lower at 11.8% (Table 24).

Further analysis of price changes for those products which provide economical services of energy and protein for the 1970-1982 period showed marked fluctuation and high overall averages ranging from 9.1% to 22.0%. The overall average for imported products was higher on average - 16% vis-a-vis 14.6% for the locally-produced items. It must be noted, however, that not many locally-produced products qualified as economical sources of energy and protein (Table 25).

It can be concluded, therefore, that despite price controls, the period was marked by high inflation and fluctuation in prices. Control prices applied to local products did establish price stability during a few years.

Table 24: CONSUMER AND FOOD PRICE INDICES WITH ANNUAL PERCENTAGE  
CHANGES, ANTIGUA, 1975-1982 (JAN. 1969 = 100)

Year	CPI	% Change	FPI	% Change
1975	194.55	-	230.94	-
1976	211.30	8.6	250.00	9.7
1977	244.30	15.6	288.00	15.2
1978	265.00	8.5	311.60	8.2
1979	287.00	8.3	344.40	10.5
1980	345.70	20.5	394.70	14.6
1981	394.50	14.1	448.00	13.7
1982	433.50	12.4	498.20	11.0

Table 25: PRICES OF ECONOMICAL SOURCES OF ENERGY AND PROTEIN FOR SELECTED FOOD GROUPS  
ANTIGUA, 1970 - 1982

Product	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	Overall Average
	----- Cents per pound -----													%
<u>STAPLES</u>														
*Cornmeal	16	-	-	23	33	36	-	49	41	-	-	-	-	12
*Wheat Flour	13	-	-	21	38	37	-	-	40	-	64	57	-	15
Rice	21	32	34	-	85	75	80	70	70	84	128	83	134	19.5
*Sugar	20	20	30	50	65	108	86	68	62	68	126	158	87	22.0
<u>LEGUMES</u>	46	-	-	68	84	85	-	141	145	-	154	203	-	16.3
<u>FOOD FROM ANIMALS</u>														
Beef (local)	100	100	100	100	150	150	250	192	200	212	200	250	250	9.1
Fresh Fish	30	40	40	60	100	100	100	100	100	125	150	200	225	20.1
Chicken (B.N.W)	36	40	50	60	58	88	87	79	77	106	111	109	115	11.3
Cheese	120	160	200	240	320	320	400	460	413	439	587	571	555	14.7
<u>FATS &amp; OILS</u>														
Cooking Oil	37	56	56	60	112	147	116	122	110	98	151	243	188	18.8
Margarine	65	65	70	85	127	156	151	188	237	243	292	245	293	14.6

\* C.I.F, Others - Statistical Division, Average Prices for Cost of Living Index. Calculations.

## Food Consumption Patterns

Antigua has a history of import dependence in terms of food consumption patterns. The survey results as well as the food availability data show that import dependence on food still predominates the consumption pattern.

An examination of the food consumption data clearly demonstrates the dominance of wheat and wheat products in the dietary of Antiguans. Bread has been the most important food in terms of quantity consumed, number of listings by respondents and total energy intake. It is second only to fish in terms of total protein intake. Wheat flour consumed in other forms, for example, dumplings, as well as macaroni, ranks high in respect of total energy and protein intake and together with bread constitute the major source of energy (Table 25). The popularity of foods and their contribution to energy and protein intake varies among the various groups as is shown in the tables but the data provides supportive evidence that very few foods provide the bulk of energy and protein in the diet of many societies. In addition to bread, margarine, fish, sugar and oil are important contributors to energy intake while fish, bread, saltfish, chicken wings, beef and evaporated milk make the major contributions to protein intake (Table 26).

The dominance of fat and sugar in the diet is particularly disturbing. These, together with the highly refined carbohydrates in the form of wheat and wheat products are likely to predispose the population to obesity and its associated chronic nutrition-related syndromes. This will become clearer when the anthropometric results are presented and discussed.

Table 26: MOST IMPORTANT FOODS BY ENERGY AND PROTEIN CONSUMED

ANTIGUA 1984

CODE	FOODSTUFF	ENERGY KILOCALORIES X 1000	RANK	PROTEIN X 100 G	RANK
0147	Bread	117.3	1	37.9	2
1106	Margarine	44.9	2	-	-
0934	Fish	43.0	3	59.5	1
0301	Sugar	42.1	4	-	-
1110	Olive Oil	34.3	5	-	-
0121	Rice	32.3	6	-	-
0135	Wheat Flour	30.0	7	4.9	12
0168	Macaroni	28.4	8	9.6	8
1101	Butter	21.9	9	-	-
0910	Saltfish	21.7	10	32.6	3
1004	Evap. Milk	21.3	11	10.8	6
0749	Chicken Wings	20.3	12	25.7	4
0742	Sausage, Links	15.7	13	2.9	15
0706	Beef	15.4	14	12.8	5
1010	Cheese	14.5	15	9.4	9
0801	Eggs	11.4	16	9.1	10
0105	Corn, Whole Grain	9.1	18	-	-
0219	Potato, Sweet (pale variety)	8.9	19	1.1	19
1001	Cows' Milk	8.4	20	4.5	13
0746	Chicken (Drum- stick)	-	-	9.8	7
0747	Chicken (W&B)	-	-	7.8	11
1244	'Ovaltine'	-	-	3.5	14
0411	Red Beans	-	-	1.9	16
0214	Irish Potato	-	-	1.4	17
0412	Blackeye Peas	-	-	1.3	18
0118	CSM	-	-	1.1	20

Source: Survey Data

#### 4.9. Food Consumption Relationships

Individual caloric intake (ICI) and individual protein intake (IPI) were regressed on per caput household income (Y) and sex of the individual (S). Per caput income was weighted by the ratio of the recommended dietary allowance of the individual and the per caput recommended dietary allowance for the household. Dummy variables (male = 1, female = 2) were used in the analysis.

There was no significant relationship between individual caloric intake per caput income and sex of the individual nor were the coefficients. There was, however, a significant relationship between individual protein intake, per caput income and sex of the individual as indicated by the following equation:

$$\text{IPI} = 153.228 - 30.226 \text{ S} + 0.237 \text{ Y} + e \quad (4.6)$$

(8.703)      (0.013)

$$\text{N} = 164 \quad \text{R}^2 = 10.82\% \quad \text{F} = 9.77$$

The income elasticity with respect to protein intake is estimated at 0.8 at the means (IPI = 121.18, Y = 405.26). Females had a lower protein intake than men.

When individual food expenditure (IFE) replaced per caput income in the model, the following equations were obtained:

$$\text{ICI} = 2117.45 + 1.076 \text{ IFE} - 117.482 \text{ S} + e \quad (4.7)$$

(0.148)      (118.657)

$$\text{N} = 256 \quad \text{R}^2 = 19.03\% \quad \text{S.E.E.} = 915.71 \quad \text{F} = 29.73$$

$$\text{IPI} = 115.294 + 0.044 \text{ IFE} - 23.626 \text{ S} + e \quad (4.8)$$

(0.007)      (5.934)

$$\text{N} = 256 \quad \text{R}^2 = 20.31\% \quad \text{S.E.E.} = 45.79 \quad \text{F} = 32.23$$

Both caloric and protein intakes were associated positively with individual food expenditure. The coefficient for sex was significant in the case of protein intake but not caloric intake implying no difference between sexes in respect of caloric intake but a significant difference in

the case of protein. The estimated elasticity linking food expenditure with caloric and protein intakes was 0.3 at the means.

When IPI and ICI was regressed on weighted income per caput, only IPI yielded significant results as indicated in the following equation. The income elasticity with respect to protein intake was calculated at 0.12 at the means. (IPI = 119.68, Y = 412.61)

$$\text{IPI} = 105.21 + 0.035 \text{ Y} + e \quad (4.9)$$

(.012)

$$N = 170 \quad R^2 = 4.99 \% \quad F = 8.8$$

Attempts to generate differences in IPI and ICI among three income levels - low, medium and high, failed to yield significant results.

When ICI and IPI were regressed on individual food expenditure (IFE) using a double log specification, the resulting coefficients were highly significant as indicated in the equations below:

$$\text{Log ICI} = 1.999 + 0.499 \text{ log IFE} + e \quad (4.10)$$

(0.040)

$$N = 256 \quad R^2 = 37.68 \% \quad \text{S.E.E.} = 0.126 \quad F = 153.54$$

$$\text{Log IPI} = 0.498 + 0.538 \text{ log IFE} + e \quad (4.11)$$

(0.048)

$$N = 256 \quad R^2 = 33.14 \% \quad \text{S.E.E.} = 0.150 \quad F = 125.92$$

The results suggest a slightly higher expenditure elasticity with respect to protein intake, than with caloric intake; but they are both around 0.5.

The application of the Linear Expenditure System (LES) to ascertain how additional food expenditure would be allocated among staples, legumes, fruits and vegetables, foods from animals and fats and oils yielded the following results. Standard errors are in parentheses below the coefficients (Table 27).

TABLE 27: Results of the LES Model, Antigua

Food Group	Basic Expenditure	Marginal Expenditure Proportion
	(C)	(B)
STAPLES	1.71 (.345)	0.189 (0.001)
LEGUMES	0.831 0.121	-0.059 (0.004)
FRUITS AND VEGETABLES	0.133 (0.039)	-0.254 (0.029)
FOOD FROM ANIMALS	-0.631 (0.261)	0.413 (0.013)
FATS AND OILS	-16.746 (0.388)	0.711 (0.025)

The results suggest that Antiguan, given an additional food expenditure dollar would allocate it to fats and oils (71 cents) food from animals (41 cents), staples (19 cents) and reduce expenditure on legumes and fruits and vegetables as indicated by the B values. Staples, legumes and fruits and vegetables are primary sources. The results are in keeping with the high fat consumption and the tendency towards obesity in the Antiguan population.

An analysis of expenditure patterns on various food groups by category of respondent was pursued with the following results based on a double log model specification in respect of caloric intake (Table 28). The coefficients generated demonstrate clearly the varying patterns of consumption and expenditures among the various categories of households. In general, expenditures on legumes and fruits and vegetables had no effect on caloric intake of households. Increases in expenditure on staples would increase caloric intakes of farmers, fishermen and vendors/traffickers

TABLE 28: REGRESSION RESULTS RELATING CALORIC INTAKE TO EXPENDITURE ON VARIOUS FOOD GROUPS  
AND TOTAL EXPENDITURE - ANTIGUA 1984

HOUSEHOLD CATEGORY	REGRESSION COEFFICIENTS WITH STANDARD ERRORS IN BRACKETS BELOW							F	R <sup>2</sup>
	CONSTANT TERM	STAPLES	LEGUMES	FRUITS/ VEGETABLES	FOOD FROM ANIMALS	FATS & OILS	TOTAL EXPENDITURE		
Fishermen	1.69	0.407 (0.109)	0.042 (0.024)	- 0.003 (0.024)	0.229 (0.124)	0.077 (0.027)	.055 (0.152)	11.42	67.5
Farmers	1.55	0.148 (0.057)	0.020 (0.013)	- 0.031 (0.016)	0.115 (.074)	0.052 (0.016)	0.439 (0.109)	17.02	58.7
Vendors/ Traffickers	1.60	0.113 (0.044)	- 0.006 (0.030)	- 0.015 (0.027)	0.136 (0.115)	0.777 (0.041)	0.404 (0.151)	5.33	59.3
Consumers	2.63	0.032 (0.067)	0.020 (0.023)	- 0.058 (0.025)	0.114 (0.051)	0.099 (0.023)	0.149 (0.112)	7.76	51.43
Grocers	1.88	0.053 (0.053)	0.015 (0.022)	0.035 (0.023)	- 0.010 (0.065)	0.072 (0.025)	0.452 (0.153)	16.49	72.3

but would leave unchanged caloric intake among consumers and grocers. Expenditure increases on foods from animals would increase caloric intake of fishermen and consumers but would not significantly affect other groups. As might be expected, increases in expenditure on fats and oils would increase caloric intakes of all categories. Increase in total food expenditure by grocers, vendors/traffickers and farmers would result in positive increases in caloric intake. Caloric intakes of consumers and fishermen would remain unchanged with increases in food expenditure.

A semi-log model applied to individual caloric intake (ICI) and individual protein intake (IPI) in relation to family size, sex of household head, years of secondary education of household head, age, weight and height of the individual, yielded a significant relationship only for IPI according to the following equation. A dummy variable was used for sex (Male = 1, Female = 2).

$$\begin{aligned} \text{Log IPI} = & 4.23 - 0.020 \text{ FS} - 0.189 \text{ SH} \\ & (.010) \quad (0.055) \\ & + 0.004 \text{ H} + e \\ & (0.002) \end{aligned} \quad (4.12)$$

N = 267      R<sup>2</sup> = 8.64%      S.E.E. = 0.339      F = 8.23

Larger families had a depressing effect on individual protein intake and where a female was the head of the household, individual protein intake was lower.

### Nutritional Status

The 1981 national survey results showed that in a sample of 436 pre-schoolers, 54.9% was normal, 30.8% mildly malnourished, 6.8% moderately malnourished, 1.2% severely malnourished, while 6.3% was obese according to the Gomez Classification of Weight for Age. The peak incidence of underweight was in the 18-23 months age group in which 26.1% was below 80% of the standard weight for age and another 30% between 80-89% of standard. The obesity observed was concentrated in the 0-6 months age group - a result possibly due to the high prevalence of bottle-feeding.

Assessment of the nutritional status of pre-schoolers according to the Waterlow Classification of Weight for Height for Age showed severe wasting and stunting in 1% of the children with 89.2% being normal, 2.4% stunted and 7.3% wasted (Table 29).

Like in other Caribbean countries, anaemia exists in Antigua although the actual prevalence levels in the population have not yet been fully assessed. The most commonly affected groups are pregnant and lactating women and pre-school children. The major contributory factors are inadequate dietary intake and low absorption of iron, dietary deficiency of folate and sometimes vitamin B<sub>12</sub> and parasitic infestation.

TABLE 29: Waterlow Classification of Weight for height for Age - Pre-School Age Children - Antigua/Barbuda - 1981

Height as a Percentage of Standard/Age	Weight as a Percentage of Standard/Height		
	Under 80%	80% and Up	Total
Under 90%	4 (1.0%)	10 (2.4%)	14 (3.4%)
90% and Up	30 (7.3%)	365 (89.2%)	395 (96.6%)
TOTAL	34 (8.3%)	375 (91.7%)	409 (100.0%)

The 1981 survey data revealed a very high percentage of obese individuals particularly among women. Some 48% of the women in the sample was above 120% of their standard weight for height. Data for 1978 showed a total of 4,251 individuals attending diabetic clinics and 2,664 persons attending hypertensive clinics. These health problems are closely linked to obesity.

This review points to the major nutritional problems - protein-energy malnutrition existing side-by-side with obesity and anaemia. The survey results of this study support the evidence of over-nutrition in a large segment of the population.

Adults (256) dominated the sample (299) because of their accessibility to the interviewers (Table 30). An anthropometric nutritional status assessment using weight for height revealed a high percentage of obese adults

Table 30 : Age and Sex Composition of the Sample - Antigua 1984

Age	Male	Female	Unknown	Total
0 - 5	0	1	0	1
6 - 18	8	22	0	30
19 +	159	90	7	256
Unknown	3	2	7	12
TOTAL	170	115	14	299

particularly female 48% female to 38% male (Table 31).

Table 31 . Weight for Height Status of Individuals in Sample Antigua 1984

	80%	80-120%	120%	Unknown
Male 0 - 5	0	0	0	0
Female 0 - 5	0	0	1	0
Male 6 - 18	0	3	5	0
Female 6 - 18	0	14	7	1
Male 19 +	3	91	58	7
Female 19 +	0	44	41	5

These results are in keeping with a previous assessment (1981) in Antigua and with the pattern observed in Barbados (1981), BVI 1984 though obesity among Antiguan males might be higher than in the countries mentioned.

Just over one percent of the adults (all male) was below 80% of the standard weight for height.

The obesity problem in Antigua is serious and there is clear evidence that the food import policy is implicated. In a country where starchy fruits, roots and tubers could be successfully grown, given appropriate incentives, the majority of the calories consumed comes from wheat and wheat products, sugar and fat which are all imported. These high energy, low fibre foods predispose the population to obesity and its related diseases, hypertension, diabetes and cardiovascular diseases, as well as other diseases such as cancer of the colon. A decision has to be made concerning the availability of relatively cheap imported food vis-a-vis a higher cost but more health promoting local foods with its vast employment and income-generating potential.

An analysis of energy and protein adequacy levels for various categories of respondents revealed a strong tendency towards inadequacy of energy among all categories. Part might be due to the inability to procure an adequate amount of food or to a conscious effort to deal with the problem of obesity (Table 32).

TABLE 32: ENERGY AND PROTEIN ADEQUACY LEVELS - ANTIGUA 1984

	ENERGY			PROTEIN		
	<80%	80-120%	>120%	<80%	80-120%	>120%
FARMERS	9	36	33	0	4	74
FISHERMEN	7	19	13	0	6	32
TRAFFICKERS	4	8	14	0	0	26
CONSUMERS	11	16	24	0	4	47
IMPORTERS/ WHOLESALERS	3	2	3	1	3	4
SUPERMARKETS	1	2	5	0	0	8
GROCERS	13	17	22	1	4	47
BUTCHERS	2	4	6	0	1	11
OVERALL	50	104	120		22	249

## Foreign Exchange

The increasing invisible trade deficit from 35.1 million dollars in 1973 to 180.6 million in 1980 with food imports accounting for 28-50% of the trade deficit demonstrates clearly the inability of the agricultural sector to impact significantly on food availability and on foreign exchange earnings. The total value of food exports amounted to only 0.26 million dollars in 1973 and 1975 increasing to 0.69 million dollars in 1978. These figures represent only 1.7%, 1.1% and 2.2% of the value of food inputs for the periods 1973, 1975 and 1978 respectively. Unless appropriate action is taken, the foreign exchange contribution by the agricultural sector would remain minimal.

In the light of the nutritional problems - a combination of malnutrition in under fives and obesity among adults, the first priority should be on greater self-reliance on local foods including fish. The consequent employment generation, reduction in food imports and increase in exports would impact on foreign exchange earnings and savings. The lower caloric density and higher fibre content of local foods would lower the predisposition to obesity and its associated chronic disease syndromes.

## Exchange Rates

An emerging concern for food policy analysts is the issue of exchange rates. Antigua and Barbuda and other Organisation of East Caribbean States (OECS) countries are linked into a currency union through the East Caribbean Central Bank (ECCB). The State's currency is the EC\$ = US\$0.37 and is pegged to the US dollar because of the economic dominance of the tourist sector, the US dollar is frequently used in transactions.

The value of the EC dollar relative to other currencies besides the US dollar fluctuates in accordance with the strength or weakness of the US dollar towards those currencies. In theory, high exchange rates make for lower cost of foreign exchange and encourage high importation since goods from other countries including food are relatively cheap. The converse is the case with a low exchange rate. From the perspective of the local producer, his products are at a disadvantage both at the local market and at the export market. At the local market farmers' products face strong competition from cheap imports while at the export level their products are undervalued. This disincentive to export increases supplies to the local market with a consequent depressing of the foreign exchange earning potential. Thus, while consumers are assured of relatively cheap food supplies, the farmers bear the burden.

