A PUBLIC SECTOR STRATEGY FOR PROVIDING AN ADEQUATE FOOD AND NUTRITION IN NIGERIA.

BY

MICHAEL OLUFEMI OJO
B.Sc. (Econ) (Ibadan); M.Sc. (WISCONSIN)

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CERTIFICATION

This is to certify that this work was carried out by Mr. M. O. Ojo at the Department of Economics, University of Lagos, Lagos.

1987

Author

Supervisor

Internal Examiner

Internal Examiner

External Examiner

Head of Dept. & Chairman

A B S T R A C T

The main purpose of the study was to develop a systematic approach for analysing food and nutrition problems in Nigeria, with a view to providing a suitable framework of public sector policies to ensure adequate food and nutrition in the country. Food balance sheets were compiled from national and regional data for the period 1961 - 1982, while food gaps were computed from estimated food supply and demand.

The study revealed in the aggregate analysis that per capita calories derived from available food supply in the country were below the minimum requirements for the greater part of the period, while per capita protein supply fell short of minimum requirements throughout the period. When compared with potential demand, available food supply recorded shortfalls for most of the period. Available evidence from past food consumption and expenditure surveys pointed to the existence of malnutrition among the population. While the regional analysis confirmed these findings, it also suggested that the food situation in the Middlebelt and to some extent in the North of the country was relatively tolerable in the first half of the period. Thereafter, the food situation in all the regions deteriorated. Also it was found that a high population growth rate and large

food waste were important factors contributing to the food and nutrition problems in the country.

The study has contributed to a better understanding of the food and nutrition problems in Nigeria by providing a framework of analysis which can be of immense assistance in the planning process. The application of the framework to an analysis of Nigeria's food and nutrition problems and policies during the last four National Development Plan periods has also helped to articulate the major factors affecting the food situation and policy implementation and hence provided more informed basis for some common generalisations on the subject. Through the regional analysis undertaken, it has provided a more objective basis for policy formulation and may enhance public sector resource allocation to various food production programmes. Finally, the more systematic review and assessment of food policies contained in the study can assist policy makers to make necessary adjustments to existing food policies.

A C K N O W L E D G E M E N T S

My interest in this subject began during a Master's degree course at the University of Wisconsin - Madison, U.S.A., in 1976/77. During that period, the dangers posed by the food and nutrition problem became clearer to me than was previously the case. The late Professor Hugh L. Cook of the Department of Agricultural Economics was then my supervisor and his contributions to my initial ideas on the subject were invaluable. I am much indebted to my employer, Central Bank of Nigeria, for giving me ample chance to undertake the courses and studies that finally led to the completion of this work

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ACGS	-	Agricultural Credit Guarantee Scheme.
ADP	-	Agricultural Development Project.
CARD	-	Centre for Agricultural and Rural Development.
CBN	-	Central Bank of Nigeria.
CSNRD	-	Consortium for the Study of Nigerian Rural Development.
FAO	-	Food and Agriculture Organization.
FDF	-	Federal Department of Fisheries.
FMA	-	Federal Ministry of Agriculture.
FMANR	-	Federal Ministry of Agricultural and Natural Resources.
FMED	-	Federal Ministry of Economic Development.
FMI	-	Federal Ministry of Information.
FMNP	-	Federal Ministry of National Planning.
FOS	-	Federal Office of Statistics.
FPDD	-	Fertilizer Procurement and Distribution Division.
FSM	-	Food Strategies Mission.
GDP	-	Gross Domestic Product.
gm	-	gram.
ha.	-	hectare.
IBRD	-	International Bank for Reconstruction and Development (World Bank).
ILCA	-	International Livestock Centre for Africa
IITA	-	International Institute for Tropical Agriculture
cal.	-	calorie

kg	-	kilogram
km	-	kilometre
m	-	metre
NADC	-	National Agricultural Development Committee
NAS	-	National Academy of Sciences
NACB	-	Nigerian Agricultural and Cooperative Bank
NCRI	-	National Cereals Research Institute
NES	-	Nigerian Economic Society
NRCRI	-	National Root Crops Research Institute
OECD	-	Organization for Economic Cooperation and Development
PPIB	-	Productivity, Prices and Incomes Board
RBDA	-	River Basin Development Authority
RBRDA	-	River Basin and Rural Development Authority
SITC	-	Standard International Trade Classification
tge	-	tonnes of grain equivalent
USDA	-	United States Department of Agriculture
USDEHW	-	United States Department of Education, Health and Welfare
USAID	-	United States Agency for International Development
WHO	-	World Health Organization.

CHAPTER I

THE RESEARCH PROBLEM

1.1 Introduction

In the recent past, the food problem which may be defined as a situation of persistent short-fall in food supply relative to human nutritional requirement has assumed a world-wide importance. The growing dimension of the food problem at the international level has been associated with increased activity by the Food and Agriculture Organization of the United Nations Organization (FAO) in an attempt to ameliorate the situation.[1/] The deterioration in the world food situation has more or less been identified with the less-developed countries of Africa. In these African countries, the annual rate of growth of food production was estimated by the FAO to be less than 2 per cent during the period 1975-1984 (FAO Production Yearbook, 1975-1984). The average growth rate of food production was lower than population growth rate of about 2.5 - 3 per cent and the growth rate of average income which was above 3 per cent . Food deficits in many of these countries have widened during years of drought, resulting in some dependence on international food aid. Human nutrition has become an important international issue not only because of the deleterious effects of undernourishment of adults and general economic instability, but also because of

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1/ The FAO was set up in October 1945 initially to solve the problem of feeding large populations in those countries whose economies had been ravaged by World War II. Later, the FAO widened its activity to include a continuous analysis of the world food situation and assisting countries to overcome their food problems.

the high incidence of mal-nutrition among children in many countries. Malnutrition, a condition of inadequate quantity of specific nutrients, particularly protein, for good health, is one of the biggest contributors to child mortality in the developing countries (Berg, 1973: Ch.1 and Clastra 1973: Ch. 1). Various studies have also identified malnutrition as the primary or an associated cause of many diseases (Berg, 1973: Clastra, 1973 and Spivey,1975).

On the Nigerian scene, the civil war (1967 - 1970) appeared to have urshered in serious food problems and it may be suggested that this was due to less attention paid to agricultural development during that period. However, all indications are that food problems had begun to build-up much earlier and that the war merely escalated them to the serious dimensions they assumed, especially from the early 1970s. Total food production has generally increased at lower rates than population, urbanization and incomes, resulting in inflationary pressures and malnutrition for certain sections of the population. As the problem became more serious in the mid-1970s, food importation was resorted to in a bid to stem shortages. Between 1970 and 1982, the volume of food imports increased more than four-fold and was accompanied by substantial increases in foreign exchange expenditure.

The National Development Plans launched since 1962 have underscored the belief that Nigeria has a great potential for rapid economic development and for significantly improving her food and nutrition situation. It is believed that the food production potential can be attained through increased crop yields, tapping of the nation's water resources, improved

animal husbandry, greater incentives to farmers and reduction of food waste (Nigeria, FMED, 1975a. Ch.6). It appears that one of the prerequisites for achieving this objective is to know the dimension of the problems to be solved and to implement policies effectively. This forms the basis of this study.

1.2 The Research Problem

The literature contains strong empirical evidence that adequate food supply is essential for rapid economic development, while inadequate food and nutrition can constitute a serious constraint in the development process (see Chapter II). Given the close association between food, nutrition and economic development and the overall objectives of agricultural policy, it is necessary to keep under periodic review the various aspects of the food and nutrition situation of any given country. In particular, it is essential to know the quantitative dimensions of the country's food situation, its main determinants and its real and potential effects on the population and the whole economy.

In throwing more light to the food and nutrition issues in Nigeria, contributions by existing literature can be enriched in at least four areas. First, there is a need for a general framework of analysis of the food situation and various food policies. This framework can provide criteria for the assessment of the food situation utilising the available data, as well as outline a procedure for appraising adopted food policies. This aspect

is important because it becomes easier to design and evaluate food policy targets. In the process, planning for adequate food and nutrition can be made more meaningful than at present when many food policies are based on inadequate knowledge. Second, the application of the framework to a long-term analysis of the food and nutrition situation will be an important contribution since it will reveal some of the dynamic factors in Nigeria's food and nutrition situation. A similar study on Nigeria's food and nutrition situation by Olayide et. al. (1972) was a major pioneering effort, but it was limited in scope, especially since it analysed actual data for only one year (1968/69).

Third, the application of the framework to the analysis of the regional food and nutrition situation will also enhance the state of knowledge on the subject because it will permit a better understanding of the regional variations in the food and nutrition situation, particularly in a setting of different ecological features. This will aid attempts to formulate food production programmes and enhance efficiency in resource allocation. In addition, the regional analysis will throw more light on food demand profiles in the country and thereby facilitate the formulation of policies for efficient distribution of food items throughout the country. Fourth, an appraisal of Nigeria's food policies in a dynamic setting will assist policy makers in making necessary adjustments to current policies. Most of the current policy assessments are not based on any rigorous theoretical framework and are ad hoc in nature. A more scientific appraisal of current food policies can aid policy

makers in providing improved planning frameworks for food and nutrition in the country.

1.3 Objectives of the Study

In the light of the research problem outlined above, the main purpose of the study is to develop a systematic approach for analysing food and nutrition problems in Nigeria, with a view to providing a suitable framework of public sector policies in Nigeria. The broad objective of the study is designed to examine three important aspects in the analysis and improvement of the food and nutrition situation in the country. The first is the analysis of long-term trends which tend to reveal a better picture of the food and nutrition situation because the effects of dynamic factors in the economy can be assessed. The second is the evaluation of the regional food and nutrition characteristics, with particular reference to production and consumption which provide a sounder basis for improving the aggregate food and nutrition situation of the country since it allows for flexibility in food policies. The third is the articulation of appropriate policies and programmes for ameliorating the food and nutrition problems of the country. The issue of a suitable analytical framework runs through these aspects since it is essential not only to measure the adequacy of the food and nutrition situation but also to assess the impact of food policies.

The specific objectives of the study are to:

(i) review the critical role of food and nutrition in economic development as a justification for studying the various aspects of food and nutrition as they affect the development process;

(ii) analyse some indicators of food and nutrition situation with a view to assessing the aggregate food and nutrition situation in Nigeria;

(iii) assess the regional food production and consumption potential with the aim of idenfying variations caused by ecological differences and resource endowments; and

(iv) outline a framework of public policies for providing adequate food and nutrition in the country.

1.4 Plan of the Study

In the present chapter, a general background on the subject of the study is provided. This has involved references to the increasing food and nutrition problems at the national and international levels, as well as the gaps in the understanding of the subject which provided a setting for the choice and specification of the objectives of the study. Chapter II provides the literature review, while Chapter III surveys Nigeria's agricultural situation and problems and their implications for food and nutrition policies. Chapter IV discusses the methodology of the study, while chapters V - VII contain the empirical analyses of the aggregate food situation, the regional aspects and assessment of food policies. Chapter VIII presents a framework of public sector food policies and Chapter IX contains the summary and conclusions.

CHAPTER II

A REVIEW OF THE LITERATURE

Studies on food and nutrition problems are undertaken regularly by the FAO (the state of Food and Agriculture), Organization for Economic Cooperation and Development (OECD; 1967b, 1976), the United States Government (1974), several developing countries and individual scholars. Many of the studies have been of a general nature and only few in-depth analyses of the problems in specific countries have been undertaken. Specific studies have been undertaken on India (Bhatia, 1970), Egypt (Amin, 1966) and Nigeria (Olayide et. al., 1972). There are three major aspects of food and nutrition that have been examined in the literature, namely:

(a) the important role of food and nutrition in economic development;

(b) evaluation of Food and Nutrition Situation; and

(c) steps to improve the food and nutrition situation.

2.1 The Role of Food and Nutrition

With reference to the role of food and nutrition in economic development, the main themes discussed in the

literature are well-illustrated by FAO (1964), Amin (1966), Mellor (1966), Belli (1971), Berg (1973), Spivey (1975) and Clastra (1978). In addition, the literature contains interesting historical perspectives on the role of adequate food and nutrition in economic development. Several writers, including Heaton (1948), Clapham (1948), Amin (1966), Nakamura (1966), Johnston and Kilby (1975) and Timmer (1976) have reviewed the historical experiences of many countries, especially the developed ones and concluded that rapid development and industrialization in these countries could have been extremely difficult without an appreciable increase in their domestic food supply and the attainment of the requisite nutritional levels. The main implication of their historical surveys is that developing countries experiencing serious food problems in recent times have bleak development prospects. This conclusion has also been confirmed from studies by the FAO (1966), Johnson et. al., (1969) and the World Bank (IBRD) (1974a).

A review of the works of these authors suggests that there are two aspects to the role of food and nutrition in economic development. These are the nutritional and economic aspects.

2.1.1 Nutritional Aspects

An important group of functions which food performs in the development process relates to its biological properties. When there is adequate nutrition, the human body performs efficiently, physically and mentally. However, when nutrition is inadequate, the human body does not perform as efficiently. The three factors that can lead to physical and mental inefficiency are under-nutrition, malnutrition and overnutrition. Under-nutrition is the lack of sufficient food intake, and/or poor utilization of food nutrients. Malnutrition is the lack of nutritionally proper food, involving the consumption of too little or too much of one or more food nutrients. A victim of malnutrition may not necessarily be under-nourished, but an undernourished person most probably suffers from malnutrition. Overnutrition results from too much eating which may result in too much intake of one or more nutrients to the detriment of the body.

All the three food situations are found in many developing countries, but malnutrition is prevalent and most disturbing.

1 Types of Malnutrition

There are three groups of food which supply nutrients for an adequate diet (Robson, 1972: chs. 1-3). First, carbohydrates and fats are the main sources of energy necessary for work and metabolism. Since calorie intake must balance the daily energy output, carbohydrates and fat requirements depend mainly on the individual's type of activity. But, other factors, such as sex, age, body weight and climate, also influence the daily calorie requirement. Second are those foods which supply protein required for the growth and repair of organic structures and tissues. The two principal sources of protein are animal proteins (milk, eggs, meat and fish) and pulses (sorghum, millet and cowpea). Animal proteins provide a higher quality of protein than pulses. Third are those which supply vitamins and minerals that are necessary for adequate body functioning and provide necessary materials for the growth of bones and teeth. The main examples are calcium, vitamin A, lysine and theonine.

When the intake of these categories of food is not adequate, three types of malnutrition occur. Calorie malnutrition results from insufficient intake of carbohydrates and fats, while protein malnutrition is a result of a short fall in the intake of protein rich foods of

animal and vegetable origin. The combined calorie - protein malnutrition results when there is insufficient intake of either or both of calorie and protein in the diet.

2 Effects of Malnutrition

These dietary deficiencies, frequently result in a number of serious diseases which can be separated into two groups (Spivey, 1975: p. 7: Robson, 1972: Chs. 1-3):

(a) Those resulting from protein/calorie deffiency; and

(b) Those resulting from mineral/vitamin deficiency.

The two main diseases associated with protein/calorie deficiency are kwashiokor and marasmus. The cause of kwashiokor is lack of protein and it particularly affects children who are put on starchy adult diet soon after weaning. The major symptoms are a general apathy, a bloated stomach, wasted muscles and a discoloration and swelling of the skin which may lead to retarded growth and reduced resistance to other diseases. The symptoms of marasmus are similar except that there is no rash or swelling of the skin. Starvation is the main cause and can lead to wasting of the body tissues and improper functioning of the body.

Some of the diseases associated with vitamin/mineral deficiency are beri-beri, pellagra, avitaminosis A, rickets, osteomalacia and goiter. Beri-beri frequently causes a paralysis of the limbs and nervous disorder and is caused by lack of vitamin B. The disease is frequently linked

with diets based on polished rice, the polishing process having removed the husk that contains vitamin B. Pellagra is also due to a deficiency of vitamin B and is associated with diets based mainly on maize. Avitaminosis A is caused by a vitamin A deficiency and it may result in blindness. Rickets and osteomalacia are due to a vitamin D deficiency and prevent the proper absorption of calcium and phosphorus needed for growth and maintenance of normal teeth and bones. Goiter, caused by an iodine deficiency, results in retardation of fetal development and of normal physical growth.

The above are some of the physical visible effects of malnutrition. Malnutrition can also cause some mental and psychological defects. It can result in reduced mental capacity or to psychological imbalance. Spivey vividly described these effects as follows:

> "Malnutrition is as devasting psychologically as it is to growth physically and mentally. Such effect shows itself in a feeling of lethargy, a lack of initiative and indifference to others" (Spivey, 1975; p. 11).

It can be gleaned from the review so far that the effects of malnutrition can be very serious when it occurs. On a general level, the incidence of malnutrition has been linked with low per capita incomes. For instance, Belli (1971), using the levels of protein supplies as a main determinant of per capita incomes in about 70 countries found that roughly 50 per cent of the variance in per

capita incomes could be explained by variations in per capita supplies of total protein. Furthermore, he discovered that the correlation coefficient increased by about 20 per cent when per capita supplies of animal protein were used as the independent variable instead of per capita supplies of total protein. Malnutrition has been linked, especially in less-developed countries, with high child mortality, low mental development or intelligence, low resistance to disease, stunted growth and reduced working life span (Berg, 1973 and Belli, 1971). The FAO has estimated that malnutrition is the highest contributor to child mortality in less-developed countries (Berg, 1973: p. 4 and FAO, 1970: p. 25). One side effect of these diseases is that the affected person soon becomes less curious and imaginative. Also, once affected by malnutrition, there is a tendency towards less resistance to diseases generally and inadequate physical growth, all of which have been linked with reduced labour productivity (Amin, 1966: pp. 6-8; Belli, 1971: pp. 10-16).

2.1.2 Economic Aspects

The main economic functions of food and nutrition in development can be grouped into three categories: its role in feeding the population, its role in the mobilization of resources for the rest of the economy and its role in inducing price stability for economic growth.

1 Food and Population Growth

There is considerable agreement in the literature that the most essential role of food and nutrition in economic development is to provide for the increasing food demand of the population (Mellor, 1966: p. 43 and FAO, 1964: p. 1). The increased demand for food results from the tendency of population and incomes to increase in the process of economic development. The net increase in population comes about through the respective trends in the death and birth rates. As development grows, the death-rate tends to fall while the birth rate tends to increase, resulting in a positive population growth rate. But the population growth rate tends to fall overtime (Mellor, 1966: pp. 47-55). The amount of increased food demand will therefore depend on the respective impact of the population and income effects. In both cases, the developed and less-developed countries have contrasting experiences.

With respect to the less-developed countries, the evidence shows that population growth is the more important factor. During the period 1975-1984, for instance, the average rate of growth of population in less-developed countries of Africa, Latin America and Asia ranged between 2-3 per cent per annum, and in fact, exceeded 3 per cent in some countries (IBRD, 1980-85). On the other hand, in the developed countries of Europe and North America, the average growth rate of population was about 1 per cent,

and, in fact, was slightly less than 1 per cent in certain countries (IBRD, 1980-85). It has also been observed that, not only are current rates of population growth higher in less- developed countries, but appear to be higher than what they were when the present developed countries were at a comparable stage of development with the LDCs (FAO, 1964: p. 2). One important feature of population growth, especially in the less-developed countries is the disproportionate rate of growth as between urban and rural areas. In these countries, although the majority of the population still reside in the rural areas, urban population growth has been very rapid largely because of the rapid increase in rural-urban migration (FAO, 1975a: p. 106). Also the fact that the populations tend to be relatively young and contain more females than males is another source of food demand increase (Olayide et. al., 1972: pp. 5-9). Thus, food supply must increase not only to meet the normal population growth, but also to meet the higher demand generated by rapid growth of urban and relatively active populations.

With respect to the income effect, food production must grow to keep pace with the increased demand generated by higher incomes which arise with development. Increased consumption of food both in terms of quantity and quality in response to larger incomes is confirmed by observed values of income elasticities of demand for food which show generally that as incomes rise, there is an increase

in food demand, though at a decreasing rate. FAO studies have found that the income elasticity of demand for food in less-developed countries is much higher than in developed countries of, for example, Western Europe and North America (FAO, 1971b: pp. 129-290; 1975a: pp. 111-116). Thus, an increase in per capita income induces a higher demand for food than in the advanced countries. In addition, since the income elasticities of demand for certain quality products such as meat, dairy products, fruits and vegetables are higher than those of other products, an increase in per capita income will also tend to induce larger demand for these products.

2 Food and Resource Mobilization

(a) Capital Contributions

Food supply is a source of physical capital which contributes substantially to new investment in the domestic economy because food production is a dominant activity in the agricultural sector that employs a significant proportion of the population. Available evidence for 1970-1984 shows that in Africa about 70 per cent of the economically active population was engaged in agriculture (FAO Production Yearbook, 1970-1984). In North America and Western Europe, the corresponding ratios were 3 and 12 per cent, respectively. In many countries and particularly the less-developed ones, the bulk of capital for development is derived from the sector[1/].

1/ The main exception is in respect of mineral producing countries.

Capital contribution from food supply may be derived from at least three sources: taxes, the savings potential of surplus labour and change in the terms of trade (FAO, 1964: pp. 9-12 and Amin, 1966: pp. 8-18).

The main types of taxes derived from food production are the land tax, export tax and accumulated surplus funds of state marketing agencies. Land taxes are less important in most less-developed countries "largely because of universally weak valuation systems, systems which have, in many cases, remained weak despite decades of plans and programmes, supposed to improve them" (Bird, 1974: p. 75). In Nigeria, for example, there are no land taxes in existence due mainly to the predominance of communal land holdings, which makes conventional form of land taxation unworkable (Bird, 1974, p. 75). Many less-developed countries have therefore tended to charge taxes on agricultural exports. There are two main kinds of export taxes. First, there are explicit export taxes whose rates usually depend on the unit prices of the commodities concerned; second, there are marketing taxes collected through government marketing agencies which usually have statutory monopoly of purchases of certain export produce. The marketing agencies purchase produce from farmers at prices set deliberately below those obtaining on world markets, the difference, after expenses, being retained as surpluses, supposedly for stabilization purposes, but used in practice for development expenditure (CBN, 1973b).

The income tax is another source of revenue from food production although it is more important in developed countries. In these countries, income derived from production is taxed exactly like income from any other source. This is not practicable in less-developed countries where there may be difficulties in measuring net income from agricultural activity generally. The more general approach in these countries is to levy a flat rate tax on people who are not in paid employment.

Some economists believe that food supply can contribute another form of capital through mobilizing the labour surplus in the less-developed countries. In these countries, a large proportion of the population is engaged in food production mainly at subsistent levels of living. It is claimed that a significant portion of the labour employed in such production can be removed without affecting total production, implying that the marginal product of labour is zero. This is the basis of the surplus-labour models propounded by Lewis (1954) and Nurkse (1955). The surplus labour is said to be a potential source of capital for development. If the surplus could be transferred to capital construction works or to other productive activity and their earnings saved and accumulated, this would increase the national capital stock. Several criticisms have been levelled against these models. For instance, Bhatia (1970) believes that such models implicitly assume that the transfer of labour from food production to other occupations would result in a

food surplus to feed the labour transferred. Bhatia contended that this could be realised only if the surplus labour transferred from agriculture could have access to their previous share of food consumption. Consequently, their output in the new occupations would become a surplus which may be accumulated for capital formation. This capital accumulation, according to Bhatia, would take place under two conditions:

(i) that the transferred labour will continue to consume the same amount of food in the new employment; and

(ii) that the labour left behind in food production will not raise its consumption of food, thereby making available the whole amount of food saved by the transfer of the surplus labour.

Bhatia believes that the first condition is not valid because the surplus labour may not move from its traditional occupation unless it is offered higher wages which will induce increased food demand. He also thinks that the second condition is unrealistic because with the movement of surplus labour, the implied increase in marginal productivity and incomes of those left behind in food production may lead to increased food consumption. Another school of thought denies even the existence of the so-called "disguised unemployment" of labour in the agricultural sectors of the less-developed countries, while other economists reject as gross over-estimates assertions that disguised unemployment exists in propor-

tions as high as 25 to 30 per cent of the labour force in any ssctor of the economy of any less-developed country (Morgan, 1975: pp. 267-272).

Finally, it has also been argued that food production may contribute to capital formation by making supply so abundant as to cause a relative reduction in food prices (Mellor, 1966: pp. 95-97). The reduction in prices provides a transfer of real income to other sectors and induces higher profits through allowing a relatively lower wage structure for the urban working class. The higher profits can then provide a source of capital formation in the economy. HOwever, the contribution to capital formation through this channel can only be possible if wage rates are in fact held down relative to non-food prices and if the economic environment is conducive to investment for industtial expansion rather than for consumption.

(b) Foreign Exchange Earnings

Adequate foreign exchange plays a critical role in economic development of less-developed countries because of the need to import essential capital goods for industrialization and general infrastructural development, as well as to cope with increased demand for imported consumer goods. Except in a few cases, foreign trade in food products remains the most important source by which the nation's foreign exchange can be expanded. In fact, in most of the developing countries, agricultural products account for the larger proportion of exports and a

break-down of total agricultural exports points to a large contribution by the food component to aggregate foreign exchange earnings (FAO, Trade Year Book). By the Standard International Trade Classification (SITC), many so-called "cash" crops such as cocoa, groundnuts, soyabeans, benniseed and palm oil, are important food items in many countries.[2/] Besides the opportunity to earn foreign exchange which can be used to finance essential capital goods imports, other secondary benefits can be derived from food production for export. Such benefits are derivable from increased investment, consumption and flow of technology which accompany foreign investment in the food subsector. First, the level of domestic investment may be boosted where the export of a food product expands since not only the existing industries connected with the product will expand but also increased activity will be induced in all ancillary industries that serve the main export industry.

Second, a growing food export sector can induce greater consumption in the economy because of the increased capacity to purchase from a wide range of products in world markets. This "demonstration effect" can in many respects induce greater economic activity

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2/ In the case of Nigeria, the staple foodstuffs which dominate local diet are not exported, but the cash crops like cocoa, groundnuts, etc. are exported.

in the economy if it leads to the eventual setting up of import-substituting industries. But, in the short-run, it may result in greater economic dependence and balance of payments problems (Weisskopf, 1972: pp. 44-45). Finally, increased volume of food exports encourages an increased inflow of technological innovations and managerial skills, either through the introduction of plantation farming or the establishment of basic processing industries.

Furthermore, an adequate food supply can improve the balance of payments by saving on food imports, as well as allowing for an optimal use of foreign exchange resources. It is generally true that the less-developed countries, for example, import a lot of agricultural products, especially food items like cereals, fats, oils and sugar (FAO, Trade Yearbook). In fact, the growth in the imports of these products is commonly used as an important indicator of the food situation in these countries. If agricultural productivity were improved and accompanied by adequate processing and marketing, the supply of these items would meet domestic requirements. Consequently, foreign exchange which would naturally be used to import them would be saved and used to acquire other commodities which are required for development, but which cannot be produced locally.

(c) Industrialization

The food production sub-sector may aid early attempts at industrialization by making available raw materials in the form of primary commodities for processing.

Generally, food processing industries are among the first industries to be established in many countries, largely because the availability of the basic raw materials is an incentive to further processing and also because over a wide range of these industries, the major cost element is that of the basic raw material input (FAO, 1964: pp. 7-9). Another factor that favours the establishment of such industries is their labour intensity. In a typical less-developed country where agricultural raw materials and unskilled labour may be abundant while capital, foreign exchange, skilled labour and managerial skill are scarce, the choice of food processing as a basis for industrialization appears rational since such scarce factors will, to a large extent, no longer constitute serious bottlenecks to initial industrialization. Food processing industries which are among the first industries to be established include sugar manufacture, vegetable oil extraction, canned fish, fish meal, milk and milk products.

An important contribution which food supply makes to industrialization is that, by creating incomes for the food producers who constitute a large section of the population, it augments the market for manufactured goods (Anderson, 1969: pp. 12-15). Thus, at later stages of development, growth in the food supply should stimulate growth in the rest of the economy and vice-versa. Just as agriculture, through more food, stimulates industrialization which makes available industrial goods, these goods in turn provide strong incentives to farmers to increase production.

As food production expands, the manufacture of farm tools and implements, fertilizers, pesticides and other material requisities in food production provides further stimulus to increased productivity.

(d) Manpower Resources

It is observed from the experiences of industrial nations that the development process is accompanied by a gradual decline in the labour force employed in the agricultural sector (FAO, 1964: pp. 11-12). At the initial stages of development, the bulk of the labour force is required to produce food for the population. But as development gathers momentum and productivity increases, it is possible to meet national food requirements with a small labour force, thereby permitting the transfer of labour to the non-farm sector to produce other goods. This then constitutes another important contribution which adequate food supply can make to economic development. However, this natural process of development will only be brought about as rapidly as the non-farm sector itself is growing. The sources of increased productivity in the form of better technology, larger supply of farm inputs and rising purchasing power are traceable to the non-farm sector. It is believed that this inter-relationship between the farm and non-farm sectors, makes it less likely that the present less-developed countries can achieve the rate of labour transfer attained by the developed countries during their comparable periods of development (FAO, 1964: p. 12).

The first source of doubt arises from the fact that the rate of absorption of labour from the farm sector depends not only on the rate of expansion of the non-farm sector, but also on its initial size. For any given rate of industrial growth, the rate of labour absorption from the farm sector will be greater, the larger the size of the non-farm sector. Typically, the farm sectors of less-developed countries dominate economic activity, while the non-farm sector is very small. Secondly, their rates of population growth are relatively high so that the marginal rate of labour absorption is immediately more than replaced. Thirdly, there is the tendency for industries to be capital-intensive, as a result of the practice of importing the latest technology which has been developed under labour-scarce conditions in industrial countries. Consequently, labour is absorbed from the sector more slowly than if labour-intensive technology has been employed.

.3 Food and Domestic Prices

The simple supply - demand relationship in economic theory suggests that a fall in food supply relative to demand will result in increased food prices, ceteris paribus, while an increase in food supply will result in lower food prices. Thus, the critical factor is to determine what impact food prices have on the general price level. If food prices have a significant impact on the general price level, they will tend to generate inflation

when food supply is inadequate and to stem inflation when food supply is adequate. However, the impact of food price changes on the general price level varies from one economy to another because of the differences in the structures of such economies.

With respect to the less-developed countries, the evidence generally points to a close association between food price changes and the price level, the most important factor being the large proportion of income spent on food.[3/] For instance, in a study by the Central Bank of Nigeria (CBN), there was found to be a strong relationship between the rates of inflation and changes in food prices in eight African countries.[4/] The observed values of co-efficients of correlation and determination computed from the analysis suggest that, for each country, over 80 per cent of the variation in its rate of inflation was explained by changes in food prices (CBN, pp. 36-40). Edel (1969: Ch. 4) in his study of some Latin American countries, came to the same conclusion that inadequate food production accompanied by increased food prices generated substantial inflationary pressures in those countries.

An important feature of the impact of food prices on inflation in these countries is the moderating role of food imports. In countries where there is sufficient

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3/ In this respect, the Latin American experience assumes some prominence in the literature (Edel, 1966).