In the case of Antigua, there are three definitive statements one can make on the relative value of the dollar. Since the pegging of the East Caribbean dollar to the US dollar in inflation rates in Antigua and in the other OECS countries have always been in excess of those in the United States. Indeed, because of the policy in all these countries to allow prices of imported products to be marked up on a percentage basis rather than a fixed dollar amount, the inflation originated in the exporting country is always escalated. As indicated earlier, the average price increase during 1975-1982 was 12.6% vis-a-vis 8-10 for the industrialized countries during the same period. This relatively small difference in the rates of inflation points to only a slight overvaluation of the EC dollar for Antigua and could not justify a devaluation. Further, the dominance of food imports, the poor performance of the agricultural sector in providing the required food supply, and the dependence on this sector for virtually all inputs - machinery, fertilizer, pesticides, transport, herbicides, etc. make devaluation counter productive. In Antigua, the division between rural and urban communities is not clearly demarcated because of the small size of the country and the employment pattern of household members (Table 33) - skilled, professional, business and clerical workers relative to known occupations.

Table 33: Occupations by Category of Households - Antigua 1984

Household Category	Manual	Skilled	Professional	Business	Clerical	Other Service	Students	Unknown
Farmers	133	11	9	2	12	4	65	32
Fishermen	65	6	4	0	4	0	22	10
Vendors/ Traff.	33	4	3	0	1	0	31	14
Food Shops	55	8	7	22	3	5	51	23
Consumers	48	8	11	0	8	3	47	4
Butchers	12	0	3	2	2	0	8	2
Super- markets	9	1	2	1	0	1	7	0
Imp/Whl.	2	0	1	6	2	0	7	18
TOTAL	357	38	40	33	32	13	238	103

Among vendors /traffickers, fishermen and farmers were 9%, 13% and 14% respectively compared with around 23% for other categories, thus making any apparent disadvantage to farm households minimal.

## Results in Relation to Hypothesis and Criteria

The food price and subsidy policies have been presented. The subsidiary hypotheses relating to supply response, food imports and food consumption relationships have been discussed. The results provide support to virtually all components of the overall hypothesis that the food price and subsidy policies during the sixties to the present time have failed to:

- (a) improve food availability;
- (b) reduce import dependence;
- (c) stabilize food prices;
- (d) improve farm incomes; and
- (e) improve the nutritional status of all segments of the population.

Undoubtedly, food availability has improved to the extent that over-consumption, resulting in obesity, is clearly apparent. However, the distribution among all segments of the population in relation to nutritional needs is skewed. This mal-distribution may have more to do with factors such as nutrition knowledge than with price policies.

Price policies including the slightly elevated exchange rate have created an over-dependence on imports which has not been counteracted by an aggressive subsidy policy. Low acreages and improper input combinations have resulted in low production of many crops. Water is a crucial limiting factor. A reduction in import dependence would not become a reality until these issues are suitably addressed. Producers knowledge and participation in subsidies need improvement.

Food prices continue to rise at rates higher than was specified in Criterion 4 .

Farm incomes are low, relative to other sectors and incremental demand for food crops appears to be low, relative to meat, fish and poultry and fats and oils.

The existence of protein-energy malnutrition among children and obesity in adults, requires that more targeted nutrition intervention programmes are needed to redress these problems.

The direct participation by the State in the distributive sector, particularly their involvement - the import sector has increased the competitiveness of the system howbeit at a very high cost.

There is evidence that the market margins for local products under price control might be too low to allow for reasonable profits and efficiency.

Chapter 5

DATA ANALYSIS, INTERPRETATION AND POLICY IMPLICATIONS  
ST. VINCENT

Food Availability

An assessment of food availability at the national level in St. Vincent and the Grenadines for the period 1979-1981 showed an average per caput per day allowance of 2234.0 kilocalories and 50.7 g protein availability when compared to the recommended dietary allowance for the population. A high proportion of the food was imported - 49% of the energy and 64% of protein. Fat importation was also quite high at 57.4% (Table 34). This high dependence of food imports was reflected in foreign exchange expenditure of the magnitude equivalent to US\$17.1 M which accounted for 30% of the total expenditure on imports.

TABLE 34: Per Caput Energy, Protein and Fat Availability by Source - St. Vincent - 1979-1981 Average

	Energy		Protein		Fat	
	Total	% Import	Total	% Import	Total	% Import
Cereals	642.0	95.0	17.0	96.0	1.8	88.0
Wheat	420.0	100.0	12.6	100.0	1.3	100.0
Paddy Rice	186.0	100.0	3.5	100.0	0.4	100.0
Roots & Tubers	286.0	1.0	4.8	-	0.6	-
White Potatoes	3.0	100.0	0.1	100.0	-	-
Sugar & Honey	429.0	100.0	-	-	-	-
Raw Sugar	419.0	100.0	-	-	-	-
Pulses	29.0	21.0	1.9	32.0	0.2	50.0

TABLE 34: Per Caput Energy, Protein and Fat Availability (Cont'd)  
by Source - St. Vincent - 1979 - Average

	Energy		Protein		Fat	
	Total	% Import	Total	% Import	Total	% Import
Nuts and Oilseeds	92.0	-	1.5	-	8.6	-
Vegetables	5.0	40.0	0.2	50.0	-	-
Fruits	128.0	-	1.6	6.0	0.5	20.0
Meats & Offals	143.0	57.0	10.5	60.0	10.9	55.0
Eggs	19.0	5.0	1.5	7.0	1.4	7.0
Fish & Seafood	22.0	64.0	3.9	67.0	0.6	50.0
Milk	95.0	66.0	6.4	80.0	2.8	64.0
Fats & Oils	240.0	41.0	0.1	100.0	27.1	42.0
Animal Sources	28.0	71.0	-	-	3.2	75.0
Vegetable Sources	212.0	37.0	0.1	100.0	23.9	37.0
Alcoholic Beverages	51.0	69.0	0.1	100.0	-	-
Others						
TOTAL (of food classes only)	2234.0	49.0	50.7	64.0	57.4	37.0

Source: FAO Provisional Estimates

### 5.1. Food Imports

The import of food into St. Vincent and the Grenadines has undergone significant changes from 1960 to the present time but on the whole in value terms, the import bill has been generally on the increase. The value of food imports moved \$2.9M in 1960 to \$48.1M in 1982 accounting for 22.2% and 29.2% respectively of the total value of imports for those years (Table 35). The most important food imports during the period were rice, flour, sugar, fish, chicken and milk and milk products.

Table 35: DOMESTIC EXPORTS, TOTAL IMPORTS, FOOD IMPORTS,  
FOOD EXPORTS AND REMITTANCES FROM ABROAD 1960-1982 -  
ST. VINCENT

YEAR	DOMESTIC EXPORTS	TOTAL IMPORTS	FOOD IMPORTS	FOOD EXPORTS	REMITTANCES
-----EC\$ '000-----					
1960	5,800	12,973	-	-	-
1961	5,570	12,631	-	-	-
1962	5,714	12,477	-	-	-
1963	5,965	12,796	-	-	1,394
1964	6,044	16,064	-	-	1,470
1965	6,027	14,809	-	-	1,510
1966	5,872	16,055	-	-	1,455
1967	5,749	15,806	-	-	1,377
1968	6,790	20,004	-	-	1,418
1969	7,176	24,416	-	-	1,610
1970	6,529	30,517	7,510	5,351	1,639
1971	5,390	36,016	9,082	4,262	1,546
1972	5,951	35,240	10,210	4,907	1,639
1973	9,362	38,103	11,531	8,008	2,317
1974	13,799	52,304	15,448	12,764	2,599
1975	15,397	53,913	17,444	14,099	3,482
1976	23,673	62,020	19,793	22,432	3,269
1977	24,885	81,923	22,973	23,285	3,484 <sup>e</sup>
1978	92,100	97,690	31,887	39,319	3,704 <sup>e</sup>
1979	38,099	125,079	40,434	32,661	3,437
1980	40,262	154,178	46,189	33,559	3,625
1981	63,428	157,117	43,165	50,772	2,609
1982	84,826	164,526	48,110	60,761	1,774

Source: Department of Statistics, St. Vincent

e - own estimate

An analysis of time series data 1970-1982 relating food imports (FI), to domestic exports (DOMEX), food exports (FEX), and remittances from abroad (RE) yielded the following equations and their associated statistical properties. The standard errors of the coefficients are in parentheses ( ) below. N refers to the number of observations, R<sup>2</sup> is the coefficient of multiple correlation SEE is the standard error of the estimate and F is the regression test statistic. The critical F value was taken at the 0.05 level as was the t-statistic used to measure the significance of coefficients. All logarithms are to base 10.

Good fits of the data were obtained with a semilog specification on food imports as dependent variable as indicated in the following equations:

$$\begin{aligned} \text{Log FI} = & 0.690 + 0.113 \text{ RE} + 0.018 \text{ FEX} \\ & (0.024) \qquad\qquad\qquad (0.003) \\ & - 0.003 \text{ DOMEX} + e \\ & (0.002) \end{aligned} \qquad (5.1)$$

$$N = 13 \qquad R^2 = 95.85\% \qquad F = 69.31 \qquad \text{S.E.E.} = 0.07$$

$$\begin{aligned} \text{Log FI} = & 0.712 + 0.109 \text{ RE} + 0.013 \text{ FEX} + e \\ & (0.026) \qquad\qquad\qquad (0.001) \end{aligned} \qquad (5.2)$$

$$N = 13 \qquad R^2 = 94.20\% \qquad F = 81.23 \qquad \text{S.E.E.} = 0.08$$

A double log specification of the model showed only the food export coefficient as being significant (Equation 5.3).

$$\begin{aligned} \text{Log FI} = & 0.461 - 0.020 \log \text{ RE} + 0.806 \log \text{ FEX} \\ & (0.210) \\ & -0.101 \log \text{ DOMEX} \\ & (0.290) \end{aligned} \qquad (5.3)$$

$$N = 13 \qquad R^2 = 93.35\% \qquad F = 42.14 \qquad \text{S.E.E.} = 0.09$$

The greater significance of the food export variable reflects the dominance of food exports (bananas) in the total domestic export package. Any variability in export earnings from the banana industry would impact on food imports more strongly than other export industries.

5.1.1. Cereals: Rice has been one of the main staples in the Vincentian diet. More than two million pounds have been imported annually during the period under consideration with the exception of 1974 when 1.49 million pounds were imported. Rice imports peaked in 1977 reaching 4.1 million pounds after which there was a slow decline.

An analysis of per caput rice imports in relation to price for the period 1970 to 1981 using a double log function failed to generate a significant relationship.

The importation of wheat flour increased steadily during the 1960-1977 period when the establishment of the East Caribbean Flour Mills Limited halted imports. Imports increased from 8.5 million pounds in 1960 to 9.5 million pounds in 1969 valued at \$1.1M and 10.8 million pounds valued at \$4.2M in 1977. With the establishment of the flour mill, St. Vincent has become a net exporter of wheat flour.

An analysis of per caput wheat flour imports (WFI) in relation to price for the period 1969-1977 (PWF) yielded the following equation:

$$\text{Log WFI} = 1.940 - 0.112 \log \text{PWF} + e \quad (5.4)$$

(0.027)

$$N = 12 \quad R^2 = 71.42\% \quad \text{S.E.E} = 0.018 \quad F = 17.49$$

The results indicate that though wheat flour is basic in the Vincentian diet, imports were sensitive to price movements.

5.1.2. Sugar: Importation of unrefined sugar started in 1962 after the closure of its local sugar factory at Mt. Bentinck in that year. With few exceptions, the importation of this commodity kept rising over the years. In 1962, the country imported 708,000 pounds of unrefined sugar, while in 1979 it rose to 7.6 million pounds. However, it was the policy of Government to re-introduce sugar at least to supply local demand and save foreign exchange.

The import of sugar and sugar preparations valued \$5.6M in 1980. A local factory was re-established in 1981, and the State now produces its own unrefined or brown sugar. However, a substantial quantity of refined sugar is being imported.

Analysis of per caput sugar imports (SI) with respect to landed price (PS) for the period 1970-1981 yielded the following equation:

$$\text{Log SI} = 1.604 - 0.421 \log \text{PS} + e \quad (5.5)$$

(0.083)

$$N = 12 \quad R^2 = 72.18\% \quad \text{S.E.E.} = 0.076 \quad F = 25.94$$

Price elasticity with respect to sugar imports was estimated at minus 0.4.

5.1.3. Dried Legumes: Dried legumes imports increased during the sixties from 132,000 pounds to 279,000 pounds in 1971 and 145,000 pounds in 1976. 1981 imports were 286,000 pounds valued at \$269,000.

Per caput legume imports (LI) was regressed on landed price (PL) for the period 1970-1981 with the following results:

$$\text{Log LI} = 0.220 - 0.422 \log \text{PL} + e \quad (5.6)$$

(0.131)

$$N = 12 \quad R^2 = 51.04\% \quad \text{S.E.E.} = 0.096 \quad F = 10.43$$

Here again, the sensitivity of Vincentians to price is in evidence unlike their Antiguan counterparts. The greater availability of local substitutes may be responsible for the variation of imports with respect to price. Antigua, being a more import dependent economy does not have this flexibility.

5.1.4. Milk and Milk Products: Milk imports grew from 0.5 million pounds in 1960 to 1.6 million pounds in 1970 and 2.0 million pounds in 1980 but there were marked fluctuations during the period. With the establishment of the Diamond Dairy in 1980 an immediate decline in milk imports was recorded.

Per caput milk imports (MII) was regressed on landed price (PMI) for the period 1970-1981 and gave the following results:

$$\text{Log MII} = 1.209 - 0.287 \log \text{PMI} + e \quad (5.7)$$

(0.137)

$$N = 12 \quad R^2 = 30.54\% \quad \text{S.E.E.} = 0.098 \quad F = 4.4$$

Price elasticity with respect to milk imports was estimated at minus 0.3.

5.1.5. Meat, Fish and Poultry: Beef is the principal red meat imported into St. Vincent. An upward trend in imports could be discerned during 1970-1981 but imports have been erratic during the period. Regression analysis relating per caput imports to landed price failed to yield significant results.

Fish has always been an important food item in the Vincentian diet. The most significant fish import over the years has been codfish. In 1960, the quantity imported was 0.85 million pounds valued at just over \$0.2M. In 1980, the State imported 0.3 million pounds valuing \$0.6M. So while less than half of the amount was imported in 1980, its value was almost 3 times that of 1960. The decline in the importation of this commodity is the result of its rising price compared with the competitive price of chicken.

St. Vincent and the Grenadines imported 23,000 pounds of chicken in 1960, but by 1981, 4.3 million pounds were imported. This has become the most commonly used imported meat in the country today.

5.1.6. Fats and Oils: Most of the edible oils used in St. Vincent is produced locally from coconuts. Small quantities of other vegetable oils such as corn oil, are imported. Margarine, however, is imported. In 1970, imports amounted to 399,000 pounds valued at \$211,000 rising to 525,000 pounds valued at \$624,000 in 1976 and then to 812,000 pounds valued at \$1.6M in 1981.

When per caput imports (MI) was regressed on landed price (PM) for the period 1970-1981 a significant positive relation was observed (Equation 5.7).

$$\text{Log MI} = 0.665 + 0.195 \text{ PM} + e \quad (5.7)$$

(0.064)

N = 12            R<sup>2</sup> = 48.41%            S.E.E. = 0.046            F = 9.38

The pattern here is similar to that found in Antigua where margarine imports rise despite price increases.

5.1.7. Fruits and Vegetables: Imports of fruits and vegetables except those in containers are not of great significance. Local production of fruit in particular has limited the necessity of high imports.

## 5.2. Local Production

St. Vincent produces an array of food crops and livestock. Land production is augmented by sizeable landings of fish and crustacea. Table 36 presents production estimates for selected crops, livestock and fish for the period 1974-1983. Compared to Antigua, production levels for crops are quite high but not sufficiently high as to negate high food imports. Livestock and fish production is higher in Antigua.

Like Antigua, low acreages planted, low yields and high production costs characterised the local food production system (Tables 37 and 38). Household consumption of self-produced foods was well above 17% on average with cabbages being practically 100% household consumed and yams, tomatoes, carrots and pigeon peas being over 20%. The sale values for commodities were relatively high.

Fish production was on average 15,650 pounds with a sale value of \$18,353. Average household consumption of fish caught was 462.14 pounds or just under 3%.

5.2.1. Supply Response: A supply response analysis relating total production of various crops to acreage planted and various input costs gave the results presented in Table 39.

Only acreage planted showed any significance in explaining total production in yams and dasheen. All other coefficients as well as acreage planted to sweet potatoes were insignificant. It would appear that farmers use of inputs is optimal. Increasing the use of inputs do not generate production increases.

The soils of St. Vincent are very fertile and recent volcanic activity has undoubtedly increased the mineral content of the soil. The high level

of fertilizer usage suggested by the data may be creating terrible chemical imbalances, thus negating positive effects on production.

Land availability appears to be crucial to increased food production in St. Vincent. A policy on land reform is indicated.

TABLE 36 : Production of Selected Crops and Livestock Products  
St. Vincent, 1974-1983

	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983
	----- <i>Metric Tons</i> -----									
MAIZE	-	-	-	-	-	-	-	-	-	-
BANANAS	23507	19477	31420	28620	32629	28590	20931	33221	31751	37195
SWEET POTATOES	2268	1633	2136	734	1584	1452	2110	1368	1450	2000
CASSAVA	-	2000	2000	2000	3000	3000	3000	3000	3000	3000
YAMS	3765	2313	1724	1980	1688	3128	3084	3260	3000	3000
CABBAGE	-	-	100	136	150	-	-	-	180	-
CARROTS	816	590	826	344	410	289	425	181	161	-
TOMATOES	-	-	-	-	-	-	-	-	199	-
PINEAPPLES	-	-	-	-	5	-	3	2	-	-
FRESH MILK		1000	1000	1000	1000	1000	1000	2000	1000	1000
EGGS	400	420	450	480	500	520	550	550	540	560
BEEF AND VEAL	106	91	99	97	106	96	87	81	80	80
PORK	39	29	39	39	35	50	51	55	44	50
POULTRY	11	19	26	-	-	-	-	-	-	-
MUTTON	-	-	-	-	-	-	-	-	-	-
FISH	500	800	800	800	800	800	800	-	-	-

Source: UNECLAC: Agricultural Statistics - Caribbean Countries, Vol. VI, 1984.

TABLE 37: ACREAGE PLANTED, PRODUCTION, SALE VALUE AND HOUSEHOLD CONSUMPTION  
FOR VARIOUS COMMODITIES - ST. VINCENT 1984

COMMODITY NO. OF RESPONDENTS	ACREAGE PLANTED	PRODUCTION	TONS/ ACRE	SALE VALUE	SALE VALUE/LB.	HOUSEHOLD CONSUMPTION		ESTIMATED \$ RETURN AC.
						Lbs.	%	
Sweet Potatoes (34)	0.66	1,433.90	0.96	596.34	0.42	81.67	5.7	903.17
Green Bananas (39)	2.46	13,995.00	2.54	6,020.00	0.43	215.91	1.5	2,446.53
Plantains (22)	0.80	4,578.60	2.56	1,104.30	0.24	65.25	1.4	1,376.26
Yams (26)	0.34	645.42	0.85	1,220.10	1.89	143.52	22.2	3,598.56
Cassava (8)	0.21	714.29	1.52	350.17	0.49	110.00	1.5	1,668.35
Dasheen (23)	0.76	1,420.50	0.83	603.63	0.42	136.09	9.6	780.86
Eddoes (19)	0.72	2,116.10	1.31	1,067.60	0.50	138.33	6.5	1,467.20
Pigeon Peas (9)	0.31	415.00	0.60	257.29	0.62	84.38	20.3	833.28
Peanuts (19)	0.77	2,394.90	1.34	2,426.10	1.01	71.42	3.0	3,031.62
Carrots (14)	0.30	558.25	0.80	1,951.00	3.49	117.36	21.0	6,488.61

TABLE 37: ACREAGE PLANTED, PRODUCTION, SALE VALUE AND HOUSEHOLD CONSUMPTION (CONT'D)  
 FOR VARIOUS COMMODITIES - ST. VINCENT 1984

COMMODITY NO. OF RESPONDENTS	ACREAGE PLANTED	PRODUCTION	TONS/ ACRE	SALE VALUE	SALE VALUE/LB.	HOUSEHOLD CONSUMPTION		ESTIMATED \$ RETURN AC.
		Lbs.		\$	\$	Lbs.	%	
Tomatoes (7)	0.20	110.00	0.25	227.67	2.07	23.57	21.4	1,159.20
Cabbages (8)	0.39	110.00	0.13	150.00	1.36	111.00	100.0	396.03

TABLE 38: FARMERS OPERATING EXPENSES - ST. VINCENT 1984 (Sample Size = )

COMMODITY	LAND PREPARATION	PLANTING OPERATIONS	WEED CONTROL	FERTILIZERS	PEST CONTROL	HARVESTING OPERATIONS	TOTAL/AC
	\$ per Acre	\$ per Acre	\$ per Acre	\$ per Acre	\$ per Acre	\$ per Acre	
Sugar	200.00 n = 1	- -	435.00 (365.00) n = 2	462.50 (172.50) n = 2	-	273.50 101.50 n = 2	1201.00
Sweet Potatoes	164.97 (24.44) n = 34	47.58 (8.18) n = 31	84.06 (14.98) n = 32	73.07 (13.01) n = 29	39.50 15.50 n = 2	62.93 (15.75) n = 27	827.61
Green Bananas	391.52 76.56 n = 31	449.29 (158.24) n = 31	207.34 (58.00) n = 35	531.76 (88.95) n = 31	228.49 (62.55) n = 17	739.84 (125.15) n = 32	2235.02
Plantains	197.10 (58.08) n = 20	155.70 (39.08) n = 20	134.65 (49.33) n = 20	242.00 (47.02) n = 20	153.00 (30.56) n = 5	( 74.83) ( 51.27) n = 18	
Yams	407.63 (123.57) n = 24	306.14 (91.11) n = 22	220.75 (36.84) n = 24	362.55 (73.85) n = 20	40.00* n = 1	238.37 (77.82) n = 19	1575.44
Cassava	244.67 (97.38) n = 6	62.67 (30.31) n = 6	117.33 (37.85) n = 6	285.00 (200.66) n = 4	54.50 (45.50) n = 2	225.20 (57.92) n = 5	1009.37
Dasheen	238.05 (49.53) n = 22	74.84 (20.49) n = 19	146.52 (40.00) n = 21	108.30 (23.65) n = 20	0.0	99.75 (21.57) n = 16	667.46
Eddoes	450.80 (195.08) n = 15	421.67 (195.12) n = 12	301.38 (178.74) n = 13	235.71 (86.59) n = 14	6.00 n = 1	381.43 (186.83) n = 14	1796.99

TABLE 38: FARMERS' OPERATING EXPENSES - ST.VINCENT 1984 (Sample Size = )

COMMODITY	LAND PREPARATION	PLANTING OPERATIONS	WEED CONTROL	FERTILISERS	PESI CONTROL	HARVESTING OPERATIONS	TOTAL AC
	\$ per Acre	\$ per Acre	\$ per Acre	\$ per Acre	\$ per Acre	\$ per Acre	
Pigeon Peas	114.86 (39.67) n = 7	36.67 (13.76) n = 6	66.00 (28.85) n = 6	123.50 (76.50) n = 2	50.00 n = 1	113.33 43.76 n = 3	502.36
Peanuts	106.68 (17.94) n = 19	124.89 24.06 n = 18	321.95 (123.75) n = 19	112.88 (19.50) n = 17	40.38 (18.66) n = 8	223.32 (27.74) n = 19	930.10
Carrots	159.33 (31.27) n = 12	73.69 (22.46) n = 13	141.42 (32.38) n = 12	116.75 (33.70) n = 11	206.00 194.00 n = 2	130.57 (39.90) n = 7	827.74
Tomatoes	132.43 (59.69) n = 7	32.57 (13.17) n = 7	224.29 (125.11) n = 7	95.33 (80.97) n = 6	0.0	140.00 n = 1	624.62
Cabbage	200.71 68.50 n = 7	20.00 5.90 n = 7	119.71 (38.98) n = 7	62.43 (33.34) n = 7	36.75 (21.42) n = 4	51.67 (19.22) n = 3	491.27

TABLE 39: Supply Response Analysis: Regression Coefficients and Other Statistical Properties for Selected Crops - St. Vincent 1984

CROP (No. of OBS.)	Constant Term	Log Cost Fertilizer	Log Cost Weed Control	Log Cost Planting	Log Cost Land Preparation	Log Acreage	R <sup>2</sup>	F
SWEET POTATOES	2.739	0.008 (0.282)	-0.197 (0.371)	0.664 (0.436)	-0.493 (0.431)	1.364 (1.244)	18.56%	1.18
YAMS	2.069	0.70 (0.219)	-0.176 (0.349)	-0.015 (0.261)	- -	4.542 (1.542)	39.37%	2.60
DASHEEN	2.381	0.060 (0.149)	-0.142 (0.209)	0.045 (0.120)	0.184 (0.179)	1.855 (0.408)	62.91%	5.43

Source: Based on Survey Data.

Basic function:  $\log TP = f(\log X_{i \dots n})$  where TP is total production and  $X_{i \dots n}$  are various input costs as specified.

### 5.3. Farm Incomes

Generally there was a low level of reporting of family income. An average farm household income was \$641.40 per month compared with \$1,036.90 for grocers, \$1,235.40 for consumers, \$1,308.40 for fishermen, \$1,424.30 for butchers, \$1,563.70 for vendors/traffickers, \$1,804.00 for supermarkets and \$2,816.70 for importers/wholesalers.

The analysis of farm costs and revenues suggest negative to narrow gross margins for most crops with high gross margins for a few, e.g., carrots and peanuts (Table 40).

The small acreages devoted to crops has the effect of minimising losses and restricting earning potential of farmers. Because of the strong positive relationship between acreage planted and total production and the fact that farm prices are generally high, improvement in total food availability with greater self-reliance might be achieved by a policy of increased land allocation to farmers. Within recent years a number of farms have been abandoned while a few large estates are not farmed efficiently. This policy might be implemented by purchase and reallocation of larger estates and consolidation of small holdings into larger units.

### Food Distribution, Market Structure, Conduct and Performance

The high dependence on imported foods led to the development of a complex system of distribution, beginning with the importer/wholesaler through a chain of grocers and more recently supermarkets to consumers. Foods produced locally go to consumers via vendors/traffickers, food shops and supermarkets. These channels of distribution are discussed for individual commodities highlighting the structural elements within the system and the conduct of participants.

### 5.4. Distribution Channels

The distribution channels for selected imported and locally-produced foods are depicted in Table 41. There appears to be a greater complexity

in the distribution system for local products and the proportion of products moving directly to consumers differs with respect to commodity - tomatoes, carrots and cabbages had very high proportion going directly to consumers.

### 5.5. Market Structure

5.5.1. Concentration: The analysis of the cumulative percentage sales by type of firm indicated high concentration among importers/wholesalers and supermarkets and to a less extent traffickers. A low concentration was indicated for grocers (Table 42).

5.5.2. Entry and Exit: There was freedom of entry and exit to or from the distributive sector. Obtaining capital and supplies for the establishment of a business presented problems for grocers, vendors/traffickers and butchers - supply constitutes a problem also for supermarkets. Alternative investment and employment opportunities were the major constraints to the industry (Tables 43,44).

### 5.6. Conduct

Distributors were generally knowledgeable about the import and pricing policies - vendors/traffickers being least familiar (Table 45).

Adherence to price control was the dominant method of product pricing by butchers, importers/wholesalers, supermarkets and grocers. Percentage mark-up was also important for importers/wholesalers and supermarkets. Consultation and following the lead firm was important for grocers and vendors/traffickers in their pricing strategy (Table 46).

Product promotion was low among distributors except importers/wholesalers, who used radio and television as their prime media. Price reduction and improved services were the preferred methods of meeting competition among the distributors. (47). Reported unethical practices were virtually non-existent except for supermarkets where false claims were the only complaints.

Table 41: Distribution Channels for Selected Imported Products and Proportion of Distributor Sales

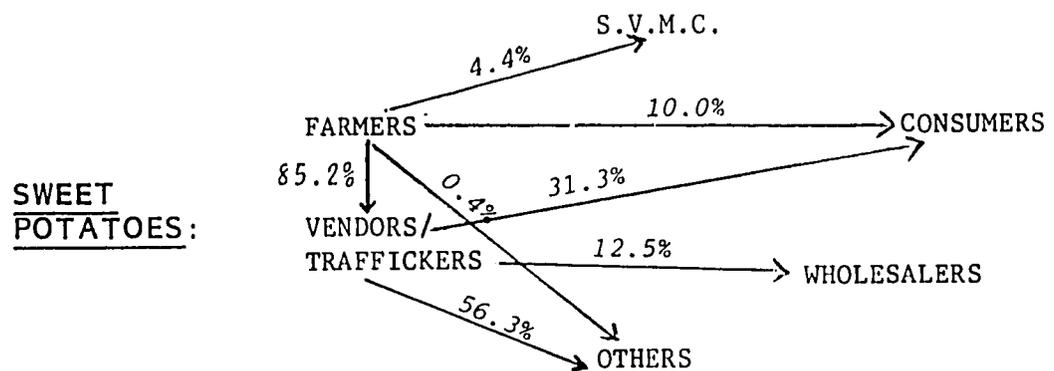
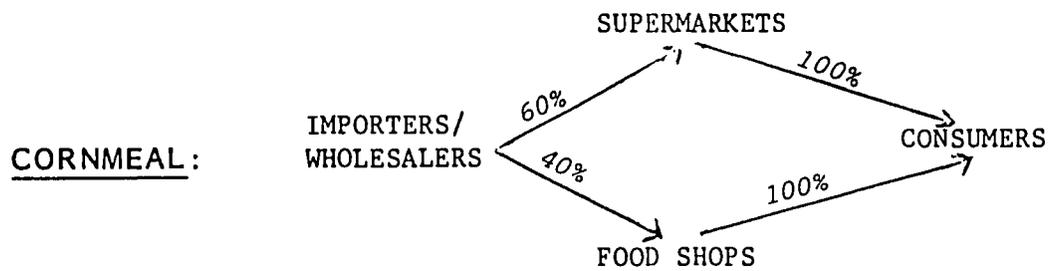
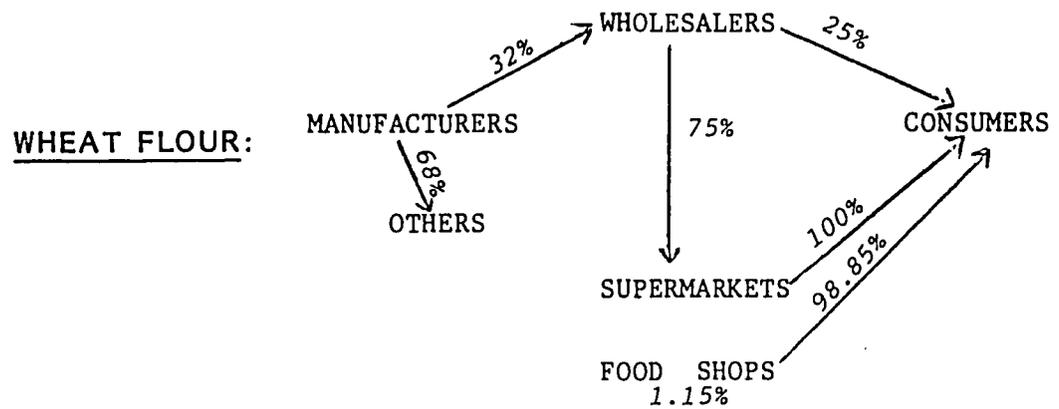
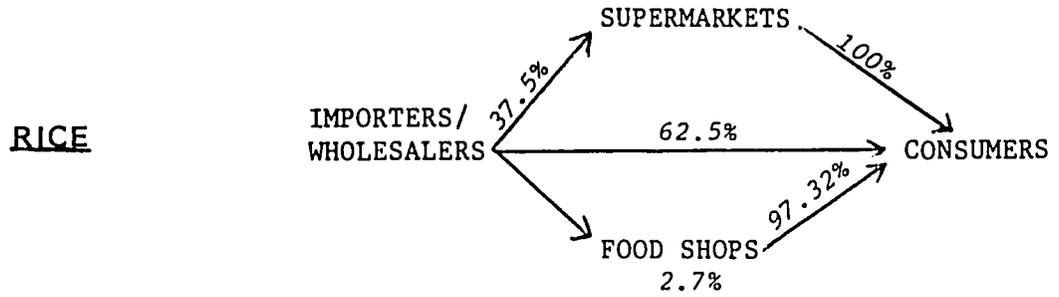


Table 41 : Distribution Channels for Selected Imported Products and Proportion of Distributor Sales

(Cont'd)

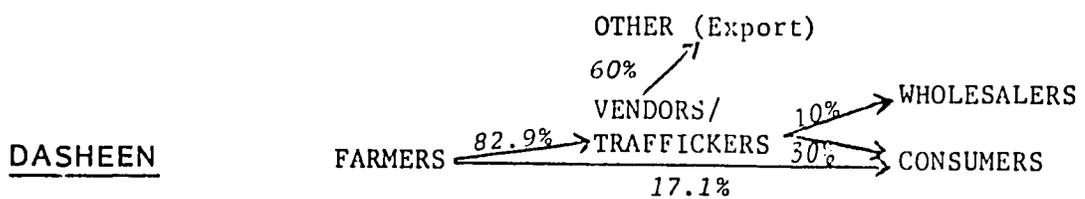
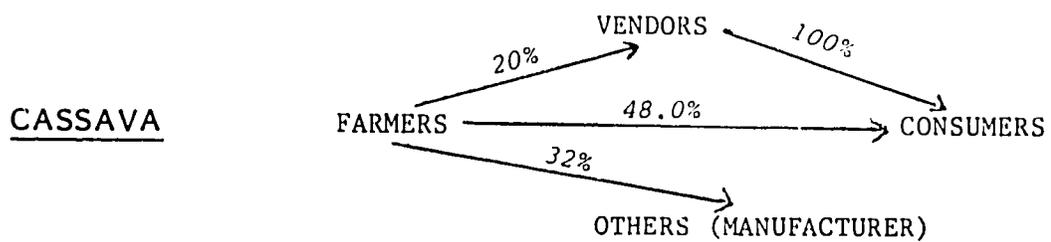
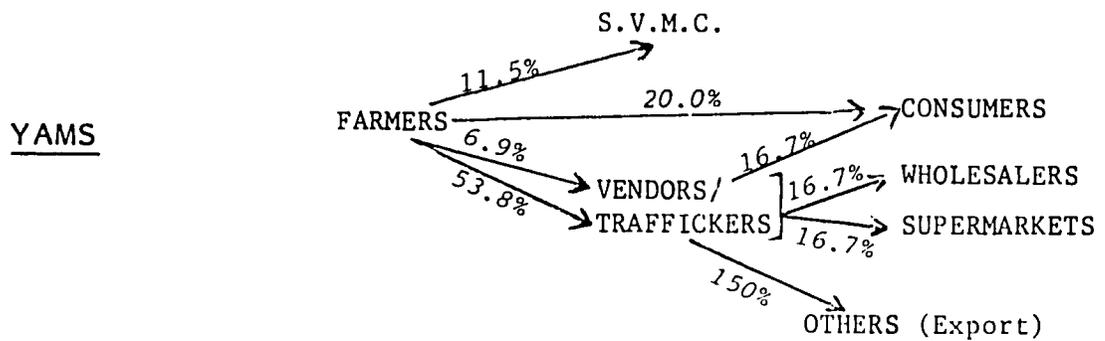
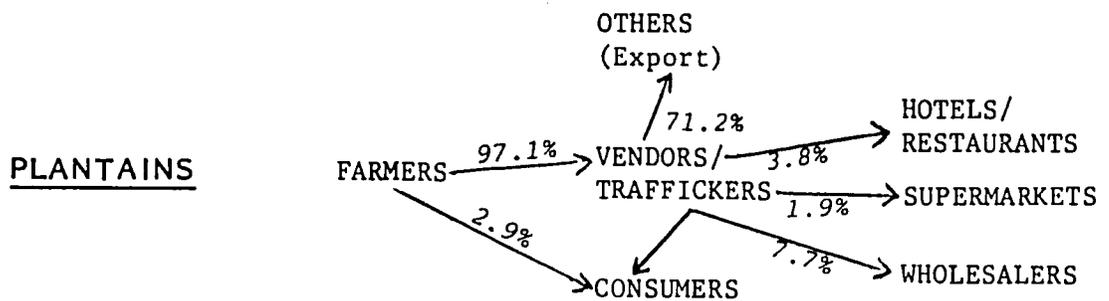
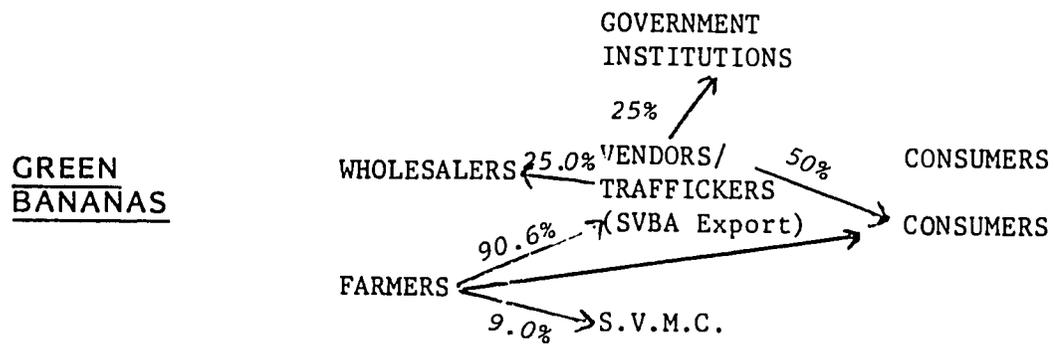


Table 41: Distribution Channels for Selected Imported Products and Proportion of Distributor Sales (Cont'd)