4/ These include Ivory Coast, Mauritius, Sierra Leone, Somalia, Kenya, Sudan, Morrocco and Tunisia.

foreign exchange, imports tend to reduce food shortages and inflation, whereas in countries where there is a foreign exchange constraint, food shortages intensify inflation and especially because speculative activities usually develop under such circumstances (Onitiri, 1966). But even in the situation where there is adequate foreign exchange to finance food imports, what is gained in price moderation seems to be lost in possible misallocation of foreign exchange reserves and also in that excessive food imports may inhibit the potential development of domestic food production. This is evidenced by recent developments in Nigeria where certain imported food-stuffs such as rice and polutry products have landed costs that are much lower than the cost of producing such products locally.

If inflationary pressures are linked with serious food shortages, it might be examined whether and to what extent inflation has produced any impact on the economies concerned. However, the theoretical frame-work provided by the literature is beset by controversy. The controversy as to whether inflation promotes or retards economic growth is typified by the views of the monetarists and structuralists. While the monetarists argue that rapid economic growth requires price stability, the structuralists maintain that inflation is a natural consequence of economic growth. There is also no consensus on the empirical evidence regarding the relationship between inflation and growth. Morgan (1975; p. 376), while reviewing empirical

studies in Latin America, Asia and Africa noted:

> "rapid economic growth has at different times been associated with rising, constant, and falling price levels, just as periods of slow growth or ..... no growth have been marked by every manner of price behaviour".

However, the conclusion from a study by Dorrance (1975) was more positive. He observed that while a declining price level inhibits growth, and a relatively slowly rising price level can have a stimulating effect, rapid price increases may seriously hamper economic growth (Dorrance, 1975: p. 1). Morgan (1975, p. 376) believes that a price increase of about 8-15 per cent a year is relatively high, suggesting that the higher rates of inflation, caused mainly by food shortages, obtaining in most less-developed countries in the last decade was a contributing factor to slow economic performance.

2.2 Evaluation of Food and Nutrition Situation

An analysis of the increasing magnitude of the food and nutrition problems which is the other aspect frequently examined in the literature requires a detailed anatomy in both qualitative and quantitative terms. But most authors admit many inadequacies in this regard, particularly in respect of developing countries.[5] Most developing countries lack a sound agricultural data base and this makes it difficult to compile meaningful indicators. In addition, there are no regular consumer expenditure, food consumption and medical nutrition surveys. Consequently, many authors rely on indirect evidence and general observation to assess the nutritional status

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[5] The problem of compiling relevant data in this regard is made glaring by the FAO in its annual publications. The peculiar position of the less-developed countries is usually highlighted in these publications. In the first major study of the food situation in Nigeria, the uphill task of compiling meaningful data was also pointed out (Olayide et al., 1972; pp. 3-4).

of these countries. The FAO remains the main source of information. It compiles annual food balance sheets for all member countries and in these, calories and nutrients from each country's available supply are estimated and then related to some minimum requirements which are determined by physi cal activity, body size and composition, sex, age and climate (Passmore et. al., 1974). FAO estimates show that most less-developed countries have been unable to meet the minimum requirements.[2] In contrast, the developed countries have conveniently met them. For example, the United Nations World Food Conference (1974) estimated that in developed market economies, the average energy calorie availability (1974-1976) would be about 3,090 calories. In the developing market economies, average requirement was 2284 calories compared with estimated average availability of 2,210 calories. This below average position was expected to be brought about by the results in Africa, Asia and Far East, since Latin America and the Near East were likely to meet minimum requirements.

Most studies on individual countries have generally used the FAO methodology based on the compilation of food balance sheets. The food balance sheet approach attempts to present an overall picture of a country's food situation by netting out from gross food supply, food

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6 See the food balances of countries published by the FAO in annual Production Year Book.

exports as well as other quantities of food not consumed by people during a given period, usually one year. The resulting food balance is then converted into its main food components, especially calorie and protein. The food balance is computed from the following identity:

$$C = (FQ + FM + FT - FX - FI - FW) \quad \ldots\ldots(1)$$

where C = food balance for each product;

FQ = domestic food production;

FM = imports of food items;

FT = net changes in year-end food stocks;

FX = exports of food items;

FI = food used as planting seeds; raw materials in manufacturing industries; and as animal feed;

FW = quantity of food wasted up to the retail level;

The FAO most often uses estimated data for the compilation of food balance sheets for developing countries because current data are scanty. Also, it concerns itself mostly with national data. The study on Nigeria by Olayide et. al. (1972) was a major improvement on the FAO efforts in that it compiled food balance sheets for the whole country and the existing 12 states of the country.[7] This regional

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[7] The 12 states were: Western, North-Eastern, East-Central, Kano, North-Western, North-Central, Benue-Plateau, South-Eastern, Mid-Western, Kwara, Rivers and Lagos.

analysis was however limited only to the 1968/69 crop year. The national computation showed that minimum requirements of calorie and protein were not met. Daily per capita calorie supply averaged 2,190 Cals which was 90 per cent of minimum requirements. Protein supply averaged 59 gms per capita per day and was about 91 per cent of minimum requirement. In the state analysis, 6 states met the average minimum calorie requirements, while only two states met the minimum protein requirements. Although the food balance sheet approach to the assessment of food and nutrition situation has become very acceptable, it is generally well-known that it suffers from technical short-comings such as the inadequate data base that prevails in many countries and the tendency to compute aggregate measures that ignore individual, regional and seasonal variations in the data used (Farnsworth, 1967).

Comparing food supply with food demand levels is another approach which is often adopted to assess the food and nutrition situation in many countries. The main objective has been to compute potential food gaps which measure the shortfall in food supply relative to demand. Food supply is derived by netting out food not meant for human consumption from gross supply, while food demand is derived by assuming that its main determinants are income and population changes (FAO, 1971; USDA, 1974: OECD, 1976).

The food demand model is of the form:

$$D_t = a^{Y}_{t} + b^{P}_{t} + c^{T} \quad \ldots\ldots\ldots\ldots\ldots (2)$$

where D, Y, P and T refer to demand, income, population and time respectively and, a,b,c, refer to the coefficients of income, population, and time respectively. In their study on Nigeria, Olayide and others (1972) used the following food demand equation:

$$Q_p = Q_o + E_y P Q_o \quad \ldots\ldots\ldots\ldots (3)$$

where Q_p, Q_o, E_y and P refer to the projected food demand in the given year, the food demand in the base year, the income elasticity of demand and change in national income, respectively. This in effect ignored the population factor. Based on this equation, demand quantities for 1975, 1980 and 1985 were assessed for their food values and were below minimum requirements. It was also shown that food demand would increase much faster than food supply over the 15-year period, resulting in large food deficits. However, Olayide's work did not produce food demand projections for the 12 states.

Other methods which have been used for the nutritional assessment of population groups include the analysis of demographic data from which the size of nutritionally vulnerable groups can be estimated; examination of food prices from which inferences about ability to obtain adequate diet can be made: analysis

of social and cultural data which give ideas about food customs, taboos and prejudices; and educational levels which can be used to assess purchasing power.

All the above approaches for evaluating food and nutrition position give only strong indirect evidence of the food situation in a particular country since they do not measure actual food intake. The direct evidence by which the nutritional values of actual food intake are measured is obtained in a number of ways such as through consumer expenditure, food consumption and medical nutrition surveys (Robson, 1972: Ch.5). In a consumer expenditure survey, the amounts and kinds of foods purchased by the population at given levels of income can be compiled and can thus permit a knowledge of the number and types of people consuming such nutrients, as well as allow such to be related to minimum nutritional requirements. The major shortcoming of this approach is that it assumes that foods purchased will be well-prepared and consumed which may not be so. In the food consumption survey, the kinds and quantities of food consumed in household samples are compiled, assessed for their nutritive values and compared with nutritional requirements. Although more accurate than the expenditure survey, a food consumption survey has its shortcoming in that families may not remember all the details of their diets at the time of the survey or may misrepresent the

Further incursions into the literature suggest that some elements of the economic policy framework provided by Tinbergen (1967) appear to be very appropriate for analysing food policies. This framework has been adapted by Fox et. al. (1973) and Idachaba (1980b) to agricultural and food policy analysis. Tinbergen's approach to the theory of economic policy can be summarised in terms of three elements. The first is the formulation of an objective welfare or preference function which defines the general interest of the people. The second is the division of variables into exogenous variables which are grouped into those over which the policy maker has no influence and those which he can control, and endogenous variables consisting of target variables which define the immediate goals of the policy maker and the irrelevant variables which are the side effects of the means of economic policy. The third element consists of a system of structural relationships reflecting the technical, behavioral and institutional relationships in the economy. Fox et. al. utilized the Tinbergen approach as a starting point to formulate a conceptual and operational framework within which agrarian reforms are viewed as a means of attaining certain ends, especially economic growth. Idachaba's work was aimed at developing a framework for food policy analysis. His framework consists of a definition of food policy objectives, instruments and projects/programmes, as well as the policy execution process.

Several aspects of the policy execution process have been discussed by Idachaba and other authors.. The most relevant are the allocation of responsibilities among those to implement the policies, the strategy for implementing the policies, the structure of the institutions that will guide implementation and the evaluation criteria which will assist in monitoring the success or failure of the policies.

1. The Roles of Public and Private Sectors

There is a need to allocate appropriate roles to the public and private sectors which are to execute policies so as to utilize available resources efficiently in the attainment of the stated policy objectives. Apart from this overall objective, there is also a need to specify the optimal division of roles between the public and private sectors.

In defining the proper scope of public sector economic activity, EcKstein (EcKstein, 1979: pp. 5-17) identifies three approaches. First, government may intervene only when the private sector cannot perform or when it is more efficient in the performance of the activity such as in cases of market failure and natural monopolies. Second, government may go beyond the limit of the above so as to provide healthy competition and influence both private consumption and income distribution. Third, government may undertake all activities as in socialist or communist countries for the benefit of the whole society. Thus, the role of the public sector depends on the particular economic system. In Nigeria, the present system allows both public and private sectors to participate in economic activities

and the problem to be resolved is the proper balance of roles. Available evidence suggests that the public sector should divest itself from direct production. Essang (1975: pp. 18-19) in his study on Nigeria concluded that government involvement in direct agricultural production was at a high opportunity cost to the economy due in large part to the inefficiency in the management of the enterprises. Also, the cost of production was high relative to the returns. The implication was that the private sector should be left to produce. Idachaba (1980b, p.22), in his own framework was in agreement when he states that government should not be involved in direct food production, but should provide adequate incentives so that farmers can produce food to meet the nation's food policy objectives. According to him, this may be done by providing adequate infrastructural support and assisting farmers by reducing the inherent risks and uncertainty in food production and distribution caused by weather, pests and imperfection in the food and input markets.

2. Implementation Strategy

When the optimal division of roles between the public and private sectors has been undertaken, the next issue is to decide on what strategy to adopt in the implementation of policies. Two important factors have been articulated in the literature. The first relates to the structure of production. In most developing countries, food production is dominated by smallholders who carry on production largely with traditional and inefficient technologies. The modern sector is small although it is growing fast. Several authors (Johnston, 1969; Johnston and Kilby,1975) believe

that the public sector should focus policies on the smallholders, while the modern sector can be motivated by appropriate incentives. The rationale is that this approach will produce a wider impact, help in alleviating rural poverty and induce a more systematic structural transformation of the production process. The literature has provided some theoretical basis for this.

It is suggested that the smallholder is an economic man struggling to optimize his objective function subject to resource constraints (Okurume, 1969: pp. 13 - 34; Olayemi, 1980: pp. 29 - 30). The smallholder, while trying to achieve the profit maximization objective encounters two major constraints. First, the inferior resources employed by him are of low productivity and second, due to a low level of fixed capital employed, there is a limit to the absorption of variable inputs and diminishing marginal returns set in much earlier than usual. But, even besides the profit maximization objective, the smallholder is known to have other important objectives which make his objective function a mixture of many variables (Olayemi, 1980: pp. 29-30; Heady and Olayide, 1982:pp.89-91). Some of these other objectives are the need to maintain a reasonable level of self-sufficiency in food production and risk minimization in production. However, the smallholder may be inefficient in a dynamic sense largely because he does not strive to exploit opportunities for capital formation, improve his resource base and adopt innovations and improved

management techniques (Olayemi, 1980: p.31). The crux of the issue is therefore how to make the smallholder efficient in the dynamic sense.

The other issue is the overall approach for mobilizing smallholders for increased food production. Olatunbosun (1976) and Williams (1978) argue that development efforts should be concentrated in the rural areas not only because the bulk of the smallholders and other petty economic agents live in these areas, but also because the traditional approach to economic planning has over-stressed growth which has left the rural areas lagging behind in other welfare indicators like health, education and nutrition. The implication of concentrating development in the rural areas is that all sectors, including agricultural and food production must be catered for because of their inter-dependence. This particular approach is the "integrated approach" to rural development which is generally held to be a viable model for transforming the rural sector and ensuring adequate food supplies as well as other objectives of national development like better income distribution and the availability of the basic needs of life.

3. Appropriate Institutions

In order to execute policies as laid down, there is need for appropriate institutions which will plan the execution of policies, monitor the execution and undertake necessary adjustments during the process of execution (Idachaba,1980b: pp. 34 - 35). A major pitfall in developing countries is the creation of institutions that neglect the majority of the expected beneficiaries of policies. This is generally due

to the fact that the institutional procedures for policy implementation are too complex and the inadequate decentralization of their operations which does not permit all potential beneficiaries to have access to their services (Olayide et al., 1975: pp. 22 - 25). Another important consideration in the establishment of the institutions is the provision of appropriate manpower. Many institutions may be short of manpower which is partly responsible for their limitation in rendering services to all producers. From the foregoing, institutions for effective policy execution must cater for all groups of farmers, devise adequate monitoring systems and be well-staffed to pursue these goals.

4. Policy Evaluation

The success or failure of policies is determined by relating the results of such policies to the policy objectives. The FAO uses as the main evaluation criterion the nutrient content of food consumption in relation to needs. In addition, Sen (1962, pp. 131-153) and Idachaba (1980b, pp. 36-45) suggested that individual food policies should be assessed through appropriate indicators like growth in storage capacity and food exports. Policy evaluation when properly carried out will assist policy formulation by identifying the problems in the execution stage. The comparison of achievements with the objectives implies that these objectives must be quantifiable which will then permit the use of one or several indicators.

2.4 Overview

The literature review undertaken above points to several gaps which necessitate further work. An important aspect is the articulation of an evaluation framework which is appropriate for a particular country given its data base. There is need to apply this framework to evaluate the food and nutrition situation over the long-term as this will reveal more of the dynamic factors affecting food and nutrition. The literature has depended too much on aggregate evaluation, thereby ignoring the regional dimensions of food and nutrition. Equally important is the need to design a framework to assess food policies on a continuous basis as a means of making necessary adjustments. At present, most contributions in the literature are somewhat diffused and need to be rationalised for particular situations.

CHAPTER III

AGRICULTURE IN NIGERIA: PROBLEMS AND IMPLICATIONS FOR FOOD AND NUTRITION POLICIES

3.1 Major Characteristics

Agriculture remains the dominant sector of the Nigerian economy, in spite of its relative decline within the national output. Between 1961 and 1970, agriculture, including livestock, forestry and fishery, accounted for an average of 51 per cent of the Gross Domestic Product (GDP) at 1977/78 factor cost (CBN, 1970-1985). But between 1971 and 1980, and 1981 and 1985, this proportionate share declined to 28 and 22 per cent, respectively. However, it has continued to employ the bulk of gainfully employed persons in the Nigerian labour force. In the 1960s, agriculture accounted for about 80 per cent of employment opportunities in the country and by 1985, this proportion had declined, but was still relatively high at 60 per cent (Nigeria, FMNP, 1981, p.424).

The overall performance of the agricultural sector has been very disappointing in recent years. For instance, the index of total agricultural production moved generally downwards. Between 1970 and 1974, the index increased by an average of 4.5 per cent per annum, but declined by 5.6 per cent a year between 1975 and 1979, and increased marginally by 0.5 per cent per annum between 1981 and 1985 (CBN, 1970 - 1985). During the entire period, 1970 - 1985,

the index declined by an average of 0.2 per cent a year. The downward movement in agricultural output has meant reduced agricultural exports and increased imports, especially of food items. The volume of agricultural exports declined from an average of 802 thousand tonnes between 1970 and 1974 to only 174 thousand tonnes a year between 1981 and 1985, while that of food imports increased three-fold between the two periods (Federal Office of Statistics, Trade Summaries, 1970-1985).

One main feature of agricultural production is the dominance of smallholders in the various subsectors - crops, livestock, fishery and forestry (Olayide, 1980, pp. 2-15). However, the modern sector has grown very rapidly. Production by smallholders is characterised by high use of labour, low fixed capital investment on farm structures, improvements and tools and low operating capital since purchased inputs are relatively small (Olayemi, 1980, pp.18-20). It is contended that smallholders are not inefficient, but that their productivity is certainly low because of the crude technologies in use (see Chapter 11).

The main source of food and nutrition problems is the low productivity in the agricultural sector. Low productivity can be explained by environmental, technological, institutional and labour constraints on production. These and some of their policy implications are discussed below.

3.1.1 Environmental Constraints

Environmental constraints arise mainly from climatic conditions, the nature of the soils for planting and the incidence of pests and diseases:

(a) Climatic Factors

Climatic conditions are created by the pattern and quantity of rainfall, as well as the levels of temperatures and humidity. The climatic conditions in Nigeria are governmed primarily by her tropical location (FAO, 1966; Nigeria, FMANR, 1974; Agboola, 1979; Babour et al., 1982). As illustrated in Chapter VI, the West and East have the highest rainfall, especially along the coastal areas of the two regions. Average rainfall in the Middlebelt is roughly half that of the West and East, while the North has the least rainfall which is about a third of the average rainfall in the West and East. Average temperatures are higher in the North and Middlebelt than in the West and East, resulting in higher levels of evaporation.

In the North and Middlebelt, this high level of evaporation lasts for between 5 and 8 months, while in the West and East, it lasts for between 3 and 5 months. The rainfall and temperature pattern in the North and Middlebelt is such that soil moisture levels may not be high enough at certain periods to sustain plant growth, while in the West and East, it may be so high at some periods resulting in a rapid growth of vegetation which creates problems of weed control.

Climatic conditions tend to reduce food production potential because of the limits imposed on the levels and timing of moisture supply (Barbour et al, 1982: pp.14-21). In areas of the North where the dry season is very long, agricultural activities virtually cease in the dry season and both farmers and animals frequently move southwards in search of food, water and pasture (Barbour et al, 1982:p.68). In the West, East and parts of Middlebelt where rainfall is plentiful, weed growth is fairly rapid and this reduces the soil nutrients for plant growth. Excessive heat and humidity upset animal physiology and productivity of livestock. They also cause high winds which reduce plant growth and increase the possibility of wind-induced erosion which hamper soil fertility (Chang, 1968). In addition, high temperatures and humidity induce severe losses in food production due to the problems they impose on food storage and provision of water for human and livestock consumption, as well as for irrigation purposes.

Climatic conditions periodically cut back production because of sudden fluctuations which take place. An example was the occurrence of the Sahelian drought which ravaged some countries in West Africa's Sahel region (Mauritania, Senegal, Mali, Upper Volta, Chad and Niger), as well as neighbouring countries including Nigeria since the late 1960's. Beginning in 1968, the Sahel zone progressively experienced lower rainfall until 1972/73 when the lack of rainfall became acute. There was some improvement in the rainfall level up to 1980. But in 1982/83, the drought of the early 1970s reappeared when the decline in rainfall ranged between 15 and 60 per cent in many parts of Nigeria, particularly in the north (CBN, 1983a: p.14). The regular occurrence of drought is attributed to climatological changes and disruption of the ecological system (Du Bois, 1978: p.51). Climatological changes involve a serious decline and fluctuations in precipitation, with most of it coming within a short period and may be lost through run-off and rapid evaporation. The disruption of the ecological system stems from overgrazing, and improper land use arising from crude clearing and uncontrolled deforestation.

It was estimated that in 1973, largely as a result of the drought, the production of cereal crops in the country was reduced by between 25 and 40 per cent, while about 300,000 head of cattle died through starvation

(CBN, 1973a: p.19; WAPC, 1973a and b: pp. 1025 - 1027 and pp. 1065-1069, respectively). In 1983, it was estimated that over 18 million hectares of farmlands were affected by drought (CBN, 1983a: p.13). Decreases in food crop production ranged between 20 and 70 per cent, while over 30,000 head of livestock were lost through lack of food. Other effects of the drought included destruction of vegetation and gradual desertification, fall in the rate of river flow and underground and surface water tables.

The climatic problems characterised by inadequate water resources in many areas, uneven distribution of available water resources, soil erosion and rapid evaporation call for effective policies and programmes of water resource development and management. Such programmes can ensure increased and balanced food production. The basic ingredients of water resource development are conservation, optimum utilization and efficient management. Conservation involves the storage of water from rainy season to dry season and retention of water on land surface. Optimum utilization involves a knowledge of the approaches for the exploitation of water resources and selection of the most suitable one. Efficient management includes the adoption of efficient operation and maintenance procedures.

Water resource development and management appear most effective when carried out within a drainage basin (Edwards, et al, 1983; p.2). This is because the river

basin development concept emphasizes the optimal use of the water resources of a drainage area as an entity and also involves the implementation of various programmes such as water, land, infrastructure, settlement and industrial development for food and agricultural production. In Nigeria, the river basin development approach was adopted in earnest in the 1960s with the intensification of implementation of the Kainji Dam and other projects in the north. But in the 1970s, a more comprehensive approach to river basin development was adopted when 11 River Basin Development Authorities were created to undertake a comprehensive and integrated development of the various river basins in the country (Nigeria, FMI, 1976). In 1984, the number of River Basin Development Authorities was increased to 18 such that the river basins of each state would be developed by one Authority[1/].

(b) Nature of Soils

The types of soils found in Nigeria are also largely determined by her tropical location. Some features of tropical soils tend to induce lower fertility (MacArthur, 1976: Ch.2). First, the pattern of precipitation in heavy rainstorms results in extensive leaching of the soil, so that most of the soluble plant nutrients are carried away, thereby limiting the natural potential fertility of the soil.

1/ Full assessment of these Authorities is undertaken in Chapter VIII.

Second, the soils contain a low level of organic material and under humid tropical conditions, these organic matters tend to disintegrate rapidly. Thirdly, tropical soils have poor structures because without a forest cover, latosols, the major soil types are low in organic matter and the high temperatures in the tropics are harmful to nitrogen accumulation. Under these conditions, soils may not be resillient under intensive cultivation, which thus leads to increased risk of water and wind erosion.

The consequence of low soil fertility is that productivity potentials are not exploited fully. As revealed in Chapter VI, this is a serious problem in the country where about 95 per cent of soils are rated to be of low to medium fertility (Agboola, 1979: p.32). The main implication is that these soils have to be maintained to improve their fertility and productivity. In the traditional farming system under which the use of artificial fertilizers is small, soil fertility maintenance is done by the system of shifting cultivation which involves leaving a used plot uncultivated for a period so as to regenerate it. This approach has helped, but its success has been limited with increasing population and man-land ratio and the consequent shortening of the fallow period (Agboola, 1979: p.35). Government has also made attempts at controlling soil erosion and undertaking soil conservation generally. For example, state Government planned expenditures for erosion control and soil

conservation increased from about ₦1.0 million during the 1962 - 68 plan period to ₦2.5 million in 1970-74, ₦10.5 million in 1975-80 and ₦16.2 million in 1981-85[2/]. Federal Government planned expenditures increased from ₦0.2 million in 1962-68 to ₦0.3 million in 1970-74, ₦4.0 million in 1975-80 and ₦250 million in 1981-85. However a lot of the projects designed to be implemented were either not started at all or remained uncompleted as of 1984. Ofomata (1981, p.121) has assessed the attempts at soil conservation and erosion control as ad hoc in nature and this explains why these problems persist in many parts of the country.

(c) Pests and Diseases

The tropical environment tends to foster the multiplication of pests and diseases (Kamarck, 1976: pp.30-42). These pests and diseases are known to affect both crops and livestock. Parasitic fungi, insects, spider mites, eelworms and virus diseases destroy growing crops, while storage pests and rats reduce harvested crops. Animal diseases and parasites retard the development of young animals and reduce the yields of milk and meat. A number of these diseases have been identified as serious constraints to crop and livestock production in Nigeria (Anochili, 1978: pp. 1-60)

2/ These data are compiled from the various plan documents (Nigeria, FMED, 1962, 1970 and 1975; Nigeria, FMNP, 1981).

Reliable estimates on the extent of crop and livestock losses due to pests and diseases in Nigeria are very scarce and those that are available were derived many years ago. Studies undertaken by Nigeria's National Agricultural Development Committee (Nigeria, NADC, 1972: pp.4-5) put the crop losses due to pests and diseases at 10 per cent for cereals, 16.5 per cent for grains, 10-15 per cent for roots and tubers, 10 per cent for fruits and vegetables. The FAO's estimates derived for 1970-1980 indicated losses of 7 per cent for grains, and 10 per cent for roots and tubers (FAO, 1971b: pp. 25-32). Considerable efforts have been made to reduce losses due to pests and diseases, although achievements have been slowed down due to financial and technical constraints.

The International Institute of Tropical Agriculture (IITA) in Ibadan had conducted several successful researches in the development of pest and disease resistant varieties of cereals, grains and roots and tubers. For instance, it succeeded in breeding resistant rice seeds to the stalk-eyed fly which infests rice and also developed resistant rice varieties against the storage moth, as well as against blast and rice yellow mottle diseases (IITA, 1982: pp. 13-16). The IITA also developed cowpea varieties that are resistant to bruchids which cause losses of stored cowpeas, as well as against cowpea diseases like aphid

borne mosaic, yellow mosaic, anthracnose, web blight, bacterial pustule and blight (IITA, 1982: pp. 57-60). On roots and tubers, the institute has undertaken a programme for the bilogical control of the cassava mealybug, while efforts were made to counter the viruses that infest yams (IITA, 1982: pp. 94-110). Plant protection chemicals such as pesticides have also been used to fight pests and diseases. As will be shown later in Chapter VIII, much as the achievements in research and the use of chemicals have been significant, the impact on food production is however still small.

3.1.2 Technological Constraints

A second category of factors which have constrained food production in Nigeria is the inadequate application of modern technical innovations which may be derived from research, extension, education, mechanization and the utilization of material inputs such as fertilizers, improved seeds, pesticides and herbicides. These sources of innovation may be classified into three groups:
(i) research which is the most important, largely induces technological break-throughs in yields and mechanical devices; (ii) extension and education which provide the foundation for the use of the results of research by farmers (iii) modern inputs which increase the potential of new varieties of crops and minimise waste which increases the

profitability of farm operations.

(a) Research

The numerous environmental problems and other constraints on food production require intensive agricultural research to reduce their impact and increase productivity. Among others, research is needed to reduce the water constraint, soil infertility and general drudgery of farm operations.

Although agricultural research in Nigeria has a long history, the assessment of its performance so far shows that its contribution to total production in that sector has been very small. Four aspects of this problem have been identified. First, national policy on research was not clearly defined until recently and this was largely attributed to the secondary role given to research in national agricultural development (Nigeria, FMANR, 1974; Olayide, 1981). Second, priorities in agricultural research seemed not to have been identified. Third, an effective co-ordination among a multiplicity of state and Federal research agencies on the one hand, and between government and other research institutes on the other, has not been consciously pursued (Olayide, 1981: pp.20-24). Fourth, the important aspect of dissemination of research results to actual users has not been effectively done (Olayide, 1981: pp. 20-24). Further assessment of research is undertaken in Chapter VII which deals with policy evaluation.

(b) Extension and Education

Through extension and education, farmers are informed and taught new methods in production, the overall objective being to increase productivity and encourage the emergence of a commercially-oriented production system. Like agricultural research, extension and education for agricultural production are relatively old institutions in Nigeria. But the success of extension and education as tools for massive increase in production has been very limited. The majority of small farmers have not felt the impact of the extension services (Ekpere, 1979: pp. 188-189; Eleje 1979: pp. 150-154). But, limited successes have been recorded in extension and education administered in special projects which normally embrace a small proportion of the small producers[3/]. The main outcome of these special projects is that effective agricultural extension and education is a powerful tool for mobilizing peasant farmers to expand food production. One of the indicators of the weak extension and education system is the relatively low ratio of extension staff to farmers. The ratio in Nigeria has been estimated by Eleje (1979, p.156) at 1:2000. On the other hand, the ratio for the Philippines was estimated at 1:100-150,

3/ Such special projects include the farm settlement schemes of the former regional governments, the recently introduced National Accelerated Food Production Project and the special schemes of Nigerian Universities such as the Isoya Rural Development Project, Zaria Rural-Change Project, Badeku Rural-Development Project etc.

the UK, 1:312, the Netherlands, 1:191 and Kenya, 1:250 (Eleje, 1979: p.156).

(c) Modern Inputs

In view of the substantial increases in yields in developed countries arising from the wide application of modern inputs such as fertilizers, improved seeds, pesticides etc., it has been suggested that one of the most important means of increasing food production in less-developed countries is the increased utilization of such inputs (Johnson, 1975: pp.67-72). Although considerable success has been recorded in the utilization of these inputs in recent years, their utilization rate is relatively low and their impact cannot be compared to what obtains in some other countries (Falusi and Olayide, 1980: pp. 68-85). For example, it has been estimated that the rate of fertilizer utilization in Nigeria is about 1.3 kg per cropped hectare as against the recommended rate of 18 kg per hectare (Olayide, 1976: p.29). Similarly, it is estimated that only one tractor is available for every 1,000 farmers in Nigeria which shows the large dependence on human labour, involving the use of the traditional hoe and cutlass for productive activity. It is also estimated that the operation of tractor hiring unit in each state of the country has resulted in the cultivation of about 55,180 hectares of land per year by tractors which is less than 1 per cent of total land cultivated per year (Oyaide, 1979: p.37). The

rate of production of improved seeds is much below requirements in normal circumstances. As of 1983, the production of improved seeds was estimated at between 20-30 per cent of national needs (Okorie,1984: p.117).

3.1.3 Institutional Deficiencies

Institutional deficiencies which limit agricultural productivity include among others, inefficient systems of marketing, land tenure, credit and rural development.

(a) Marketing System

An efficient marketing system enhances production by ensuring stable and remunerative prices and providing adequate marketing channels and facilities (Abbot, 1967; p.365). A number of studies has shown that food marketing system in Nigeria has not performed up to potential and as such has not produced the necessary incentives for food production (Anthonio, 1971; Olayemi, 1974, Adeyokunnu, 1980).

(i) Distribution

The physical function of transportation is not performed efficiently because of inadequate storage facilities, high incidence of pest damage during storage, low incomes of farmers, insufficient feeder roads, and the irregularity and high charges of transport venicles. In the market structure, although there is a multiplicity of middlemen traders which may

indicate competitiveness, there is some degree of collusion, as well as discriminatory and monopolistic pricing by traders (Adeyokunnu, 1980: p.93). Inadequate market information and lack of standardised measure of quantity and quality are also factors that increase market imperfection.

Food prices also fluctuate a great deal and this is partly due to inadequacies mentioned above. Those deficiencies, and particularly transportation bottlenecks, inadequate storage facilities and the large number of middlemen tend to inflate marketing margins unduely. It has been estimated that marketing margins of some food crops in Nigeria are about 50 per cent of retail prices, which is considered high in view of the poor services rendered by many traders (Adeyokunnu, 1980: p.95).