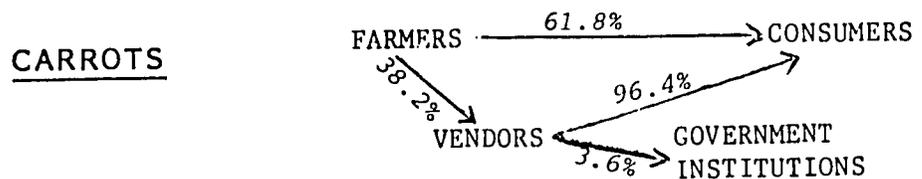
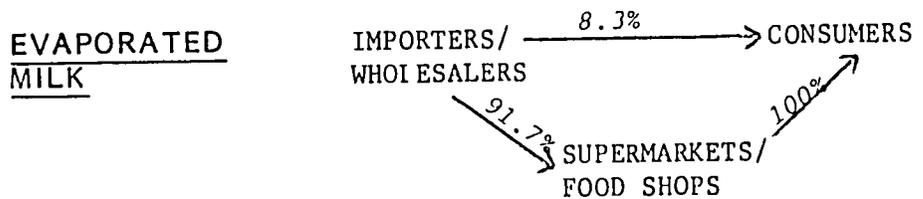
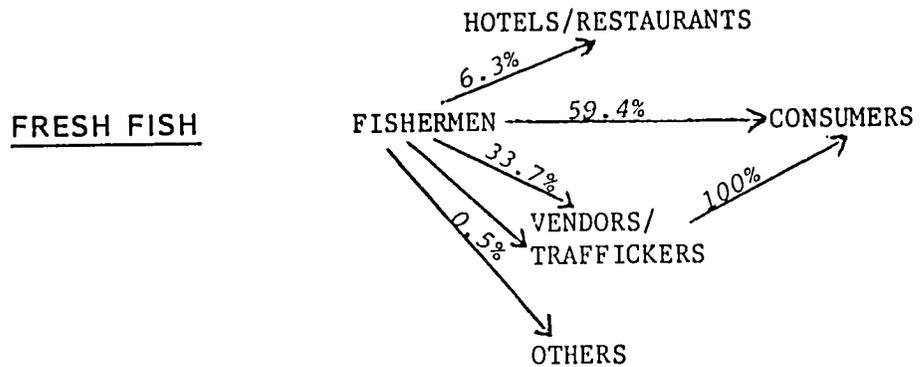
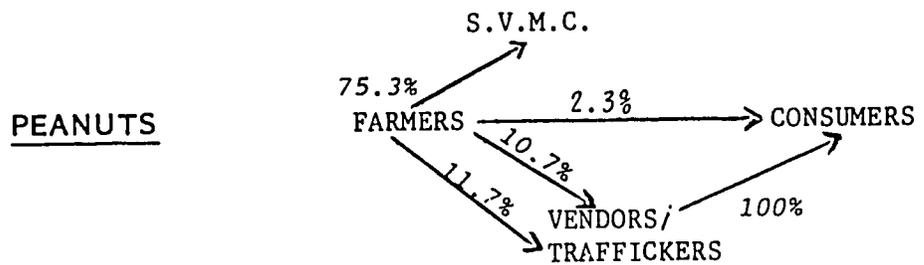
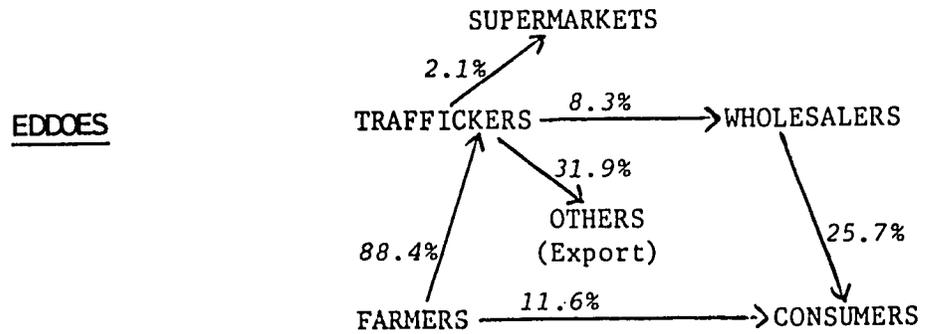


Table 41. Distribution Channels for Selected Imported Products and Proportion of Distributor Sales (Cont'd)

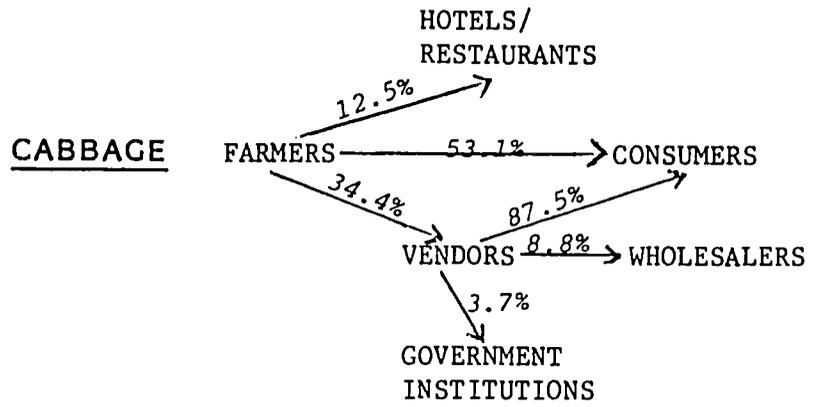
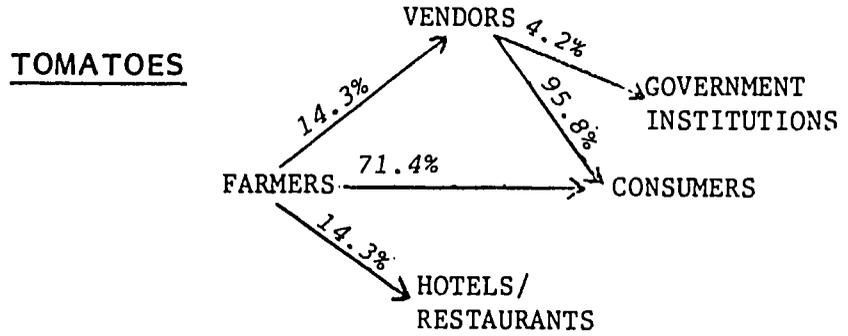


Table 42: CONCENTRATION IN FOOD DISTRIBUTION: CUMULATIVE  
PERCENTAGE SALES BY NUMBER OF FIRMS  
ST. VINCENT 1984

Number of Firms	Cumulative Percentage Sales by Type of Firm			
	Supermarkets	Importers/ Wholesalers	Grocers	Traffickers
1	69.8	48.2	12.3	17.3
2	82.8	85.7	17.3	33.0
3	88.4	94.1	21.3	44.6
4	93.6	99.1	24.9	55.7
5	97.9	100.0	28.3	64.9
6	100.0		31.6	69.3
7	-	-	34.9	73.3
8	-	-	37.9	77.4
9	-	-	40.9	80.6
10	-	-	43.9	83.6

Table 43. DIFFICULTIES ENCOUNTERED IN ESTABLISHING FIRM  
ST. VINCENT 1984

	Importers/ Wholesalers	Supermarkets	Grocers	Vendors/ Traffickers	Butchers
	-----Number of Responses-----				
CAPITAL	1	1	29	17	6
LABOUR	0	1	6	2	5
SUPPLIES	0	3	21	15	6
PLANT AND EQUIPMENT	0	0	4	5	1

Table 44: DIFFICULTIES ENCOUNTERED IN LEAVING FIRM  
ST. VINCENT 1984

	Importers/ Wholesalers	Supermarkets	Grocers	Vendors/ Traffickers	Butchers
	-----Number of Responses-----				
DISPOSAL PLANT AND EQUIPMENT	0	1	2	0	0
COMPENSATION	0	0	1	1	1
LIQUIDATION COSTS	1	0	0	0	0
ALTERNATIVE INVESTMENT OPPORTUNITIES	1	1	19	10	1
ALTERNATIVE EMPLOYMENT OPPORTUNITIES	2	1	23	20	4

TABLE 45: FAMILIARITY WITH IMPORT AND PRICING POLICIES - ST. VINCENT 1994

METHOD	IMPORTERS/ WHOLESALERS	SUPERMARKETS	GROCCERS/ FOOD SHOPS	VENDORS/ TRAFFICKERS	BUTCHERS
LICENSING ARRANGEMENTS	5	5	32	6	2
DUTIES & TAXES	5	3	12	2	2
PRICE CONTROLS	5	6	42	3	11
SUBSIDIES	2	1	3	1	0

Table 46 : METHOD OF DETERMINATION OF SELLING PRICE BY TYPE OF FIRM - ST. VINCENT 1984

Method	Importers/ Wholesalers	Supermarkets	Grocers/ Food Shops	Vendors Traffickers	Butchers
	-----Number of Responses -----				
Percentage Mark Up	2	5	2	1	0
Follow Control Price	5	8	54	0	14
Consultation	0	1	12	14	0
Follow Lead Firm	1	1	7	16	0
Other	0	1	3	3	0

Table 47 : METHODS OF MEETING COMPETITION - ST. VINCENT 1984

Method	Importers/ Wholesalers	Supermarkets	Grocers/ Food Shops	Vendors Traffickers	Butchers
	-----Number of Responses -----				
Price Reduction	3	5	15	12	3
Product Promotion	3	1	5	1	2
Improved Services	4	3	12	3	3
Other	0	0	3	0	2

### 5.7. Performance

Supermarkets, butchers, grocers and vendors/traffickers felt that there were differences in their products when compared to those of other firms. Over 50% of the distributors were concerned about the nutritional quality and safety of their products and indicated that special services were provided to the poor.

Excess capacity ranged from zero for vendors/traffickers to 1.79% for butchers, 7.5% for grocers, 8% for importers/wholesalers and 15% for supermarkets.

Profits were positive for all distributors on average, but the standard deviations were indicative of losses among some firms - importers/wholesalers, supermarkets and butchers. Average reported profit levels ranged from 2.45% for vendors/traffickers to 3.67% for butchers, 6.59% for grocers, 7.16% for supermarkets and 7.75% for importers/wholesalers. The response to sales quantities and procurement and distribution costs did not allow for an indepth profitability analysis.

### Price Stability

There was a high degree of food price inflation in St. Vincent during the 1969-1981 period, the highest levels being recorded during the 1972-1974 period when 1973 recorded a 21.4% inflation over 1972 and 1974 40% over 1973 (Table 48).

Analysis of price changes for those products which are economical sources of energy and protein from four major food groups - staples, legumes, food from animal and oils and fats (fruits and vegetables were omitted for obvious reasons) showed marked fluctuations in prices over the period 1969-1982. Overall average annual increases were generally high, ranging from 9.5% in the case of chicken back and neck to 22.7% in the case of breadfruit (Table 49). Price increases were also generally lower for imported products, compared to locally-produced products. Fresh fish is under price control while sweet potatoes and breadfruit are not. The

Table 48: PRICE MOVEMENT OF THE FOOD GROUP IN THE RETAIL PRICE INDEX - (1964 = 100) ST. VINCENT 1969-1981

YEAR	JAN	FEB	MAR	APRIL	MAY	JUNE	JULY	AUG.	SEPT	OCT	NOV	DEC	AVERAGE	Average Percentage Increase
1969	117.4	118.3	118.4	118.2	121.2	121.2	120.9	122.0	122.0	121.9	122.2	122.3	120.5	-
1970	122.6	122.6	122.6	122.9	122.9	124.2	127.9	132.0	132.4	132.6	136.9	137.1	128.1	6.3
1971	137.4	137.9	138.5	126.5	130.3	129.2	133.4	132.5	132.9	131.3	133.6	134.4	133.2	4.0
1972	134.1	135.3	137.6	133.9	132.3	139.5	141.0	141.4	143.2	143.2	143.5	143.6	139.1	4.4
1973	143.8	145.0	150.9	151.7	156.6	157.6	167.5	176.1	188.6	193.8	194.6	199.9	168.8	21.4
1974	206.7	212.6	217.8	233.0	234.7	237.3	238.3	242.0	247.7	250.1	253.8	253.7	235.6	40.0
1975	253.6	252.5	253.9	257.3	272.6	273.3	274.7	276.0	276.6	278.6	278.7	282.9	269.2	14.7
1976	286.8	287.4	291.6	291.6	291.3	296.8	298.4	304.6	313.4	319.6	318.9	321.8	301.9	12.2
1977	324.1	318.7	323.9	324.7	325.3	329.2	340.1	341.1	338.9	338.8	339.4	339.7	332.0	10.0
1978	340.4	342.4	341.8	347.0	351.7	352.0	354.6	357.1	360.2	366.5	367.7	371.3	354.4	6.8
1979	376.1	376.2	386.6	388.1	392.7	392.7	396.8	408.6	411.7	414.7	414.3	415.6	397.8	12.3
1980	417.6	429.3	438.8	429.8	438.2	438.4	443.8	447.9	470.9	481.5	509.1	514.7	455.0	14.4
1981	513.2	511.7	496.4	505.1	508.3	495.2	501.1	505.3	504.2	526.0	529.6	528.2	510.4	12.2

TABLE 49: PRICES OF ECONOMICAL SOURCES OF ENERGY AND PROTEIN FOR SELECTED FOOD GROUPS  
ST. VINCENT 1970 - 1982

PRODUCT	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	OVERALL AVERAGE
	----- Cents per pound -----													%
<u>STAPLES</u>														
Flour	17	18	20	20	51	51	55	57	45	50	51	60	60	16.0
Cornmeal	19	22	22	20	42	50	68	68	65	68	85	95	99	17.8
Rice	19	20	21	23	42	56	60	60	64	64	69	85	97	15.0
Sweet Potatoes	07	08	08	08	14	20	20	20	20	25	30	40	70	23.6
Bread-fruit	16	08	08	08	25	06	07	15	12	15	25	20	20	27.7
<u>LEGUMES</u>														
Dry Pigeon Peas	04	02	02	02	06	81	95	1.08	1.25	1.36	1.38	1.43	1.47	13.3
<u>FATS &amp; OILS</u>														
Margarine	75	81	87	98	1.56	1.82	1.71	2.18	2.61	2.80	3.30	3.28	3.27	14.4
Cooking Oil	51	52	53	53	57	73	89	90	1.01	1.25	1.53	1.57	1.79	11.4
<u>FOOD FROM ANIMALS</u>														
Chicken (B & N)	42	46	42	56	68	58	75	67	63	94	87	94	1.03	9.5

TABLE 49 : PRICES OF ECONOMICAL SOURCES OF ENERGY AND PROTEIN FOR SELECTED FOOD GROUPS (CONT'D)  
ST. VINCENT 1970 - 1982

	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	OVERALL AVERAGE
	----- Cents per pound -----													%
<u>FOOD</u>														
<u>FRCM</u>														
<u>ANIMALS</u>														
Salt Beef	85	1.10	1.20	1.20	1.20	2.00	2.25	2.25	2.25	2.80	2.80	3.50	-	12.8
Deep Sea Fish	55	60	70	75	90	90	1.25	1.35	1.40	1.50	2.00	2.00	2.00	12.1
Cod-fish	73	1.10	1.10	1.20	1.70	1.95	1.85	2.52	3.41	3.51	3.11	3.63	4.50	14.1
Condensed Milk	44	45	55	57	76	90	1.12	1.00	1.02	1.05	1.22	1.72	1.73	13.0
Cheese	1.10	1.20	1.15	1.45	2.18	2.60	3.08	3.23	3.23	4.47	4.54	5.88	6.62	14.3

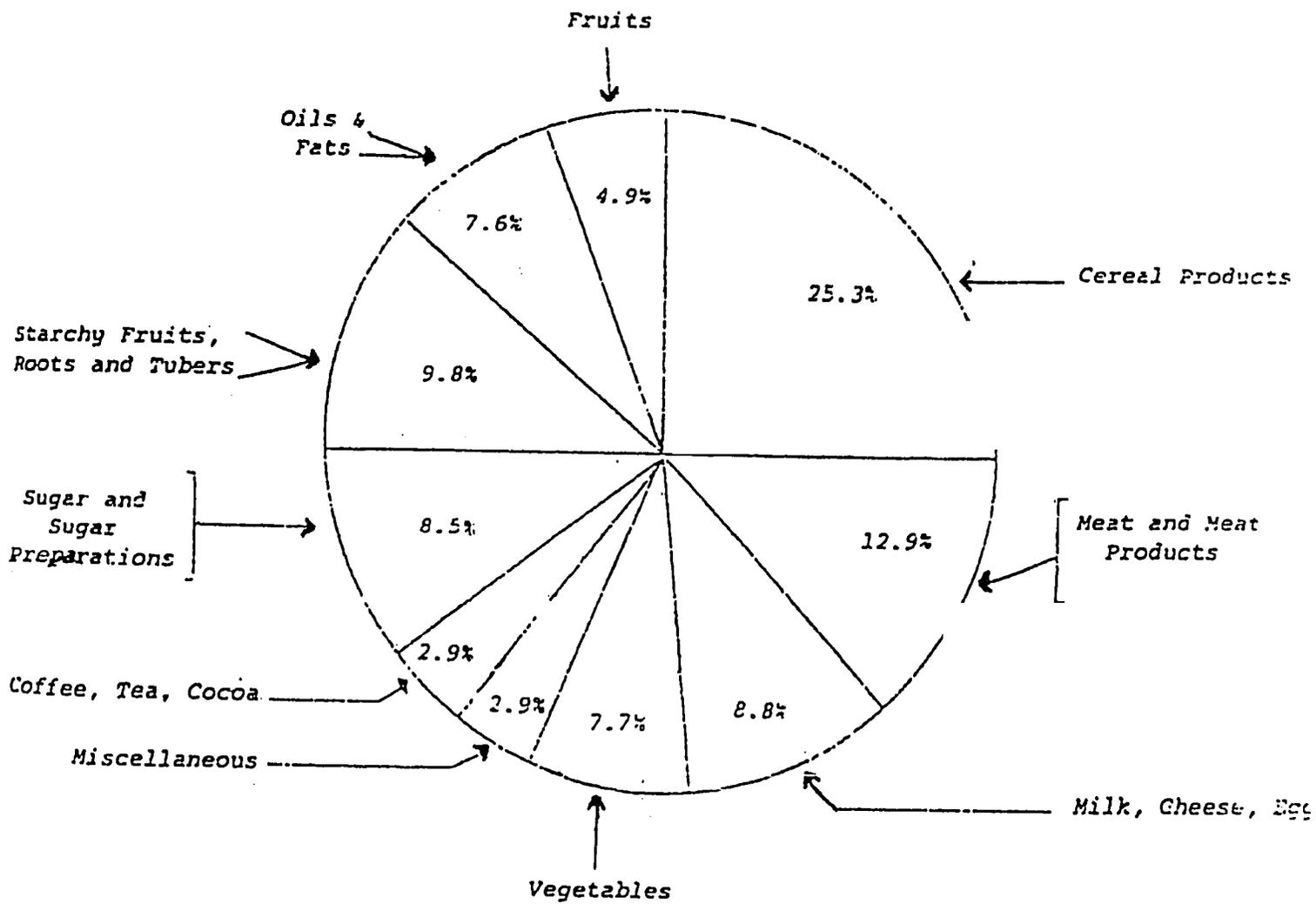


Figure 2 : Allocation of Expenditure to Various Food Groups (1976), St. Vincent

overall average rise in fresh fish price was way below those for sweet potatoes and breadfruit, indicating that the price control strategy did achieve some measure of success. However, the overall level of inflation was way above the 6% established as the criterion for successful price policy.

### Food Consumption Patterns

The Household Consumption Expenditure Survey conducted in 1976 give allocations of expenditure income to various classes of goods and services including food. The average monthly expenditure per household was \$293.16 of which \$175.32 (59.8%) was spent on food. The high proportion of expenditure devoted to food implies that the nutritional status of the population should be quite sensitive to price and income changes.

The greatest proportion of food expenditure was devoted to cereal products; followed by meat and meat products; starchy fruits, roots and tubers; milk, cheese and eggs; sugar and sugar preparations; vegetables; and oils and fats (Figure 2) and so on. Of significance is the high proportion of expenditure devoted to animal products relative to cereals and the low level of expenditure on legumes (possibly included under miscellaneous).

The survey data for this study revealed that wheat and wheat products were the primary sources of energy and second in the protein contribution in the diets of Vincentians (Table 50). The popularity of foods and their contribution to energy and protein intake varied from one group to another but it is clear that only a few foods contribute the majority of protein and energy in the diet (Appendix D.1). The contribution to energy by wheat products was followed by sugar, rice, milk and cooking oil. fish, including jacks, was the main source of protein followed by wheat products. Chicken (wings, back and neck) and milk (Table 50).

Table 50: MOST IMPORTANT FOODS BY ENERGY AND PROTEIN CONSUMED

ST. VINCENT 1984

OVERALL

CODE	FOODSTUFF	ENERGY KG CALORIES X 1000	RANK	PROTEIN X 100 G	RANK
0147	Bread	99.9	1	32.3	1
0301	Sugar	60.5	2	-	-
0121	Rice	33.8	3	5.9	13
1006	Whole Milk	32.4	4	16.7	5
1109	Oil, pure	29.1	5	-	-
0417	Green Peas, Dry	25.6	6	8.3	9
0135	Wheat Flour	19.7	7	6.9	10
0934	Fish	17.4	8	24.1	2
0749	Chicken Wings	16.0	9	20.3	3
1220	Chocolate Drink	15.9	10	3.4	16
1101	Butter	14.0	11	-	-
1106	Margarine	12.9	12	-	-
0612	Orange Juice	12.0	13	-	-
0747	Chicken (W&B)	11.5	14	1.6	20
0801	Eggs	11.1	15	11.9	7
0910	Saltfish	10.6	16	8.8	8
1010	Cheese	9.9	17	16.0	6
1004	Evap. Milk	9.7	18	6.4	12
1001	Cows' Milk	9.7	19	4.9	15
0206	Breadfruit	9.7	19	5.2	14
0932	Jacks	9.5	20	-	-
0706	Beef	-	-	17.6	4
1219	Cocoa Pwdr.	-	-	6.5	11
0422	Pigeon Peas	-	-	2.8	17
1243	'Ovaltine'	-	-	2.4	18
				2.3	19

The dominance of refined carbohydrate and fat in the diet is cause for concern because of the emerging problems of obesity and its associated diseases in the region.

### 5.8. Food Consumption Relationships

When individual protein intake was regressed on per caput household income (Y) and sex of the individual (S), the relationship was not significant. A similar model with individual caloric intake as the dependent variable yielded a significant relationship as shown in the following equation:

$$\text{ICI} = 5570.376 - 1283.684 \text{ S} - 3.592 \text{ Y} \quad (5.8)$$

(593.528)      (1.571)

$$\text{N} = 11 \quad \text{R}^2 = 8.11\% \quad \text{S.E.E.} = 3102.62 \quad \text{F} = 4.764$$

There was an inverse relationship between caloric intake and income resulting in an estimated income elasticity with respect to caloric intake of minus 0.3 at the means (Y = 254.68, ICI = 2805.3). Caloric intake was lower among females than males.

When individual food expenditure (IFE) replaced per caput income in the model, much more significant relationships were obtained for both individual caloric and protein intakes but the significance of sex was reduced (Equations 5.9, 5.10).

$$\text{ICI} = 1623.32 + 1.780 \text{ IFE} - 190.452 \text{ S} + e \quad (5.9)$$

(0.190)      (113.271)

$$\text{N} = 204 \quad \text{R}^2 = 32.70\% \quad \text{S.E.E.} = 786.951 \quad \text{F} = 48.83$$

$$\text{IPI} = 53.440 + 0.085 \text{ IFE} - 6.487 \text{ S} + e \quad (5.10)$$

(0.009)      (5.052)

$$\text{N} = 204 \quad \text{R}^2 = 35.45\% \quad \text{S.E.E.} = 35.096 \quad \text{F} = 55.18$$

The estimated elasticities relating individual food expenditure and intakes were 0.5 for protein and 0.4 for calories at the means (IFE = 520.951, IPI = 88.889, ICI = 2280.63).

The significance of the relationship improved when sex was omitted from the model and a double log specification was used according to the following equations:

$$\text{Log ICI} = 2.043 + 0.481 \log \text{IFE} + e \quad (5.11)$$

(0.043)

$$N = 204 \quad R^2 = 38.28\% \quad \text{S.E.E.} = 0.143 \quad F = 125.31$$

$$\text{Log IPI} = 0.117 + 0.667 \log \text{IFE} + e \quad (5.12)$$

(0.060)

$$N = 204 \quad R^2 = 37.83\% \quad \text{S.E.E.} = 0.201 \quad F = 122.90$$

From this model the observed individual food expenditure elasticity with respect to protein intake was 0.7 and that for caloric intake 0.5.

Relationships linking protein and caloric intakes to family size, sex of head of household, years of secondary education of household head, age, weight and height of the individual, showed only weight as being positively significant for both individual caloric and protein intake. Years of secondary education was inversely related to caloric intake. This may be related to a more sedentary lifestyle practised by the more qualified as well as better meal planning due to increased nutrition knowledge.

Attempts to establish differences among different income categories - low, medium and high, failed to generate significant results.

The varying consumption patterns of different categories of respondents were reflected in their expenditure patterns. The analysis yielded the equations given in Table 51. The double log specification fitted the data best over all categories of respondents except farmers, where an ordinary linear model fitted the data best, and is presented in the table together with the double log specification.

As was expected, the coefficients relating individual caloric intake to expenditure on fruits and vegetables, was not significant for any of the categories of respondents. Fishermen, traffickers and consumers would increase their caloric intake if additional expenditures were made on

Table 51 : REGRESSION RESULTS RELATING CALORIC INTAKE TO EXPENDITURE  
ON VARIOUS FOOD GROUPS AND TOTAL EXPENDITURE -  
ST. VINCENT 1984

HOUSEHOLD CATEGORY	CONSTANT TERM	REGRESSION COEFFICIENTS WITH STANDARD ERRORS IN BRACKETS BELOW						F	R <sup>2</sup>
		STAPLES	LEGUMES	FRUITS/ VEGETABLES	FOOD FROM ANIMALS	FATS & OILS	TOTAL EXPENDITURE		
FARMERS	1186.310	0.042	0.987	0.290	2.529	9.992	0.985	15.61	60.96
(Linear)		(1.236)	(1.360)	(1.049)	(1.110)	(1.665)	(0.641)		
(Log Linear)	2.439	0.041	0.047	0.031	0.204	0.084	0.098	9.57	48.89
		(0.030)	(0.019)	(0.017)	(0.083)	(0.019)	(0.128)		
FISHERMEN	1.910	0.291	0.084	-0.045	0.053	-0.002	0.293	7.90	65.49
		(0.154)	(0.030)	(0.029)	(0.101)	(0.031)	(0.154)		
TRAFFICKERS	1.740	0.223	0.042	-0.001	0.198	0.055	0.235	31.24	94.94
		(0.061)	(0.026)	(.021)	(0.077)	(0.024)	(0.071)		
CONSUMERS	2.243	0.368	0.059	0.007	0.228	0.073	-0.071	6.42	51.02
		(0.122)	(0.031)	(0.024)	(0.086)	(0.031)	(0.154)		
GROCERS	1.969	0.028	0.033	-0.035	0.154	0.028	0.353	7.02	58.42
		(0.047)	(0.030)	(0.031)	(0.073)	(0.636)	(0.151)		

staples but caloric intake by farmers and grocers would remain unaffected by increased expenditures on staples. Grocers caloric intake would not improve with expenditure on legumes but the indications are that other categories would. Only fishermen would not improve caloric intake from additional expenditure on foods from animals, while fishermen and grocers only would not increase caloric intake through expenditures on fats and oils. With respect to total expenditure, fishermen, traffickers and consumers would increase caloric intake through increased food expenditure.

The Linear Expenditure System was also applied to ascertain how consumers allocate food expenditure among food groups including staples, legumes, fruits and vegetables, foods from animals and oils and fats. The results are presented in Table 52.

The results indicate that an additional food expenditure dollar would be allocated to fats and oils (60 cents) food from animals (36 cents), and the rest of the staples.

#### Nutritional Status

In 1967 a survey conducted jointly by the Government and the Caribbean Food and Nutrition Institute (PAHO/WHO) on a random sample of 2,490 children under the age of five years revealed that 25.7% suffered from moderately severe malnutrition, while 1.5% suffered severe syndromes (Table 53).

Antrobus, 1971 found that a sample of newborns had birthweight somewhat lower than average, but from the 6th through the 26th week, the children were in line with the Harvard Scale. Beyond this period, however, there was a steady decline in growth rate, so that by the 48th week, their weights were comparable to the 25th percentile on the Harvard Scale.

TABLE 52: Results of the Linear Expenditure System - St. Vincent

Food Group	Basic Expenditure (C)	Marginal Expenditure Proportion (B)
STAPLES	0.813 (0.573)	0.045 (0.019)
LEGUMES	0.858 (0.133)	-0.009 (0.008)
FRUITS AND VEGETABLES	0.297 (0.088)	0.006 (0.213)
FOOD FROM ANIMALS	0.391 (0.179)	0.362 (0.016)
FATS AND OILS	-13.744 (2.090)	0.595 (.023)

TABLE 53: Weight for Age - 1967 Anthropometric Survey

	Percentage of Standard Weight for Age					Total No. of Children
	91% & Over	81-90%	71-80%	61-70%	60% & Less	
	----- Percentage of Children -----					
0 - 11	50.5	25.5	15.0	6.5	2.5	526
12 - 23	33.5	33.1	21.0	7.4	2.0	538
24 - 35	33.6	41.9	18.4	4.9	1.2	570
36 - 47	38.5	36.8	19.8	4.3	0.6	484
48 - 59	37.1	33.9	33.7	4.8	0.5	372
TOTAL	38.5	34.3	20.0	5.7	1.5	2,490

Source: Gueri, 1979. "Report on Nutritional Status of Young Children, Pregnant and Lactating Women, and Persons 60 Years of Age and Over in a Sample of Evacuation Centres - St. Vincent".

A nutritional status assessment survey of children under five years attending Child Welfare Clinics during 1972-1976 according to the Gomez Classification, showed an increasing percentage of children falling within the normal and above range (> 90%) of the standard weight for age. After dropping to 55% in 1973 from 61.7% in 1972, there was a steady climb to 69.7% in 1976 (Table 54).

TABLE 54: Nutritional Status of Children 0-5 Years Old  
Attending Some Child Welfare Clinics  
St. Vincent, 1972-1976

YEAR	Total		Normal		1°		2°		3°	
	No.	%	No.	%	No.	%	No.	%	No.	%
1972	674	100	416	61.7	94	28.8	56	8.3	8	1.2
1973	922	100	507	55.0	293	31.8	104	11.2	18	2.0
1974	764	100	444	58.1	217	28.4	83	10.9	20	2.6
1975	1,422	100	935	65.8	349	24.5	112	7.9	26	1.8
1976	2,122	100	1,478	69.7	476	22.4	133	6.3	35	1.6

Source: Clinic Records, Ministry of Health.

During this period, mild and severe malnutrition (Gomez I and II) showed a downward trend after an initial increase between 1972 and 1973. However, the downturn in the increase in severe malnutrition (Gomez III) did not begin until 1975 and by 1976 was still well above the 1972 level (Table 54). There appears to have been some improvement in the nutritional status of children under five years of age during the period, though the high level of severe malnutrition remains particularly disturbing. There is evidence to suggest that the nutritional status of clinic attenders are somewhat better than non-attenders. Should this be the case, the picture is worse than is portrayed by the data.

This is in fact supported by data from an assessment of nutritional status of 490 children under five years of age in evacuation centres immediately following the eruption of La Soufriere in 1979. Approximately half (48.4%) of the children were malnourished - a figure well above the highest recorded for the period 1972-1976 (Gueri, 1979) (Table 55). Death rates in the 1-4 year olds showed a moderate decline during 1970-1977. Percentage of deaths in the under 1 year age class declined from 26.4% in 1970 to 22.4% in 1977, while in the class 1-4 years, comparative figures were 9.8 and 8.1 respectively (PAHO/WHO 1980).

No data are available by which to assess the nutritional status of school children. The 1979 data by Gueri for 4-5 year olds indicate a rather high level of malnutrition (57.8%) with severe malnutrition reaching 2.8%. It can be concluded that the problems of protein-energy malnutrition and associated problems will continue among a large segment of the school population. Data from both Antigua and Grenada - countries with a lower prevalence of protein-energy malnutrition in the under fives support this conclusion.

Weight for height data for pregnant and lactating women arising out of nutritional status assessment of persons in a sample evacuation centres by Gueri (1979) revealed that on one end of the scale, overweight to obese ranges accounted for nearly 25% of the women while at the other end, nearly 2% were below 80% of the reference standard of weight for height. The high percentage of pregnant women (3.7%) in this latter category gives cause for serious concern as the probability of low birth weight babies  $< 2500$  g would accordingly be high.

Browne reported that hospital admissions for protein-energy malnutrition reached 206 (102 females and 104 males) during the period January 1974 to June 1976, the majority of the cases being in the 6-17 months age group (Table 56).

TABLE 55: Nutritional Status by Age Group (Gomez Classification)  
St. Vincent, 1979

Age Group (Months)	Normal (W/A 90%)		Grade I Malnutrition (W/A 75-89%)		Grade II Malnutrition (W/A 60-74%)		Grade III Malnutrition (W/A 60%)		TOTAL	
	No.	%	No.	%	No.	%	No.	%	No.	%
0 - 11	93	78.8	17	14.4	6	5.1	2	1.7	118	100.0
12 - 23	36	32.7	50	45.5	20	18.2	4	2.6	110	99.9
24 - 35	51	50.0	41	40.2	9	8.8	1	1.0	102	100.0
36 - 47	48	53.9	33	37.1	8	9.0	-	-	89	100.0
48 - 59	30	42.2	31	43.7	8	11.3	2	2.8	71	100.0

Source: Gueri (1979). "Report on Nutritional Status of Young Children, Pregnant and Lactating Women, and Persons 50 Years of Age and Over in a Sample of Evacuation Centres : St. Vincent".

TABLE 56.: Age Categories of 206 Cases of PEM Admitted to Kingstown General Hospital, St. Vincent January 1974 - June 1976

Type of PEM	----- Age in Months -----					Total
	0-5	6-11	12-17	18-23	24+	
Marasmus	25	68	45	10	8	156
Kwashiokor	7	23	13	5	2	50
TOTAL	32	91	58	15	10	206

Source: Browne - Childhood Malnutrition in St. Vincent: A Sociocultural Review.

From the limited data for pregnant and lactating women it is reasonable to assume that adults (male and female) in households from which they belong would portray similar nutritional characteristics - that is of obesity on the one hand and protein-energy malnutrition on the other. Precise definition of the extent of the problem, however, is not possible. The prevalence of diabetics (1504 attending clinics during July - September 1982) supports problems of obesity, while the data for the elderly (Gueri, 1979) certainly points to the fact that as much as 53.5% of persons 60 years and over had very little energy reserves to cope with a nutritional emergency for a prolonged period as measured by triceps fatfold.

The age-adjusted death rates from Diabetes Mellitus in 1974 was 21 per 100,000 population - the third largest in the Caribbean compared with 7 in the United States and Canada (1975). The comparative rate from hypertension was 80 for St. Vincent and 5 for the United States and Canada. The survey data for this study support evidence of the existence of under-nutrition and over-nutrition in the St. Vincent population.

Because of their ready accessibility, adults dominated the sample with slightly more males than females (Table 57).

TABLE 57: Age and Sex Distribution of the Sample -  
St. Vincent - 1984

Age	Male	Female	Unknown	Total
0-5	7	5	0	12
6-18	33	32	0	65
19-	113	77	3	193
Unknown	2	3	8	13
<b>TOTAL</b>	<b>155</b>	<b>117</b>	<b>11</b>	<b>283</b>

A nutritional assessment based on weight for height revealed a high prevalence of obesity among adults - 25% - particularly among women (44.6%) compared with 14.5% among men. The tendency towards obesity in women starts quite early as females in the 6-18 years category had a prevalence rate of 25.8% compared with their male counterparts of only 6.1% (Table 58).

On the other hand more males showed a tendency towards underweight for their height (18%) in the 6-18 year age group and 6.4% among adult males. The corresponding figures for females were 32% and 41%.

St. Vincent portrays a dual problem of obesity among females and a tendency towards underweight for height among males. The effects of obesity could be quite serious in terms of the associated disease complications. The type of food imported and consumed undoubtedly has some relationship to the problem but the fact that males and females are not affected to the same degree suggest that there are social and behavioural characteristics among the sexes which determine nutritional status outcome. The implications for loss of productivity through obesity or undernutrition cannot be over-emphasized.

An analysis of energy and protein adequacy levels for various categories of respondents revealed a strong tendency towards inadequacy of

energy among all categories. Part might be due to the inability to procure an adequate amount of food or to a conscious effort to deal with the problem of obesity. Only traffickers and grocers showed some tendency towards inadequate protein intakes (Table 59).

TABLE 58: Weight for Height Status of Individuals in Sample -  
St. Vincent - 1984

Age	Sex	80%	90-120%	120%	Unknown
0-5	Male	2	5	0	0
	Female	0	5	0	0
6-18	Male	6	25	2	0
	Female	1	22	8	1
19-	Male	7	87	16	3
	Female	3	41	30	3

Table 59 : ENERGY AND PROTEIN ADEQUACY LEVELS  
ST. VINCENT 1984

	ENERGY			PROTEIN		
	<80%	80-120%	>120%	<80%	80-120%	>120%
FARMERS	15	35	23	2	5	66
FISHERMEN	9	17	7	1	3	29
TRAFFICKERS	9	8	4	1	4	16
CONSUMERS	22	17	9	4	7	37
IMPORTERS/ WHOLESALEERS	2	1	0	0	1	2
SUPERMARKETS	3	2	1	1	1	4
GROCERS	16	17	15	4	7	37
BUTCHERS	5	3	2	0	2	8
OVERALL	81	100	61	13	30	199

## Foreign Exchange

As is easily deduced from Table 60 there was an increasing trade deficit with minor fluctuations during 1960 - 1982. Food exports, however, contributed significantly to the foreign exchange earnings. In the early seventies, food exports lagged behind food imports but were leading generally in the late seventies and early eighties. The agriculture sector cannot be faulted for its contribution to foreign exchange but because of the conflict between food exports and availability of local food, its contribution to total food availability could be improved.