(ii) Storage

Without adequate storage, the marketing system or processing establishments cannot function efficiently. Losses due to inadequate storage may be attributed to fungus and pest infestation, lack of respiration such as in yams and too much moisture such as in maize. In Nigeria, the traditional system of storage predominates (Anochili, 1978: pp.4, 21, 42). For example, maize is stored by tying the cobs together through the sheaths and suspending them through the roofs of houses where cooking fire dries the maize and kills

insects. Beans are stored in mud rumbus, pots and oil drums, while yams are stored in barns made of poles and in the pit. These traditional methods have performed some useful roles, but are increasingly inadequate for massive food production. Losses due to storage problems are caused mostly by pests and a high level of humidity. The U.S. National Academy of Sciences has estimated that 2-10 per cent of annual rice and maize production in Nigeria is lost because of moisture absorption and insect attack in storage (U.S.A., NAS, 1978: pp. 65-71; pp. 76-82). Similarly, losses due to insects in sorghum amounted to about 30 per cent, while an average of 5-10 per cent of grain production is lost to insects (U.S.A., NAS; 1978: pp. 84-94).

(b) Land Tenure

The land tenure system in a country at a particular point in time is an important factor in the production process because it determines the size and unit of ownership, as well as the share of the actual cultivator of the soil. All these variables ultimately affect the types of production techniques, the volume of production and the distribution of the output.

It is an over-simplification to refer to a land tenure system in Nigeria since various communities have their own systems of land tenure (Famoriyo, 1979: pp.44-64). But certain common characteristics of the

various systems can be identified for purpose of analysis (Oluwasanmi, 1966: pp. 24-47).

(i) land is generally regarded throughout Nigeria as the property of the community which may refer to the extended family, a clan or a village consisting of a number of lineage groups;

(ii) a member of the community usually has possessory rights in land which he enjoys in perpetuity; and

(iii) individuals cannot dispose of land which is regarded as an unnegotiable property.

The traditional tenure system has continously been modified to give room for individualistic tenure because of population pressure and the spread of the cash economy. But it can be observed that the communal tenure was predominant until the changes brought about by the promulgation of the Land Use Decree in 1978 (Nigeria, FMI, 1978).

The various land tenure systems were generally considered an important factor in social cohesion of the rural communities and provided a foundation by which production was carried on unhindered (Famoriyo, 1979: p.20). But viewed from a dynamic setting, the systems had features that constrained production (Nigeria, FMANR, 1974: pp. 72-74; Osiuntogun, 1977: pp. 64-66). First, the practice of inalienability of land could limit investments to improve the

quality of land, while crop sharing could also produce a similar result. Second, the inheritance system whereby agricultural land might be shared among off-spring could result in excessive fragmentation of holdings which might not encourage the adoption of technological innovations.

The promulgation of the Land Use Decree, 1978 sought to remove some of these constraints by its main provisions (Nigeria, FMI, 1978: pp. A49-67). The Decree vested in the Governor of a state all the land of that state to be held in trust for all citizens. The governor is to be advised in the implementation of the Decree by the state Land Use and Allocation Committee and the Local Land Allocation Advisory Committee. The latter Committee allocates land in rural areas for production and grazing. Where allocations are made, certificates of occupancy will be issued, except that all lands used for agricultural purposes before the Decree would not need certificates of occupancy. These provisions when implemented are expected to enhance the security of tenure, increased size of holdings, enable "foreigners" to own land, reduce fragmentation of holdings, and reduce excessive land rents. The Land Use Decree has probably permitted the emergence of many commercial holdings in the country. But it does not seem to have significantly reduced the land use problems at which it was aimed. Its implementation may even have added a new set of constraints in the form of long delays

in handling issues related to land and the difficulty of using land as security for loans.

(c) Agricultural Credit

Credit is the primary source of working capital and investment for farmers. Attempts by government to provide credit to the farm sector began before independence. One of the earliest credit institutions was the Nigerian Local Development Board established in 1946 (Wells, 1974: pp.315-320). The Board was later split to form development boards and corporations in the former regions. While these corporations were taking more interest in large-scale investment, especially in industry, farm credit became the speciality of the finance corporations from which later emerged the agricultural credit corporations and the 'supervised rural credit 'schemes' in the states. The Federal Government took little interest in farm credit until 1973 when it established the Nigerian Agricultural and Co-operative Bank as a limited liability Company. In 1977, the Agricultural Credit Guarantee Scheme Fund Decree set in motion the operation of the Agricultural Credit Guarantee Scheme under which commercial bank credit to farmers will be substantially guaranteed by the Central Bank (Nigeria, FMI, 1977b). On the whole, the farmer has largely depended on credit facilities supplied by families, local money lenders, and to some extent on government credit institutions, as well as commercial and merchant banks.

With respect to the credit channels operating before 1973, it has been suggested that their operations with respect to the farm sector have been "characterised more by failure than by success"(Wells, 1974: p.319). This failure is generally attributed to the fact that private financiers lent at high interest rates, while loans from banks and public institutions placed undue emphasis on the farmer's credit worthiness through the presentation of acceptable collaterals. Land and crops appear to be the only assets which farmers can use as collaterals to obtain loans. There has been a tendency to favour permanent crops which thus discriminates against food crops. On land, although the system of communal holdings appears gradually to be changing to individual ownership, it has been difficult to distinguish between individual and communal land.

With respect to recent credit institutions and schemes set up by government, there is evidence that the volume of credit flowing into the farm sector through them, especially for food production has increased (Ojo, 1984). A major problem that characterizes the operations of credit institutions is that the bulk of peasant farmers seem to be discriminated against in credit allocations because of their inability to procure necessary collaterals. Even where cooperatives are expected to play an important role as intermediaries between credit

institutions and small farmers, such cooperatives have not developed as fast as expected (Edordu,1981: pp.350-363).

An important explanation for the low involvement of farmers in organised credit institutions is the limited number of branches of such institutions. With regard to credit from the public sector, the operations are carried out in a few locations such as in Federal and State capitals in the case of the Federal Government and in the state capitals and a few local government headquarters in the case of the state Governments. The branches of commercial banks are concentrated in urban areas,even in spite of conscious efforts to induce them to establish branches in the rural areas. The effect of this paucity of banks, especially in the rural areas, is that the walking distance of a bank is extremely long and prevents easy accessibility to borrowers. For instance, available data show that there were 1213 bank branches in 1984 (CBN, 1984: p.40), and given a land area of 923.8 thousand km^2, this gives an average walking distance to a bank of about 16 km which is rather long given the inadequate transportation system.

(d) Rural Development

A fourth category of institutional deficiencies relates to the lack of rural development institutions

which place priority on the provision of special services and facilities for the rural areas. For example, the problem of inadequate infrastructures in the rural areas has been comprehensively studied by Idachaba et al (1981b). In a nation-wide survey of rural infrastructures in the local government areas of all states in Nigeria, Idachaba in collaboration with the Federal Ministry of Agriculture found that not only were rural infrastructures grossly inadequate, but also that great disparities existed in the supply of these facilities among states, within local government areas of states and between urban and rural areas (Idachaba et al, 1981b: Vols. 1 and II).

Rural infrastructures were classified into three categories: rural physical infrastructures (transportation, storage processing irrigation facilities); rural social infrastructures (health and educational facilities and rural utilities); and rural institutional infrastructures (cooperative societies, community project, financial institutions, research, extension and marketing facilities and post and telecommunication facilities). The inadequacy of rural infrastructures can be illustrated with reference to the availability of one type of each category - roads, medical and agricultural extension facilities. The road densities were unevenly distributed and extremely low, ranging from 45 metres

per km^2 in Borno State to 496 metres per km^2 in Ogun State (Idachaba et al., 1981b: p.24). The best served state in terms of medical facilities had one hospital bed per 1047 persons (Bendel) and one doctor per 12,389 persons (Oyo), while the lowest walking radius of a hospital was 10 kms in Kano (Idachaba et al.,1981b: p.36). Agricultural extension service facilities were also few and unequally distributed. The ratio of extension workers to farmers varied between 1:17,055 in Borno State to 1:820 in Benue State, while the average walking distance for an extension worker ranged from 5 kms in Benue State to 13 kms in Borno State (Idachaba et al., 1981b: p.81).

The distribution of these infrastructures by region shows that the West and East were better served than the North and Middlebelt. Road densities in the West and East amounted to 322 and 244 metres per km^2, respectively, while they stood at 75 and 125 metres per km^2 in the North and Middlebelt. The walking radius of a hospital was 20 kms in the West and 16 kms in the East. They were 36 and 42 kms in the North and Middlebelt, respectively. The ratio of extension worker to farmer was 1:1500 in the West and 1:2500 in the East. In the North and Middlebelt, they were 1:6000 and 1:2000, respectively.

Available data indicate that these indicators are relatively low in comparison with other developing countries. For instance, in section 3.1.2 (b), it was indicated that the ratio of extension staff to

farmers in Kenya was put at 1:250 in 1979 and that of the Philippines at 1:100-150. In 1980, the World Bank (IBRD, 1980: p.152) estimated the number of people per doctor to be 11,950 in Kenya, 1,070 in Egypt, 15,220 in Ivory Coast and 2,760 in the Philippines.

This inadequate state of amenities in the rural areas has restrained the attainment of possible production levels, particularly in the Middlebelt because of the lack of necessary support ofor production, reduced labour productivity, waste and poor management of output. The Federal and State Governments have generally recognised the need to provide these infrastructures and capital investment on their development has increased from about 2 per cent of total capital investment in the Second Plan to about 4 per cent in the Fourth Plan.

3.1.4 Labour Constraints

Adequate supply of labour is important in smallholder food production because it aids critical farm operations such as planting, weed control and harvesting. In spite of the available evidence that there is surplus labour in most developing countries, several labour constraints are known to limit agricultural and food production (Lele, 1975: p.23). In Nigeria, it has been found that labour bottlenecks constrain smallholder farms during the critical periods of farm operations such as land clearing,

weeding and harvesting (Atobatele and Olayide, 1980: p.152). One reason for this is the reduced supply of labour by family units due to higher enrolments in educational institutions. Another reason is the increased flow of labour from urban to rural areas in the wake of the oil boom which tended to attract bigger investment into the urban areas. A major source of labour constraint is the low level of labour productivity. This is basically due to the numerous constraints analysed earlier in this chapter. Another farm labour constraint arises from low educational and management skill. The potential for increased food production is not attained partly because of the limited knowledge of farmers with regard to modern farming techniques. These labour constraints result in lower levels of food production because they imply either inadequate labour supply or under utilization which will tend to reduce planting precision and encourage poor weed control, untimely harvesting, processing and storage.

These labour constraints call for measures that will increase the flow and quality of labour on the farms. This has to do with overall modernization of the agricultural sector through the introduction of modern techniques, organisation of rural labour, provision of more rural employment and appropriate wage policies. These areas have received some, but generally inadequate attention from the government.

CHAPTER IV

METHODOLOGY OF THE STUDY

As a result of the literature review undertaken in Chapter II and the background information on Nigerian agriculture provided in Chapter III, it is necessary to develop two aspects of the evaluation framework in this study. The First is to provide evaluation criteria for food and nutrition having regard to the existing data base. The second is the articulation of evaluation criteria which can be used for appraising food policies. The two sets of evaluation criteria constitute the methodology to be applied in Chapters V - VIII.

4.1 Evaluation of Food and Nutrition Situation

4.1.1 The Food Balance Sheet Approach

The food balance sheet is an accounting method of compiling food statistics to gauge the probable level of food consumption in a specific country in a given period, usually one year. Its use by the FAO has made it acceptable to most countries. Simply, the food balance sheet compares total food supply with total food utilization primarily to compute the net available food supply and its food content for that country during the given period. This net food supply may be derived as follows:

Let FS_{it} = gross supply of food item i in year t;

FQ_{it} = total domestic production of food item i in year t;

FM_{it} = total import volume of food item i in year t;

FU_{it} = total utilization of food item i in year t;

FC_{it} = net supply of food item i available for human consumption in the domestic economy in year t;

FX_{it} = total export volume of food item i in year t;

FW^{r}_{it} = total quantity of food item i wasted up to retail level in year t;

FW^{h}_{it} = total quantity of food item i wasted in homes in year t;

$FW_{it} = FW^{r}_{it} + FW^{h}_{it}$

FI^{p}_{it} = total quantity of food item i used as inputs for planting in year t;

FI^{s}_{it} = total quantity of food item i used as industrial raw materials (including animal feed) in year t;

$FI_{it} = FI^{p}_{it} + FI^{s}_{it}$

FT_{it} = net change in stock of food item i in year t; where carry-over stocks from year t - 1 are positive and carry-over stocks from year t are negative;

FNA_{it} = total quantity of food item i not available for human consumption in the domestic economy in year t; i.e.

$FNA_{it} = FX_{it} + FI_{it} + FW_{it}$

For any given year, gross supply of food item i consists of total domestic production, the quentity imported and the net change in stocks of food item i within the year. Thus,

$$FS_{it} = FQ_{it} + FM_{it} + FT_{it} \quad \ldots\ldots\ldots \quad (4)$$

Total utilization of food item i in a year is made up of net food supply available for human consumption in the domestic economy, food exported, food wasted and food used as inputs for planting and industrial raw materials. Therefore,

$$FU_{it} = FC_{it} + FX_{it} + FI_{it} + FW_{it} \quad \ldots\ldots \quad (5)$$

Since total food supply must offset total utilization of food,

$$FS_{it} = FU_{it} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (6)$$

and substituting the right-hand side of equation (5) for FU_{it} in equation (6), we have

$$FS_{it} = FC_{it} + FX_{it} + FI_{it} + FW_{it} \quad \ldots\ldots\ldots \quad (7)$$

and from equation (7)

$$FC_{it} = FS_{it} - (FX_{it} + FI_{it} + FW_{it}) \quad \ldots\ldots\ldots \quad (8)$$

and

$$FC_{it} = FS_{it} - FNA_{it} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (9)$$

To derive the calorie or protein content of net food supply, we define:

$i = 1, \ldots\ldots, 9$ (9 categories of food)

$j = 1$ (calorie), $= 2$ (protein)

C_{ijt} = food content of net available food supply in year t;

R_{ij} = proportion of category j per unit in food item i;

N_i = extraction rate for food item i;

P = total population for the year.

From equation (9), the food content of available food supply can be defined as:

$$C_{ijt} = \sum (FS_{it} - FNA_{it}) R_{ij} N_i \quad \ldots\ldots\ldots \quad (10)$$

or

$$C_{ijt} = \sum (FC_{it} R_{ij} N_i) \quad \ldots\ldots\ldots\ldots \quad (11)$$

and the content of net food supply per capita (C_A)

$$C_A = \frac{C_{ijt}}{365p} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (12)$$

To assess the food and nutrition situation in a particular country in a given year, the computed calorie and protein contents from net food supply are compared with the corresponding minimum requirements which have been determined by the FAO for various regional groups in the world.[1] According to the FAO, these minimum requirements are determined by five factors, the first two being the most important: physical activity, body size and composition, sex, age and climate (Passmore et. al, 1974: pp.10-11). In effect, minimum requirements

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[1] Estimates of requirements are usually prepared by Expert Committees on Nutrition convened by FAO in cooperation with World Health Organization (WHO) and are based on published research data of several decades.

may vary from one individual to another. But due to insufficient data, it is common to compute average requirements for regional groups and individual countries.

Relating the computed calorie or protein content in a given year to the minimum requirement, a country's food supply may be said to be adequate if net food supply per capita (C_A) is equal to or greater than minimum food requirement per capita:

if C_{mj} = minimum requirement of calorie or protein per capita per day for the population,

$$C_A = \frac{C_{ijt}}{365p} \geq C_{mj} \quad \text{.....(13)}$$

The derivation of the food balance based on Equations (10) - (13) can be generalised to take account of an n-commodity basket and presented in an alternative form using matrix notations. The gross supply of all food items in year t defined as FS_{it} $(i = 1,2 \ldots\ldots,n)$ is obtained through the addition of column vectors of domestic food production, FQ_{it} $(i = 1,2 \ldots,n)$, food imports, FM_{it} $(i = 1,2, \ldots\ldots\ldots,n)$, and end of year food stocks, FT_{it} $(i = 1, 2, \ldots\ldots\ldots,n)$.

Thus,

$$\begin{bmatrix} FS_1 \\ FS_2 \\ \cdot \\ \cdot \\ FS_n \end{bmatrix} = \begin{bmatrix} FQ_1 \\ FQ_2 \\ \cdot \\ \cdot \\ FQ_n \end{bmatrix} + \begin{bmatrix} FM_1 \\ FM_2 \\ \cdot \\ \cdot \\ FM_n \end{bmatrix} + \begin{bmatrix} FT_1 \\ FT_2 \\ \cdot \\ \cdot \\ FT_n \end{bmatrix}$$

If $S = S_{ij}$, $Q = q_{ij}$, $M = m_{ij}$ and $T = t_{ij}$ represent the column vectors of gross food supply, domestic food production, food imports and year-end stocks of the food items, the above expression can be alternatively put as:

$$(S_{ij}) = (q_{ij}) + (m_{ij}) + (t_{ij}) \quad \ldots\ldots\ (4a)$$

Similarly, the quantities of food not meant for human consumption in the domestic economy in year t, defined as FNA_{it} $(i = 1,2,\ldots\ldots,n)$ is obtained by the addition of column vectors of food exports, FX_{it} $(l=1,2, \ldots\ldots,n)$, food used as inputs, FI_{it} $(i=1,2,\ldots\ldots n)$ and food wasted up to retail level FW_{it} $(i=1,2, \ldots\ldots,n)$.

Thus,

$$\begin{bmatrix} FNA_1 \\ FNA_2 \\ \cdot \\ \cdot \\ FNA_n \end{bmatrix} = \begin{bmatrix} FX_1 \\ FX_2 \\ \cdot \\ \cdot \\ FX_n \end{bmatrix} + \begin{bmatrix} FI_1 \\ FI_2 \\ \cdot \\ \cdot \\ FI_n \end{bmatrix} + \begin{bmatrix} FW_1 \\ FW_2 \\ \cdot \\ \cdot \\ FW_n \end{bmatrix}$$

If $A = a_{ij}$, $X = x_{ij}$, $I = i_{ij}$ and $W = w_{ij}$ represent the column vectors of total food for purposes other than human consumption, food exports, food used as inputs and food waste, respectively, the above expression can also be expressed as:

$$(a_{ij}) = (x_{ij}) + (i_{ij}) + (w_{ij}) \quad \ldots\ldots\ldots \quad (4b)$$

The food balance in year t defined as FC_{it} $(i=1,2, \ldots\ldots,n)$ and represented by the column vector $C = c_{ij}$, is the difference between the column vectors S (gross food supply) and A (food for non-human consumption). Thus,

$$\begin{bmatrix} FC_1 \\ FC_2 \\ \cdot \\ \cdot \\ FC_n \end{bmatrix} = \begin{bmatrix} FS_1 \\ FS_2 \\ \cdot \\ \cdot \\ FS_n \end{bmatrix} - \begin{bmatrix} FNA_1 \\ FNA_2 \\ \cdot \\ \cdot \\ FNA_n \end{bmatrix}$$

which may be alternatively expressed as:

$$(C_{ij}) = (S_{ij}) - (a_{ij}) \quad \ldots\ldots\ldots\ldots \quad (9a)$$

Now, let the calorie or protein content of the various food items be represented by the row vector $R = r_{ij}$. Therefore, the food content of all food items in year t, defined as D, is the product of the vectors R (food content) and C (food balance), where R is of order $1 \times n$ and C is of order $n \times 1$. Thus,

$$D = RC = \begin{bmatrix} r_{11} & r_{12} & r_{1n} \end{bmatrix} \begin{bmatrix} C_{11} \\ C_{21} \\ \cdot \\ \cdot \\ C_{n1} \end{bmatrix}$$

$$= \sum_{k=1}^{n} r_{1k} C_{k1} \quad \ldots\ldots\ldots\ldots\ldots \quad (11a)$$

Which is a scalar. Equation (11a) is equivalent to equation (10) or (11), while the food content of net food supply per capita (C_A) per day is defined as:

$$C_A = \frac{D}{365p} \quad \ldots\ldots\ldots\ldots\ldots\ldots \quad (12a)$$

which is equivalent to equation (12). The equivalent of equation (13) is:

$$C_A = \frac{D}{365p} \geq C_{mj} \quad \ldots\ldots\ldots\ldots \quad (13a)$$

which relates food content to minimum requirements.

The above framework needs some notational adjustments for the regional analysis. To evaluate the food balance sheets for each region we can adapt equations (9), (10), (12), and (13) given above. The regional equivalents of these equations are as follows:

$$FC_{ikt} = FS_{ikt} - FNA_{ikt} \quad \ldots\ldots\ldots\ldots \quad (15)$$

$$C_{ijkt} = \sum (FS_{ikt} - FNA_{ikt}) R_{ij} Ni \quad \ldots \quad (16)$$

$$C_{AK} = \frac{C_{ijkt}}{365p} \geq C_{mjk} \quad \ldots\ldots\ldots\ldots (17)$$

where FC_{ikt} = net supply of food item i available for human consumption in region k in year t;

FS_{ikt} = gross supply of food item i in region k in year t;

FNA_{ikt} = total quantity of food item i not available for human consumption in region k in year t;

C_{ijkt} = food content of net food supply in region k in year t;

C_{AK} = food content of net food supply per capita in region k; and

K = 1,2,3,4 (4 regions).

and all other symbols are as defined earlier.

Equation (15) will be used to derive available food supply in each region, while equation (16) will be used to compute the calorie or protein content of available food supply in each region. The food content of available food supply is measured in per capita terms through equation (17), while the comparison with minimum requirements will be done by equation (18). The derivation using equations (15) and (16) can be generalised to take account of an n-commodity basket in each region through the use of matrices and vectors. The food balance in region k in year t defined as FC_{itk} (i=1,2, ...,n) and represented by the column vector $C = C_{ij}$, is the difference between the column

vector of gross food supply $(FS_{itk}, i=1,2 \ldots\ldots n)$, $S=S_{ij}$ and the column vector of food for non-human consumption $(FNA_{itk}, i=1,2, \ldots\ldots,n)$, $A = a_{ij}$.

Thus,

$$\begin{bmatrix} FC_{1k} \\ FC_{2k} \\ \cdot \\ \cdot \\ FC_{nk} \end{bmatrix} = \begin{bmatrix} FS_{1k} \\ FS_{2k} \\ \cdot \\ \cdot \\ FS_{nk} \end{bmatrix} - \begin{bmatrix} FNA_{1k} \\ FNA_{2k} \\ \cdot \\ \cdot \\ FNA_{nk} \end{bmatrix}$$

which may also be expressed as:

$$(C_{ij}) = (S_{ij}) - (a_{ij}) \quad \ldots\ldots\ldots\ldots \quad (15a)$$

If the calorie or protein content of the food items in region k is represented by the row vector $R = r_{ij}$, the total content of all food items (D) in year t in the region is the product of the vectors R and C where R is of order 1xn and C is of order nx1. Thus,

$$D = RC = \sum_{K=1}^{n} r_{1k} \, C_{k1} \quad \ldots\ldots\ldots \quad (16a)$$

which is a scalar. Net food supply per capita is defined as:

$$C_{AK} = \frac{D}{365p} \quad \ldots\ldots\ldots\ldots\ldots\ldots \quad (17a)$$

while the calorie or protein assessment criterion is:

$$C_{AK} = \frac{D}{365p} \geq C_{mjk} \quad \ldots\ldots\ldots\ldots \quad (18a)$$

4.1.2 Food Gaps

The food gap in any given period measures the difference between available food supply and potential demand. This is also a good measure of food adequacy since it attempts to show the extent to which food supply should rise to meet up with demand that is implied by income and population parameters. The food gap may be derived from the following equations:

$$g_t = S_t - D_t \quad \ldots\ldots\ldots\ldots\ldots \quad (19)$$

$$S_t = (FS_{it} - FNA_{it}) \quad \ldots\ldots\ldots\ldots \quad (20)$$

$$D_t = D_o (1 + E_y P + E_N B) \quad \ldots\ldots\ldots \quad (21)$$

$$g_t > 0 \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (22)$$

$$g_t < 0 \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (23)$$

where g_t = food gap in year t;

S_t = net food supply in year t;

D_t = food demand in year t;

D_o = food demand in the base year;

E_y = income elasticity of demand for the food item;

P = percentage change in GDP from the base year;

E_N = population demand elasticity for the food item; and

B = percentage change in population from the base year.

Equation (20) is the same as equation (19) in the previous section, and thus measures actual food supply. Equation (21) is a modified form of equation (3) and makes food demand primarily a function of income and population growth. Other factors like urbanization, income distribution, prices and family size and composition may be important but lack adequate quantification in the Nigerian context. Equations (22) and (23) indicate that when supply is greater than demand, there is a food surplus and the food gap is positive. When this occurs, the food situation is adequate. However, when the food gap is negative, the food situation is inadequate.

It may be observed that the food gaps are only indicative of the actual situation since the two series of supply and demand data are to be estimated independently of each other, with no account taken of the effects of any interaction between them.

To undertake the regional estimates, we simply adjust the above equations by adding the regional notation. The equivalents of equations (19) - (23) will be:

$$g_{kt} = S_{kt} - D_{kt} \quad \ldots\ldots (24)$$

$$S_{kt} = FS_{ikt} - FNA_{ikt} \quad \ldots\ldots (25)$$

$$D_{kt} = D_{ko} (1 + E_y P + E_N B) \quad \ldots\ldots (26)$$

$$g_{kt} > 0 \quad \ldots\ldots (27)$$

$$g_{kt} < 0 \quad \ldots\ldots (28)$$

where g_{kt} = food gap in a region in year t;

S_{kt} = food supply in a region in year t;

D_{kt} = food demand in a region in year t;

D_{ko} = food demand in a region in the base year;

and all other symbols are as defined earlier. Similarly equations (27) and (28) are used to define adequate and inadequate food situations, respectively.

4.1.3. Indicators of Malnutrition

Malnutrition is properly assessed after food intake has been measured. But due to lack of data, it is often assessed indirectly through an interpretation of the data compiled from a food balance sheet, the levels of poverty and education.

(a) Indirect Assessment

(i) The Food Balance Sheet

As indicated before, the food balance sheet is not a compilation of actual food consumption, but it gives a general indication of the probable pattern of food consumption. The levels of protein and calorie supply achieved from the nation's food supply can affect the level of malnutrition in three ways (Robson, 1972: p.55). First, if the level of protein is not adequate, the growth, maintenance and repair of body tissues will be impaired. Second, even if protein intake is adequate, but it is not of the highest quality, the human body will

not attain its optimum efficiency.[2] Third, if the calorie supply falls short of requirements, the body will convert protein and other nutrients into calories for energy thereby reducing the protein intake.

(ii) Poverty

In general, although malnutrition may be said to be due to a combination of interrelated factors such as ecology and culture, it can be claimed that poverty is the primary cause of malnutrition (FAO , 1975a; p.106 and Annexe Table 3D). It is therefore not surprising that the bulk of malnourished people are in Asia and Africa, the poorest continents in the world (USDA 1974: pp.50-51; IBRD, 1980-1985). A low level of income is the most important aspect of poverty. Not only does it confer inadequate purchasing power over the necessary food items, it also limits the quality of housing, medical facilities and other environmental conditions which tend to intensify the malnutrition problem (Burk and Ezekiel, 1967: p. 340). Poverty in less-developed countries has rural and urban dimensions (FAO: 1975a: p.110). A fast rate of urbanization is linked with a declining diet and results in increased incidence of diseases due to slow growth in supply and limited variety of diet.

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2 It is generally known that animal proteins are superior to vegetable proteins. This is obvious from Table 5.3 (Section I) in which can be seen the protein content of animal and vegetable foods. Except for cowpea and groundnuts, livestock products produce a higher content of protein than vegetable products.

(iii) Education

The level of education is an important determinant of nutritional levels. Generally a low level of education results in low incomes which induce inadequate nutrition. The low level of education can also contribute to the incidence of malnutrition since people with little or no education have been known to lack knowledge of nutritive values of foods and of requirements of adequate diet (Burk and Ezekiel, 1967: p. 339). Such people also have been known not to take adequate care in the preparation of foods so as to prevent great losses of nutritive value.

(b) Direct Assessment

In a direct assessment of malnutrition, there is a measurement of actual food intake by the population (FAO, 1969: p.16). Usually however, the direct measurement of food intake is undertaken for population samples due to the prohibitive costs of a nationwide survey. The two most commonly used methods of direct food intake are:

(i) consumer expenditure survey, and

(ii) food consumption survey.

These have been defined earlier. Data compiled from these surveys can be used to assess actual food intake by comparing them with minimum requirements and examining the quality of diets through the types of foods consumed by the population.

4.2 Food Policy Evaluation

In adapting the policy frameworks provided by Tinbergen, Fox et al and Idachaba (see Chapter II), there is need to specify criteria for food policy formulation and implementation against which policy achievements can be assessed. Policy formulation involves the statement of objectives, the choice of instruments and the adoption of appropriate projects and programmes, while policy implementation requires the definition of the roles of the participants, the adoption of an overall strategy, the shaping of appropriate institutions and the design of evaluation criteria.

4.2.1 Policy Formulation

1. Policy Objectives

The objective of policy is simply a statement of the aim for which the set of policies is being adopted. The aim of policy is usually translated into an aggregate social welfare function of the society or the policy maker's preference function that reflects the interest implied in the society's welfare function. The policy objectives are designed by applying several principles such as the time horizon within which the policy objectives are to be achieved. This time dimension will take into account past and future developments in the world economy which will to a large extent determine the feasibility of achieving the objectives within local resources. Also, since the policy objectives will be

pursued with the support of part of national resources which are meant to achieve other national and sectoral objectives, developments in the domestic economy must be taken into consideration.

2. Policy Instruments

The policy instruments are the means of achieving the stated objectives of policy. Policy instruments are divided by Tinbergen into three categories. The first group consists of the instrument variables which are quantitative in nature and used to effect small changes in the economy. Examples are changes in tax rates and subsidies. The second group of instruments can be used to alter the underlying structure of the economy. Examples are improvements in credit, and other infrastructural facilities. The third group of instruments consists of reform measures which induce changes in the foundations of the economy. Examples are land reforms which involve redistribution, consolidation or nationalization. What is important in the listing of policy instruments is that they are many and in order to attain the desired objectives, such instruments must be closely related to the objectives.

3. Projects and Programmes

The formulation of projects and programmes precedes policy execution and evaluation. Projects and programmes are the physical investments in particular activities in attempting to attain the overall policy objectives through selected policy instruments. Projects involve generally single activities such as the construction of a dam across a river or the construction of a rural road. Programmes

consist of several projects or activities in support of a large number of participants. Examples in agriculture are commodity programmes involving the production of several crops and livestock, input programme involving the supply and distribution of various inputs and extension programmes which are aimed at efficient delivery and effective utilization of inputs. The most important consideration in chosing particular projects and programmes is their relevance in terms of achieving the objectives. Thus, they need to be evaluated.