## Exchange Rates

The issue of exchange rates in St. Vincent is different from Antigua. The agricultural sector here dominates the economy and is the chief earner of foreign exchange. The dependence on food imports though quite high is substantially lower than Antigua. Use of the same currency as is the case has different consequences.

The major trading partner for St. Vincent is the United Kingdom which imports bananas (St. Vincent major export crop), and a wide array of vegetables, roots and tubers. The falling value of the pound sterling relative to the US dollar to which the EC\$ is pegged has caused a substantial drop in the earnings from exported bananas. So significant was the fall that Leaders in the Windward Islands (all of which export bananas to the United Kingdom under preference) have initiated negotiations with the U.K. for the establishment of a more stable rate of exchange in the form of a 'Banana Pound' at which trade in bananas would take place.

An alternative option to solving the exchange rate crisis is that of devaluation but St. Vincent is not the only country using the EC\$ and consensus has to be achieved. With a devaluation imported food would become relatively more expensive and local farmers would become more competitive for both export and local markets.

On the other hand, St. Vincent is heavily import dependent for a wide range of goods and services and these would become relatively more expensive and could result in the lowering of the general standard of living.

The rate of inflation in St. Vincent, relative to, for example, the United States, suggest only a small over-valuation of the currency. Within recent times, the pound sterling has been on an upward trend leading to an improvement in the foreign exchange earnings in St. Vincent.

The population of skilled, professional, business and clerical workers relative to known occupations was 11% for farm households, 9% for fishermen, 20% for vendors/traffickers, 32% for food shops, 23% for consumers, 12% for butchers, 54% for supermarkets and 71% for importers/wholesalers (Table 60).

Table 60 OCCUPATIONS BY CATEGORY OF HOUSEHOLDS  
ST. VINCENT 1984

	MANUAL	SKILLED	PROFES- SIONAL	BUSINESS	CLERI- CLERICAL	OTHER SERVICES	STUDENTS	UNKNOWN
FARMERS	105	6	14	5	0	5	92	92
FISHERMEN	61	3	2	4	4	1	66	44
VENDORS/ TRAFFICKERS	39	4	4	16	3	1	66	29
FOOD SHOPS	59	9	11	29	8	1	63	109
CONSUMERS	62	10	14	14	5	3	79	25
BUTCHERS	16	0	1	3	1	0	22	14
S/MARKETS	1	0	2	7	4	0	10	1
IMPORTSRs/ WHOLESALEERS	1	0	2	6	4	0	4	3
TOTAL	344	32	50	84	29	11	402	317

Households of farmers, fishermen and butchers are clearly at a disadvantage with regard to the exchange rate. The low participation of these households in the skilled, professional, business and clerical occupations means that there is no compensating income effects for the low prices received for their products. For these households, a devaluation would be beneficial.

## Results in Relation to Hypotheses and Criteria

The study revealed that while there was a much higher degree of food self-sufficiency in St. Vincent than in Antigua, there were serious shortfalls in cereals, milk and milk products, sugar, legumes, meat, fish and poultry and fats and oils, necessitating substantial food imports. Local production has fluctuated during the period under review - the significant upward trends have been in the export sector.

Food prices have increased dramatically, particularly in the early seventies. Local products have remained uncompetitive to imports. The dependence on export agriculture as the major source of farm income earnings while a somewhat over-valued exchange rate has resulted in low farm incomes.

The cheap food import policy pursued through price controls based on a percentage mark-up, has encouraged the over-consumption of high calorie and protein foods by some segments of the population. The consequences have been a rather high prevalence of obesity and its associated chronic diseases, diabetes and hypertension. Other segments of the population however, are unable to obtain their required nutrients and suffer from undernutrition. A significant number of individuals consumed less than their recommended energy allowance.

The establishment of the St. Vincent Marketing Corporation and its predecessor, the St. Vincent Marketing Board, has increased the competitiveness of the food distributive sector. The export and import roles of the Corporation have enhanced foreign exchange earnings and conservation and stimulated production. It has also played a role in restricting higher inflation through the operations of its retail outlet.

The market margins for products under price control are not consistent with reasonable profit margins and efficiency, thereby restricting investment and expansion in areas where prices are controlled. Marketing arrangements were identified as the major problem in the agriculture sector.

The issue of land availability was identified as being crucial to increased food production. With 44% of the farms under rental or other tenure besides ownership, investments are unlikely to be high. The low acreage planted exemplify the restrictions in land use placed on farmers.

In general, there is evidence to support the hypothesis that the food price and subsidy policies have failed to reduce import dependence, improve farm incomes, stabilize food prices and improve the nutritional status of all segments of the population. Where food availability has been improved, it has been at the expense of local producers. It has also resulted in consumption patterns by some segments of the population which affect adversely their health status.

## Chapter 6

### FOOD AND NUTRITION INTERVENTIONS : CONCLUSIONS AND RECOMMENDATIONS

Food and nutrition are inseparably linked in a circular means/end relationship. Satisfactory nutrition implies adequacy of nutrients availability. Nutrients come from food which is produced. The ability to produce food at the levels required by the population requires good nutrition and health status which enhance productivity. Other inputs such as land, water resources, machinery and chemicals are all important to the food production process but without labour and management resources, the production process would be severely limited.

This inseparability between food and nutrition has sparked an interesting debate among food policy analysts in the context of defining and classifying food and nutrition interventions. The goal of this chapter is not to join this debate but to emphasise the futility in separating the issues, review food and nutrition interventions and to present recommendations for food and nutrition intervention in the light of the results presented in the previous chapter.

#### 6.1. Food and Nutrition Interventions

A wide range of interventions impact on the food and nutrition status. Invariably they all have both positive and negative effects. A rational choice can be made only on the balance of positive versus negative effects. Matters relating to food price and subsidy policies including exchange rates and Government's direct participation in the production and distribution sector have been discussed. Other food and nutrition interventions are discussed.

6.1.1. Food Ration Schemes: Free enterprise economies utilise the price system in the food allocation process. Food ration schemes attempt to allocate the available food equitably among the population or particular groups according to nutritional needs. Problems of malnutrition and obesity

are successfully addressed by such schemes but they are expensive in terms of administrative costs. In times of emergencies or disasters, this approach is particularly effective but some resistance to implement such schemes in the Caribbean during a period of normalcy is anticipated.

6.1.2. Fair Price Shops: Some Governments have established fair price shops in certain depressed areas to enable those communities to have access to low-cost foods. The product line usually consists of basic commodities to which access may be restricted or unrestricted. While such shops make food available to the poor at low cost, consumption of those foods are not guaranteed.

6.1.3. Food Stamps: In order to enable vulnerable groups to attain a satisfactory level of nutrition in an economy in which they are at a disadvantage, food stamps or food coupons have been given with the expectation that food purchases would be supplemented. Aside from high administrative costs, such programmes are likely to be abused. Food firms may exchange the coupons for non-food items or foods of dubious nutritional value.

A food stamp programme that is targeted to needy cases for specific products and where the conversion to cash is restricted, could be effective in improving eating habits and nutritional status. Where the specified products are essentially locally-produced, a stronger demand for these products would be in evidence.

6.1.4. Direct Income Payments: Direct income payments to vulnerable groups have been used to improve the living conditions of individuals or families. There are some nutritional benefits to such schemes but this depends on what portion of the income is devoted to the purchase of food vis-a-vis other consumer items. Food producers have also benefitted from such schemes during times of low product prices.

6.1.5. Supplementary Feeding Programmes: Supplementary feeding is usually targeted to identified vulnerable groups at no cost to the recipients. Programmes in the region focus on pregnant and lactating women and children under five. The types of food distributed - wheat flour, milk and margarine -

are products that are normally consumed within the household and as such represent a supplement to the household. Leakages to other family members are therefore in evidence.

Sometimes supplementary feeding programmes take the form of food-for-work or school feeding programmes. The first provide food in lieu of pay or for part payment and is specific to the participant. Where the food is prepared and served, the participants benefit directly. If the raw materials are given, consumption by the participant is uncertain.

School feeding programmes may be targeted to those in need or generalized. In a generalized system, waste could be high and negative effects, for example, increased obesity, may result.

Supplementation of specific nutrients, e.g., iron and folic acid, is routine for particular groups, e.g., pregnant and lactating women. Vitamin A supplementation has proved to be effective in some communities.

6.1.6. Nutrition Education: Choice of food is deliberate and nutrition knowledge is important in making appropriate food choices. Nutrition education in the school system and in the electronic and print media play an important role in determining food choice. The promotional activities of food firms tend to run counter to the promotion of sound nutritional knowledge. Particular foods are often highlighted in nutrition education programmes and the programme directed to a specific audience - iron, breastfeeding and weaning foods to pregnant and lactating women.

6.1.7. Breastfeeding Promotion: Breastfeeding promotion deserves specific mention. A basic food resource for which there is no substitute is often allowed to waste while many starve and succumb to disease. The aggressive promotion practices of milk firms have created in the minds of many the notion of infant formulae being superior. Obstetric advice, hospital routines and the legal ramifications surrounding the marketing of formulae often go against the widespread use of breastmilk.

6.1.8. Food Fortification: Specific nutrient deficiencies are often addressed through food fortification in which a food commonly used by an at risk group serves as a carrier for this nutrient, e.g., minerals and vitamins in wheat flour. Such programmes are usually low-cost and could be very effective if the appropriate technology is utilized.

6.1.9. Related Programmes: A number of interventions undertaken by the health, environment or public utility sector impinge on food and nutrition. Water, sanitation, immunization and insect vector and rodent control programmes have positive effects on the food and nutrition situation and could be classified as food and nutrition interventions. The list is inexhaustive but should be terminated.

## 6.2. Food and Nutrition Priorities - Antigua

6.2.1. Land Reform: The issue of land reform seems crucial to increasing food production. Lack of ownership and insecurity of tenure militate against sound investment practices. The question of inheritance is also a factor to be considered. Land reform must be given priority in any programme of agricultural development.

6.2.2. Input Subsidies: Water is a critical input in food production in Antigua. The low and variable rainfall coupled with high water costs limit acreage planted and use of other inputs such as fertilizer. A large scale programme to ensure the availability of water and subsidized water rates to bona fide farmers should be high on the list of priorities.

The low level of knowledge and participation in other input subsidy schemes suggest more aggressive information dissemination activities on the part of the agricultural administration.

6.2.3. Import Policy: The competitiveness of imported foods against locally-produced foods gives cause for concern. The foreign competition could be reduced by increasing import duties and taxes on certain food items. Luxury items should be the first to receive consideration for such action.

The dominance of the tourist sector in the economy does not lend support to giving priority to import restrictions but agricultural development

could be enhanced through regulation of import quantities in relation to production increases. This calls for a workable surveillance system to ensure that adequate supplies are available to consumers at all times.

6.2.4. Food Prices: Food prices were generally high and increased during the period under study. Even products that are basic to the diet experienced high levels of inflation. Products under price control did not escape the rapid inflationary trend though their prices were stable for relatively long periods before major increases.

A common system for establishing price controls should be established to replace the dual system of a percentage mark-up for imported foods and a fixed dollar mark-up for locally-produced items. The fixed dollar mark-up is preferred. The Prices Division should be strengthened to monitor prices and prosecute offenders. Alternatively, price controls could be abolished.

6.2.5. Central Marketing Corporation: The position of the Central Marketing Corporation in handling farmers' produce was relatively weak except for a few products. The impact of a policy for direct involvement in the distributive sector could be greater if the corporation competed more directly within the food import sector while maintaining close cooperation with the farm production and distribution sector for local foods. Such a policy would put the Corporation on a stronger financial footing.

6.2.6. Food Supplementation: The problem of obesity on the one hand and protein-energy malnutrition on the other, support the notion of targeted programmes to the needy cases only. To the extent that farmers' productivity is limited by sub-optimum food intake, a Supplementary Feeding Programme to this group might be warranted. The overall responsiveness of caloric and protein intake to individual food expenditure was estimated at 0.5. At the mean of 381 kilocalories per dollar expenditure, this estimate implies that additional food expenditure of 10 cents would increase caloric intake by a mere 19 kilocalories or 190 kilocalories per additional dollar expenditure. Most basic foods consumed in Antigua provide far in excess of 190 calories per dollar thus making a transfer payment less effective than a food

supplement or food coupon for particular foods in increasing caloric intake.

6.2.7. Foreign Exchange and Exchange Rates: The foreign exchange earning position in the agricultural sector is weak and would remain so in the foreseeable future. The strategy adopted should be one of foreign exchange conservation through stopping leakages for the purchase of food and greater self-reliance on local food production. Devaluation would improve farmers competitiveness but a tax on imports along with restrictions might be more effective at this stage. The taxes could be used in subsidy programmes.

6.2.8. Nutrition Education: Nutrition knowledge is fundamental to sound food choices. The high prevalence of obesity points to gross misconceptions regarding nutrient requirements. An education programme at all levels of the society could be effective in lowering the prevalence of obesity as well as protein-energy malnutrition. Implementation of the breastfeeding strategy should be given high priority. The propensity towards high consumption of fat should also be curbed.

### 6.3. Food and Nutrition Priorities: St. Vincent

6.3.1. Land Reform: The results of the study point to land availability being important to increase in food production. The high percentage of rented farm holdings acts as a disincentive to investment. A land reform programme should be given priority in an agricultural development package.

6.3.2. Input Subsidies: Farmers' and fishermen's knowledge of and participation in subsidies were quite low. The better known subsidies among farmers were credit facilities and planting material, while for fishermen only credit was outstanding.

Given the competition by food imports, extension of the input subsidies could be effective in improving agricultural production. Any subsidy scheme should be supported by improved farmer education concerning the scheme and extension education on the appropriate use of subsidized inputs.

6.3.3. Import Policy: The competition from cheap imports would continue to depress demand for locally-produced items. This could be addressed to the imposition of higher duties and taxes. Import restrictions on some food imports could have a positive impact. The peculiar position of St. Vincent in respect of its exports to the United Kingdom suggests that a devaluation of the dollar would have a formidable impact on farm households. Such a policy would have to be weighed carefully against the overall impact on the economy as a whole.

6.3.4. Food Prices: Food prices increased during the period under study - well above the suggested criterion of six percent per annum. The increase in prices among economical food sources was also high and tended to be higher for local products than for imported commodities. Products under price control, e.g., fish, did not show any significant difference from items not under price control as far as inflationary trend is concerned.

The method of a percentage mark-up applied to imports vis-a-vis a fixed dollar price for local products should be rationalized in favour of a fixed dollar price. The abolition of price controls does not appear to be counter productive and should be seriously considered.

6.3.5. St. Vincent Marketing Corporation: There was high concentration among supermarkets, importers/wholesalers and traffickers. There was a high degree of dissatisfaction among farmers in respect of pricing arrangements for their products. The principal problem farmers perceived as limiting agricultural development was the lack of markets and improved guaranteed markets was suggested as the main move for enhancing agricultural development. The St. Vincent Marketing Corporation played a limited role in handling the farmers' produce selected, except peanuts. Closer cooperation needs to be established between the Corporation and the farmers. The retail outlet of the Corporation is effective in moderating prices and further expansion of the import/wholesale activities should enhance its financial position.

6.3.6. Food Supplementation: The nutritional status was characterised by obesity among females and a tendency towards underweight among men based on weight for height measurements. There was evidence of inadequate consumption of both calories and to a less extent protein among households.

The responsiveness of caloric and protein intakes to individual food expenditure was estimated at 0.5% and 0.7% respectively, thus making calorie intake more sensitive than protein intake as food expenditure increases. The responsiveness of calorie intake to food expenditure at 0.5% at the mean of 463 calories per dollar expenditure imply an increase in calorie intake of 236 for an additional dollar expenditure. Barring significant differences in administrative costs, a food supplementation or food coupon programme on particular foods would be more effective than a transfer payment.

6.3.7. Nutrition Education: Like Antigua, a programme of Nutrition Education should be effective in reducing the prevalence of obesity and malnutrition. Implementation of the breastfeeding strategy and particular focus on the ills of excessive fat consumption should help to alleviate these problems.

An education programme aimed at restructuring the consumption pattern among the obese could stimulate local production, in that most local products are higher in fibre and less energy dense than the imported items.

6.3.8. Foreign Exchange and Exchange Rates: The agricultural sector has demonstrated a high foreign exchange earning capacity which could be improved with appropriate incentives including better marketing arrangements for exports. The loss in earnings from the relative decline in the Pound Sterling could be addressed through devaluation. The negotiations would certainly be delicate since devaluation would affect participants in the currency system differently.

7. Methodology and Further Research

The methodology applied to the study was effective in establishing linkages among food production, distribution, food consumption and nutritional status within the context of Government's policy regarding markets, prices and nutrition. Despite this, a number of weaknesses could be identified. Perhaps the most significant limitation was the reluctance of interviewees to provide information. Information on income was particularly limiting as well as procurement and distribution costs of food distributors.

The 24-hour recall was a simple method of estimating food consumption while the inclusion of a price variable allowed the conversion to food expenditure.

Despite the limitations, the study achieved its objectives satisfactorily. The co-efficients relating food imports to prices, food exports, gross domestic product and remittances could be useful in food surveillance activities. The analysis of distribution channels, market structure and conduct point to areas for change in policy. The consumption coefficients could be used in planning effective intervention programmes.

The food and nutrition system is dynamic and as programmes are implemented, coefficients will change. As new data are collected, further analyses would be needed to measure these changes. Having had a broad view of the whole area, smaller indepth studies of particular segments are recommended.

Appendix A

DEMAND AND SUPPLY ANALYSIS

A.1. Demand Analysis

The theory of demand seeks to explain and measure the behaviour of consumers with respect to their choice of goods and services in a market economy. The theory is based on the fundamental notion that choice is deliberate and the chosen set of goods and services serve to maximise welfare given the budget constraint. The problem then is one of allocating income to various goods and services.

The expenditure that consumers make on a commodity at any given time period is dependent on a host of factors. The basic demand function relates the quantity of the commodity purchased and the factors influencing that quantity. Thus,

$$X_i = f(P_i, P_{n-i}, Y) \quad i = 1, 2, \dots, n \quad (1)$$

where  $X_i$  is the quantity of good  $i$  purchased at that time,  $P_i$  is the price of the good  $i$ ,  $P_{n-i}$  are the prices of other goods and  $Y$  represents the income. This function illustrates interrelatedness among the demands for various goods and services. The determination of these relationships is the essence of demand analysis.

The elasticity of demand measures the responsiveness of demand to a change in some causal variable. Thus price elasticity is defined as:

$$e_d = \frac{dX_i}{dP_i} \times \frac{P_i}{X_i} \quad (2)$$

where  $e_d$  is the price elasticity of demand,  $dX_i$  is a small change in the quantity of good  $X_i$  and  $dP_i$  is a small change in the price  $P_i$  if that good. Similarly, the expression:

$$e_y = \frac{dX_i}{dY} \times \frac{Y}{X_i} \quad (3)$$

in which Y refers to income and the notations are as defined in (2), defines the income elasticity of demand. The degree of substitutability between commodities is measured by the cross elasticity of demand as follows:

$$e_{ij} = \frac{dX_i}{dP_j} \times \frac{P_j}{X_i} \quad (4)$$

in which the change in quantity of  $x_i$  is attributed to a change in the price  $P_j$  of another good.