In an attempt to ensure that scarce resources are channelled into activities that can earn the highest returns, the evaluation of projects and programmes has at least four phases. The technical phase involves the evaluation of the various inputs, their availability, location and accessibility in relation to the different methods of production. The financial phase involves the evaluation of the financial implications of the technical alternatives. Specifically, it deals with estimates and sources of capital costs, the probable revenues and the financial profitability. The economic aspects examine the contribution of the project to the economy as a whole. It calculates the social costs and social benefits, using shadow prices which reflect the relative scarcity of the resources to be used and taking into account the risk and uncertainty surrounding the project (Gittinger, 1982: pp. 18-21). The final phase is the managerial and organizational aspect which considers the implementation of the projects or programmes by prescribing appropriate roles and ensuring adequate coordination of activities.

4.2.2 Policy Execution and Evaluation

In this aspect, we need to define proper roles for those implementing policies, recommend a strategy for policy implementation, prescribe criteria for the institu- structure and indicate criteria for monitoring food policy implementation.

Although the present economic philosophy permits the public sector to undertake direct food production, there is evidence that private producers are more efficient at production. Consequently, the public sector should provide the necessary incentives to private farmers to produce. Also, given the dominant position of peasant farmers in the production system, the package of incentives should be focussed on them using an integrated rural development approach which has been found to be relatively more efficient than other approaches. For the integrated rural development approach to be effective, there should be well-staffed rural development institutions which can reach the majority of farmers. For the purpose of monitoring and evaluation, there should be criteria or indicators to assess the aggregate food situation as well as individual policies on a continuous basis.

CHAPTER V

EMPIRICAL ANALYSIS OF THE AGGREGATE FOOD AND NUTRITION SITUATION IN NIGERIA

This is the first of two chapters to be devoted to the evaluation of the food and nutrition situation in Nigeria, utilizing the methods developed in Chapter IV. In this chapter, the analysis involves the application of the aggregate data for the country. First, the primary data of domestic food production are reviewed. Second, with necessary adjustments to the food production data, a national food balance sheet is derived with a view to computing the calorie and protein gaps for the period under review. Third, food supply and demand data are compiled with a view to computing food gaps in the country. Finally, some indicators are reviewed to assess directly or indirectly the incidence of malnutrition in the country during the period.

5.1 Domestic Food Production

5.1.1. Data Sources

Domestic food production classified by categories is presented on Table 5.1, while the production of individual food items is in Appendix 1. Production data of major staple foodstuffs were obtained from the Federal Office of Statistics which annually conducts a rural economic survey (Nigeria, FOS, Annual). The rural economic survey embraces the major staple food crops. With respect to other crops and items, such as livestock products, not covered in this survey,

production estimates made by Olayide et.al. (1972, Ch.3), the FAO (Production Yearbook) and the Federal Department of Agriculture (Nigeria, FMNAR, 1974; Chs. 6-8) are used. Data on fish production were obtained from the Federal Department of Fisheries (Nigeria, FDF, 1980: pp. 3 - 32).

For the purpose of aggregating annual food production data, which are normally presented in metric tons in the above sources, the primary figures were converted into their respective grain equivalents. The conversion factors were obtained from the FederalDepartment of Agriculture and are as follows[1/] cereals (0.96), grain legumes (1.06), roots and tubers (0.26), oilseeds and nuts (1.47), vegetables and fruits (0.08), vegetable oils (2.40), sugar (1.07), beverages (0.08) and livestock products (0.46).

5.1.2 Analysis of Data

(a) Production Trends

Total food production was generally on the decline during the review period. For analytical purposes, the whole period can be subdivided into five: 1961 - 1964, 1965 - 1969, 1970 - 1974, 1975 - 1979 and 1980 - 1982. Between 1961 and 1964, total food production was strongly upwards. It moved from 15.1 million tonnes of grain equivalent (tge) in 1961 to 17.6 million tge in 1962, 18.3 million tge in 1963 and 19.3 million tge in 1964, indicating an average production of 17.6 million tge and a growth rate of 8.5 per cent per annum. Between 1965 and 1969, total food

1/ The conversion factor indicates the grain equivalent of one metric ton.

production increased strongly in the first two years, recording a peak of 19.6 million tge in 1966, after which there was a significant decline. Average production in the period was 17.7 million tge which was slightly higher than the 1961 - 1964 average production by 0.9 per cent. But production recorded an annual decline of 3.9 per cent.

In the subsequent two sub-periods 1970 - 1974 and 1975 - 1979, there was a marked downturn in total food production in the country. Between 1970 and 1974, average production was 17.0 million tge and was 3.9 per cent below the 1965 - 1969 average production. Total food production during the period increased annually, except during the peak of the Sahelian drought in 1973 when it declined by 30.4 per cent. Consequently, the growth rate of production was only 0.3 per cent per annum. Between 1975 and 1979, average production was 16.0 million tge which was 5.9 per cent lower than the 1970 - 1974 average and the lowest for any of the previous five-year periods. But the average rate of growth in production was 1.3 per cent per annum which was better than the achievements in the previous two sub-periods. In the last period covering 1980 - 1982, total food production tended to recover, recording an average level of 16.9 million tge which was 5.6 per cent higher than the average level for 1975 - 1979. Its average rate of growth of 2.1 per cent a year was also better than for 1975 - 1979. But the average production for 1980 - 1982 was slightly less than the 1970 - 1974 level, and below the average levels for the 1961 - 1964 and 1965 - 1969 periods by 4 and 4.5 per cent, respectively.

On the whole, total food production increased at an annual rate of 1.3 per cent per annum and this achievement was influenced largely by the results obtained for 1965 - 1974, when production declined at an annual rate of 1.8 per cent per annum. There were two main factors during this period. The first was the Sahelian drought which, though with a relatively moderate impact in Nigeria, affected agricultural production adversely, especially in the northern parts of the country between 1967 and 1973. The second was the civil war which ranged between 1967 and 1970 and disrupted normal activities, particularly in the war areas in the eastern parts of the country. It does appear that these two factors tended to have lingering effects long after their occurrences as production never quite reached the levels attained earlier. The regional dimensions of the factors are also discussed in Chapter VI.

(b) Composition of Production

Domestic food production as shown on Table 5.1 is classified into 9 product groups - cereals, grain legumes, roots and tubers, oilseeds and nuts, vegetables and fruits, vegetable oils, suger, beverages and livestock products. The two most important product groups are cereals and roots and tubers, which on the average, accounted for 72 per cent of average production during the review period. Cereals accounted for 44 per cent, while roots and tubers accounted for 28 per cent. The proportionate share of cereal products tended to increase over the period. Its share increased from 42 per cent in 1961-64 to 46 and 47 per cent in 1970-74 and 1975-79, respectively, but declined slightly to 44 per cent in 1980-82. But the share of roots and tubers tended to

decline during the period. The share stood at 34 and 33 per cent in 1961-64 and 1965-69, respectively, but declined to 25 per cent in each of the periods 1970-74 and 1975-79. In 1980-82, the share increased to 29 per cent.

The next important product groups were grains legumes, vegetable oils and livestock products which accounted for 23 per cent of average production during the entire period. The proportionate share of grains increased from 9 per cent in 1961-64 to 13 per cent in 1970-74, but declined to 8 and 7 per cent in 1975-79 and 1980-82, respectively. The proportionate share of vegetable oils ranged between 8 per cent in 1961-64 and 12 per cent in 1975-79, while that of livestock products ranged between 2 per cent in 1961-64 and 4 per cent in 1975-79 and 1980-82. The remaining product groups - oilseeds and nuts, vegetables and fruits, sugar and beverages accounted for about 5 per cent of average production during the period.

If all the product groups are reclassified into two broad categories of vegetable and animal products, the above data indicate the dominance of vegetable products over animal products. During the entire period, vegetable products accounted for 97 per cent of average production, while animal products accounted for only 3 per cent cent. There were only small deviations from these averages during the sub-periods. The share of vegetable products amounted to 98, 97, 97, 96 and 96 per cent in 1961-64, 1965-69, 1970-74, 1975-79 and 1980-82, respectively. The share of animal products for these respective sub-periods were 2,3,3,4 and 4 per cent. As will be shown later, this lopsided structure has implications for the

values of food contents, as well as the quality of the diet.

5.2 Food Balance Sheet

In Chapter IV, equations (10), (12) and (13) were derived as relevant for the compilation of the food balance sheet and evaluation of the nutritional standard at the national level and may be restated as follows:-

$$Cijt = \sum (FS_{it} - FNA_{it}) \; R_{ij} Ni \qquad (10)$$

$$C_A = \frac{Cijt}{365p} \qquad (12)$$

$$C_A = \frac{Cijt}{365p} \geq C_{mj} \qquad (13)$$

5.2.1 Data:Sources and Adjustments

From equations (10), (12), and (13) data on about 11 variables are required to permit a rough estimation of the food balance:

(a) the primary food production data have been derived as shown on Table 5.1;

(b) data on food imports were compiled from the Nigeria Trade Summary published by the Federal Office of Statistics, Lagos. Food import quantities from that source are shown on Table 5.2 and Appendix 2;

(c) net change in the stock of each food item was assumed to be zero;

(d) the proportion of each relevant food item wasted or used as inputs was obtained from the Federal Department of Agriculture, Lagos and FAO (1971 a and b). The average coefficients for waste are as follows: cereals (10%), grains (15%), roots and tubers (15%), oilseeds and nuts (5%) milk (35%), and fish (10%).

Those for input requirements are: cereals (5%), grains (60%), roots and tubers (15%), oilseeds and nuts (20%), milk (25%) and fish (10%). The coefficients were held constant for the period of the study because such statistics are not compiled on a regular basis. But in the sensitivity analysis, these coefficients are varied where appropriate so as to take account of possible changes in them over the period;

(e) the calorie and protein content of each food item was derived by using the relevant conversion factors indicated in the food composition tables usually prepared by the FAO (FAO, 1971b: p. 32). The most important of these are shown on Table 5.3:

(f) the population figures used in the computation were based on the estimated growth rates by the National Population Bureau and United Nations. These suggest that the Nigerian rate of population growth increased from 2.5 per cent between 1961 and 1975 to 2.8 per cent between 1976 and 1982.[2] The population data used are shown on Table 5.4. The population growth rate was also varied as indicated in the sensitivity analysis;

2/ The national population bureau generally uses a constant population growth rate of 2.5 per cent for the country. Some doubt has been expressed about this estimate (Nigeria, FMNP (1980): p.85). United Nations estimates indicate a growth rate of about 2.8 per cent after 1975 (FAO, 1971b, p. xxx).

(c) the FAO, in cooperation with the World Health Organisation (WHO), is the primary source of data on calorie and nutrient requirements for regional groups of the World. These are calculated by Expert Committees on Nutrition using the basic criteria indicated earlier and other relevant information and data. These requirements may then be adjusted to reflect the peculiar circumstances of each country. Basic adjustments in respect of Nigeria, have, to date, been made by Idusogie and Olayide et.al. The requirements calculated by the latter are the frame of reference of this study. Idusogie (1971) compiled the basic requirements and Olayide et.al. (1972) applied a factor to take account of food waste in the kitchen and on plates. On this basis, the minimum requirements of calorie and crude protein for the Nigerian population were estimated at 2,420 calories (cals) and 65 grams of crude protein per capita per day (Olayide et.al. 1972: Cha. II).

5.2.2. Empirical Results

With the above information, available food supply at the national level between 1961 and 1982 was computed and its calorie and protein contents derived. Available food supply, its total calorie and protein contents, as well as the per capita calorie and protein contents are shown on Table 5.4. The breakdown of the calorie and protein contents by product group is presented on Tables 5.5 and 5.6. The calorie and

protein gaps are indicared on Table 5.7. These various components are discussed below.

(a) Available Food Supply

Total available food supply can be broken into its two components - imports and domestic supply. The import component witnessed an unprecedented growth during the review period. Average food imports between 1961 and 1964 amounted to only 225 thousand tge. But the average import level increased by 60.4 per cent in 1965-69, 95 per cent in 1970-74, 128.3 per cent in 1975-79 and 79.7 per cent in 1980-82 when it recorded a level of 2.9 million tge. On the other hand, the domestic component of supply was on the decline generally. For the whole period, it recorded an average decline of 0.1 per cent per annum. In 1961-64 the domestic component averaged 13.6 million tge, which declined by 0.4, 1.7 and 1.6 per cent in 1965-69, 1970-74 and 1975-79, respectively. It, however, increased on the average by 5.5 per cent per annum between 1980 and 1982.

The positive growth in the import component was transmitted into some significant growth in total available food supply. Total food supply which averaged 13.9 million tge between 1961 and 1964, increased by 0.6, 0.8, 4.9 and 13.6 per cent in 1965-69, 1970-74, 1975-79 and 1980-82, respectively. The average growth rate for the entire period was 2.4 per cent per annum. The contrasting movements of the import and domestic components of total food supply indicated an increasing dependence of the country on imports during the period. In 1961-64, for instance, food imports constituted only 1 6 per cent of total food supply, while the domestic component accounted

for 98.4 per cent. But the import component increased its share of total food supply progressively to 2.6, 5.0, 10.9 and 17.3 per cent in 1965-69, 1970-74, 1975-79 and 1980-82, respectively. On the other hand, the proportionate share of the domestic component of food supply declined progressively to 97.4, 95.0, 89.1 and 82.7 per cent in the four respective sub-periods.

(b) Nutrient Content of Food Supply

Also shown on Table 5.4 are the respective magnitudes of total calorie and protein from available food supply, as well as the per capita levels which take account of population growth. Total calorie supply was generally on the upward trend, except for the 1970 - 1974 sub-period. Average calorie supply amounted to 133.9 billion cals between 1961 and 1964 and increased by 2.5 per cent per year to record an average level of 137.3 billion cals between 1965 and 1969. But in 1970 - 1974, the average calorie supply declined by 3.2 per cent to 132.9 billion cals. Thereafter, it increased significantly, reaching an average level of 139.8 billion cals in 1975 - 1979 and 163.9 billion cals in 1980 - 1982. For the entire period, the average growth rate of calorie supply was 3.3 per cent per annum. Total protein supply assumed a stronger upward movement than total calorie supply. Total protein supply recorded an average growth rate of 5.3 per cent per annum during the entire period. From an average level of 3,249 million gms between 1961 and 1964, it increased by 5.6 per cent to 3,431 million gms in 1965 - 1969. During 1970 - 1974 and 1975 - 1979, it recorded slightly smaller increases of 4.8

and 3.5 per cent, attaining average levels of 3,595 and 3,720 million gms, respectively. Average protein supply attained its peak in 1980 - 1982 when it recorded 4,369 million gms per year. This level was 17.2 per cent higher than the average level for the 1975 - 1979 sub-period.

Owing to more rapid growth in population, per capita calorie and protein levels generally moved down-wards during the review period. Per capita calorie supply averaged 2,433 cals between 1961 and 1964. The average levels in the sub-periods 1965 - 1969, 1970 - 1974 and 1975 - 1979, however, declined progressively by 7.9, 14.5 and 8.2 per cent to 2,241, 1,916 and 1,758 cals, respectively. Between 1980 and 1982, there was a slight recovery when per capita calorie supply averaged 1,844 cals. During the entire period per capita calorie supply recorded an average decline of 5.9 per cent a year. Trends in per capita protein supply were somewhat similar to those of calories. Between 1961 and 1964, per capita protein supply averaged 59 gms. The average per capita protein levels in the next three sub-periods declined by 5.1, 14.6 and 2.1 per cent, respectively. However, it increased by 5.1 per cent to 49.2 gms between 1980 and 1982. For the entire period, the per capita protein supply recorded an average decline of 4 per cent per annum.

(c) Calorie and Protein Gaps

When per capita calorie and protein supplies are related to minimum calorie and protein requirements stipulated earlier, calorie and protein gaps can be computed and these measure the deviations of the per capita levels from the

stipulated minimum requirements (See equation 13). The calorie and protein gaps are shown on Table 5.7. For most of the review period, calorie and protein deficits prevailed, and in fact increased in magnitude through the sub-periods. Between 1961 and 1965, the calorie gap was a surplus which averaged 1.4 per cent a year. Thereafter, the gaps turned into increasing deficits. Between 1966 and 1970, the calorie deficit averaged 10.2 per cent, while in 1971 - 1975 and 1976 - 1982, the calorie deficits averaged 23.8 and 26.0 per cent per year, respectively. During the entire period, the calorie gap was an overall deficit which averaged 14.3 per cent per annum. The protein gaps assumed similar trends and were generally of higher order than the calorie gaps. Between 1961 and 1965, the protein gap was an average deficit of 8.4 per cent per annum. In 1966 - 1970, 1971 - 1975 and 1976 - 1982, the protein deficits averaged 15.4, 22.4 and 26.9 per cent, respectively. During the entire period, the protein gap was an overall deficit which averaged 19.1 per cent per annum.

5.2.3 Sensitivity Analysis

A sensitivity analysis was undertaken to examine the impact of possible variations in some of the parameters used in the primary computations. This is essential for two important reasons. First, most of the parameters were estimated from limited studies. Second, the parameters were held constant for the 22-year period of this analysis and this does not appear too realistic. The values of at least three parameters used in the computations need to be varied.

The population growth rate needs to be varied not only because of the controversy surrounding the 1963 population figure, but also because of the tendency for several authorities to use different growth rates. The proportions of food items assumed to be wasted should also be varied because these were subject to change due to improved harvesting, storage, marketing and distribution, increased application of modern farm inputs such as pesticides, introduction of improved seed varieties and less wastage in homes. Also, with a higher tempo of industrialization, partly based on local processing of food stuffs, greater needs for planting materials and livestock feeds, input requirements were likely to increase and these call for variations in these coefficients.

New assumptions were made in respect of the above possibilities and four scenarios were examined:

(i) Since official sources have continued to use a constant population growth rate of 2.5 per cent a year, the assumed growth rate of 2.8 per cent for 1976 - 1982 was reduced to 2.5 per cent. In an alternative computation, a growth rate of 1.5 per cent for the entire period was used to assess the general effect of population on the food situation;

(ii) Two variations were made on the coefficients for food waste. It was assumed that the proportions indicated in subsection 2 above were reduced by half during 1971 - 1982. The new coefficients

are: cereals (5%), grains (7.5%), roots and tubers (7.5%), oilseeds and nuts (2.5%), vegetables and fruits (5%), vegetable oils (2.5%), fish (5%), and milk (17.5%). This reduction in food waste may be justified by reference to efforts made to reduce such waste in the 1970s through the application of larger volumes of pesticides, the increased use of more disease-resistant seed varieties and the provision of more infrastructural facilities (Olayide et.al., 1980). There is also the possibility of reduced waste in homes with rising food prices. In an alternative computation, it was assumed that food waste was non existent during the period to assess the general impact of this parameter on the food situation.

(iii) During the 1970s also, there could have been increased diversion of foodstuffs to local industries, livestock feeds (especially poultry) and seed planting. The input requirement ratios were therefore increased slightly by 5 per cent. The new ratios are: cereals (10%), grains (65%), roots and tubers (20%), oilseeds and nuts (25%), milk (30%), and fish (15%);

(iv) Finally, a combination of the above variations could also have been a possibility. In a fourth scenario, a reduction in population growth rate to 2.5 per cent during 1976 - 1982, reduction in waste by half during 1971 - 1982 and increase

in non-food uses by 5 per cent in the same period were assumed.

The results of the computations based on these new assumptions are presented on Table 5.8 which indicates the average calorie and protein gaps for the following sub-periods; 1961 - 1965, 1966 - 1970, 1971 - 1975, and 1976 - 1982.

(a) Population Growth Rate:

There were two new assumptions about the population growth rate. Instead of applying a population growth rate of 2.8 per cent between 1976 and 1982, a growth rate of 2.5 per cent was used. The impact of this for that period was only marginal. The calorie deficit averaged 25.2 per cent, compared with 26 per cent in the primary analysis, indicating a reduction of only 0.8 of a percentage point. The protein deficit also averaged 26.3 per cent which was only 0.6 percentage point less than the deficit in the primary analysis.

However,, the assumption of 1.5 per cent population growth rate during the entire period resulted in a significant positive impact on the food situation. In the four sub-periods - 1961 - 1965, 1966 - 1970, 1971 - 1975 and 1976 - 1982, the calorie gaps averaged 1.4, - 6.0, - 15.8 and - 12.0 per cent respectively, compared with 1.4, - 10.2, - 23.8 and - 26.0 per cent in the primary analysis. Thus, with this new assumption, the calorie deficit was reduced by an average of 7 percentage points per annum, while the protein deficit was reduced by an average of 7.2 percentage points per annum. These imply that the original calorie deficit was reduced by nearly 50 per cent, while the protein deficit was

reduced by about 38 per cent.

(b) Waste Coefficients

There were also two new assumptions about the coefficients for waste. It was assumed that these coefficients were reduced by half during 1971 - 1982. The calorie deficits under this new assumption averaged 20.2 and 22.1 per cent per year during the sub-periods 1971 - 1975 and 1976 - 1982. The corresponding calorie deficits in the primary analysis were 23.8 per cent for 1971 - 1975 and 26 per cent for 1976 - 1982. Thus, the new assumption resulted in a reduction of calorie deficit by an average of 3.8 percentage points per annum. The protein deficits under the new assumption were 19.0 and 23.4 per cent for 1971 - 1975 and 1976 - 1982, respectively, compared with 22.4 and 26.9 per cent in the primary analysis. Consequently, the new assumption resulted in an average reduction of 3.5 percentage points per year in protein deficits.

The assumption of zero waste produced a more substantial positive impact on the food situation. The calorie gap was an average surplus of 10.4 per cent between 1961 and 1965, compared with the surplus of 1.4 per cent in the primary analysis. In the subsequent three sub-periods, the calorie gaps were deficits of 1.4, 16.0, and 17.1 per cent, respectively, compared with the respective deficits of 10.2, 23.8 and 26.0 per cent in the primary analysis. In the entire period, 1961 - 1982, the calorie deficit under the new assumption averaged 5.5 per cent a year, compared with the averaged deficit of 15.5 per cent in the primary analysis

indicating a fall of 65 per cent. The protein gap under the new assumption was a surplus of 4.6 per cent a year between 1961 - 1965, and deficits of 6.6, 14.4 and 19.4 per cent in the next three sub-periods. In the original assumption, the protein gaps were deficits of 8.4, 15.4, 22.4 and 26.9 per cent in the four sub-periods, with an average of 19.1 per cent a year for the entire period. This overall average deficit compared with the 9.9 per cent computed under the new assumption, indicating a fall of about 48 per cent.

(c) Input Coefficient

The new assumption of increased input requirements resulted in larger calorie and protein deficits between 1971 and 1982. Under the new assumption, the calorie deficit averaged 25.8 per cent during 1971 - 1975 and 29 per cent between 1976 and 1982. In the primary analysis, the calorie deficits averaged 23.8 and 26 per cent in the respective periods. Thus, the calorie deficits increased by an average of 2.1 percentage points per year. On the other hand, the protein deficit increased by an average of 3.1 percentage points per year. It showed levels of 25.6 and 29.9 per cent in the two sub-periods, compared with 22.4 and 26.9 per cent, respectively in the primary analysis. These results are however, only nominal. In practice, the impact of the new assumption should be positive on the food situation. This is because processed foods can be consumed locally, while increased needs for planting and livestock feeds should result in larger domestic production which will be consumed locally.

(d) Combination of Coefficients:

In the last scenario, the results indicated that the positive impact of reduced population growth rate between 1976 and 1982 and the reduction in waste between 1971 and 1982 was to some extent neutralised by the assumption of increased input requirements. Under the combined new assumptions, the calorie deficits were 23.0 and 22.9 per cent for 1971 - 1975 and 1976 - 1982, respectively, while the protein deficits were 22.0 and 25.9 per cent. In the primary analysis, the calorie deficits were 23.8 and 26.0 per cent, and the protein deficits were 22.4 and 26.9 per cent, respectively. Thus, under the new assumptions in this scenario, calorie deficit was reduced between 1971 and 1982 by an average of 2.1 percentage points a year, while protein deficits were reduced by an average of 1 percentage point a year. This positive impact could be bigger subject to the possibility that increased input requirements could actually enhance domestic food production.

The sensitivity analysis done above shows that the food situation in the country during the review period was generally unsatisfactory because deficits continued to be recorded even when the parameters were positively adjusted. Both population growth rate and food waste were found to be potent factors in the country's food situation. Careful population planning and control can help curb serious food problems, while reduced food waste could improve the food situation significantly.

5.3 Food Gaps:

The equations needed for deriving and assessing food gaps were earlier indicated as equations (19) - (23) and may be restated as follows:-

$$g_t = S_t - D_t \quad \text{.....(19)}$$

$$S_t = (FS_{it} - FNA_{it}) \quad \text{..... (20)}$$

$$D_t = D_o (1 + E_Y P + E_N B) \quad \text{.....(21)}$$

$$g_t > 0 \quad \text{.....(22)}$$

$$g_t < 0 \quad \text{.....(23)}$$

5.3.1 Data: Sources and Adjustments

The relevant food supply data were compiled while deriving the food balance in the previous section and this was through equation (20). This balance was computed for every food product, consolidated and indicated earlier on Table 5.4.

Data on five variables are required for estimating food demand from equation (21). These are: food demand at the base year, income elasticity of demand for the relevant food item, the change in gross domestic product, population demand elasticity for the food item and change in population. For the base year demand, it is assumed that available food supply via the food balance sheet is equal to demand in that year in accordance with FAO practice (FAO, 1971b. pp XXVIII - XXXIV), 1964 was chosen as base year in this analysis because it was thought to be a normal year, preceding the civil war, the Sahelian drought and recent production reverses. In respect of the data on income elasticities of demand, this analysis relied on past estimates made by FAO in its commodity projections for 1970 - 1980 (FAO, 1971a and 1971b). These elasticities are as follows: cereals (0.4), grains (0.3), roots and rubers (0.2), oilseeds and nuts (0.3), vegetables and fruits (0.6), vegetable oils (0.5), sugar (1.5) beverages (0.8) and livestock products (1.0). To complete the income

effect on food demand, percentage changes in GDP were computed by using the GDP series valued at 1962/63 constant market prices (Nigeria, FMED: 1970 and 1975). The population figures used in computing the estimates were those used in Section I of this chapter. The population demand elasticity was assumed to be unity.

Food demand was estimated for the period 1961 - 1982 by applying the above criteria on the available food supply for 1964. The estimates are shown on Table 5.9. The comparison of the supply and demand data gives the total food gaps, as well as the per capita food gaps which are all shown on Table 5.10.

5.3.2. Empirical Results

The analysis of the food supply data has been done in Section 5.2.2. The food demand data are analysed below:

(a) Food Demand

Under the influence of rapid population growth and incomes, total food demand increased at a rapid rate between 1961 and 1982. Average food demand increased from a level of 14.1 million tge between 1961 and 1964 to 16.4 million tge between 1965 and 1969, indicating an increase of 16.1 per cent. In 1970 - 1974, the average food demand level increased by 31.8 per cent to 21.6 million tge. In the subsequent two sub-periods, the rates of increase in food demand were lower at 18.4 and 10.5 per cent, respectively. During the entire period, 1961 - 1982, the average growth rate of food demand was 3.9 per cent per annum, compared with the average growth rate of 2.4 per cent per annum computed for food supply in the previous subsection.

(b) Food Gaps

Total food gaps during the sub-periods were all deficits. Total food gap moved from a deficit of only 240 thousand tge a year between 1961 and 1964 to 2.4 million tge between 1965 and 1969. The level of deficit trebled to record 7.5 million tge between 1970 and 1974. The food gap increased in the next two sub-periods, but at lower rates. Total food gap averaged 10.8 million tge between 1975 - 1979, indicating an increase of 43.7 per cent over the average level in 1970 - 1974. During the period 1980 - 1982, the food gap increased further, but by only 6.2 per cent, recording a peak average level of 11.5 million tge.

Per capita food gaps were also mostly deficits, except for the period 1962 - 1964. Per capita food gaps increased gradually to a peak of 155 kg in 1973 and then assumed a downward trend. Between 1961 and 1964, per capita food gap was an average deficit of only 5kg. The average level of deficit increased rapidly to 38kg in 1965 - 1969, 106kg in 1970 - 1974 and 136kg in 1975 - 1979. It however, declined to an average of 129kg per capita between 1980 and 1982.

5.4 Indicators of Malnutrition

5.4.1 Indirect Assessment

Indirect assessment is done by examining the data revealed in the food balance sheet, the level of poverty and the level of education:

(a) The Food Balance Sheet

The food balance sheet computed for Nigeria for the

period 1961 - 1982 indicated that malnutrition was a potential problem among the Nigerian population during that period (see Chapter IV. In the first place, throughout the period, protein supply per head was below minimum requirements. Reference was also made in Chapter IV to the seasonal and ecological factors in food production which were likely to lead to unequal distribution of protein supplies and induce significant degrees of malnutrition among communities and groups of people in the population. Secondly, given the structure of protein supply, the available protein was not of the best quality possible. As can be seen on Table 5.6, the bulk of protein supply was accounted for by vegetable products during the two decades. During 1961 - 1970, supply of protein from animal sources averaged 10.4 per cent per annum, while supply from vegetable products accounted for 89.6 per cent. During 1971 - 1982, there was only a marginal change from that composition - animal sources accounting for 13.8 per cent and vegetable sources taking the balance of 86.2 per cent per annum.

Thirdly, except for the period, 1962 - 1966, calorie supply per head was also below requirements during the review period. By inference, a good number of people, partirularly due to the fact of unequal distribution, would have part of their protein supply converted to supply converted to supply energy. This process in turn would decrease the protein supply per head, and hence create a favourable environment for the incidence of malnutrition. The potential food and nutrition situation depicted by the available supply of calorie and protein during 1961 - 1982 pointed to incidence of protein - calorie malnutrition in the country and dangers of diseases

like Marasumus and Kwashiorkor could be real.

(b) Poverty

There is evidence that the bulk of the Nigerian population is poor, not only because of extremely low income, but also because of the very poor state of housing, medical facilities, transportation and the general environment.[3] A good number of studies have also shown that there is a significant degree of income inequality in Nigeria (Etim and Eronini: 1975: Fajana: 1975: Diejomaoh and Anusionwu: 1981). The regional dimension has also been shown to be quite disturbing (Anusionwu: 1979). Given this fact, there is bound to be a maldistribution of available food supply among groups in the population and regions in the country.

In Nigeria, there is clear evidence of a rapid rate of increase in urban population. The World Bank estimated that in 1960, urban population constituted 13 per cent of total population in the country and this proportion increased to 20 per cent in 1980 (IBRD, 1980: p. 148). On the other hand, it estimated that the annual rate of growth of urban population between 1960 and 1970 was 4.7 per cent and this increased to 4.9 per cent between 1970 and 1980. Olayide (1976: p.17) suggested a 4.5 - 5 per cent growth rate of urban population for the period 1960 - 1975. This rapid urbanization is fuelled by mass exodus from the rural areas and unemployment and underemployment have been identified as some of the main

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3/ Enough evidence was assembled in an annual conference of the Nigerian Economic Society; See Nigerian Economic Society NES (1976): Poverty in Nigeria. Proceedings of 1975 Annual Conference, Parts II - IV.

consequences (Sada, 1975: pp. 97 - 99). The overall effect is a depression of income levels which adversely affect the quality of nutrition. In addition, given the poor state of social services such as housing, medical and environmental facilities (Ogunpola and Ojo, 1975: pp. 111 - 122), nutritional levels were most likely to be reduced. Urban areas also are affected by the inefficient food distribution system, and the activities of numerous middlemen. These factors tend to inflate the cost of basic food-stuffs and narrow the variety of the diet.

In the rural areas, low income levels also prevail (Olayide and Essang, 1975: p. 154 - 145). Several factors have been identified as the main causes of low incomes in the rural areas. First, there is evidence of inadequate opportunities for full and lucrative employment in the rural areas, especially during the slack farm period, despite an increasing rate of rural-urban migration (Olayide and Essang, 1975: p. 155). Secondly, agriculture is beset by low productivity because of the application of crude technology, inefficient marketing system, inadequate infrastructural facilities, rigid land tenure systems and insufficient institutional services such as credit and pricing policies (Oshuntogun, 1975: pp. 192 - 194). Thirdly, productive activity in the rural areas is mostly subsistent in nature with the result that rural dwellers do not have enough purchasing power to acquire adequate nutritive food items or purchase services that will improve their nutritional levels.

(c) Education

In the urban areas it has been established that the

majority of persons engaged in petty economic activities in Lagos have had no formal education and incomes realized from such activities are grossly inadequate (Sada, 1975: pp. 97 - 98). Although the unemployed people had some formal education the majority did not acquire an adequate level of education to fetch well-paid jobs. Consequently, they too have low incomes or very often depend on relatives for subsistence.

The low level of education in the rural areas is also a major factor in low incomes in those areas. In studies conducted in rural districts in Ibadan, Ife and Ogbomosho, a high level of illiteracy was found among farmers (Olayide and Essang, 1975: pp. 154 - 155; Oshuntogun, 1975: p. 193; Adeyokunnu, 1975: p. 170). More recent studies by Anusionwu (1979) and Diejomaoh and Anusionwu (1981) confirm these tendencies. This low level of education or lack of any formal education affects the nutrition standards of rural people generally. It could be an important constraint on their ability to get alternative employment during the slack farm seasons in the non-farm sectors. This factor has also been important in the limited success of extension meant to improve the farmers' productivity (Williams, 1978: Ch. 6).

4.2 Direct Assessment

(a) Consumer Expenditure Surveys

Consumer expenditure surveys have been few in Nigeria. The first was conducted by the Federal Office of Statistics, Lagos in 1952 (Nigeria, FOS, 1981a: p.2). Then in the early 1960's, consumer expenditure surveys were conducted in some

major cities of the country for the lower and middle-income groups.[4] In 1975, the office conducted another survey covering a large number of selected urban and rural centres, as well as the lower, middle and upper income groups (Nigeria, FOS, 1981a). One main shortcoming of these surveys for the purpose of this study is that quantities of food purchased were not indicated as they were in terms of monetary expenditures only. Nevertheless, they give an indication of the likely diets of the income groups covered.

The consumer surveys in the major cities were conducted between 1959/60 and 1965/66. The small changes observed in the results of these surveys indicate that the typical Nigerian diet did not change significantly in the 1960's. As shown on Table 5.11 the evidence is that a greater proportion of expenditure was devoted to the purchase of staples such as yams, gari, plantain and palm oil. The proportion ranged between 52.2 and 59 per cent for the lower income group, and between 35 and 45.3 per cent for the middle income group. For livestock products, the proportions ranged between 23.8 and 36.9 per cent for the lower income group, and 27.4 and 39 per cent for the middle income group. As revealed in earlier sections, the fact that the bulk of expenditure was on staples showed a bias for calorie - rich foods. The lower income group which embraces the bulk of the population spent more of their incomes on these foods than did the middle-income group. Similarly, the middle-income group spent more of their

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4/ Nigeria, FOS: Urban Consumer Surveys. Surveys were conducted in Lagos (1959/60), Ibadan (1961/62), Enugu (1961/62), Kaduna (1962/63) and Sokoto (1964/65, 1965/66).

incomes on protein foods than did the low income groups.

The consumer surveys for 1975 exhibited broadly the same features described above, although the published data were less detailed than in earlier surveys.[5] For the rural and urban households, the preponderance of expenditure was on local foodstuffs, while such proportions decreased as income levels increased. Expenditure on processed foods increased as income levels increased (see Table 5.12).

(b) Food Consumption Surveys

One of the earliest food consumption surveys in Nigeria was carried out by Galetti et.al. (1956) who collected some information on the diets of Nigerian cocoa farmers for 1951/52. Between 1954 and 1957, Nicol (1959a and b) carried out a comprehensive survey of the foods consumed and calorie and protein intakes in five ecological zones spanning the whole country. The first major food consumption inquiry which falls within our study period was conducted by the Federal Office of Statistics in 1963/64 and these related mainly to rural areas (FOS, 1966). Comparing the survey results by Galetti et.al., Nicol and the Federal Office of Statistics, it is observed that only small changes were exhibited by the typical Nigerian diets during the period.

Using the conversion factors earlier indicated on Table 5.3 for protein contents, calorie consumption data derived by Gusten from the 1963/64 survey were analysed for their protein content and these are shown on Table 5.13 (Gusten, 1968: p.60). Daily per caput consumption of calories in Nigeria

5/ According to the 1981 Report (p.8), the published data on the 1975 survey were prepared manually so as to make available some information for immediate use and to assist in planning for the next survey.

averaged 2,215 cals. and was thus below the minimum requirements stipulated earlier. Per caput consumption of protein averaged 46 grams per day and was also below minimum requirements. Since part of the protein consumption would be converted to satisfy calorie needs, the indicated protein consumption figure would turn out to be smaller than the results indicated. There was thus a clear evidence of malnutrition. Based on the fact that protein from vegetable sources is inferior to that from animal sources, the quality of protein consumption was poor since about 75 per cent of it was derived from vegetable sources (see Table 5.14).

The next major nutrition survey was carried out in 1965 by the U.S. Department of Health, Education and Welfare (USDHEW, 1967) at the request of the Nigerian Government. A team of U.S. nutritionists and other scientists collaborated with a team of Nigerian scientists to conduct an evaluation of the nutritional status of samples of the Nigerian population between February and April 1965. The survey which among other things investigated the food consumption habits of 444 persons was conducted in seven locations: Ballah (Kwara), Kuru (Plateau), Nsukka (Anambra), Ibusa (Bendel), Asaba (Bendel), Surulere (Lagos) and Osegere (Oyo). The result of the survey show that calorie and protein intakes in these locations were generally below minimum requirements (USDHEW, 1967: Chapter VI). In Nsukka, calorie intake was 2,435 cals per capita per day, while in other locations, calorie intake ranged from 1,851 in Ibusa to 2,286 cals in Ballah. The average calorie intake in all locations was 2,172 cals per capita per day. Protein intake did not meet minimum require-

ments in any of the locations. The protein intake ranged between 36 gms per capita per day in Ibusa and 57 gms in Kuru. The average protein intake for all the locations was 50 gms per capita per day.

These results have generally been confirmed by other surveys, though much limited in scope, undertaken by some individuals. For instance; in a study carried out in some villages in Ife Division of Oyo State in 1972, Adeyokunnu estimated the daily per caput consumption of calorie by the persons surveyed at 2,517 cals. per day, while protein consumption was only 44.4 grams per day (Adeyokunnu, 1975: p.169). Also while 91 per cent of protein intake was derived from vegetable products, only 9 per cent was derived from animal sources.

CHAPTER VI

EMPIRICAL ANALYSIS OF THE REGIONAL FOOD AND NUTRITION SITUATION IN NIGERIA

The aggregate data presented in Chapter V are analysed in this chapter, with a view to evaluating the food and nutrition situation in the main agricultural regions of Nigeria. A regional analysis is very useful in designing appropriate policies for ensuring adequate food and nutrition. First, in a large country like Nigeria, it is unlikely that ecological features, which determine the cultivation of food items in specific locations, can be the same in all areas of the country as may be implied in an aggregate analysis. A regional analysis will, for instance, permit some insight into the regional variations in food production pattern, particularly with res'ect to the effects of differences in climate, vegetation, soil fertility, land density and agricultural resource endowments. This information will be vital in formulating food production programmes and the attainment of an efficient allocation of resources. Second, although food production may be an important determinant of consumption, especially under subsistent production, there are other economic characteristics like income, wealth, population and infrastructural facilities which can result in significant variations in regional food consumption pattern. A regional analysis can reveal such variations and thereby facilitate the design of programmes for ensuring efficient distribution of food

throughout the country.

Consequently, the focus in this chapter is on the analysis of the ecological features of the agricultural regions, the food varieties, their growth trends and nutrient contents. This then facilitates the analysis of the regional food consumption potential through the compilation of food balance sheets and food gaps.

6.1 Regional Classification

For the purpose of this analysis, the whole country is divided into four agricultural regions comprising:

A NORTH: Sokoto, Kaduna, Kano, Bauchi, Borno.

B MIDDLEBELT: Kwara, Niger, Benue, Plateau, Gongola.

C WEST: Lagos, Ogun, Oyo, Ondo, Bendel.

D EAST: Rivers, Imo, Anambra, Cross River.

The main criterion for the above regional classification relates to similarities in ecological features such as climate, vegetation and soil types which determine the nature of the agricultural production systems and the kinds of food items grown. These ecological features are to a large extent distinct from region to region and homogeneous within each region. This is evident from studies by Oyenuga (1967: ch.3), Agboola (1979: chs.2-5) and Barbour et. al. (1982: Part 5). But, since state boundaries, largely determined by political considerations, are also important for constituting the regions, the classification may depart slightly from what is strictly dictated by ecological features. On the whole, these small departures would tend to cancel out and are thus not expected to make any significant differences to the results

of the analysis.

According to the 1963 census figures which have formed the basis of current estimates, the population of Nigeria was put at 55.7 million (see Chapter V) which is distributed among the four agricultural regions as follows: North, 19.5 million; Middlebelt, 9.9 million; West, 13.8 million; and East, 12.3 million (Nigeria, FOS, 1981b: p.3). These indicate that the North accounted for 35 per cent of the total population; Middlebelt, 18 per cent; West, 25 per cent and East, 22 per cent. Of Nigeria's total land area of 923.8 thousand km^2, the North occupies about 34 per cent, Middlebelt, 33 per cent, West, 20 per cent and East 13 per cent (Nigeria, FOS, 1981b: p.3).

6.2 Regional Characteristics

Nigeria is a developing country with some well-known economic characteristics. Also, the country lies within the tropical region which tends to dictate the nature of the ecological features that prevail there. The ecological characteristics however differ gradually as one moves in south - North direction and consequently give each of the above agricultural regions some unique features of its own. Differences in climate, vegetation, soils, land density and natural resources in the four agricultural regions provide a setting for differences in their general economic characteristics.

6.2.1 Climate

Rainfall pattern is the most important climatic factor, especially under rainfed farming. Annual mean

rainfall tends to decline rather rapidly in a South-North direction.[1/] The West and East record the highest annual rainfall out of the four regions. Along the sea coasts of the two regions, annual mean rainfall is over 4000 mm, while in the rest of the two regions, annual rainfall ranges between 1,500 and 3,000 mm. This level of rainfall is excessive, especially during the rainy season. In parts of the Middlebelt towards its south and around the Jos Plateau, annual rainfall reaches about 1,200 to 1,500 mm, while in the rest of the region, the mean rainfall is about 1,000 mm and sometimes well below that level in northern Gongola. The mean annual rainfall in the North ranges between 500 and 750 mm and in the extreme North, annual rainfall is mostly less than 250 mm.

Seasonality in rainfall distribution in the whole country is the main factor that governs farming activity. The alternation of wet and dry seasons varies widely among the regions. In the West and East, the dry season lasts for 3-5 months, while in the Middlebelt, it lasts for between 5 and 7 months. In the North, the dry season lasts for upwards of 8 months during which agricultural activity virtually stops and both man and animal may migrate to the south in search of food and water. On the other hand, the heavy rainfall in the West and East results in high run-off, soil erosion, leaching and wild vegetation.

1/ The materials for this section were largely drawn from four sources: Nigeria, Federal Ministry of Agriculture and Natural Resources, 1974, Chapter 2; FAO, 1966, pp.10-16 and Chapter X; Agboola, S.A., 1979, Chapter 3; and Barbour, K.M. et.al, 1982, parts 2 and 5.

Temperature, another important climatic variable also plays an important part in shaping the regional landscape. Temperatures are relatively higher in the North where they climb up to over 40^{oC} and in the Middlebelt - with average temperatures reaching 35^{oC}. These high temperatures result in substantial evaporation in the two regions and deplete water resources. Mean temperatures in the West and East average about 30^{oC} and pose lesser dangers of evaporation than in the North and Middlebelt.

6.2.2 Vegetation

The vegetational zoning closely follows the climatic conditions described above. The West and East which have broadly similar climate have mostly forest vegetation as a result of plentiful rainfall which supports it. The Middlebelt and the North are dominated by savanna vegetation which changes gradually in a north - bound direction until, at the far North, the vegetation is the sudan savanna type with only grasses and shrubs. The vegetation types make land clearing and weeding very tedious in the West and East. In the North and Middlebelt where these operations are not as difficult, the level of water resources may mean minimal agricultural activity at certain periods of the year.

6.2.3 Soil Types and Fertility

The types of soils found in the four regions vary substantially, but only a simplified sketch can reveal the salient attributes of those soils. In general, three types of soils are common: alluvial soils, ferruginous tropical soils and ferralsols. The alluvial soils are

the most fertile and productive due to high soil moisture content, and only small leaching. However, they have a low plant nutrient content, poor drainage and found in only limited areas. In the West and East, these soils are on the coast line and on the banks of the River Niger. In the Middlebelt, alluvials are located on the banks of the Niger and Benue Rivers and in the North, they are found in the Lake Chad district. The ferruginous tropical soils are rated to be of medium fertility and occupy roughly one third of the land areas of the four regions. Both the West and Middlebelt contain the largest tracts of these soils. Such soils in the East and North are also fairly sizeable. The ferralsols constitute the largest proportion of soils in each of the regions and are generally of low fertility. They are generally difficult to cultivate and have a low organic content and poor drainage.

6.2.4 Land Density

There are some differences in the demographic characteristics of the regions which give rise to differences in land densities. The varying demographic features tend to point to lesser pressures on the land in the North and Middlebelt than in the West and East. For instance, total land per head in the North and Middlebelt in 1980 were 0.4 and 0.7 hectares, respectively, compared with the 0.3 and 0.2 hectares in the West and East, respectively (Olayide et al., eds. 1980: pp.3-5). On the other hand, population densities in the North,

Middlebelt, West and East were 76, 46, 186 and 241 persons per km^2, respectively. Total arable land in the country amounted to 26.9 million hectares out of which, the North, Middlebelt, West and East accounted for 9.1, 8.8, 5.5 and 3.5 million hectares, respectively. Thus, total arable land per head in the four agricultural regions amounted to 0.3, 0.6, 0.3 and 0.2 hectare, respectively. However, total farmer population in the North, Middlebelt, West and East was estimated to be 4.5, 2.3, 3.2 and 2.9 million, respectively (Olayide et. al, eds. 1980: p.4). Therefore, the arable land per farmer in the respective regions were 2.0, 3.8, 1.7 and 1.2 hectares.

6.2.5 Agricultural Resources

For the purpose of analysing the distribution of major agricultural resources, particularly, crops, livestock and fisheries, it is convenient to follow the general classification of the country into three agricultural zones - the south, the Middlebelt and the North (Barbour, et. al, eds., 1982: p.72). The southern zone corresponds with the West and East in this analysis, while the North and the Middlebelt coincide with our classification.

The amount and distribution of rainfall are the most important determinants of the types and period of crop cultivation. In the West and East, there is adequate rainfall and is well distributed over a season. In the Niger Delta which spans substantial parts of Bendel and Rivers States, the rainy season lasts for more than nine

months, with extensive flooding. The main food products are plantain, water yams, cocoyams, vegetables and fruits. To the West of the southern zone, yams, maize, cocoyams and cassava are the most important food products, with cocoa, citrus fruits, rubber and kolanuts as the main commercial crops. To the east of the southern zone, the most important food crops are yams, cassava, plantain, cocoyam and rice, while oil palm is the principal cash crop. In the Middlebelt, the rainfall pattern supports the cultivation of root and cereal crops. Towards the south of the zone, yams, cassava and rice are the main crops, while to the North, cereals like maize, guinea corn and millet are the dominant crops. In the Northern zone with very light rainfall, short wet season and low humidity, the principal food crops are cereals, grains and sugar cane.

Both the North and Middlebelt are more naturally endowed with livestock resources because of their favourable climatic conditions. The bulk of the cattle population is concentrated in the North, while insect pests and diseases of the forest zones in the West, East and parts of Middlebelt prevent easy cattle rearing. The North and the Middlebelt also contain the bulk of the sheep and goats. These are also kept in small numbers largely as domestic animals in the West and East. Most of the pigs are bred in the West and East, while poultry appear evenly distributed in the four agricultural regions. Fishery resources are generally evenly distributed because of the large number of rivers and lakes scattered

throughout the country. The principal fishing lakes are Chad (North), Kainji (Middlebelt) and the Delta (West and East). In the West, the principal river sources of fish are the Ogun and Oshun, while in the East, the major ones are Imo and Cross River. The Rivers Niger and Benue are two important rivers which span through all four agricultural regions and support fishing throughout the year.

6.2.6 Other Economic Characteristics

The varying ecological features described above largely determine the distribution and levels of production of agricultural resources. There are other economic characteristics such as the levels of incomes, industrial and mineral resources, manpower and infrastructural facilities which differ from region to region and significantly influence the demand for food products.

There is no official breakdown of gross national income by region, but all indications are that there is a concentration of income and wealth in the West and East which are the most developed in terms of resources which are currently being tapped. Of the other two regions, the North is relatively more developed than the Middlebelt whose potential remains largely untapped. Manufacturing is dominated by food processing industries. There is a large concentration of these industries in the port cities and the urban centres in the West and East largely because of their large markets, good transportation facilities and adequate labour force. The North has a

larger number of these industries than the Middlebelt. Mineral deposits are also largely concentrated in the East and West, particularly petroleum, limestone and coal. The Middlebelt is more blessed with mineral deposits than the North, particularly of tin, iron ore and columbite. The development of these industrial and mineral resources has influenced the pace of development of transportation facilities. The West and East are the best served in respect of road networks, inland waterways and port facilities. Similarly, these two regions are the most developed educationally. In the East and West, the primary student population as a percentage of total population ranges between 10 and 14 per cent, whereas it is about 2-5 per cent in the Middlebelt and less than one per cent in the North (Barbour et. al. eds., 1982: pp.50-51). For secondary education, the proportion for the West and East is 1-1.5 per cent, while it ranges between 0.5 and 1 per cent in the Middlebelt and is less than 0.5 per cent in most of the North. The West and East also have the largest number of institutions of higher learning and student enrolment in those institutions.

6.3 Adjustments to Food Production Data

The national food production data analysed in Chapter IV (see Table 5.1) require three important adjustments to permit a regional analysis and comparison of the key variables. These adjustments include the distribution of the data among the four agricultural regions, their aggregation for comparative purposes and their nutrient assessment.

6.3.1 Regional Data

The regional distribution of the data was based on the compilation of the Federal Office of Statistics, Lagos which has traditionally compiled the data on major crop production by region or state. During the period covered by our analysis, the country went through three phases of regional/state arrangements:

(a) 1961 - 1966;

(b) 1967 - 1975;

(c) 1976 - 1982.

The third period, 1976-1982, poses the least problem because the 19 states which were sub-divided into four groups to form the four agricultural regions had come into existence. The data for each region were simply integrated from Federal Office of Statistics sources.

Between 1967 and 1975, there were 12 states - East Central, South Eastern, Rivers, Midwest, Lagos, West, Kwara, Benue-Plateau, Kano, North-Western, North Eastern and North Central. Again there is no problem compiling data for the West and East. The West will include Midwest, Lagos and West, while the East includes East Central, Southeastern and Rivers States. If we can find a way of splitting the Federal Office of Statistics data for North-western between Sokoto and Niger, and those for North-eastern among Bauchi, Borno and Gongola States, it becomes relatively easy to integrate the data so as to obtain data for the North and Middlebelt. The dis-aggregation of production data as between Sokoto and

Niger states, and among Bauchi, Borno and Gongola states during this period was done by assuming that the proportionate shares of these states out of total output recorded for 1976 and 1977 could roughly be maintained for the period under consideration. Thus, the two years might roughly represent the production pattern for the 1967 - 1975 period. The data for 1976 and 1977 would therefore suggest that the 1967 - 1975 data for North Western State should be shared between Sokoto and Niger as follows: cereals, 80:20; grains, 92:8; roots and tubers, 2:98, vegetables and fruits, 92:8 and livestock products, 75:25. Similarly, the data for North Eastern State for 1976 and 1977 were shared among Bauchi, Borno and Gongola in the following proportions and were applied to the 1967 - 1975 period: cereals, 28:42:30; grains 37:37:26; roots and tubers, 1:1:98; vegetables and fruits, 17:17:66; vegetable oils, 35:36:29; livestock products, 42:40:18.

Between 1961 and 1966, there were four regions - North, East, West and Midwest.[2/] The East coincides with the East in this analysis, while the West and Midwest, as well as Lagos, coincide with the West in our analysis. Consequently, the Federal Office of Statistics data for this period were taken as appropriate. The North of the period embraced what we have called North and Middlebelt in this study and it will therefore be necessary to split the data for that single region into two. This was done

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2/ The Midwest was created out of the West in 1963. Lagos was the Federal Territory which did not form part of any of the Regions.

by assuming that the average proportions of production accounted for by the North and Middlebelt in 1967 could be applicable to the period 1961 - 1966. Again, the assumption is that the production pattern in 1967 would roughly be the same as in the previous period (1961 - 1966) in these two regions. The production of the major food items for 1961 - 1966 was estimated according to the above assumption for the North and Middlebelt as follows: cereals, 73:27; grains, 84:16; roots and tubers, 1:99; vegetable oils, 88:12; vegetables and fruits, 25: 75; and livestock products 75:25.

With the above assumptions, data of domestic food production were compiled for the four agricultural regions and are shown on Tables 6.1 - 6.4. For convenience of comparison, the production data were converted to grain equivalent by using conversion factors indicated in Chapter IV.

The final adjustment to the national data is to compute the food content of regional food production by applying the conversion factors which were specified on Table 5.3. This computation is intended to show the relative importance of the values of food items found in each region, as well as to examine the relative position of each region vis-a-vis the national output. The calorie and protein contents of domestic food production in each region are presented on Tables 6.5 - 6.8.

6.4 Analysis of Food Production Data

The empirical results presented on Tables 6.1 - 6.8 are analysed in this section with respect to food

production trends, regional shares of total food production and the nutrient contents of major food items.

6.4.1 Trends in Production

The growth pattern of food production was somewhat similar in the four regions during the review period. Production increased steadily up to the early 1970s, declined generally up to the late 1970s and then showed some recovery in the early 1980s. This trend may be illustrated by looking at the following time intervals; 1961-1964, 1965 - 1969, 1970 - 1974, 1975 - 1979 and 1980 - 1982. Total food production in the North (Table 6.5) increased from an average of 6.7 million tonnes of grain equivalent (tge) in 1961 - 1964 to 6.7 million tge in 1965 - 1969 and to 7.6 million tge in 1970 - 1974, indicating an increase of 14.7 per cent during the three periods. But average production declined by 13.3 per cent to 6.6 million tge in 1975 - 1979 and declined further by 4.8 per cent to 6.3 million tge between 1980 and 1982. However, average production between 1976 and 1982 was about 10 per cent less than the average production between 1961 and 1975.

Food production trends in the other three regions were generally similar to the pattern described for the North. Total food production declined in the Middlebelt continously from 1961 to the late 1970s and showed some recovery in the early 1980s. Total food production averaged 4.5 million tge in 1961 - 1964, but declined by 22.4 per cent during the fifteen year period, 1965 - 1979, to record an average level of 3.6 million tge in 1975 - 1979.

Average production increased to 3.9 million tge in 1980 - 1982. In the West, average production increased from 3.3 million tge in 1961 - 1964 to 3.4 million tge in 1965 - 1969, but declined by 18.7 per cent to 2.7 million tge between 1970 and 1974. Average production, however, increased to 2.9 million tge in 1975 - 1979 and to 3.4 million tge in 1980 - 1982. Average production in the East increased from 3.1 million tge in 1961 - 1964 to 3.3 million tge in 1965 - 1969 but declined to 2.7 million tge in 1970 - 1974 and then increased by 8.1 and 13.7 per cent in 1975 - 1979 and 1980 - 1982, respectively.

The downward trend in food production in the four regions during the review period can be attributed to two factors which occurred almost simultaneously. There was the adverse impact of the Sahelien drought which ravaged the West African Sub-region between 1967 and 1975. Both the North and Middlebelt regions were more affected especially between 1973 and 1975 than the West and East which experienced only mild drought. Average production in the North between 1973 and 1975 fell by 21 per cent compared with the previous three years. In the Middlebelt, the fall in average production between 1973 and 1975 was 27.5 per cent. Average production during that period fell by 22.6 per cent in the West and by 15.6 per cent in the East. But the East in particular, as well as the West were also adversely affected by the civil war between 1967 and 1970. The effects of the war most likely lingered on long after the cessation of hostilities. Average production reached a peak of 3.5 million tge in 1966 in the East

just before the outbreak of war. This average declined to a low of 2.4 million tge in 1973 and 1974 and up to 1982 never reached the peak levels attained between 1964 and 1966. The pattern was similar in the West whose production level declined gradually after 1966 and only started to recover after 1976.

6.4.2 Regional Shares of Production

There are two aspects of this review: the relative importance of each food item in each region and the relative importance of each region in total food production in the whole country. Tables 6.1 - 6.4 are the basis of the analysis. As is shown on Table 6.1, cereals and grains dominated food production in the North. These two food items accounted for an average of about 94 per cent of total food production within that region between 1961 and 1965 and for 90 per cent in the early 1980s. Vegetable oils and livestock production accounted for 6 per cent of production in the region between 1961 and 1965 and for 9 per cent in the 1980s. Roots and tuber crops were insignificant. In the Middlebelt, on the other hand, cereals and tuber crops accounted for about 90 per cent of total food production in the region between 1961 and 1965 while grains, oilseeds, sugar and livestock products accounted for about 12 per cent. In the 1980s, the ratios were 85 per cent for cereals and tubers, and 13 per cent for other items. Thus, the Middlebelt showed some departure from the Northern food production pattern by being an important producer of tuber crops, as well as vegetable products and sugar. In the West, three products dominated production - vegetable oils, roots

and tubers, and cereals, which accounted for 93 per cent of its total annual food production in the early 1960s and 88 per cent in the early 1980s. Between the two periods, oilseeds, vegetables and livestock increased their share from 5 to 10 per cent. In the East, the same products accounted for about 93 per cent of total food production in the early 1960s and 87 per cent in the early 1980s. In the East, also, livestock production was fairly important. It accounted for about 3 per cent of total production in 1961 - 1965 and 5 per cent between 1980 and 1982.

The data suggest that the North relative to other regions was an important producer of cereals, grain legumes and livestock. In the early 1960s, the region accounted for about 66 per cent, 78 per cent and 49 per cent of national production of the respective items. Between 1980 and 1982, the North accounted for 63, 83 and 46 per cent of these items. The Middlebelt accounted for 38 per cent of tuber production and nearly all of sugar production. Its shares of cereals and livestock products were 24 and 17 per cent, respectively. The West accounted for about 37 and 32 per cent of each of vegetable oil and tuber production in the early 1960s. Its shares of these items in the 1980s were each 34 per cent. The two products were also the main food products in the East and the region accounted for about 55 per cent of vegetable oil production and 28 per cent of tuber production between 1961 and 1965, and 50 and 35 per cent, respectively in 1980-82. Its production of livestock products, mainly fish, was also significant, accounting for nearly 21 per

cent of national output in the early 1960s and 25 per cent in 1980-82.

6.4.3 Nutrient Content of Production

The calorie and protein contents of food production indicate the values of such food items in each region. The computed calorie and protein contents of domestic food production in each region are shown on Tables 6.5 - 6.8.

Total calorie and protein contents of food production were generally on the decline in all the regions which was a reflection of the downward trend in food production observed in the previous sections of this chapter. In the North, total calorie content of food production increased from an average of 67.0 billion calories (cals) in 1961-1964 to 72.5 billion cals in 1970-1974, but declined by 11.7 and 5.5 per cent in 1975-1979 and 1980-82, respectively. In the Middlebelt, average calories content declined continously from its peak level of 44.7 billion cals in 1961-1964 to 34.9 billion cals in 1975-1979, but recovered in 1980-1982 when it increased by 10.9 per cent to 38.7 billion cals. The trends in the West and East were broadly similar. In the West, total calorie content increased by 2.7 per cent, to 34.1 billion cals in 1965-1969, but fell by about 21 per cent in 1970-1974, only to increase by about 25 per cent during the period 1975-1982. Similarly, total calorie content which averaged 31.4 billion cals in 1961-1964 in the East increased by 4.1 per cent in 1965-1969, declined by 20.5

per cent in 1970-1975 and increased by 22 per cent between 1975 and 1982. Total protein contents followed the same pattern of movements as the total calorie contents in each region. Total protein content in the North increased from an average of 2,180 million gms in 1961-1964 to 2,598 million gms in 1970-74, but declined to a low of 1982 million gms in 1980-1982. Total protein contents increased from an average level of 1,266 million gms in 1961-1964 in the Middlebelt to 1,268 million gms in 1965-1969, fell by 19.4 per cent between 1970 and 1979 and increased again in 1980-1982 by 4.2 per cent. In the West, total protein content moved from an average level of 621 millions gms in 1961-1964 to 672 million gms in 1965-1969, but declined in 1970-1974 and then increased to 746 million gms in 1980-1982. In the East the pattern of movement was similar to that of the West. Total protein content moved from an average level of 518 million gms in 1961-1964 to 574 million gms in 1965-1969, but increased to 578 and 662 million gms in 1975-1979 and 1980-1982, respectively.

In all the regions, total calorie and protein contents of food production tended to recover slightly towards the end of the study period, particularly during 1980-1982, but total contents generally failed to reach the peak levels attained in the 1960s and early 1970s. Coupled with this was the problem of rising populations in the regions, which caused sharper declines in per capita levels of calorie and protein contents in all the regions. In

the North, per capita calorie content declined from an average level of 3,468 cals in 1961-1964 to 3,171, 2,980, 2,322 and 1,956 cals in 1965-1969, 1970-1975, 1975-1979 and 1980-1982, respectively. Per capita protein also declined continously from an average level of 112.9 gms in 1961-1964 to 64.1 gms in 1980-1982. In the Middlebelt, per capita calorie content declined from an average level of 4,451 cals in 1961-1964 to 2,446 cals in 1980-1982. Per capita protein content declined also from a level of 129 gms in 1961-1964 to 67.9 gms in 1980-1982, indicating a total decline of about 48 per cent. In the West per capita calorie declined by 7.3, 29.8 and 6.0 per cent in 1965-1969, 1970-1974 and 1975-1979, respectively, but increased by 5.5 per cent in 1980-1982. Per capita protein declined from a level of 45.4 gms in 1961-1964 to 34.1 gms in 1980-1982. In the East, per capita calorie content declined from 2,581 cals in 1961-1964 to 2,436, 1,711 and 1,600 cals in 1965-1969, 1970-1974 and 1975-1979, respectively, but increased slightly by 2.5 per cent in 1980-1982. On the other hand, per capita protein content increased marginally from 42.6 to 42.7 gms in 1965-1969, declined by about 24 per cent between 1970 and 1979, but increased to 33.9 gms in 1980-1982.