The concept of demand elasticity has been used extensively in describing and measuring demand relationships. An important relationship is that between expenditure and the price elasticity of demand. When price elasticity of demand is greater than 1, expenditure increases with a fall in price. If price elasticity of demand is less than 1, expenditure decreases with a price fall. Expenditure is unchanged if the price elasticity of demand is equal to 1.

The relationship between expenditure and price elasticity of demand could be quantified as follows: The basic price quantity relationship of the demand curve is:

$$Q = Q(P)$$

Expenditure being a quantity X price relationship is given by:

$$E = P \cdot Q \text{ for any price.}$$

From the derivative of expenditure with respect to price, we have:

$$\begin{aligned} \frac{dE}{dP} &= Q + P \frac{dQ}{dP} \\ &= Q \left[ 1 + \frac{P}{Q} \right] \frac{dQ}{dP} \\ &= Q(1 - e_d) \end{aligned}$$

where  $e_d$  is the price elasticity of demand. Thus,

$$dE = Q(1 - e_d) dP.$$

when price falls with  $e_d = 1$  (unitary elastic demand)

$dE = 0$  (no change in expenditure).

with  $e_d \rightarrow 0$  (inelastic demand)

$dE$  is negative and expenditure decreases

with  $e_d \rightarrow \infty$  (elastic demand)

$dE$  is positive and expenditure increases.

when price increases the converse holds for inelastic and elastic demand while unitary elasticity remains the same.

In demand analysis there is no single functional form of a model which is absolutely superior to another and the selection of a particular model rests heavily on the preference and experience of the researcher. All demand models are based on a set of assumptions concerning the nature of the data, whose realism could be revealed only after the application of the model to the data in question. For example, the following functional forms have been used in demand analyses:

(a) The linear function:

$$Q_1 = a + b_1 P_1 + b_2 P_2 + b_3 Y + u$$

where  $Q_1$  is quantity demanded,  $a$  is the constant,  $b_1, \dots, b_3$  are unknown parameters to be estimated,  $P_1$  the price of the commodity  $Q_1$ ,  $P_2$  the price of another related commodity,  $Y$  is disposable income and  $u$  the error term.

(b) The semilogarithmic function:

$$Q_1 = a + b_1 \log P_1 + b_2 \log P_2 + b_3 \log Y + u$$

(c) The double logarithmic function:

$$\log Q_1 = \log A + b_1 \log P_1 + b_2 \log P_2 + b_3 \log Y + u$$

All these functional forms could be estimated using ordinary least squares multiple regression techniques.

Another model which is intuitively appealing is the linear expenditure

model. The linear expenditure model consists of a system of demand equations and has been found to give satisfactory results in the analysis of demand involving the allocation of total income. The model in its stochastic form might be written:

$$E_i = P_i Q_i = C_i P_i + B_i \left( M - \sum_{j=1}^n C_j P_j \right) + U_i$$

$$i = j = 1, 2, \dots, n$$

Here  $P_i$  and  $Q_i$  denote the price and quantity, respectively of the  $i$ th commodity,  $E_i$  refers to the expenditure on the  $i$ th commodity; and  $M$  is the total expenditure on the  $n$  commodities. The  $C_i$ 's and  $B$ 's are unknown parameters which are to be estimated, and  $U_i$  is the error term. The model stipulates that consumers first allocate among the various goods and services certain basic expenditures,  $C_i P_i$ , and then allocate the remaining expenditure income to obtain additional quantities of the various commodities in proportions given by the  $B_i$ 's - the marginal expenditure proportions. The model satisfies the desirable features of demand systems in that: (a) the sum of the direct and cross price elasticities and income elasticities equals zero in price and income; (b) the income elasticities weighted by the expenditure shares sum to unity; (c) the Slutsky condition, which describes the relationship resulting from simultaneous changes in prices and income, is met; and, (d) the model assumes that the income elasticity for each commodity does not have to be equal to 1 (Yoshihara, 1969).

This model could be applied to the food consumption/expenditure data to ascertain how additional food expenditure income would be allocated among, for example, staples, legumes, vegetables, foods from animals, fruits and fats.

#### A.2. Supply Analysis

Supply is governed by the basic function

$$Q_i = f(P_i, P_{n-i}, C_i, C_{n-i}) \quad i = 1, 2, \dots, n$$

where  $Q_i$  represents the quantity of a good  $i$  supplied at a given time,  $P_i$

the price of that good,  $P_{n-1}$  are the prices of other goods that could be produced,  $C_i$  the cost of inputs in the production of that good and  $C_{n-1}$  the costs of inputs in the production of other goods.

Supply elasticity or response is defined in a similar manner to demand, for example,

$$e_s = \frac{dQ_i}{DP_i} \times \frac{P_i}{Q_i}$$

denotes the price elasticity of supply,  $e_s$ . Generally, supply response depends on the mobility of resources in the production process, the cost structure of producing firms, ease of entry and exit of producers and the time dimension. The time variable is of particular importance since production which precedes supply and inventory changes takes time - some production processes requiring rather long time periods.

Costs of inputs is important in determining supply. Quantity supplied and cost of inputs are usually inversely related. Changes in the price of other products affect the supply of a given product, but a relatively long period is necessary to bring about structural changes in production.

Like in demand analysis various functional forms are used in estimating supply responses. The double log model is often used.

TABLE 61. Family Data: Income, Food Consumption Relationships - Antigua 1984

ELEMENT	IMPORTERS/ WHOLESALEERS	SUPERMARKETS	FOOD SHOPS	VENDORS/ TRAFFICKERS	BUTCHERS	FARMERS	FISHERMEN	CONSUMERS
Monthly Household Income	4637.40 (402.47)	2000.00 (1216.30)	1103.40 (147.53)	830.00 (195.68)	1708.60 (570.44)	974.71 (119.91)	1553.30 (346.08)	836.22 (102.87)
Household Energy Requirements	6971.00 (498.18)	564.00 (1216.30)	6000.40 (609.84)	517.00 (1059.70)	7027.90 (1457.70)	7376.20 (705.31)	6261.70 (793.79)	6128.10 (617.17)
Household Protein Requirements	128.40 (8.57)	105.29 (21.02)	118.15 (10.64)	98.48 (18.72)	135.57 (27.28)	143.72 (12.62)	121.62 (14.71)	112.08 (10.75)
Food Cost for Selected Individuals	7.98	13.79 (1.73)	10.01 (1.67)	6.34 (0.39)	8.68 (1.92)	7.54 (.31)	7.32 (.52)	7.7 (0.912)
Individual Caloric Intake	1948.70 (280.97)	2913.90 (331.02)	2591.30 (141.75)	2396.30 (127.28)	2921.40 (334.71)	2907.10 (1.57)	2722.90 (146.19)	2746.80 (142.31)
Individual Protein Intake	96.78 (17.15)	128.27 (13.59)	109.58 (5.39)	100.31 (5.47)	137.37 (25.19)	113.98 (4.52)	134.60 (10.15)	102.98 (6.76)

Source: , Survey Data

TABLE 62: Family Data: Income, Food Consumption Relationships - St. Vincent 1984

ELEMENT	IMPORTERS/ WHOLESALEERS	SUPERMARKETS	FOOD SHOPS	VENDORS TRAFFICKERS	BUTCHERS	FARMERS	FISHERMEN	CONSUMERS
Monthly Household Income	2816.7 (183.33)	1804.00 (467.94)	1036.90 (226.30)	1563.70 (188.36)	1424.30 (573.87)	641.40 (140.34)	1308.40 (251.89)	1235.40 (150.41)
Household Energy Requirements	8716.70 (2166.12)	10,227.00 (1767.10)	9979.80 (1071.80)	13,281.00 (1415.30)	10,282.00 (1680.10)	10,820.00 (783.29)	11,663.00 (1153.80)	11,696.00 (1149.60)
Household Protein Requirements	152.00 (36.24)	184.25 (30.54)	183.85 (18.12)	242.67 (25.59)	182.15 (30.10)	563.65 (28.73)	210.05 (20.36)	210.41 (20.19)
Food Cost for selected Individuals	4.16 (67.1)	4.92 (.95)	5.02 (.51)	6.17 (0.14)	4.83 (.70)	5.66 (0.29)	12.25 (4.32)	5.77 (1.31)
Individual Caloric Intake	1807.20 (144.07)	2003.40 (252.00)	2170.90 (119.42)	1992.60 (187.30)	2422.40 (225.40)	2565.50 (106.30)	2741.10 (187.77)	2057.20 (115.11)
Individual Protein Intake	67.80 (11.40)	81.15 (10.80)	87.16 (6.33)	70.64 (7.33)	103.74 (10.84)	96.72 (4.50)	113.47 (4.43)	77.45 (4.71)

Source: Survey Data

TABLE 63: MOST IMPORTANT FOODS BY LISTINGS . CONSUMED FOR  
VARIOUS GROUPS - ANTIGUA 1984

CODE	FOODSTUFF	OVERALL		FARMERS		FISHERMEN		TRAFFICKERS		CONSUMERS		WHOLESALERS		SUPERMARKETS		GROGERS		BUTCHERS	
		FREQUENCY	RANK	FREQUENCY	RANK	FREQUENCY	RANK	FREQUENCY	RANK	FREQUENCY	RANK	FREQUENCY	RANK	FREQUENCY	RANK	FREQUENCY	RANK	FREQUENCY	RANK
0147	Bread	317	1	87	1	38	1	31	1	65	1	15	2	9	1	53	1	19	1
0301	Sugar	210	2	59	2	23	3	25	4	32	2	17	1	4	6	34	3	16	2
1106	Margarine	165	3	40	5	23	5	31	2	31	3	-	-	4	7	22	6	14	3
0121	Rice	158	4	44	4	27	2	16	5	26	5	7	4	3	12	28	5	7	7
0573	Onion	153	5	30	8	23	4	26	3	24	6	-	-	7	4	31	4	12	4
1004	Evap. Milk	141	6	20	14	14	8	11	7	30	4	4	16	9	2	45	2	8	5
1110	Oil, Olive	103	7	31	7	17	6	10	10	-	-	-	-	-	-	14	11	4	13
0934	Fish	97	8	26	9	15	7	11	6	16	9	5	8	3	11	16	9	5	8
1101	Butter	92	9	45	3	11	12	-	-	-	-	6	7	-	-	19	7	-	-
0801	Eggs	86	10	23	12	8	17	7	15	19	7	5	13	3	16	16	10	5	9
0579	Tomato	84	11	32	6	-	-	-	-	9	15	4	17	-	-	12	19	-	-
1010	Cheese	79	12	16	20	9	14	9	12	17	8	6	6	-	-	18	8	-	-
0749	Chicken Wings	71	13	24	11	12	10	6	16	12	10	-	-	3	15	12	15	-	-
0910	Saltfish	69	14	19	15	11	11	11	8	10	12	-	-	3	14	-	-	-	-
0583	Tomato Ketchup	68	15	-	-	14	9	11	9	-	-	-	-	4	8	-	-	8	6
1001	Cows Milk	56	16	24	10	8	16	-	-	8	19	5	11	-	-	-	-	4	10
0168	Macaroni	56	17	21	13	10	13	-	-	-	-	-	-	-	-	11	20	3	16
0219	Sweet Potato	52	18	18	16	-	-	5	20	-	-	3	19	-	-	12	17	-	-
0516	Carrots	52	19	16	19	-	-	5	19	-	-	-	-	-	-	13	12	-	-
1235	Soft Drinks	49	20	-	-	-	-	8	13	9	13	-	-	3	10	-	-	-	-
0105	Cornmeal	-	-	16	18	-	-	9	11	-	-	-	-	3	13	-	-	4	11
0742	Sausage	-	-	17	17	-	-	-	-	12	11	-	-	-	-	-	-	3	20

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TABLE 63 : MOST IMPORTANT FOODS BY LISTINGS CONSUMED FOR  
VARIOUS GROUPS - ANTIGUA 1984 (CONT'D.)

CODE	FOODSTUFF	OVERALL		FARMERS		FISHERMEN		TRAFFICKERS		CONSUMERS		WHOLESALEERS		SUPERMARKETS		GROCERS		BUTCHERS	
		FREQUENCY	RANK	FREQUENCY	RANK	FREQUENCY	RANK	FREQUENCY	RANK	FREQUENCY	RANK	FREQUENCY	RANK	FREQUENCY	RANK	FREQUENCY	RANK	FREQUENCY	RANK
0706	Beef	-	-	-	-	8	15	8	14	-	-	6	5	-	-	12	18	3	14
1109	Oil, pure	-	-	-	-	7	18	-	-	-	-	-	-	-	-	13	13	-	-
0135	Wheat Flour	-	-	-	-	6	19	5	18	8	20	-	-	-	-	-	-	-	-
0214	Irish Potato	-	-	-	-	6	20	-	-	-	-	4	14	4	5	-	-	-	-
0747	Chicken (WSB)	-	-	-	-	-	-	5	17	-	-	-	-	-	-	-	-	-	-
0559	Egg Plant	-	-	-	-	-	-	-	-	9	14	-	-	2	20	-	-	-	-
0302	Sugar, Gran.	-	-	-	-	-	-	-	-	9	16	-	-	-	-	-	-	-	-
1236	Soft Drink (Cola)	-	-	-	-	-	-	-	-	8	17	-	-	2	19	-	-	-	-
0608	Lime Juice	-	-	-	-	-	-	-	-	8	18	-	-	-	-	-	-	-	-
1224	Coffee (Brewed)	-	-	-	-	-	-	-	-	-	-	11	3	-	-	-	-	-	-
0530	Mixed Veget- ables	-	-	-	-	-	-	-	-	-	-	5	9	-	-	-	-	-	-
0612	Orange Juice	-	-	-	-	-	-	-	-	-	-	5	10	-	-	12	16	-	-
0515	Cabbage	-	-	-	-	-	-	-	-	-	-	5	12	-	-	-	-	-	-
0505	Beans, Fresh	-	-	-	-	-	-	-	-	-	-	4	15	-	-	-	-	-	-
0577	Squash, Bash	-	-	-	-	-	-	-	-	-	-	3	18	-	-	-	-	-	-
0204	Banana (Ripe)	-	-	-	-	-	-	-	-	-	-	3	20	-	-	-	-	-	-
1109	Oil, Pure	-	-	-	-	-	-	-	-	-	-	-	-	7	3	-	-	-	-
0613	Juice, Frozen	-	-	-	-	-	-	-	-	-	-	-	-	3	9	-	-	-	-
0557	Cucumber, Fresh	-	-	-	-	-	-	-	-	-	-	-	-	3	17	-	-	-	-
1244	'Ovaltine'	-	-	-	-	-	-	-	-	-	-	-	-	3	18	-	-	3	19
1243	'Milo'	-	-	-	-	-	-	-	-	-	-	-	-	-	-	13	14	-	-

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TABLE 63 MOST IMPORTANT FOODS BY LISTINGS CONSUMED FOR  
 VARIOUS GROUPS - ANTIGUA 1984 (CONT'D.)

CODE	FOODSTUFF	OVERALL		FARMERS		FISHERMEN		TRAFFICKERS		CONSUMERS		WHOLESALERS		SUPERMARKETS		GROCERS		BUTCHERS	
		FREQUENCY	RANK	FREQUENCY	RANK	FREQUENCY	RANK	FREQUENCY	RANK	FREQUENCY	RANK	FREQUENCY	RANK	FREQUENCY	RANK	FREQUENCY	RANK	FREQUENCY	RANK
0411	Red Beans, Dry	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
0746	Chicken (Drumstick)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	12
0212	Plaintain, Ripe	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	15
0702	Beef, Medium	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	17
																		3	18

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TABLE 63 : MOST IMPORTANT FOODS BY QUANTITIES CONSUMED FOR  
VARIOUS GROUPS - ANTIGUA 1984

CODE	FOODSTUFF	OVERALL		FARMERS		FISHERMEN		TRAFFICKERS		CONSUMERS		WHOLESALERS		SUPERMARKETS		GROCERS		BUTCHERS	
		OZS	RANK	OZS.	RANK	OZS	RANK	OZS.	RANK	OZS.	RANK	OZS.	RANK	OZS.	RANK	OZS.	RANK	OZS.	RANK
0147	Bread	1538	1	438	1	204	1	161	1	302	1	56	1	43	1	232	1	102	1
0934	Fish	954	2	253	3	170	3	90	3	163	2	49	2	28	4	121	4	80	2
0121	Rice	902	3	263	2	182	2	84	4	129	3	32	3	24	6	140	3	48	
1235	Soft Drinks	558	4	162	5	54	6	100	2	102	5	-	-	30	3	90	6	-	-
1004	Evap. Milk	545	5	92	11	49	8	43	7	108	4	-	-	27	5	190	2	26	8
0749	Chicken Wings	490	6	152	6	107	4	38	8	73	9	-	-	16	11	92	5	-	-
1001	Cows Milk	454	7	210	4	40	11	-	-	54	12	14	14	-	-	-	-	49	3
0301	Sugar	398	8	132	7	47	10	44	6	56	11	23	5	-	-	61	12	28	7
0135	Wheat Flour	291	9	120	9	38	12	27	14	53	13	-	-	10	19	-	-	16	15
0910	Saltfish	290	10	78	15	49	9	36	9	43	16	-	-	18	10	52	14	-	-
0168	Macaroni	272	11	90	12	53	7	-	-	-	-	-	-	-	-	63	10	20	12
0219	Sw. Potato	272	12	122	8	-	-	-	-	-	-	-	-	-	-	67	9	-	-
0105	Cornmeal	268	13	90	13	-	-	52	5	43	18	-	-	20	8	-	-	22	10
0801	Eggs	247	14	76	16	28	17	-	-	51	14	12	16	10	18	40	18	14	20
0706	Beef	242	15	-	-	61	5	34	10	-	-	24	4	-	-	54	13	24	9
0214	Irish Potato	234	16	68	18	28	18	-	-	-	-	16	9	20	7	63	11	16	14
0612	Orange Juice	222	17	-	-	32	15	-	-	46	15	18	7	-	-	86	7	-	-
1106	Margarine	220	18	-	-	-	-	32	12	73	8	-	-	-	-	-	-	14	18
1228	Beer	219	19	-	-	30	16	-	-	89	7	-	-	10	20	-	-	40	5
0579	Tomato	-		115	10	-	-	-	-	-	-	-	-	-	-	-	-	-	-
0747	Chicken(W&B)	-		84	14	28	20	34	11	-	-	-	-	-	-	-	-	-	-
0118	CSM	-		58	19	-	-	-	-	-	-	-	-	-	-	-	-	-	-
0744	Chicken(Whole)	-		58	20	34	14	-	-	-	-	-	-	-	-	36	-	-	-

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TABLE 63: MOST IMPORTANT FOODS BY QUANTITIES CONSUMED FOR  
VARIOUS GROUPS - ANTIGUA 1984 (CONT'D)

CODE	FOODSTUFF	OVERALL		FARMERS		FISHERMEN		TRAFFICKERS		CONSUMERS		WHOLESALEERS		SUPERMARKETS		GROCERS		BUTCHERS	
		OZS	RANK	OZS	RANK	OZS	RANK	OZS	RANK	OZS	RANK	OZS	RANK	OZS	RANK	OZS	RANK	OZS	RANK
1236	Soft Drink (Cola)	-	-	75	17	-	-	24	15	102	6	-	-	20	9	-	-	-	-
0573	Onion	-	-	-	-	37	13	27	13	39	20	-	-	11	17	-	-	14	19
1006	Milk Powder	-	-	-	-	28	19	-	-	-	-	-	-	-	-	-	-	-	-
0659	Pawpaw	-	-	-	-	-	-	23	16	-	-	-	-	-	-	-	-	-	-
0204	Banana (Ripe)	-	-	-	-	-	-	21	17	-	-	-	-	-	-	-	-	-	-
0203	Banana (Green)	-	-	-	-	-	-	18	19	-	-	-	-	14	13	-	-	-	-
0516	Carrot (Fresh, raw)	-	-	-	-	-	-	18	18	-	-	-	-	-	-	-	-	-	-
1010	Cheese, Whole milk (Cheddar, Blue)	-	-	-	-	-	-	17	20	-	-	14	13	-	-	44	15	-	-
0608	Lime Juice	-	-	-	-	-	-	-	-	66	10	-	-	-	-	-	-	-	-
0559	Egg Plant	-	-	-	-	-	-	-	-	43	17	-	-	16	12	-	-	-	-
0746	Chicken (Drumstick)	-	-	-	-	-	-	-	-	43	19	12	17	-	-	41	17	20	11
0530	Mixed Veggies. (Frozen)	-	-	-	-	-	-	-	-	-	-	22	6	-	-	-	-	-	-
1224	Coffee (Brewed w/out sugar)	-	-	-	-	-	-	-	-	-	-	16	8	-	-	-	-	-	-
0610	Oranges (All varieties, peeled)	-	-	-	-	-	-	-	-	-	-	16	10	-	-	-	-	-	-
0956	Snapper	-	-	-	-	-	-	-	-	-	-	16	11	-	-	-	-	-	-

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TABLE 63: MOST IMPORTANT FOODS BY QUANTITIES CONSUMED FOR  
VARIOUS GROUPS - ANTIGUA 1984 (CONT'D.)