On the whole, the Middlebelt and the North to a large extent produced food in quantities that could meet the minimum requirements of calorie and protein, which are estimated to be 2,420 cals and 65 gms as indicated in Chapter V . On this basis, the Middlebelt met minimum

calorie requirements in all years except 1973, 1977, 1979 and 1981-1982. Minimum requirements of protein were met in all years except 1979. The North met minimum calorie requirements between 1961 and 1975 after which it did not, but it met minimum protein requirements in all years except 1979-1982. The West met minimum calorie requirements only in 1962 and 1964-1966, but did not meet protein minimum requirements in any year, just as the East. But the East met minimum calorie requirements in more years, 1961-1967.

6.5 Food Balance Sheets

From Chapter IV, the relevant equations for compiling and evaluating the food balance sheet for each region can be restated as follows:

$$FC_{ikt} = FS_{ikt} - FNA_{ikt} \quad \ldots\ldots\ldots (15)$$

$$C_{ijkt} = \sum (FS_{ikt} - FNA_{ikt}) R_{ij} N_i \quad \ldots\ldots (16)$$

$$C_{AK} = \frac{C_{ijkt}}{365p} \quad \ldots\ldots\ldots\ldots\ldots\ldots (17)$$

$$C_{AK} = \frac{C_{ijkt}}{365p} \geq C_{mjk} \quad \ldots\ldots\ldots\ldots (18)$$

where all the symbols are as defined in Chapter III.

6.5.1 Data

Proceeding from the food production data compiled for each region and presented on Tables 6.1 - 6.4, we need data on the following variables to enable us compute the food balance and its calorie or protein content; net change in year - end food stocks, food waste and input requirement co-efficients, calorie and protein contents

annual food imports into the country during the review period.

6.5.2 Empirical Results

Given the above assumptions, available food supply in each region between 1961 and 1982 was derived and converted into their calorie and protein contents. Available food supply in each region is shown on Tables 6.9 - 6.12. Total calorie and protein supplies, as well as the per capita levels are also shown on Tables 6.9 - 6.12. The calorie and protein gaps by region are shown on Table 6.13, while the gaps derived from the sensitivity analysis are presented on Tables 6.14 - 6.17.

(a) Available Food Supply

Available food supply has two components - imports and domestic supply. One obvious fact from the data on Tables 6.9 - 6.12 is the rapid growth in the import component of supply in all the regions. For instance, average food imports in the North amounted to 43 thousand tge in 1961-1964 and increased by 58.6, 96.2, 128.6 and 79.5 per cent in 1965-1969, 1970-1974, 1975-1979 and 1980-1982, respectively. Similarly, the average food import level in the Middlebelt increased from 17.7 thousand tge in 1961-1964 by 61.6, 97.2, 126.6 and 80.2 per cent, in the four subsequent periods. In the West, the average food import level was 105.3 thousand tge in 1961-1964 and increased to 169.4, 330.8, 755.4 and 1,357.0 thousand tge in the subsequent four periods under review. In the East, food imports increased from an average level of 58

thousand tge in 1961-1964 to 93.6, 182.8, 417.8 and 750.7 thousand tge in 1965-1969, 1970-1974, 1975-1979 and 1980-1982, respectively.

On the other hand, domestic food supply in each region either declined or recorded only modest increases. Average domestic food supply in the North increased from 5.2 million tge in 1961-1964 to 5.9 million tge in 1970-1974 and then declined to 5.2 million tge in 1980-1982. In the Middlebelt, average domestic supply declined from a peak of 3.2 million tge in 1961-1964 to 3.0 million tge in 1980-1982. In the West, average domestic supply declined from 2.7 million tge in 1961-1964 to 2.3 million tge in 1970-1974, but increased to 2.9 million tge in 1980-1982. In the East, average domestic supply grew from 2.5 million tge in 1961-1964 to 2.7 million tge in 1965-1969, declined to 2.2 million tge in 1970-1974 and then climbed to 2.8 million tge in 1982.

The rapid growth in food imports and the tendency towards decline in domestic supply in each region resulted in the increasing share of imports in total food supply or rising import dependence of each region. In the North, food imports constituted only 0.9 per cent of total supply in 1961-1964, but increased the share to 1.3, 2.3, 5.5 and 9.5 per cent in 1965-1969, 1970-1974, 1975-1979 and 1980-1982, respectively. In the Middlebelt, food import share increased from 0.6 per cent to 0.9, 2.0, 4.5 and 7.2 per cent in the four subsequent periods. In the West, the share increased from 3.7 per cent in 1961-1964 to 5.9, 12.8, 22.2 and 31.8 per cent in the following four periods.

and in the East, the import share increased from 2.2 per cent in 1961-1964 to 3.4, 7.6, 14.1 and 21.4 per cent in the subsequent four review periods.

(b) Nutrient Content of Food Supply

Total calorie and protein supply in each region tended to move up in the 1960s, decline in the 1970s and recover slightly in the early 1980s. In the North, average calorie supply amounted to 49.7 billion cals in 1961-1964, increased by 0.6 and 14.2 per cent in 1965-1969 and 1970-1974, declined by 6.3 per cent in 1975-1979 and then increased to an average level of 55.9 billion cals in 1980-1982. Average protein supply followed a similar pattern of movement. It increased from 1,509 million gms in 1961-1964 to 1,747 million gms in 1970-1974, declined to 1,637 million gms in 1975-1979 and then increased to 1,717 million gms in 1980-1982. In the Middlebelt, average calorie and protein supplies declined between 1965 and 1979 and then increased between 1980-1982. Average calorie supply declined from 30.8 billion cals in 1961-1964 to 30.4, 27.8 and 26.8 billion cals in the next three periods and then increased to 31.5 billion cals in 1980-1982. Average protein supply which amounted to 853 million gms in 1961-1964 declined by 3.2 and 6.1 per cent in 1970-1974 and 1975-1979, but increased to a peak of 893 million gms in 1980-1982. In the West, average calorie supply moved from 27.5 billion cals in 1961-1964 to 29.4 billion cals in 1965-1969, declined by 16 per cent in 1970-1974, but increased by 27.5 and 34.9 per cent in 1975-1979 and 1980-1982, respectively. Average protein

supply followed the same pattern of movement. In the East, average calorie supply was 26 billion cals in 1961-1964, increased to 27.5 billion cals in 1965-1969, declined by 15.3 per cent in 1970-1974, while increasing by 17.2 and 24.9 per cent in 1975-1979 and 1980-1982, respectively. Average protein supply moved from 411 million gms in 1961-1964 to 475 million gms in 1965-1969, declined slightly in 1970-1974 and then increased by 26.4 and 28.2 per cent in 1975-1979 and 1980-1982, respectively.

Per capita calorie and protein supplies declined generally between 1961 and 1974 and tended to recover between 1975 and 1982. In the North, per capita calorie supply declined from 2,577 cals in 1961-1964 to 2,332 cals in 1965-1969, increased to 2,352 cals in 1970-1974 and declined by 16.5 and 8 per cent in 1975-1979 and 1980-1982 respectively. Per capita protein declined continously from 78.2 gms in 1961-1964 to 72.9, 71.9, 59.4 and 55.5 gms in the next four periods, respectively. But in the Middlebelt, per capita calorie supply amounted to 3,138 cals in 1961-1964, but fell by 11.5, 19.6 and 15.6 per cent in the next three periods and then increased by 5.2 per cent in 1980-1982. Per capita protein declined from 87 gms to 78.6, 66.9 and 55.2 gms in the next three periods, only to increase slightly to 56.4 gms in 1980-1982. In the West and East, the recovery in per capita calorie and protein started in 1975-1979 and up to 1980-1982. In the West, per capita calorie declined from 2,010 cals in 1961-1964 to 1,929 and 1,438 cals in the next two periods and then increased by 11.2 and 21.2 per cent in 1975-1979 and 1980-1982, respectively. Per capita protein moved from

34.9 gms in 1961-1964 to 35.1 gms in 1965-1969, declined by 10 per cent in 1970-1974, and then increased by 13.6 and 26.7 per cent in 1975-1979 and 1980-1982, respectively. In the East, per capita calorie declined from 2,136 cals in 1961-1964 to 2,047 cals in 1965-1969 and 1,527 cals in 1970-1974, but increased by 1.9 and 12.1 per cent in the next two periods. Per capita protein increased by 4.5 per cent to 35.2 gms in 1965-1969, declined by 12.5 per cent in 1970-1974 and increased by 10.1 and 15.0 per cent in 1975-1979 and 1980-1982, respectively.

(c) Calorie and Protein Gaps

The relationship of per capita calorie and protein supplies to minimum requirements enables us to derive calorie and protein gaps which measure the percentage difference of the per capita levels from the stipulated minimum requirements. As indicated earlier, these minimum requirements are 2,420, cals for calorie and 65 gms for protein.

The data on Table 6.13 which indicate these gaps suggest that per capita calorie was higher than minimum requirements in the North between 1961 and 1972, except 1961, 1967 and 1969. After 1972, they were below minimum requirements. Looking at the intervals of 1961-1965, 1966-1970, 1971-1975 and 1976-1982, per capita calorie was above minimum requirements in the North by an average of 6.6 per cent in 1961-1965, but below these requirements by 3.4, 3.4 and 23.9 per cent in 1966-1970, 1971-1975 and 1976-1982, respectively. The Middlebelt had the best results. Per capita calorie was above minimum requirments

by an average of 30.8 and 8.8 per cent during the first two periods, but below minimum requirements by 12.2 and 21.6 percent in the subsequent two periods.

This situation in the West and East was disturbing. Per capita calorie was below minimum requirements in the West by 15.8, 24.8, 43.4 and 14 per cent in the respective four periods, while the East had 10.8, 20, 39.4 and 44.2 per cent calorie deficits during the same review periods.

With respect to protein, the North and Middlebelt had the best achievements, while the results were poor for the West and East. During 1961-1965, 1966-1970, and 1971-1975, per capita protein in the North was above minimum requirements by an average of 15.4, 11.6 and 8 per cent, respectively. But between 1976 and 1982, it was below minimum requirements by an average of 14.3 per cent. In the Middlebelt, per capita protein was above minimum requirements during the first two periods, 1961-1965 and 1966-1970, by 35.2 and 15.4 per cent, respectively. Per capita protein was however below requirements in 1971-1975 and 1976-1982 by an average of 1.0 and 15.4 per cent, respectively. In the West and East, per capita protein did not meet minimum requirements in any single year during the period. For example, in the West, per capita protein was below requirements by an average of 45.6, 46.6, 53.2 and 36.7 per cent during the four respective review periods. On the other hand, the protein deficits during the four periods in the East averaged 47, 47, 53.6 and 43.7 per cent, respectively.

One important factor in the comparison of calorie and protein gaps is the population of each region. The food situation in the North would have been substantially better than what it was but for its big share of total

population. It consistently controlled the largest share of total food supply, ranging between 30 and 35 per cent during the period. The larger shares of total population in the West and East helped to worsen the poor food situation in the two regions. Since 1975, the two regions have taken the larger shares of total food supply than the Middlebelt. It was precisely during this period that the two regions had the highest calorie and protein deficits. In the same period, the food situation in the Middlebelt was substantially better due largely to its small population.

6.5.3 Sensitivity Analysis

In Chapter V, we adduced several reasons for undertaking a sensitivity analysis in the aggregate analysis. Among these was the inappropriateness of holding, in the absence of current estimates, some parameters such as waste and input co-efficients constant. The evidence pointed to the fact that such parameters were likely to change over the period in view of several policy measures in that direction (see Chapter V). The same considerations underlie the necessity to undertake a sensitivity analysis in the regional assessment. Four new situations were examined.

(a) Population Growth Rate

In the primary analysis, a population growth rate of 2.5 per cent per annum was used for the period 1961-1975, while a rate of 2.8 per cent was used for the period 1976-1982. In the sensitivity analysis, a flat rate of 2.5 per cent per annum was applied to the whole period. The latter rate is official and is used by the National Population Bureau. The results under this new assumption

are presented on Table 6.14 which gives the resultant calorie and protein gaps. The positive impact produced by the reduction in population growth rate between 1976 and 1982 was only marginal - the calorie and protein gaps were reduced by an average of one percentage point. In the North, the calorie deficits averaged 22.9 per cent and protein deficits 13.3 per cent. The calorie and protein deficits in the primary analysis were 23.9 and 14.3 per cent, respectively. In the Middlebelt, the new calorie and protein deficits were 19.9 and 14.4 per cent for the period, compared with 20.9 and 15.4 per cent in the primary analysis. In the West, the calorie and protein deficits averaged 25 and 35.7 per cent under the new assumption, compared with 26 and 36.7 per cent in the primary analysis. In the East, the calorie and protein deficits averaged 30.6 and 42.7 per cent compared with 31.6 and 43.7 per cent in the primary analysis.

(b) Waste Co-efficient

In the original analysis, the proportions of food items that were subject to waste ranged between 5 and 35 per cent. In the sensitivity analysis, it was assumed that these ratios were reduced by half after 1970 and the rationale was that during that period, vigorous efforts were made by the government to supply facilities that could lead to that reduction (see Chapter V). The resultant calorie and protein gaps by using the ratios are presented in Table 6.15. These show that reduction in food waste would have produced a significant impact on the food situation. For instance, during the few years

when calorie and protein surpluses were attained in the regions, these were increased by 3-4 percentage points. When, as was more often the case, deficits prevailed, such were reducdd by the same extent. Under the new assumptions, calorie deficits between 1971 and 1982 averaged 12.5, 13.7, 29.7 and 31.3 per cent in the North, Middlebelt, West and East, respectively. The respective deficits in the primary analysis were 16.1, 17.3, 33.3 and 34.9 per cent. Also, under the new assumption, protein deficits were 1,5.9, 40.1 and 44.2 per cent for the North, Middlebelt, West and East, respectively compared with 4.7, 9.4, 43.6 and 47.8 per cent in the primary analysis.

(c) Input Co-efficient

With increased industrialization and consumption of livestock feeds, food items required as industrial raw materials and planting seeds were likely to increase. In the primary analysis, input co-efficients ranged between 5 and 60 per cent. In the sensitivity analysis these were increased by 5 percentage points after 1970. The results presented as calorie and protein gap s are shown on Table 6.16 The effect of this was to increase the calorie and protein gaps during the period by an average of about 2-3 percentage points. Under the new assumption, calorie deficits between 1971 and 1982 averaged 18.4, 19.6, 35.7 and 37.3 per cent in the North, Middlebelt, West and East, respectively. These compared with deficits of 16.1, 17.3, 33.3 and 34.9 per cent in the respective regions in the primary analysis. Also under the new assumption, protein deficits in the four regions averaged

7.1, 11.8, 46 and 50.3 per cent in the four regions, compared with 4.7, 9.4, 43.6 and 47.8 percent in the primary analysis.

(d) Combination of Co-efficients

In the fourth sensitivity analysis, we assumed the fact that there could be a combination of the above changes. Under this scenario, the population growth rate between 1976 and 1982 was assumed to be 2.5 per cent. The effect of this as described earlier was a marginal reduction in calorie and protein gaps. The other assumptions were the reduction in waste by half between 1971 and 1982 and an increase in input demand by about 5 percentage points during the same period. The reduced waste factor had a positive impact, while the increased input utilization had a negative effect on the calorie and protein situation. The combined effect was that calorie and protein gaps in the four regions were reduced by about 1-3 percentage points a year (see Table 6.17). Under the new assumptions, calorie deficits in the North, Middlebelt, West and East during the period averaged 14.1, 15.7, 30.1 and 31.8 per cent, respectively, whereas the deficits in the primary analysis were 16.1, 17.3, 33.3 and 34.9 per cent, respectively. The protein deficits under the new assumptions averaged 3.2, 7.9, 42.1 and 46.4 in the respective regions, compared with 4.7, 9.4, 43.6 and 47.8 per cent, respectively in the primary analysis.

6.6 Food Gaps

The second method used in evaluating the food consumption potential and the overall food situation in

each region was to compare data of potential food demand with those of supply with a view to identifying probable food surpluses and deficits in each region. The relevant equations for this exercise were designated as Nos. 24 - 28 in Chapter IV and may be restated as follows:

$$g_{kt} = S_{kt} - D_{kt} \quad \ldots\ldots\ldots\ldots (24)$$

$$S_{kt} = FS_{ikt} - FNA_{ikt} \quad \ldots\ldots\ldots (25)$$

$$D_{kt} = D_{ko}\,(1 + E_Y P + E_N B) \quad \ldots\ldots\ldots (26)$$

$$g_{kt} > 0 \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots (27)$$

$$g_{kt} < 0 \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots (28)$$

where all the symbols are as defined in Chapter III.

Food available for human consumption in each region was computed as indicated in section 6.5.1 and the results were presented on Tables 6.9 - 6.12.

In estimating food demand data from equation (26), the main parameters were derived as in Chapter V and the same estimating procedure was adopted. The base year (1964), the income elasticities of demand for the food items and population growth rate also remained unchanged in the computation and were all indicated in Chapter V. With these assumptions, the food demand estimates for each region are presented on Table 6.18. Comparing the food supply and demand data, surpluses or deficits were computed for each region and are presented on Tables 6.19 and 6.20.

6.6.2 Empirical Results

Food supply data were analysed in Section 6.5.2. In this section, food demand, as well as aggregate and per capita food gaps are analysed.

(a) Food Demand

Largely because of the rapid growth of income and population, food demand increased at a rapid rate in all the regions between 1961 and 1982. Average food demand in the North increased from 5.5 million tge in 1961-1964 to 6.3, 8.6, 10.2 and 11.3 million tge in 1961-1964, 1965-1969, 1970-1974, 1975-1979 and 1980-1982, respectively. On the average, the North accounted for about 40 per cent of total demand. In the Middlebelt which accounted for about 23 per cent of total demand, the average level of demand moved from 3.4 million tge in 1961-1964 to 3.9, 5.1, 5.9 and 6.6 million tge in the four subsequent review periods. In the West, average food demand moved from a level of 2.7 million tge in 1961-1964 to 3.1, 4.0, 4.8 and 5.2 million tge in the four review periods and the region accounted on the average for about 19 per cent of total food demand. The East whose share of total demand was about 18 per cent had an average food demand level of 2.6 million tge in 1961-1964, which increased by 16.4, 30.7, 18.3 and 10.4 per cent in 1965-1969, 1970-1974, 1975-1979 and 1980-1982, respectively.

(b) Total Food Gaps

Coupled with the unimpressive growth in total food supply which we observed in section 6.5.2, the effect of the rapid increase in food demand was to induce a similar rapid growth in average food gaps in the four regions between 1961 and 1982. The gaps were deficits in the North and Middlebelt after 1964 and were all deficits in the West and East after 1968. However, the rates of

growth of average food deficits were generally on the decline in all the regions. In the North, the average food deficit which was only 262 thousand tge in 1961-1964 increased by 348.9 per cent in 1965-1969, 116.1 per cent in 1970-1974, 76.4 per cent in 1975-1979 and 23.3 per cent in 1980-1982. Also in the Middlebelt, average food deficit increased from 167 thousand tge in 1961-1964 to 795 thousand tge in 1965-1969, an increase of 376 per cent. But the rates of growth in the three subsequent periods were 158.7, 49.9 and 9.2 per cent, respectively. In the West, average food deficit increased by 560.2 per cent to attain a level of 1,426 thousand tge in 1970-1974 but increased by 3.6 per cent in 1975-1979 and declined by 36 per cent in 1980-1982. Similarly, average food gap moved from a surplus of 33 thousand tge in 1961-1964 in the East to a deficit of 232 thousand tge in 1975-1979 and actually declined by 9.1 per cent to 1,589 thousand tge in 1980-1982.

(c) Per Capita Food Gaps

Per capita food gaps increased generally in all the regions between 1961 and 1982, but rates of increase in the various sub-periods were smaller than those recorded for total food gaps. Per capita food gaps were generally deficits in the regions except for the period 1961-1964 in the West and East. In the North, per capita food gap moved from a deficit of 14 kg in 1961-1964 to 54, 103, 161 and 179 kg in 1965-1969, 1970-1974, 1975-1979 and 1980-1982, respectively. The per capita gap in the

Middlebelt also increased from period to period, except in 1980-1982 when it fell by 1.8 per cent from the 1975-1979 level. In the West, the gap was a surplus of 12 kg in 1961-1964. However, deficits of 13, 82, 76 and 43 kg were recorded in 1965-1969, 1970-1974, 1975-1979 and 1980-1982, respectively. Similarly in the East, per capita food gap was a surplus of 3 kg in 1961-1964. But per capita deficits of 17, 96, 100 and 81 kg were recorded in the four subsequent periods.

The impact of population data for the regions was equally evident in the per capita food gaps, but the impact is now a reverse of what resulted generally from the analysis in section 6.5.2. There, a smaller population was an advantage because it meant spreading available supply over a smaller population in per capita terms. With respect to food gaps, a smaller food gap might mean a higher per capita gap in view of the smaller population over which the gap is spread. For instance, per capita food deficits in the North were generally smaller / than those of the Middlebelt because the gap in the North were spread over a larger population. Also, the per capita gaps in the West and East were smaller partly due to their larger populations, but also due to the smaller levels of average food gaps.

CHAPTER VII

AN APPRAISAL OF PUBLIC SECTOR FOOD POLICIES IN NIGERIA

This Chapter completes the empirical analysis by reviewing and evaluating the public sector food policies adopted and implemented in the country between 1962 and 1985. This analysis is undertaken against the background of the theoretical framework outlined in Chapter IV.

7.1 Review of Public Sector Food Policies

The statement of public sector food policies can generally be found in the four National Development Plans launched in 1962, 1970, 1975 and 1981. The various food policy objectives, instruments and programmes became better articulated with the start of a new plan and this bore some relationship to the increasing dimension of the food problems discussed in Chapters V - VI. These corresponding features can only be explained by a detailed review of the food policy objectives, instruments and programmes during the period.

7.1.1 Food Policy Objectives

During the first Plan period, 1962 - 1968, the role of the Federal Government was limited to agricultural research and there was no clear statement of a food policy objective, except the implication that its research role would enhance food production. The Regional Governments, particularly in the East and West, had well defined food policy objectives which included increasing food production to meet increasing demand of the population, increasing the nutrient value of food intake and increasing the varieties of foods to meet changing tastes (Nigeria,FMED,1962:pp.206, 287). There was a clear restatement of these food policy objectives in the Second Plan which was the first integrated plan for the country (Nigeria, FMED, 1970: p. 109). However, there were no targets in these two plans.

During the Third and Fourth Plan periods, these policy objectives were not only articulated, but also translated into quantitative targets. For instance, the target for the Third plan was to attain minimum nutrient requirements of calorie and protein from which target increases in basic food items were computed (Nigeria, FMED, 1975a: pp. 66-70; Nigeria, FMNP, 1981a: pp. 78-85). The minimum nutrient requirements were put at 2191 cals and 53.8 gms of protein. These led to estimates of annual growth rates of 4·3, 3.0, 3.3 and 3.0 per cent for cereal, roots and tuber, grain and livestock production, respectively, between 1981 and 1985.

7.1.2 Food Policy Instruments

During the period under consideration, various food policy instruments were adopted to attain the food policy objectives outlined above. These food policy instruments include: food price support, development of processing and storage facilities, provision of credit, subsidies on inputs, research and extension support, rural infrastructural development, control of international trade and encouragement of modern food production techniques. During the first plan period, the emphasis was on providing research and extension support, while in the Second Plan period, credit and international trade control became popular, especially with the improvement in government revenue and foreign exchange earnings. As from the Third Plan period, all the eight food policy instruments had become established in pursuance of the food policy objectives.

All the food policy instruments were used to induce

higher food production either directly or indirectly. For instance, the input subsidies were given to encourage the utilization of physical inputs like fertilizers, pesticides, improved seeds and machinery which would enhance crop yields (see section 7.1.3). The provision of processing and storage facilities, as well as intensification of research were aimed at reducing food waste, as well as to increase crop and livestock productivity. Provision of credit was meant to provide necessary capital to farmers at reasonable interest rates, while the promotion of modern farming techniques were expected to increase production faster than under traditional techniques. The extent to which the food policy instruments were appropriate in achieving the stated objectives can only be known through a review of the achievements of the food programmes.

7.1.3 Food Programmes: Nature and Achievements

Taking an overview of the food programmes in the past four National Development Plans, it appears that six have been quite prominent in terms of the resources committed by government. These programmes include: input subsidy, credit, agricultural research, direct food production, integrated rural development and river basin development programmes. Virtually one or a combination of the food policy instruments discussed earlier have been used in these programmes and the last two are unique in that each one involves the use of multiple instruments. The nature and achievements of the various food programmes are discussed below.

(1) Input Subsidy Programme[1/]

There are several inputs which have been supplied to

1/ The statistics and other information used in this subsection were derived from the unpublished records of the Fed. Dept of Agric., Lagos.

farmers at less than actual cost since the second plan period. Fertilizers have occupied a prominent position. From 1975, the procurement and distribution of fertilizers was centrally administered by the Federal Department of Agriculture. Up to 1983, the subsidy element in fertilizer price was about 85 per cent borne by the Federal and State Governments. In 1984, the subsidy was reduced to 50 per cent. Total subsidy paid by the government increased from ₦34 million in 1978 to ₦135m in 1982. As a result of these efforts, fertilizer consumption has increased tremendously, from an average of 75 thousand tonnes in the early 1970s to about 500 thousand tonnes between 1980 and 1983. Against these achievements are some serious shortcomings of the fertilizer subsidy scheme. For example there has been evidence that not all fertilizer supply actually got to the farmers owing to leakages in the transportation and distribution process, as well as in smuggling into neighbouring countries where prices were higher (Nigeria, PPIB, 1979: pp. 1-10). Also because of the apparent excess demand for fertilizer, a black market coexisted with the official channels, resulting in rapid price increases which were those paid by the average farmers rather than the subsidised price.

Another subsidised input is pesticide which is supplied at reduced cost to farmers through the Federal and State Pest Control Services. It is estimated by the Federal Department of Agriculture that an average of ₦20 million per annum was being spent on the pesticide subsidy scheme between 1976 and 1983 for which data are available. Pesticide consumption has increased from an average of 20

thousand tonnes between 1971 and 1975 to about 40 thousand tonnes per annum between 1980 and 1983. The pesticide scheme has been adversely affected by problems similar to those of fertilizer supply particularly with regard to inflated prices and inefficient distribution by government agencies.

Improved seeds have been supplied also to farmers at about 50 per cent of actual cost and the subsidy is estimated to have run into an average of about ₦5 million a year since 1978. The supply of improved seeds has increased from an average of 6000 tonnes between 1970 and 1975 to about 25 thousand tonnes a year between 1980 and 1983. The major constraints in the utilization of improved seeds are inadequate production and the untimely distribution of supply, which are similar problems affecting the fertilizer and pesticide schemes.

Another price subsidy has been in respect of bush clearing and use of agricultural machinery. One of the operations of the River Basin Development Authorities involves bush clearing for the resettlement of farmers. After clearing the land, the Authorities allocate it to displaced farmers at minimal cost. It is estimated that a subsidy of about ₦100 million has been given to farmers annually since 1980 as a result of this activity. The subsidy on the use of agricultural machinery arises from the hiring out of farming tools like tractors, harvesters, planters, ploughs and harrows to farmers at reduced rates of up to 50 per cent of cost. This activity has been handled by the Federal Department of Agriculture, the States' Tractor Hiring Units and the RBDAs. The subsidy element has been

running at ₦10 million a year in 1980-1983. These activities have however not made much impact on land development through modern techniques as evidenced by the neglible proportion of total hectarage prepared under these schemes. It is estimated that as of 1983 there was one tractor for every 20 thousand hectares of cultivated land, while a total of 55 thousand hectares of land were being prepared annually by the various units mentioned earlier (Oyaide, 1979: p.37). Moreover, the foreign exchange problem facing the country has restrained the importation of agricultural machinery and spare parts to maintain the existing machines. It has been estimated that over 50 per cent of the tractor fleet kept by the states have become grounded for lack of proper maintenance and spare parts.

In summary, the review has shown that input utilization has increased significantly since the early 1960s possibly as a result of price subsidy policy on those inputs. However, several features of the input subsidy schemes have made their impact minimal. These features include the limited supplies of the inputs, illegal activities which inflated the prices of inputs, inefficient distribution, the high cost of subsidies to the government and their high import content.

(2) Credit Programme

Government has since the early 1970s favoured the provision of credit to farmers as an important tool of agricultural policy (Nigeria, FMED, 1975: p.71). The renewed government efforts in agricultural credit administration were partly in response to the failure of earlier agencies charged with that role and partly due to disenchantment with the

exploitation of farmers by private money lenders.

Two types of lending institutions have featured prominently in the credit programme. The first includes the public credit institutions such as the State Government Credit Corporations and the Federal Government-owned Nigerian Agricultural and Cooperative Bank (NACB). The operations of the state credit corporations are not discussed here because of inadequate data. The NACB was set up in 1973 by the Federal Government primarily to extend medium and long-term agricultural credit which the commercial banks had neglected. Up to 1984, the NACB had accommodated 3133 borrowers made up of individuals (17.4%), Cooperatives (17.3%), Companies, (16.0%), State Governments (18.8%) and others (13.9%) 2/. A total amount of ₦422.1 million had been lent to borrowers out of a total commitment of ₦585.7 million. The sectoral distribution of total loans shows that 45.8 per cent of the loans was extended to crop production, 5.5 per cent to animal husbandry, 5.1 per cent to fishery, 9.4 per cent to poultry and 34.2 per cent to miscellaneous agricultural activities. Operational results look quite impressive, but a number of problems have been associated with the Bank's activities. The main one is that its operations have tended to discriminate against the majority of small farmers partly because its activities are carried on in a few urban locations and partly because most farmers do not belong to

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2/ The data in this section are compiled from returns of banks to the Central Bank.

cooperatives which were supposed to be the focus of such activities[3/]. Another problem was the high rate of default in loan repayment. As of 1984, 1418 borrowers were defaulting on loan repayment and the total amount involved was over ₦50 million.