CODE	FOODSTUFF	OVERALL		FARMERS		FISHERMEN		TRAFFICKERS		CONSUMERS		WHOLESALEERS		SUPERMARKETS		GROCERS		BUTCHERS	
		OZS	RANK	OZS	RANK	OZS	RANK	OZS	RANK	OZS	RANK	OZS	RANK	OZS	RANK	OZS	RANK	OZS	RANK
0446	Coconut water	-	-	-	-	-	-	-	-	-	-	15	12	-	-	-	-	-	-
0515	Cabbage, common	-	-	-	-	-	-	-	-	-	-	12	15	-	-	35	20	-	-
0986	Snail (Fresh water)	-	-	-	-	-	-	-	-	-	-	12	18	-	-	-	-	-	-
0724	Mutton & Lamb (Medium Fat)	-	-	-	-	-	-	-	-	-	-	12	19	-	-	-	-	-	-
0505	Beans (Fresh raw)	-	-	-	-	-	-	-	-	-	-	11	20	-	-	-	-	-	-
0613	Orange Juice frozen, con- centrate etc)	-	-	-	-	-	-	-	-	-	-	-	-	40	2	-	-	-	-
0611	Orange Juice, Fresh	-	-	-	-	-	-	-	-	-	-	-	-	14	14	-	-	-	-
1109	Oil, pure	-	-	-	-	-	-	-	-	-	-	-	-	12	15	-	-	-	-
0411	Red Beans, Dry	-	-	-	-	-	-	-	-	-	-	-	-	12	16	-	-	-	-
1227	Malt Drink	-	-	-	-	-	-	-	-	-	-	-	-	77	8	-	-	-	-
0162	Crackers, soda	-	-	-	-	-	-	-	-	-	-	-	-	-	-	42	16	-	-
0207	Cassava Fresh root)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	32	6
0212	Plantain, Ripe	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	16	13
0924	Grouper	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	16	16
0702	Beef (Medium)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	15	17

TABLE 64: MOST IMPORTANT FOODS BY LISTINGS CONSUMED FOR  
VARIOUS GROUPS - St. VINCENT 1984

CODE	FOODSTUFF	OVERALL		FARMERS		FISHERMEN		TRAFFICKERS		CONSUMERS		WHOLESALERS		SUPERMARKETS		GROCCERS		BUTCHERS	
		Frequency	RANK	Frequency	RANK	Frequency	RANK	Frequency	RANK	Frequency	RANK	Frequency	RANK	Frequency	RANK	Frequency	RANK	Frequency	RANK
0147	Bread	355	2	85	2	40	2	33	2	80	1	10	1	10	1	76	2	21	1
0301	Sugar	411	1	108	1	53	1	46	1	77	2	6	3	10	2	91	1	20	2
0121	Rice	168	3	44	4	23	4	20	3	35	3	2	9	4	4	32	3	8	4
1001	Cows Milk	127	4	35	6	11	12	20	4	11	17	6	2	7	3	31	4	6	8
1109	Oil, Pure	112	5	28	10	26	3	13	6	14	11	-	-	-	-	22	5	8	5
0801	Eggs	101	6	33	8	15	8	5	16	17	8	3	5	-	-	21	6	6	9
0612	Orange Juice	96	7	31	9	17	7	5	12	18	6	2	8	1	20	20	8	-	-
1004	Evap. Milk	96	8	34	7	-	-	-	-	31	4	-	-	2	14	21	7	-	-
1006	Whole Milk	96	9	44	5	13	9	-	-	13	13	3	7	-	-	14	14	5	12
0417	Green Peas, Dry	92	10	50	3	22	5	-	-	-	-	-	-	-	-	19	9	-	-
0749	Chicken Wings	82	11	19	17	9	14	15	5	15	10	1	15	3	8	16	12	4	15
1220	Chocolate Drink	77	12	21	15	-	-	-	-	21	5	-	-	-	-	12	19	3	19
0934	Fish	71	13	-	-	9	13	5	13	12	15	1	19	4	5	17	10	9	3
0206	Breadfruit	70	14	22	14	11	11	7	9	12	14	-	-	-	-	14	13	3	17
0932	Jacks	68	15	18	20	20	6	-	-	13	12	-	-	-	-	-	-	4	13
1106	Margarine	57	16	25	12	-	-	-	-	12	16	-	-	-	-	13	16	-	-
0210	Coco, Dasheen	56	17	26	11	-	-	6	11	10	18	-	-	-	-	-	-	-	-
1224	Coffee, Brewed	53	18	-	-	-	-	10	7	-	-	-	-	-	-	13	15	6	10
0910	Saltfish	52	19	-	-	7	18	-	-	18	7	-	-	-	-	-	-	-	-
1219	Cacao Pwdr.	52	20	20	16	-	-	-	-	-	-	-	-	2	17	-	-	-	-
0747	Chicken (W&B)	-	-	23	13	-	-	-	-	-	-	-	-	-	-	-	-	-	-
0422	Whole Seeds	-	-	19	18	7	20	5	15	10	19	-	-	-	-	-	-	-	-

TABLE 64: MOST IMPORTANT FOODS BY LISTINGS CONSUMED FOR  
VARIOUS GROUPS - ST. VINCENT 1984 (CONT'D.)

CODE	FOODSTUFF	OVERALL		FARMERS		FISHERMEN		TRAFFICKERS		CONSUMERS		WHOLESALERS		SUPERMARKETS		GROCERS		BUTCHERS	
		FREQUENCY	RANK	FREQUENCY	RANK	FREQUENCY	RANK	FREQUENCY	RANK	FREQUENCY	RANK	FREQUENCY	RANK	FREQUENCY	RANK	FREQUENCY	RANK	FREQUENCY	RANK
0221	Yar, Yampie	-	-	18	19	-	-	-	-	-	-	-	-	-	-	-	-	-	-
101	Butter	-	-	-	-	12	10	-	-	-	-	-	-	-	-	-	-	-	-
0135	Wheat Flour	-	-	-	-	9	15	-	-	9	20	-	-	3	10	-	-	8	6
0005	Milk, Condensed	-	-	-	-	9	16	-	-	-	-	-	-	3	7	12	18	-	-
0653	Ripe Mango	-	-	-	-	7	17	9	8	-	-	-	-	-	-	-	-	-	-
0905	Fish, Bonito	-	-	-	-	7	19	-	-	-	-	1	12	3	6	-	-	5	11
0611	Orange Juice, Fresh	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
0224	Yautia, Tannia	-	-	-	-	-	-	6	10	-	-	-	-	-	-	-	-	-	-
010	Cheese	-	-	-	-	-	-	5	14	-	-	-	-	-	-	11	20	6	7
0516	Carrots	-	-	-	-	-	-	5	17	-	-	-	-	-	-	-	-	-	-
0932	Jacks	-	-	-	-	-	-	5	18	-	-	-	-	2	15	-	-	-	-
0214	Irish Potato	-	-	-	-	-	-	4	19	-	-	-	-	-	-	-	-	-	-
0608	Lime Juice	-	-	-	-	-	-	4	20	-	-	1	14	2	12	-	-	4	16
0204	Banana (Ripe)	-	-	-	-	-	-	-	-	15	9	-	-	-	-	-	-	-	-
0579	Tomato	-	-	-	-	-	-	-	-	-	-	3	4	-	-	12	17	-	-
0706	Beef	-	-	-	-	-	-	-	-	-	-	3	6	-	-	-	-	-	-
0557	Cucumber, Fresh	-	-	-	-	-	-	-	-	-	-	2	10	-	-	-	-	4	14
0744	Chicken (Whole)	-	-	-	-	-	-	-	-	-	-	2	11	-	-	-	-	-	-
0722	Mutton & Lamb	-	-	-	-	-	-	-	-	-	-	1	13	-	-	-	-	-	-
0635	Fruit Cocktail	-	-	-	-	-	-	-	-	-	-	1	16	-	-	-	-	-	-
0606	Beans, Canned	-	-	-	-	-	-	-	-	-	-	1	17	-	-	-	-	-	-
0742	Sausage, Links	-	-	-	-	-	-	-	-	-	-	1	18	-	-	-	-	-	-
														1	20				

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TABLE 64: MOST IMPORTANT FOODS BY LISTINGS - CONSUMED FOR  
VARIOUS GROUPS - ST. VINCENT 1984 (CONT'D.)

CODE	FOODSTUFF	OVERALL		FARMERS		FISHERMEN		TRAFFICKERS		CONSUMERS		WHOLESALERS		SUPERMARKETS		GROCERS		BUTCHERS	
		FREQUENCY	RANK	FREQUENCY	RANK	FREQUENCY	RANK	FREQUENCY	RANK	FREQUENCY	RANK	FREQUENCY	RANK	FREQUENCY	RANK	FREQUENCY	RANK	FREQUENCY	RANK
1110	Oil, Olive	-	-	-	-	-	-	-	-	-	-	-	-	3	9	-	-	-	-
0219	Sweet Potato	-	-	-	-	-	-	-	-	-	-	-	-	2	11	-	-	-	-
0710	Beef, Canned	-	-	-	-	-	-	-	-	-	-	-	-	2	13	-	-	-	-
1244	'Ovaltine'	-	-	-	-	-	-	-	-	-	-	-	-	2	16	-	-	-	-
1225	Tea, Instant	-	-	-	-	-	-	-	-	-	-	-	-	2	18	-	-	-	-
0433	Peanut Butter	-	-	-	-	-	-	-	-	-	-	-	-	2	19	-	-	-	-
1243	'Milo'	-	-	-	-	-	-	-	-	-	-	-	-	-	-	17	10	-	-
0915	Dolhipn	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	18
1236	Soft Drink (Cola)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	20

TABLE 64. MOST IMPORTANT FOODS BY QUANTITIES CONSUMED FOR  
VARIOUS GROUPS - ST. VINCENT 1984

CODE	FOODSTUFF	OVERALL		FARMERS		FISHERMEN		TRAFFICKERS		CONSUMERS		WHOLESALERS		SUPERMARKETS		GROCERS		BUTCHERS	
		OZS.	RANK	OZS.	RANK	OZS.	RANK	OZS.	RANK	OZS.	RANK	OZS.	RANK	OZS.	RANK	OZS.	RANK	OZS.	RANK
0147	Bread	1310	1	333	1	176	2	93	2	307	1	34	1	33	2	243	1	90	1
0121	Rice	946	2	224	3	183	1	114	1	189	2	7	7	23	3	160	2	46	3
0612	Orange Juice	813	3	226	2	120	4	32	10	145	3	19	3	10	10	147	3	14	15
0301	Sugar	572	4	172	6	80	6	55	7	99	5	6	8	11	9	126	5	23	7
1001	Cows Milk	525	5	187	4	33	17	57	6	27	19	25	2	41	1	129	4	26	6
0206	Breadfruit	415	6	103	10	69	8	44	9	76	6	-	-	-	-	103	6	16	13
0749	Chicken Wings	386	7	94	12	56	10	58	5	61	8	3	15	16	8	78	8	20	10
0934	Fish	386	8	72	16	71	7	25	12	58	9	2	19	17	6	95	7	46	2
0417	Green Peas, Dry	335	9	173	5	98	5	-	-	-	-	-	-	-	-	61	9	-	-
0932	Jacks	310	10	58	20	139	3	13	18	41	12	-	-	-	-	37	18	22	8
0653	Ripe Mango	307	11	-	-	51	11	91	3	34	15	9	5	22	4	-	-	33	5
0608	Lime Juice	303	12	79	14	45	12	-	-	145	4	-	-	10	11	-	-	-	-
0747	Chicken (W&B)	263	13	148	7	33	18	18	14	33	16	-	-	-	-	-	-	-	-
1004	Evap. Milk	248	14	97	11	-	-	-	-	74	7	-	-	5	17	49	11	-	-
0210	Coco, Dasheen, Taro	246	15	106	9	-	-	21	13	49	10	-	-	-	-	47	13	-	-
0801	Eggs	240	16	87	13	31	20	10	20	34	13	8	6	-	-	52	10	16	11
1006	Whole Milk	226	17	120	8	-	-	-	-	-	-	3	13	-	-	39	17	-	-
0135	Wheat Flour	191	18	-	-	31	13	-	-	34	14	-	-	16	7	43	15	-	-
0204	Banana (Ripe)	188	19	-	-	32	19	-	-	-	-	12	4	-	-	48	12	11	18
1235	Soft Drinks	180	20	72	17	58	9	-	-	-	-	-	-	-	-	-	-	-	-
0422	Whole Seeds	-	-	71	18	-	-	11	19	-	-	-	-	-	-	-	-	-	-

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TABLE 64. MOST IMPORTANT FOODS BY QUANTITIES CONSUMED FOR  
VARIOUS GROUPS - ST. VINCENT 1984 (CONT'D.)

CODE	FOODSTUFF	OVERALL		FARMERS		FISHERMEN		TRAFFICKERS		CONSUMERS		WHOLESALERS		SUPERMARKETS		GROCERS		BUTCHERS	
		OZS	RANK	OZS	RANK	OZS	RANK	OZS	RANK	OZS	RANK	OZS	RANK	OZS	RANK	OZS	RANK	OZS	RANK
0635	Fruit Cocktail	-	-	-	-	-	-	-	-	-	-	3	17	-	-	-	-	-	-
0506	Vegetables, Canned	-	-	-	-	-	-	-	-	-	-	3	18	-	-	-	-	-	-
0742	Sausage, links	-	-	-	-	-	-	-	-	-	-	2	20	-	-	-	-	-	-
0219	Potato, Sweet, pale variety	-	-	-	-	-	-	-	-	-	-	-	-	18	5	-	-	-	-
0118	CSM	-	-	-	-	-	-	-	-	-	-	-	-	8	12	-	-	-	-
0710	Beef, Canned	-	-	-	-	-	-	-	-	-	-	-	-	6	14	-	-	-	-
0207	Cassava, Fresh root	-	-	-	-	-	-	-	-	-	-	-	-	6	16	-	-	-	-
0515	Carrot, Fresh	-	-	-	-	-	-	-	-	-	-	-	-	5	18	-	-	-	-
0105	Cornmeal	-	-	-	-	-	-	-	-	-	-	-	-	5	19	-	-	-	-
1110	Olive Oil	-	-	-	-	-	-	-	-	-	-	-	-	4	20	-	-	-	-
0610	Oranges, all varieties	-	-	-	-	-	-	-	-	-	-	-	-	-	-	45	14	-	-
1010	Cheese, (Whole milk, Cheddar)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	34	19	-	-
0915	Dolphin	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	12	16
0530	Mixed Veget- ables	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10	20

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TABLE 64: MOST IMPORTANT FOODS BY QUANTITIES CONSUMED FOR  
VARIOUS GROUPS - ST. VINCENT 1984 (CONT'D.)

CODE	FOODSTUFF	OVERALL		FARMERS		FISHERMEN		TRAFFICKERS		CONSUMERS		WHOLESALERS		SUPERMARKETS		GROCERS		BUTCHERS	
		OZS	RANK	OZS	RANK	OZS	RANK	OZS	RANK	OZS	RANK	OZS	RANK	OZS	RANK	OZS	RANK	OZS	RANK
0651	Malacca Apple	-	-	74	15	-	-	-	-	-	-	-	-	-	-	-	-	-	-
0221	Yam, Yampie Fresh	-	-	69	19	35	14	-	-	27	20	-	-	-	-	-	-	-	-
0203	Banana, Green	-	-	-	-	34	15	-	-	-	-	-	-	-	-	34	20	10	19
0446	Coconut, Water	-	-	-	-	34	16	-	-	-	-	-	-	-	-	-	-	-	-
1228	Beer, Stout	-	-	-	-	-	-	80	4	-	-	-	-	-	-	-	-	-	-
0611	Orange Juice, Fresh	-	-	-	-	-	-	51	8	-	-	-	-	-	-	-	-	-	-
1224	Coffee, (Brewed w/out sugar)	-	-	-	-	-	-	25	11	-	-	-	-	-	-	-	-	11	17
1236	Soft Drink (Cola)	-	-	-	-	-	-	18	15	-	-	-	-	-	-	-	-	16	14
0224	Yautia, Tannia	-	-	-	-	-	-	15	16	28	18	-	-	-	-	43	16	34	4
1109	Oil, Pure	-	-	-	-	-	-	14	17	-	-	-	-	-	-	-	-	-	-
0910	Saltfish	-	-	-	-	-	-	-	-	42	11	-	-	-	-	-	-	-	-
1220	Chocolate Drink	-	-	-	-	-	-	-	-	32	17	-	-	-	-	-	-	-	-
0579	Tomato	-	-	-	-	-	-	-	-	-	-	5	9	-	-	-	-	-	-
0706	Beef	-	-	-	-	-	-	-	-	-	-	5	10	6	15	-	-	20	9
0744	Chicken (whole)	-	-	-	-	-	-	-	-	-	-	5	11	-	-	-	-	-	-
0214	Irish Potato	-	-	-	-	-	-	-	-	-	-	4	12	6	13	-	-	16	12
0557	Cucumber, Fresh	-	-	-	-	-	-	-	-	-	-	3	14	-	-	-	-	-	-
0722	Mutton & Lamb, Fat	-	-	-	-	-	-	-	-	-	-	3	16	-	-	-	-	-	-

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