The second type of agricultural lending has been through commercial and merchant banks. Beginning from the early 1970s, the banks were required through the Central Bank guidelines to extend stipulated proportions of their loans to various sectors including agriculture. This induced a rapid growth, amounting to about 62 per cent a year in bank loans to agriculture between 1970 and 1977. Credit going into agricultural production through the banks was further boosted with the initiation of the Agricultural Credit Guarantee Scheme (ACGS) which was aimed at insuring the loans extended to farmers by the banks. Between 1978 and 1983, a total of 6095 loans, amounting to ₦179.6 million were granted to borrowers under the scheme. Consequently, the proportional share of bank credit to agriculture out of total credit to all sectors increased from 3.1 per cent a year between 1971 and 1977 to 6.9 per cent a year between 1978 and 1984. In spite of this modest achievement, the ACGS experienced a number of problems which were similar to those of the NACB. First, the scheme was not in favour of the majority of small farmers. Food crop production which is dominated by this group of farmers received about 21 per cent of total loans,

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3/ For instance, at the end of 1980, only 6.5 per cent of farmers were estimated to belong to cooperative organizations (Nigeria, FMNP, 1981a: p.200).

while poultry which is dominated by urban-based enlightened farmers[4/] received over 60 per cent of total loans. Second, it experienced repayment problems just like the NACB. By 1983, the commercial banks had made a total of 226 claims involving ₦7.0 million on account of unrepaid loans under the scheme (CBN, 1983a: pp.110 - 114). The ACGS has also been affected by the low accessibility of banks whose main operations have been largely concentrated in urban areas. This has prompted the Central Bank to embark on a rural banking programme to induce the banks to extend their branch operations to the rural areas of the country. The programme has been divided into 3-year phases (starting from 1977) for implementation and under it, commercial and merchant banks are required to establish branches of their banks in specified rural locations. In addition, the annual monetary and credit guidelines of the Central Bank have requested the banks to lend not less than 30 per cent of total deposits collected through such rural branches to customers in those rural areas (CBN, 1983a: p.7).

(3) Research Programme

As indicated earlier, government interest in agricultural research has had a long history. The various research agencies have gone through several structural changes, particularly since the early 1970s in an attempt to increase their effectiveness. As at the end of 1984, there were about 18 agricultural research institutes in Nigeria, 12 of which

4/ For instance, Olayide (1980, p.11) estimated that 99 per cent of total output of food crops was accounted for by small farmers.

carry on research specifically on food crops, livestock and fisheries, 4 on tree crops and 2 on general services.[5/]

The increased allocations made to research in the various Development Plans should reflect the importance attached to that activity. Capital allocations to agricultural research increased from only ₦6 million in the First Plan to ₦11.0 million in the Second Plan, ₦96.1 million in the Third Plan and about ₦250 million in the Fourth Plan. These allocations have increased significantly but their proportionate shares in total agricultural allocations have declined with each plan. For instance, the proportionate shares of research allocations out of total allocations to agriculture in the First through the Fourth Plans were 23.0, 16.2, 5.7 and 4.6 per cent, respectively. Agricultural research allocations constituted 0.04, 0.05, 0.32 and 0.88 per cent of GDP during each of these four plan periods.

5/ The research institutes for food crops, livestock and fisheries include: Institute for Agricultural Research, Samaru; National Cereals Research Institute, Ibadan; National Root Crops Research Institute, Umudike; National Institute for Horticultural Research, Ibadan; Institute of Agricultural Research and Training, Ibadan; National Veterinary Research Institute, Vom; National Animal Production Research Institute, Shika; Nigerian Institute for Trypanosomiasis Research, Kaduna; Lake Chad Research Institute, Mechoun Fatori; Kainji Lake Research Institute, New Bussa; and Nigerian Institute for Oceanography and Marine Research, Lagos. The Universities also undertake agricultural research through their Faculties of Agriculture, while the International Institute for Tropical Agriculture (IITA) based in Nigeria (Ibadan) also carries on research that is relevant for the African Region. Except the IITA, most of the government research agencies are required to undertake breeding, agronomic and entomological research, as well as crop utilization (Research Institutes Establishment Order 1975).

The growth in the allocations to agriculture would seem to suggest that agricultural development was an important aspect of policy and, research, being an important tool for increased agricultural production, should have received much higher allocations.

It is not possible in this brief review to undertake any rigorous assessment of research to agricultural production in the country because of the paucity of relevant data. Available evidence shows that significant research results have been produced by all the research agencies. Some of the highlights of research findings at the IITA were described in Chapter VII. Other research Institutes have made several break throughs in developing improved seed varieties. For instance, the National Cereals Research Institute (NCRI) and the Institute of Agricultural Research (IAR) (Zaria) developed white and yellow maize varieties for use in the Western and Northern parts of the country (NCRI, Annual Reports, 1980-85). The National Root Crops Research Institute (NRCRI) Umudike, also has made some findings with respect to improved varieties of yams, cassava and cocoyams (Annual Reports, 1976 - 1981).

These research findings have resulted in increased quantities of seeds distributed by the National Seed Service (Okorie, 1984: pp. 116-117). The distribution of improved seeds of cereals grew from 983 tonnes in 1979 to an annual average of nearly 3,000 tonnes between 1980 and 1983. Also the distribution of improved grain seeds increased from 146 tonnes in 1979 to an average of 169 tonnes between 1980 and 1983. A number of reviews have however shown that the agricultural research programme has not made the expected

impact (Nigeria, FMED, 1970: pp. 107 - 112; FMED, 1975a, pp.66 - 72; Idachaba, 1980c: pp. 9-66). Idachaba (1980c: pp. 26-30) in his assessment of agricultural research concluded that it has generally been ineffective and identified several constraints. First was the inadequate funding referred to earlier and this affected the completion of research projects and planning of new ones. Second, research personnel were inadequate. This also led to delays in completing research projects. Not only were the personnel not adequate in number, they were unstable because of a large turnover. This resulted in incomplete projects and even total abandonment. Third, the research institutes lacked necessary materials and equipments for carrying out research projects. Existing equipments were not also adequately serviced. Fourth, research results were not sufficiently disseminated because the institutes were not operationally well-coordinated with the extension services in the states and most of the latter were suffering from similar problems facing the research institutes.

(4) Direct Production Programme

Large scale mechanized farming has been an important feature of Federal and State Government food policy since the late 1960s. The decision to set up large scale state farms for food production was predicated on the need to embark on rapid modernization as these farms were operated on modern farming techniques, and the increasing concern about the prospects of the smallholder subsector. These considerations coupled with the favourable revenue position of the government led to the setting up of food production companies in the

late 1960s. State Governments, especially Bendel and Kwara were first to establish food production companies. By 1975, virtually all state Governments had set up state farms. For example, the East Central State (now Imo and Anambra States) set up an Agricultural Development Authority to undertake large-scale food production. One of its largest projects was to develop a rice plantation on the Imo/Anambra Basin with an area of 20,000 ha and at a cost of ₦7.5 million (Nigeria, FMED, 1975b, pp. 33-77). The project was to involve clearing of the swampy area, construction of irrigation and drainage system, access roads and the purchase of the relevant machinery and equipment. Kwara State through its Kwara Food Production Company planned several projects for rice, maize, cowpea, guinea-corn and yam production at a cost of ₦11 million. The rice production scheme was to involve an irrigation of 15,000 ha. The Mid-West State (Bendel) planned to spend ₦14 million to set up 4 farms covering 42,000 ha. in various locations as an extension of the Agbede Farm Project. The North Central State (Kaduna) planned to set up a Company during the Third Plan period and would undertake preliminary work for food production and processing at a cost of ₦2 million.

The direct involvement of Federal Government in direct food production began in the early 1970s with the establishment of the River Basin Development Authorities and the Nigerian Meat and Livestock Authority which were aimed originally at providing some infrastructural facilities and inputs to farmers, but which tended to develop keen interest in direct food production. The Federal Government subsequently

established in the late 1970s the National Grains Production Company (NGPC), the National Fish Production Company, the National Root Crops Production Company and the Nigerian Beverages Production Company. Most of these Federal Companies, including those set up by the states were expected to be run as commercial ventures with foreign technical partners.

Although the direct involvement of government agencies has received wide commentaries, the impact of the agencies is poorly documented. In 1983, the annual survey of agricultural production conducted by the Research Department, Central Bank of Nigeria was planned to cover the state and Federal Government food production companies. The returns from that aspect of the survey were extremely poor for any meaningful analysis. The National Grains Production Company however gave some rough information about its activities in five pilot projects:

(i) Mokwa Farm Project in Niger State;

(ii) Ilero Farms in Oyo State;

(iii) Jem'a Farms in Kaduna State

(iv) Kuzuntu Farms in Kaduna State;

(v) Jesse Farms in Bendel State.

Total investment in these projects between 1975 and 1980 amounted to ₦2.889 million. The crops cultivated included cowpea, groundnuts, sorghum, maize and rice. The average production, yield and areas cultivated for the pilot projects are stated below. Output of the five crops averaged 178, 669, 594, 2411 and 3155 tonnes for cowpea, groundnut, sorghum, maize and rice, respectively. Based on output

targets for the pilot projects, performance ratios were calculated to be 82, 76, 83, 42 and 37 per cent for the respective crops. Crop yields in the pilot farms averaged 252, 700, 850, 1042 and 1338kg/ha for cowpea, groundnut, sorghum, maize, and rice, respectively. If these yields are compared with average yields obtained (average for 1975 -80) for these crops in the various states in which they are located, the actual yields indicated increases of 26, 56, 13, 16 and 7 per cent for the respective crops. The average cost per hectare was computed to be ₦84 which would be seen in a better perspective when compared with the cost in the Agricultural Development Projects.

National Grains Production Company
1976 - 1980

	Production (tonnes)	Areas (Ha)	Yields (kg/Ha)
Cowpea	178	705	252
Groundnut	669	938	700
Sorghum	594	682	850
Maize	2411	2230	1042
Rice	3155	2358	1338

A number of problems faced the execution of direct production projects generally and these resulted in their marginal contribution to output (Nigeria, FMNP, 1981a: p.84). For instance, the projects were embarked upon without adequate planning and were faced with the problem of inadequate funding. The shortage of material inputs such as land acquisition and machinery also prevented much progress. There was also a shortage of skilled manpower particularly

as remuneration and other conditions of service were generally the same as in the civil service.

(5) Agricultural Development Projects

The Agricultural Development Projects (ADPs) embarked upon throughout the country by the Federal and State Governments in cooperation with the World Bank since the early 1970s appear today to be the most articulated of programmes aimed at mobilizing peasant farmers. An ADP is an integrated rural development project with emphasis on agricultural project activities such as production,markets, credit, extension and farm inputs. A full integrated rural development project usually has the agricultural activities and other components such as rural industrial development, rural public works, health facilities, family planning and education. Government interest in integrated rural development projects began in the early 1960s with the establishment of farm settlements and institutes in the country. The experiences gained from these schemes prompted more intensive research by Nigerian Universities using such schemes as Badeku, Uboma, Ibarapa and Isoya (Olatunbosun, 1976: pp. 14 - 17). The ADPs became the first practical demonstrations of these researches.

The ADPs were conceived as a major tool of rural mobilization one of the objectives of which is to assist in the achievement of self-sufficiency in food production in the country (IBRD, 1974a,b,c,). The main strategy of the ADPs is to increase the productivity of peasant farmers in four ways (Nigeria, FDRD, 1982a,b,c,). First, there is an input (with credit facilities) supply component which is

handled through a net work of farm service centres located very near producing areas. Second, there is a rural feeder road programme that will ensure rapid evacuation of food, timely delivery of inputs and opening up new areas for cultivation. Third, there is a farm extension and training component designed to induce wider adoption of improved practices and modern farm inputs. Finally, there is a built-in project monitoring and evaluation.

Three of the ADPs - Funtua, Gusau and Gombe - completed the first phases of their implementation in 1980[6/]. The Funtua Agricultural Development Project covers the two local government areas of Funtua and Malumfashi in Kaduna State. The Gusau Agricultural Development Project is located in Sokoto State and extends over two local government areas of Gusau and Kaura Namoda. On the other hand, the Gombe Agricultural Development Project is situated in Bauchi State and extends over Gombe local government area and parts of Akko and Tangale - Waja local government areas. All the three projects took-off in 1975. Each ADP is financed by the government of the state in which it is located, the Federal Government and the World Bank in a rough ratio of 40: 25: 35. A total investment of ₦100.4 million was planned for the three ADPs under consideration[7/]. Out of this amount, Funtua was to take ₦39 million, Gusau ₦30.6 million and Gombe ₦30.8 million. However, at the end of 1980 a total of ₦122.4 million had actually been spent on the

6/ See the completion Reports for the three ADPs (Nigeria, FDRD, 1982a,b,c).

7/ All the information used in this section was compiled from the Completion Reports for the three projects.

three projects, made up of ₦44.6 million for Funtua, ₦44.5 million for Gusau and ₦33.3 million for Gombe. Each ADP is planned to render services to a fairly large number of farmers. The three ADPs were planned to assist about 215 thousand farmers who cultivate about 869 thousand hectares of farm lands. Thus, the mean holding of a farmer in these project areas was about 4 hectares. In totality, the three projects embrace an area of 1800 sq. km.

The available data show that some satisfactory results have been achieved in the three pilot ADPs and these have encouraged other states to launch similar projects in their areas. Crops grown by farmers in the three ADPs included sorghum, maize, groundnuts, cowpeas and millet. The most important crop grown in Funtua and Gombe was sorghum the output of which ranged between 50 and 150 thousand tonnes. In Gusau, millet was the major crop and its output ranged between 90 and 116 thousand tonnes during the period, 1976 - 1980. Total incremental production recorded averages of 52.0, 46.0 and 62.0 per cent in Funtua, Gusau and Gombe respectively. The average cost per hectare in the three projects was computed to be ₦28, while the average yield increase ranged between 53 per cent for sorghum and 113 per cent for millet.

On the basis of these results, the ADPs have generally performed well. To a large extent, this may be attributed to the integrated approach adopted in the implementation of the schemes. The approach recognised the multiplicity of farmers' problems such as the inadequate utilization of inputs, insufficient infrastructures and minimal attention from the extension system. These problems were simultaneously attacked

in the ADPs. But in spite of the satisfactory results from the ADPs, some problems have been observed to reduce their overall potential (Idachaba, 1980a: pp. 30-44). For instance the ADPs did not incorporate marketing and processing services in their implementation and this has resulted in substantial losses. Similarly, the ADPs did not include the development of social infrastructures such as health, education and utilities.

(6) River Basin Development Programme

The concept of river basin development was introduced into the Nigerian agricultural policy partly as a response to the occurrence of drought and partly as a means of making optimal use of the land and water resources of the numerous river basins in the country. In 1973, the first two River Basin Development Authorities (RBDAs), Sokoto - Rima and Chad Basin were set up, while 9 others - Ogun Oshun, Cross-River, Niger, Hadejia-Jam'are, Upper Benue, Lower Benue, Benin-Owena, Anambra, Imo and Niger Delta were established in 1976. In 1984, the eleven River Basin Development Authorities were decentralised such that each state, except Lagos and Ogun which would have one basin authority, now had one basin authority each. In addition, the new 18 basin authorities were required to extend their functions to include all rural development activities and were now known as River Basin and Rural Development Authorities (RBRDAs).

The specific functions of the RBRDAs are (Nigeria, FMI, 1976):

(i) large-scale mechanised clearing and cultivation of land for farmers;

(ii) construction of dams, boreholes and irrigation systems;

(iii) undertaking schemes for the control of floods and erosion and for water shed management;

(iv) supply of electricity to rural areas from large irrigation dams;

(v) establishment of agro-service centres with workshops and tractor hire services;

(vi) large-scale multiplication of improved seeds for distribution to farmers;

(vii) large-scale rearing of improved livestock and poultry for distribution to farmers as breeding stock; and

(viii) establishment of grazing reserves for nomadic stock breeders.

As can be seen from the above list of functions, the River Basin Authorities are multi-purpose agencies. The activities of the River Basin Authorities are also tailored to solve some of the environmental problems discussed in Chapter III. In particular, the irrigation activities of the River Basin Authorities should enhance the intensification of cropping, minimise the risk of crop failure due to inadequate rainfall, reduce soil moisture level in areas where rainfall is excessive and to meet special water requirements of crops like rice and sugarcane.

During the Third Plan, a total of ₦225.0 million was allocated for the establishment of irrigation projects under the control of the Sokoto - Rima and Chad Basin Development

Authorities.[8/] This was about 13.5 per cent of total capital allocations to the agricultural sector by the Federal Government. But, during the Fourth Plan, 1981 - 1985, a total of ₦1,780 million which represented about 33 per cent of Federal Government capital allocations to agriculture, was budgeted for financing the operations of the existing eleven Authorities. The total allocations were distributed as follows:

Authority	Allocations (₦ million)	Actual Expenditure 1981 - 1984 (₦ million)
Anambra-Imo	105	97
Benin-Owena	130	107
Upper Benue	118	93
Lower Benue	77	198
Chad Basin	170	175
Cross River	80	67
Hadejia Jama'are	127	246
Niger Delta	85	90
Niger River	146	160
Ogun-Oshun	145	120
Sokoto-Rima	597	441
Total	1,780	1,794

Actual expenditures by the River Basin Authorities between 1981 and 1984 amounted to about ₦1,794 million. The distribution of these amounts allocated shows that river basin authorities in the North accounted for 50 per cent, the Middlebelt, 19 per cent, the West, 15 per cent

8/ The statistics discussed in this subsection were compiled from the unpublished returns of River Basin Development Authorities submitted to the Federal Ministry of Water Resources.

and the East, 16 per cent. The distribution of the actual expenditures was 48, 25, 13 and 14 per cent for the North, Middlebelt, West and East, respectively. Against these huge expenditures, achievements by the Authorities have so far been small. For example, out of a total of 250,000 hectares of land planned for irrigation during the Fourth Plan, only 82 thousand hectares were actually irrigated and 90 per cent of these were undertaken by the Chad Basin, Hadejia-Jama'are and Sokoto-Rima Authorities which had been operational much earlier than those created in 1976. Unpublished returns of the Authorities show that about 25,000 farmers have so far been resettled by the Authorities. A total of 504 thousand tonnes (grain equivalent) of various food crops have been produced on lands prepared by the Authorities. About 1.5 thousand tonnes of fish have been caught. An average of 80 thousand layers and 70 thousand broilers were raised by the Authorities between 1981 and 1984.

The limited achievements of the Basin Authorities have been due to a number of problems. The basic problem of the Authorities especially those created after 1976 was the lack of long-range planning which was required for such capital intensive projects. Consequently, many projects have not started to produce the impact envisaged. In this regard, shortage of manpower has been a major constraint in that the field of irrigation engineering was a relatively new one and thus needed sometime to train or acquire the requisite manpower. Land acquisition is an important prerequisite for the projects of the Basin Authorities and this has proved rather difficult. Many communities, aware that the

Authorities were acting on behalf of the government, put a high price on their land. In some cases, speculators acquired land from communities only to offer it for sale to the Authorities at high prices.

The misuse of funds by the Authorities and the high capital intensity adversely affected the contribution of the projects (IBRD, 1983: pp. 35 – 37). Many important aspects of some projects have not been undertaken, while the delay in the release of funds has slowed down the implementation of other aspects. The projects have not been left out of the foreign exchange bottleneck. The importation of spare parts has been reduced and this has led to maintenance problems.

7.2 Appraisal of Food Policies and Programmes

7.2.1 Overall Assessment

The analysis of the nature and achievements of the food programmes undertaken above could only touch on a partial assessment of their impact because most of them lacked quantitative targets for such assessment. Only the direct production and ADP programmes had quantitative targets from their inception and the review above showed that such targets were not met in the actual implementation of the direct food production programme; while they were exceeded in the case of the ADPs. The input, credit, research and river basin development programmes did not have such targets against which their achievements can be measured. However, the entire food programmes can be assessed with reference to the overall target of meeting the minimum requirements of calorie and protein consumption as stipulated in the Third and Fourth National Development Plan documents. During the

Third Plan period, the target was to attain 2200 cals and 60 - 65 gms of protein per capita per day (Nigeria, FMED, 1975a: p.67). During the Fourth Plan period, the targets were 2073 cals and 49.7 gms of protein (Nigeria, FMNP, 1981a: p. 84). Actual achievements during the Third Plan period were 1781 cals and 46.5 gms of protein and during the first two years of the Fourth Plan period, achievements were 1863 cals and 49.7 gms of protein. The shortfall in calorie amounted to 19 per cent during the Third Plan period and 10 per cent in 1981 and 1982. Protein shortfall in the Third Plan was 22 per cent while protein target was exactly met in the Fourth Plan. It should be observed that the targets in the Fourth Plan were much lower than those in the Third Plan since it appeared the objective was no longer attainment of minimum requirements but some feasible consumption levels.

Another aggregate measure is to relate actual growth rates of food production to the targets set in the two plan periods. These can be illustrated as follows:

	Targets		Actuals	
	1976-80	1981-82	1976-80	1981-82
Cereals	6.0	4.3	0.1	2.0
Roots & Tubers	3.0	3.0	7.0	1.8
Grains	5.0	3.3	-2.5	1.9
Vegetable Oils	6.0	4.0	-0.4	1.8
Livestock	5.5	3.0	0.9	2.0
Total	4.8	3.9	1.7	1.9

It can be seen that virtually all the targets were not met.

During the Third Plan period, the growth rate of total food production was set at 4.8 per cent (Nigeria, FMED, 1975a; p.69), while the target growth rates for cereals, roots, grains, oils and livestock were 6.0, 3.0, 5.0, 6.0 and 5.5 per cent, respectively. Actual achievements for total food production was 1.7 per cent (Table 5.1), while those for the food components were 0.1, 7.0, -2.5, -0.4 and 0.9 per cent respectively. Only the target growth rate for roots and tubers was exceeded. In the Fourth Plan period, the growth target for total food production was 3.9 per cent (Nigeria, FMNP, 1981a: pp. 82-83), and those for the food components were 4.3, 3.0, 3.3, 4.0 and 3.0 per cent, respectively. Actual achievements for total food production was 1.9 per cent in 1981-82, and 2.0, 1.8, 1.9, 1.8 and 2.0 per cent for the respective components, indicating that no target had been met during the first two years.

Another indicator of the failure of food policies was the substantial increase in food imports coupled with a corresponding decline in foreign earnings from food exports. As revealed in Chapter V, food imports constituted less than 5 per cent of total food supply before 1970, but increased the share to about 17 per cent in the early 1980s. With increased volumes of food imports, foreign exchange expenditures on food items imported have increased substantially. From a modest annual average of ₦44.7 million between 1961 and 1965, foreign exchange expenditure on food imports increased by 20.0, 184.7, 441.3 and 82.2 per cent to annual averages of ₦53.6 million, ₦152.6 million, ₦826 million and ₦1,505.2 million, respectively in 1966-70,

1971-75, 1976-79 and 1980-82 (Nigerian Trade Summary for various years). On the other hand, there was a drastic fall in foreign exchange earnings from the exports of food items such as cocoa, groundnuts and vegetable oils. Consequently, from about 1975, the country increasingly spent more foreign exchange than it earned from such exports to import the food items to supplement domestic supplies. Such deficits increased from an annual average of ₦376.5 million between 1975 and 1979 to an annual average of ₦1308.6 million between 1980 and 1982.

One result of inadequate food supplies was the rapid increase in food prices. Between 1960 and 1968, domestic food prices increased at an annual rate of 1.9 per cent. The annual average rate of increase jumped to 19.2 per cent between 1969 and 1975 and 15.6 per cent between 1976 and 1982 (see CBN Annual Reports for the years). During these periods the annual rate of increase of the all-items price index averaged 2.4, 13.6 and 15.1 per cent, respectively. Since the food component has the largest weight in the all-items price index, the contribution of the food price change to that of the all-items price index increased significantly during the period. Such contribution increased from 33.8 per cent between 1960 and 1968 to about 70 per cent between 1969 and 1982.

7.2.2 Food Policy Constraints

The failure of food policies and programmes to meet the desired objectives during the review period can be traced to both endogenous and exogenous factors. The endogenous factors have their roots in the food policy design and execution,

while the exogenous factors originate from developments outside the agricultural sector. These two are interdependent as made clear in our analytical framework which demands that food policies must be designed and executed in the context of overall agricultural policies, other sectoral policies, as well as the international economy. This interdependence appeared to have largely been ignored in the last few years.

1. Endogenous Factors

The most important constraint on food policies was the introduction of several inappropriate instruments and programmes. Typical examples were direct production programmes of the government, the input subsidies and the programming of the RBDA projects. The evidence is that government is better suited for providing support for private producers rather than engaging in direct production. The results of direct government participation in food production have been very poor as illustrated earlier and suggest that resources utilized have been misdirected. Similarly, the input subsidy programme was over-emphasised, while efficiency in distribution and ensuring adequate supplies of the inputs were down played. The result was that subsidies that were meant for farmers were not earned by them but by middlemen distributors (IBRD, 1985: pp. 11-20). Also, the sheer cost of the programme was a prohibitive factor in view of the large size of the farm population. The approach of the river basin development programme as an integrated means of utilizing the nation's land and water resources was sound as a long-term policy. There was inadequate planning

in the launching of gigantic irrigation projects which could not be supported by the prevailing resource base of the government or the economy in general.

From the review undertaken earlier, many policies and programmes were being implemented by ineffective institutions and this was another source of the failure of such policies. The most important of these were the credit institutions, the research agencies and cooperatives. As indicated earlier, most credit institutions set up by the government failed to reach the majority of the small farmers whom they were to serve. To be very effective, such credit institutions should have been part of the rural setting and not elitist institutions whose activities were most visible in the urban locations. The private credit institutions like the commercial banks were the least suited to serve small farmers because of the large number of the farmers, the high cost of administering such credit and the general profile of the farmer in being unable to meet the conditions normally required by the banks. Farmers' cooperatives could have been effective agencies in the implementation of several programmes such as credit and input distribution. The development of cooperatives did not occupy a priority position in government policy and this resulted in government agencies being involved in many schemes such as input distribution and credit rationing which could have been done more effectively either by farmers' cooperatives or other private agencies. Another ineffective institution was the research institutes whose activities never permeated the rural areas. Research activities should have been under-taken in such a

way as to permit the majority of farmers to benefit directly from them.

A noticeable weakness in food policies was the lack of coordination at both the policy and implementation levels. Almost invariably, Federal and State Governments adopted and implemented policies which were uncoordinated, resulting in duplication of efforts and minimal impact. This development by passed the need to have a good division of roles among the various tiers of government to ensure that policies were better implemented. One typical example was the setting up of direct production projects by the Federal and State Governments without exploring areas where cooperation would have minimized problems of such projects. The glaring fact in the last few years was that all the tiers of government wanted to be seen to be implementing some programmes, irrespective of what was being done elsewhere.

Finally, there has been a problem of ineffective monitoring of food policy implementation. Apart from the general statement of food policy objectives, instruments and programmes in the various plan documents, the ex-post evaluation of policies and the corresponding programmes is only done minimally by the relevant government agencies. The overall assessment of food and nutrition status of the country is not done on a regular basis and it is sometime more rewarding to search external sources such as the FAO and other international agencies for some relevant data on food and nutrition in the country. One of the main problems in this regard is the lack of relevant criteria against which evaluation will be done. Except at the aggregate level at

which food supply is targeted to meet some minimum requirements, most other policies do not have targets or indicators that can assist in their assessment. Another problem is the absence of a specific government agency charged with compiling these indicators. Under normal circumstances, the Federal Ministry of Agriculture should assume such a responsibility, but like many other issues the problem of inadequate statistical documentation has not been effectively tackled by the Ministry.

2. Exogenous Factors

These factors which had their sources largely outside the agricultural sector, are quite many, but two of these need to be highlighted. The most important has been the resultant effects of overemphasis on the petroleum sector of the economy. For example, while the so-called oil boom lasted, there was a tendency to draw up ambitious programmes in all sectors of the economy and these programmes could survive only as long as the oil sector was buoyant. But in the late 1970s and early 1980s, there was a drastic decline in the international oil market which resulted in reduced government revenue, led to an accumulation of deficits and increased prices. These have generally produced disincentive effects on agricultural and food production. The rising costs of production and the bias for locating substantial public investment in the urban areas swung the balance of advantage against agriculture and induced movement out of the rural areas.

Another exogenous factor was the continued incidence of drought in many parts of the North. This development was

particularly disturbing when viewed against the background of the massive programmes of irrigation embarked upon since 1976. The drought has led in some cases to reduced volume of water resources in some drainage systems such as in the Niger and Chad Basins, with the result that a good part of capital investment in irrigation dams became very unproductive.

Although these two factors - the effects of general macroeconomic policies and the incidence of drought were to a large extent exogenous, the impact they produced on the food subsector seems to suggest that policy design and execution has been undertaken without proper consideration for international economic developments and general priorities of the economy.

CHAPTER VIII

A SUGGESTED FRAMEWORK OF PUBLIC SECTOR FOOD POLICIES

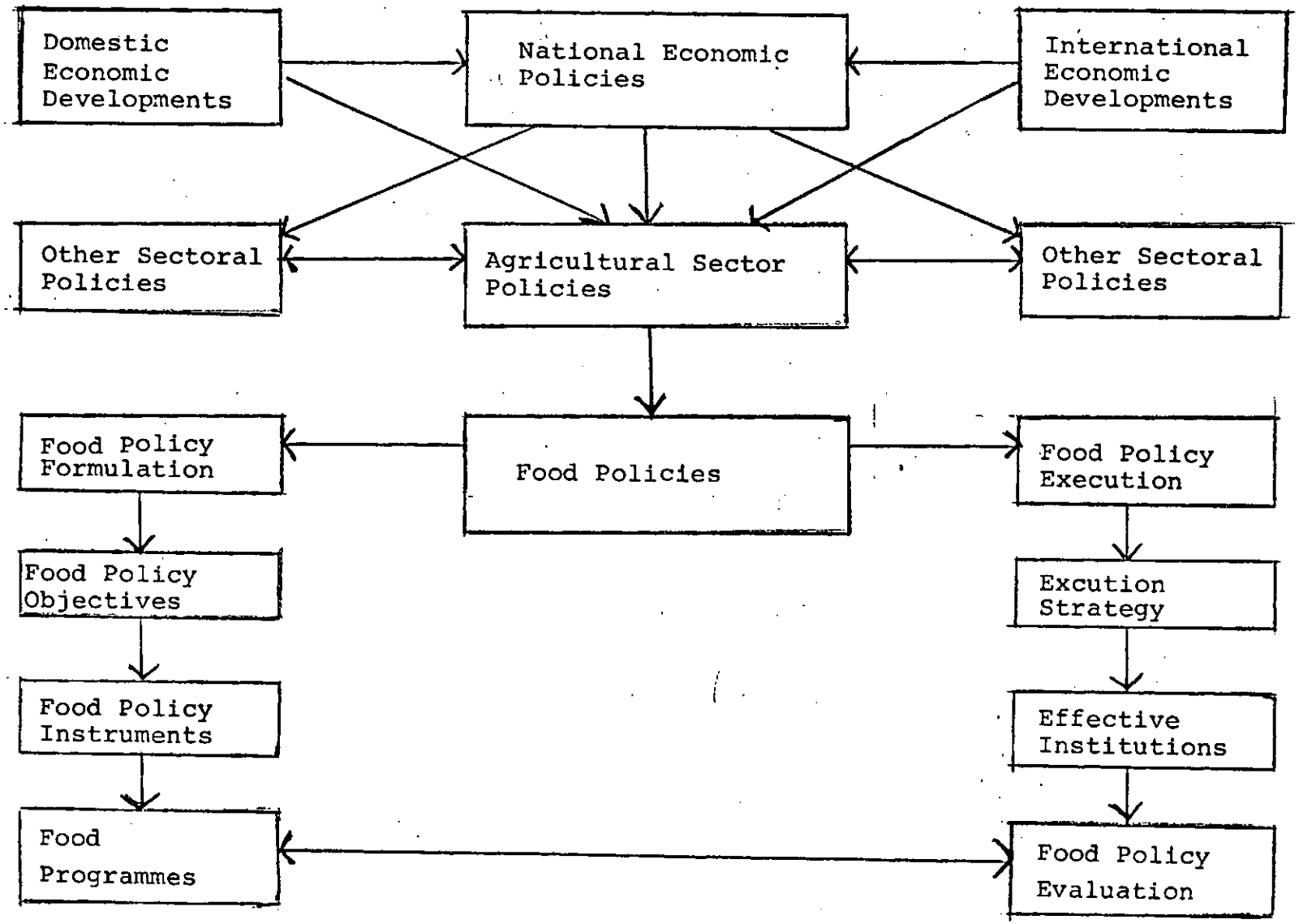
In view of the grave food problems facing Nigeria and the observed ineffectiveness of current food policies to ensure adequate food and nutrition for the population, it is desirable to make some adjustments to such policies. Specifically, public sector food policies should be designed within a well defined framework such as was discussed in Chapter IV and illustrated in Figure I. The framework illustrates that food policy is a systematic series of actions by the policy maker and not a "trial and error" affair which has been common in recent years. This chapter focusses on four salient aspects of this framework: definition of food policy objectives, food policy priorities, an appropriate food production strategy and institutional reforms. The approach in the discussion is to recommend adjustments to policies and institutions that may assist in the attainment of policy objectives within the framework of the food production strategy. It is assumed that these adjustments can be carried out within the current financial resources of the government.

8.1 Food Policy Objectives

As stated in Chapter IV, the objective of food policy which is to attain minimum nutrient requirements for the population within a plan period is too narrowly defined which makes it difficult to comprehensively evaluate the adequacy of the food and nutrition situation. In view of this, food policy objectives should be redesigned to have two attributes.

FIGURE I

A FRAMEWORK OF PUBLIC SECTOR FOOD POLICY FORMULATION AND EXECUTION IN NIGERIA



First, the time frame within which they are to be achieved should be longer than a plan period because experience has shown that short-term pursuit of objectives can result in inadequate planning which encourages the choice of wrong policy instruments and inappropriate programmes. Second, food policy objective should be designed to articulate its major dimensions which, besides ensuring minimum food requirements on a per capita basis, include the even distribution of food supplies by population and regions and ensuring adequate incomes for producers and efficiency in food marketing and distribution.

Adequate food and nutrition for the population should ensure overall self-reliance and certainly self-sufficiency in major food items. In the midst of competing demand for national resources and because some long-gestation investments are needed, self-reliance in food supply is only feasible over a long-term period of about 10-15 years. This period can, however, be split into five-year segments each of which should have a particular thrust in the context of desired targets.

In the context of providing adequate food and nutrition for the population, the food policy objective should be broadly defined to take account of some important aspects. First, the overall goal of adequate food and nutrition should imply some reasonable compensation for those engaged in food production and the rural areas so that the producers are encouraged to remain in production and the rural areas derive fair returns for their contribution to national development. Second, there

is need for even distribution of food supply among regions since disparities in regional resources result in inadequate food supplies in some regions. Thus, the goal of adequate food and nutrition should involve creating conditions, such as adequate marketing, storage and processing facilities, necessary for transfering food surpluses from one to the other. Third, there must be inter - and intra - seasonal stability in food supplies to ensure that the food diet is stable and both producers and consumers are not adversely affected by wide fluctuations in food prices. Finally, adequate food and nutrition for the population must ensure that the agricultural sector is gradually transformed through technologies based on local resource endowment and hence preempt any instability that may arise from overdependence on other countries for important production inputs.

The expanded objectives of food policy will accordingly require the compilation of many more indicators of food and nutrition. Apart from deriving nutrient intake at the national level in relation to minimum requirement, such nutrient intake will need to be compiled at the regional, state and local government levels, as well as by population and income groups. This compilation will also indicate the extent of interregional and state/local government food flows, as well as dependence on food imports. The process of compiling these indicators will also reveal relevant information on farm incomes, food prices and production costs which may be used to assess farmers' returns, price stability and the general conditions of the rural areas.

8.2 Food Policy Instruments, Programmes and Projects

As illustrated earlier, the attainment of food policy objectives will depend largely on the types of policy instruments, programmes and projects to be adopted. The success of the latter will in turn depend on their appropriate design and application. Thus, there is need to identify the sources of food production gains which can be tapped with relevant policy instruments, programmes and projects.

8.2.1 Sources of Food Production Gains

Food production increases can be attained in two major ways. First, there can be an expansion of land area under cultivation through the development of virgin lands throughout the country. As illustrated in Chapter VI this approach may be constrained by rising population which has resulted in increased pressure on land in many states. In areas, such as Middlebelt where there appears to be vast unused farm lands, the available evidence indicated that the development of the lands cannot be done on a massive scale due to cost constraint and possible damage which indiscriminate mechanization can do to the top soil (IBRD, 1985: pp. 16-17). Thus, only a small proportion of production increase can result from attempting to increase land area under cultivation.

Second, production increases can result from increased productivity of cultivated land. This appears to be the better approach under the smallholder food production system because of the vast potentials that exist for improving productivity. As was shown in Chapter III, these potentials can be attained by removing the serious food production constraints and this

was partially confirmed by the limited success of some food programmes reviewed in Chapter VII.

8.2.2 Food Policy Instruments

The review of current policies undertaken in Chapter VII suggests that there are three important means of exploiting the productivity potentials of the smallholder subsector as exemplified in the ADP approach. First, productivity can be increased through the efficient application of more physical inputs such as high yielding seed varieties, fertilizers, pesticides and mechanical devises all of which directly increase yields and reduce waste. Second, increased productivity can arise from provision of infrastructures, such as feeder roads, storage and processing facilities, research and extension service and marketing facilities which increase yields by reducing waste substantially and improving agronomic practices and farm management techniques. Third, productivity potentials can be tapped through appropriate economic incentives, such as remunerative prices and credit facilities which encourage the use of physical inputs and new technologies.

8.2.3 Food Programmes and Projects

1. Physical Inputs

The major causes of the low impact of input utilization as outlined in Chapter VII are the lack of a comprehensive input policy, the limited domestic production capacity, inefficient distribution and low farmer awareness.

The potential impact of input utilization has long been recognised by the government, but the implementation of the input programme since the Third National Development Plan period has

not been anchored on well defined objectives. For instance, while the issue of subsidies dominated policy, the problems of over-dependence on external supply and the ability of government to continue financing the subsidy programme were hardly examined. Thus, it will be essential for government to draw up a national input policy which can be applied with variations based on individual inputs and the ecological areas of the country. Some elements of the national input policy should include the provision of all inputs to farmers throughout the country in adequate quantities, reducing the country's dependence on the imports of inputs and the elimination of malpractices in the input distribution system. These objectives can be attained within the input programme through projects directed at domestic input production, procurement and distribution.

The major departure from current policies is to reduce substantially the direct involvement of government which was a major cause of the inefficiencies analysed in the previous chapter. As a means of increasing the domestic production capacity, private sector agencies should be encouraged to establish production plants or in the alternative, government should in the short run go into partnership with private companies to set up more input producing establishments. It is however clear that the ultimate goal of self-reliance in input supply can only be achieved over the long-term and consequently, importation of substantial quantities of inputs such as fertilizers, pesticides and herbicides may continue. In this case too, inefficiencies can be reduced to a minimum

by privatising such input procurement and if a government agency is to continue to perform this function, it should operate commercially, which will reduce the bureaucratic nature of its functions. The same recommendations apply to input distribution which should ultimately be the responsibility of private agencies so as to remove current inefficiencies. In the shortrun, the cooperative societies and other local merchants who are reputable enough should be allowed to distribute inputs along with the government agencies such as government parastatals, ADPs and state Ministries of Agriculture, which will inject some competition and improved efficiency into input distribution.

2. Infrastructures and Services

On the basis of the successful ADPs and considering some of the major food production problems examined in Chapter VII, the most important infrastructures that are likely to make significant impact on smallholder food production are feeder roads, storage and processing facilities and research. However, in view of the overall importance of infrastructures in promoting food production, there is a need to formulate a comprehensive policy framework which is currently not the case. The objectives of the framework are to provide the basic needs regarding the infrastructures and to identify programmes and projects that will ensure the attainment of the basic needs.

That there is acute shortage of these infrastructures has been made clear in the previous chapter. Thus, the main innovation to policy is to suggest modalities for providing the facilities in view of the fact that government capability is grossly limited. For instance, a lot of resources will be required to increase the current road density from $4m/km^2$

to the standard density of 110m/km^2 (Nigeria, FSM, 1980a: pp. 18-19). The provision of other facilities will similarly need substantial amounts of resources which are not readily available. The ideal strategy under this situation is to have phased programmes of development such that areas with high food production potential like the North and Middlebelt can be favoured initially. This is why it is important to design a policy framework on the basis of which the phased programmes can be mapped out. Another means of providing the necessary infrastructures is to encourage private agencies like companies, communities and cooperatives to build infrastructures either in the interest of their own activities or of the community.

In order to increase the contribution of research to smallholder food production, the activities of the research institutes should be oriented towards solving the basic problems of small farmers such as water management, soil maintenance and mechanization. This should call for greater interaction between research personnel and farmers which is not the case now. This may be achieved if the present research system is more diffused such that both Federal and State Governments can participate in research activities as opposed to the sole control by the Federal Government. While the Federal Government funds research activities as at now, the results of research can be disseminated through state extension services.

3. Economic Incentives

As suggested in Chapter VIII, input subsidies did not produce anticipated impact on input utilization and production because the subsidies were inefficiently administered and generally not rationalised. To enhance food production, input subsidies should

be administered on the basis of well-defined guidelines oriented towards the attainment of specific objectives. For example, input subsidies when determined to be necessary should be given in a package because of their complementarity and the subsidies should be earned by the producers intended. Similarly, subsidies should be fixed such that government can pay them during a fixed period without the need to cut them off suddenly to the detriment of producers. In cases where the use of inputs is profitable, there is no justification to subsidize it. On the basis of these factors, the current input subsidies should be phased out while some rationalization takes place. Emphasis should be placed on providing adequate quantities, and efficient distribution.

The present guaranteed minimum price policy has hardly been effective and therefore has not served as an incentive to farmers. For the prices to be effective, they should be fixed at levels that can at least cover production costs and leave a small profit margin. Another price incentive farmers need is through market support during the harvest period which may firm up prices. Such purchases can be resold during the off-season to dampen prices. Both farmers and consumers will tend to gain from price stability. However, adequate storage and infrastructural facilities need to be provided for this scheme to be effective.

To enable farmers obtain credit for production, the activities of public credit agencies at the Federal and State levels should be coordinated such that their activities can permeate the rural areas. For instance, the NACB can lend to the state credit agencies for on-lending to farmers in their areas.

The public credit agencies can also administer their credit through programmes such as the ADPs which will enable many more farmers to obtain credit. This will also reduce loan default since credit use can be supervised under the programmes.

Another area which can be examined to provide an incentive to producers is the reduction in labour cost. The rise in urban wages during the oil boom made labour scarce in the rural areas and also costly. It was estimated that labour costs increased at a rate of 20.7 per cent a year between 1970 and 1982 (IBRD, 1985: p21). Government can assist by controlling minimum wages and inducing increases in agricultural productivity through the introduction of appropriate technologies as a result of research findings.

8.3 Food Production Strategies

On the basis of the review in Chapter VII, the public sector can pursue any of four approaches for the attainment of its food policy objectives. These include:

(a) development of medium and large-scale modern holdings through public sector agencies;

(b) development of medium and large-scale modern holdings through private sector agencies;

(c) development of the smallholder food subsector; and

(d) a combination of all or some of (a), (b) and (c).

Direct production by government agencies which is what the first option entails has so far not met initial expectations (Chapter VII) largely because its impact on output has been disproportionately small in relation to cost. As in many other

government enterprises, these projects have experienced management problems, financial constraints, inability to procure essential machinery due to foreign exchange problems and inadequate maintenance of available machinery and equipment (Nigeria, FSM, 1980a; p.42). There is no reason to believe that these constraints will be eliminated in the future and it is therefore unwise for government to continue to participate in direct food production activities.

The dominance of the food production enterprise by private modern holdings should be the ideal in the long-run because of their high technical efficiency. However, it is only feasible to pursue this option over the long-term because the country lacks the basic technologies and other inputs which will be needed to induce substantial output increases from that subsector. What the government should do is to continue to encourage the modern large-scale farmers through a package of incentives such as the accessibility to inputs, income tax relief, duty-free importation of machinery and equipment, investment allowance and less painful acquisition of land.

On the basis of impact, equity and welfare, the development of the small holder food subsector appears to be the best option for achieving the food policy objectives at minimum cost. The available evidence is that the small-holder food subsector controlled about 97 per cent of total cultivated land area of 17 million hectares in 1980 (Nigeria, FSM, 1980b: p.17) and the proportion has probably not changed significantly since then. If the improvement

of this sector is pursued vigorously, it is bound to be a major source of increased production since production gains can be spread over a large number of farm holdings to produce a worthwhile increase on the aggregate. Apart from this, priority in the development of the smallholder food subsector can be justified on other grounds. First, an effective rehabilitation and mobilization of the subsector can help in achieving several of the objectives of national development as outlined in the Development Plans since 1962: increased rural incomes, reduced income inequality, faster development of the rural areas and consequent slowdown of rural-urban migration (Nigeria, FMED, 1975a: pp. 29-30; FMNP, 1980a: pp. 37-39). This is because the bulk of the nation's labour force is engaged in agricultural and food production • Second, such a development approach may foster more positive interactions between the food subsector and the rest of the economy through the performance of those functions discussed in Chapter II. Among others, adequate food supply and industrial raw materials, increased inflow of foreign exchange and a net flow of capital for investment in other sectors will help to restore stability to the Nigerian economy.

8.3.1 Choice of Strategy

The review above seems to favour the choice of a dual approach in providing adequate food and nutrition for the Nigerian population. Since the smallholder subsector overwhelmingly dominates food production, it should be supported directly by the government through programmes of development that affect the foundations of production enterprises which

should be transformed into modern ones over the 10-15 year period. The small but growing modern subsector should also be supported as at now through a package of incentives and other policies. But government should not be involved in the running of such enterprises.

However, when considered from the viewpoint that both the peasant production system and the modern holdings represent different stages of development, there is really no dichotomy in the development strategy chosen above. Over the long-term, the smallholder subsector should be developed to the standard of the private modern subsector of food production. The transformation process may be slow unless the government is committed to its food policies. To speed up the process, government can use more dynamic policy tools. For instance, it can be done through cooperative development whose potential has hardly been exploited. Cooperative farms can be encouraged by grouping a number of farm holdings into more viable ones. It may then be possible to introduce new technologies on such holdings, encourage farmers to adopt tested innovations and utilize the extension system to more effectively improve management techniques. Another way of transforming the smallholder subsector is to adopt a more integrated development approach which will attempt to remove the multiplicity of problems facing farmers simultaneously. This approach, as was illustrated in Chapter VII is being adopted in the execution of the ADPs and some amount of success has been achieved. The present ADP approach can make greater impact if its components are increased by services on education, health,

nutrition and other social amenities. Also, if its initial impact has been successful, the scheme should be adopted in every local government area of the country after the detailed planning has been done. Most importantly, the smallholder subsector can be modernised more rapidly if several institutional adjustments can be made to reduce the constraints of policy implementation. There is need to rationalise the roles of the public and private sectors and to streamline the roles within the public sector itself.

8.3.2 The Roles of the Public and Private Sectors

The issue of whether or not the public sector should engage in food production has been discussed above and it was concluded that it was better for the private farmers to produce food while the government supports them with adequate incentives and other inputs. This conclusion is based partly on the theory of public expenditures (see Chapter VII) which suggests that government should intervene only when the private sector cannot efficiently undertake such activity. It was also derived from the actual intervention by government in direct food production which has not been quite successful. In the implementation of the food production strategy, there are other activities like input supply and distribution and marketing the execution of which appeared to be poor whenever government attempted to be too much involved in their implementation. Consequently, the principle that governed the choice of a role for the public sector in food production should be made applicable to other food programmes. The major principle is that government should leave for the private sector the implementation of those aspects of food programmes in which the private sector

is clearly more efficient. The activities of the private sector will however be subject to control if necessary.

In the area of marketing, government direct involvement through an agency like the Nigerian Grains Board seems to be unnecessary in that private agencies have generally performed well in the midst of many constraints such as the inadequacy of infrastructural facilities. The removal of these constraints should get the attention of government while the private sector engages in direct marketing activities. Government should also provide market intelligence reports for the use of private agencies, as well as provide technical assistance on storage and handling methods.

The same conclusions apply to the input supply system. The limited distribution of inputs so far undertaken by the government has been beset by problems. If government were faced with the distribution of larger input supplies as envisaged, the failure will be multiplied. Government can be relieved of some aspects of the input delivery system. For example private agencies can be involved in the procurement and distribution of inputs provided some modest profits can be earned. What government should do is to ensure that input supply sources are expanded, infrastructures for efficient distribution are provided and that planned subsidies are actually earned by farmers. Government has usually stressed the importance of farmers' cooperatives in its agricultural policy. In fact, input procurement and distribution is one area in which such cooperatives which will perform this function should also be a priority for the government rather than direct participation in supply and distribution.

Even the provision of rural infrastructures which has been stressed so far needs to be handled in cooperation with the private sector. The government must provide a policy framework for infrastructural development and the feasible programmes over a plan period. The actual work can be handled by the private sector under the direction of the government agencies. The direct involvement of government in this aspect often results in unnecessary costs which tend to limit the volume of services provided.

In the area of agricultural research, there is no doubt that government should be directly involved in conducting research simply because it involves a lot of resources and a long period of waiting which may not appeal to profit-oriented private agencies. But, having made a break through in research, the findings can be passed on to private firms for commercial development. At present many research results may be lying undeveloped because of lack of funds and other relevant facilities. What government needs to ensure is that such research results get to the ultimate users at modest costs.

8.4 Institutional Reforms

Institutional defects were identified in Chapter VII as one of the major constraints on effective policy implementation. Some of these defects include the lack of coordination in government activities, poor organizational set-up of Ministries of Agriculture, and agricultural parastatals and inadequate monitoring and evaluation system. Some institutional reforms are needed in these areas for more effective food policy implementation.

8.4.1 Coordination of Government Activities

Prior to the launching of the Third National Development Plan, Federal Government role in agricultural development tended to complement that of the regions/states either through limiting its role or supporting the regions/states with grants (Nigeria, FMED, 1962: pp. 55-59; 109-296: 1970: pp. 112 - 113). From the Third Plan period, all the previous cooperation between Federal and State Governments was reduced and it appeared that the Federal Government was now taking independent actions with its enhanced revenues. In schemes like the Operation Feed the Nation, River Basin Development, Commodity Marketing and Green Revolution, there was only minimal cooperation with states and this accounted for some of the failures of the schemes (Nigeria, FSM, 1980b: pp. 345 - 346). This calls for serious adjustments .

The problem to be resolved is what should be the appropriate roles of the three tiers of government in agricultural development within which adequate food can be assured for the country. On this, the literature provides several guidelines which can be adapted to the circumstances of a particular country. For instance, EcKstein (1979: pp. 31 - 39) suggested that governmental functions, particularly in a federation, should be diffused as much as possible to state and local authorities because it is at these levels that there are opportunities for mass participation which is an advantage in programme implementation. However, he was of the view that much as

decentralization of functions should be encouraged, there is a need for national action to be taken in resolving some critical problems, especially when financial resources required for such action may not be at the disposal of state and local authorities.

In the light of the above, it is suggested that the role of the Federal Government in agricultural development should be carefully designed to produce a more positive impact on the sector. The Federal Government could be less involved directly and yet achieve more with the same amount of funds it now has. This may be brought about if the Federal Government takes more active part in national policy formulation and evaluation in cooperation with state and local governments which will be required to supply inputs about regional and local variations that will be necessary in such national food policies. There are some key areas such as research, credit, manpower development, land use and rural development in which Federal Government may need to intervene independently. Coordination in these areas is still essential and may be attained if the Federal Government concerns itself mainly with the establishment of apex institutions which cooperate with their state and local counterparts. Another important role which the Federal Government should assume is to establish a national information system for food and other agricultural issues. There is at present such a confusion with regard to food and nutrition statistics simply because there is no national authority that has taken initiative to undertake this assignment. If this can be done, monitoring and evaluation of food policies

will become routine in nature.

8.4.2 Structures of Ministries of Agriculture

Ideally, it is the Ministries of Agriculture that should be involved in policy formulation and evaluation at the national and state levels, but this exercise is either not presently done at all or ineffectively undertaken because the Ministries emphasize administrative issues and leave a lot of initiative to the specialised agencies. The formulation and evaluation of food policies should be based on continuous studies which should be conducted at the Federal and State Ministries, while the specialised agencies will be involved in the implementation of special projects aimed at achieving specific objectives.

In the light of these, the various Ministries of Agriculture should be organised functionally to formulate and assess policies which were articulated in section 8.3. For a start, it is suggested that the Federal Ministry of Agriculture, for instance should have six functional units which will now deemphasize the sub-sectoral structure in a bid to conceive policies that cut across subsectors. The functional units which should aim at studying the basic problems of the small farmers include agricultural research, rural development, land development, manpower development, planning and economics and statistics.

The agricultural research unit should be the main agent of forging a national agricultural research system which is capable of building the technological base for agricultural growth by studying the research needs of

the country, examine the general funding of research, identify desirable institutional changes and consider the practicalization of research results. The rural development unit will study and plan the development of the rural areas. In particular, it will evaluate the adequacy of the package of inputs, services and other facilities that enhance rural development - physical inputs, markets extension services, credit, farmers' groups, infrastructures like roads and marketing services.

The land development unit will perform duties relating to the analysis and study of irrigation, drainage, land clearing, soil conservation and tenurial systems all of which affect land quality and the effective use of technological innovations. The manpower development and training unit will study the manpower problems in relation to agriculture and recommend on a regular basis the appropriate measures which will ensure manpower adequacy for agricultural development. The planning unit on the basis of current trends will consider future trends in the agricultural sector and determine the resource requirements at the Federal, state and local government levels. The economics and statistics unit will compile basic agricultural and food statistics, recommend periodical changes in the agricultural data collection system and analyse trends in major aspects of agricultural development in the country.

The State Ministries of Agriculture should be organised along the same lines as the Federal Ministry of Agriculture and should perform the same functions within the areas of

each state. The State Ministries should however have a slightly different set-up of Departments. The most relevant Departments appear to be Research and Extension, Rural Development, Land Development, Manpower Development and Training, Economics and Statistics, Planning and Cooperatives.

The local governments should be increasingly involved in agricultural development in the local areas. For a start, they can be involved in three areas - cooperative development, provision of infrastructures and compilation of local agricultural statistics. In the promotion of agricultural cooperatives, local governments should be involved in short-term training of cooperative agents and members with regard to their functions and rights. This will involve the provision of educational facilities in each local government area. The local governments should be the main agents for planning and implementing the rural feeder road programme. They will map out the programme and start implementation with the priority feeder roads. Other facilities such as social and institutional infrastructures must also be planned and implemented by them. The national agricultural statistical system should use the local governments as the basic units in the various ecological zones. This will assist the monitoring system as substantial information will be available from the grassroot sources.

8.4.3 Rural Development Authorities

For effective delivery of inputs, services and incentives to the smallholder subsector, there is need to

have institutions in each state that will implement the major policies for rural transformation. In the previous chapter, we reviewed the activities of two rural institutions. The ADPs have been run as state government institutions financed by matching grants from the Federal treasury and are engaged in grassroot execution of agricultural programmes with assistance of state extension services. Some measure of success has been recorded in the execution of the programmes. The River Basin and Rural Development Authorities (RBRDAs) which have consumed more than 75 per cent of Federal Government allocation to agriculture are primarily expected to provide irrigation water and drainage. The RBRDAs not only went into the building of big irrigation dams, but also attempted to produce food directly from lands prepared by them. Their activities have not made significant impact. There is need to streamline the roles of the two institutions such that the framework of cooperation outlined in a previous subsection can be made operational. Essentially, the activities of the two institutions should be coordinated such that those of the RBRDAs would complement those of the ADPs. Thus, the RBRDAs should be engaged primarily in providing inputs, especially irrigation water and drainage, as well as services like extension, seed multiplication and research which make the use of irrigation water more productive. However, the provision of such services should be in specific areas where irrigation water has been provided. In order that the activities of RBRDAs may permeate the rural areas, it is suggested that they should,

like the ADPs, be run as state government institutions, but supported by the Federal Government with matching grants. The role of the Federal Government will be to monitor and evaluate their activities on a continuous basis.

Given the scarce resources of the government at present, there is need to reassess water resource development as a long-term policy which has to be implemented more gradually than at present. For the development of the smallholder subsector, there is also a case for trying small scale irrigation development which may be more widespread, cheaper and liable to smaller management problems.

8.4.4 Research and Extension

As shown in chapter VIII, agricultural research has been handicapped by inadequate facilities, equipment and inability to transmit research results to farmers. These in turn can be attributed to the bureaucratic setting in which it operates at present. Since it is funded solely by the Federal Government, there has also been a problem of over centralization. Both state governments and the private sector hardly participate in agricultural research activities. The funding of agricultural research can be done by all interested parties - government and private sector which stands to benefit from research results. Joint funding will also encourage the cooperation of the government and private sector. Consequently, the research institutions will become more autonomous in their operations, but government should monitor and evaluate them in the context of national agricultural policy.

The extension system should be the means of carrying research result to farmers. We have suggested that the extension service should be part of the rural development package being implemented by the ADPs and RBRDAs. Thus, the research agencies must have a direct link with these rural institutions. All the empirical work of the research agencies must be carried out with the active cooperation of the rural institutions so that the extension arm of the institutions become directly involved in dissemenating successful research results.

8.4.5 Credit Institutions

The major problem to be solved with respect to credit is how to ensure that the small farmers obtain credit for their operations. We have observed that despite the increased supply of agricultural credit facilities, the small farmers have been unable to obtain credit. The solution to this problem is to cut a direct link between credit institutions and those agencies that deal directly with farmers. In the rural development framework, it should be possible for credit agencies like Agricultural Credit Corporations in States and commercial banks to extend credit to agencies like the ADPs and RBRDAs which can in turn on-lend to farmers. Such agencies can ensure that loan repayment will be undertaken if they organize the marketing of farmers' output. Loan diversion can also be prevented since such agencies can give credit in kind and undertake effective monitoring of credit utilization.

In the final analysis, the farmers' cooperatives when fully developed, should be able to take over such roles from the government agencies. Cooperatives can take agricultural loans and distribute them among members who may decide to sell their products to the cooperatives.

8.4.6 Monitoring and Evaluation

Monitoring and evaluation of food policy implementation has an institutional aspect which defines the agencies to be charged with the performance of specific functions. With the new structures of the Ministries of Agriculture sketched above, the monitoring and evaluation of food policies should start from the local government area where relevant data are collected and collated by the economics and statistics units of Federal and State Ministries of Agriculture.

The routine compilation of data for evaluating food policies is the professional aspect of monitoring and evaluation. However, it can be asserted that the elimination of food and nutrition problems in Nigeria will require political will and commitment. There is a need for a national body that will symbolise this political commitment to solving the food and nutrition problems. Such a body will report to the President and assist in mobilizing the people to appreciate the food and nutrition problems, how they are being solved, what remains to be done and the roles of the people. It is suggested that

such a body be called the National Committee on Food and Nutrition and will be made up of Federal Minister of Agriculture (Chairman), Federal Ministers of National Planning, Commerce, Industries, Water Resources and Science and Technology; Commissioners for Agriculture in all the states; representatives of local governments from each state and of farmers' organizations; and "Permanent Secretary, Federal Ministry of Agriculture (Secretary).

The Committee will, specifically, commission relevant studies, especially on the main dimensions of the country's food problems, prepare periodical reports on individual aspects and examine on a continous basis the Nigerian food situation in the context of international developments.

CHAPTER IX

SUMMARY AND CONCLUSIONS

The focus of the study was the development of a framework for the evaluation of the food and nutrition situation and public sector food policies in Nigeria. This Chapter presents a summary of the major findings and the conclusions of the study.

9.1 Summary of Findings

The summary of the major findings of the study can be conveniently presented in three parts. The first part which is derived from Chapters I - IV provides some background information to the study, leading to the discussion of the methodology used. The second part is derived from Chapters V - VII and gives the results of the empirical analysis. The third part which is based on Chapter VIII presents the outline of public sector food policies in the light of shortcomings of existing policies.

9.1.1 Background and Framework of Analysis

Chapter I provided the general background for the discussion of the focus of the study and the specification of its objectives.

In Chapter II, a review of the literature was undertaken. This consisted mainly of reviewing the functions of food and nutrition in the development process, evaluation criteria for the food and nutrition situation and steps for reducing food and nutrition problems. The main functions of food supply are to provide adequate nutrition for the population and mobilize financial and physical resources for the rest of the economy. Among the criteria which have been used to assess food and nutrition situation are the food balance sheet, computation of the food gap and evidence of malnutrition compiled from food consumption and consumer expenditure surveys. Income and educational levels have also been linked directly or indirectly with malnutrition problems. The main contributions from the literature in the area of food policy analysis are derived from the work of Tinbergen who emphasised the process of designing policy objectives, instruments and programmes. Others have also focussed on the policy implementation process by emphasising the adoption of overall strategy, the roles of participants and institutions.

In Chapter III, the structure of agricultural production was discussed, as well as the main constraints on increased productivity. The agricultural production system is dominated by smallholders employing outdated

technologies. Production is constrained by environmental, technological, institutional and labour problems.

In Chapter IV, the methodology of the study was outlined. The definitions of the food balance sheet, food gap, other indicators of malnutrition and the conceptual framework of food policy analysis were articulated.

9.1.2 Empirical Analysis

In the aggregate evaluation undertaken in Chapter V, the food balance sheet indicated that derived calories from available food supply exceeded the minimum requirements during 1962 - 1966 and fell short in the remaining 17 years. Between 1962 and 1966, the calorie gap was a surplus of 12.2 per cent a year and between 1967 and 1982, it was an average deficit of 22.3 per cent per year. During the whole period, the calorie gap was an average deficit of 14.3 per cent per annum. On the other hand, protein supply fell short of minimum requirements throughout the period under review. The protein gap was an overall deficit which averaged 19.1 per cent a year between 1961 and 1982. These trends prevailed when the various parameters used in the analysis were varied in the

sensitivity analysis. The sensitivity analysis also showed that a fast population growth rate and excessive waste of food tended to increase food problems. For instance, under an assumption of 1.5 per cent annual growth rate in population, the average calorie and protein deficits were reduced by about 40 per cent a year. The assumption of zero waste resulted in the reduction of average deficits by about 55 per cent a year.

When trends in food supply were compared with those of estimated rates of increase in demand, the food situation was also inadequate for most of the period. The aggregate demand for all products increased at an annual rate of 3.9 per cent, while their supply increased at 2.4 per cent a year. This outcome was brought about largely by the movements in the supply of and demand for cereals, tubers, and livestock products. Consequently, food deficits persisted during the period. The total food gap for the review period was an average deficit of 87 kg per capita per year.

The incidence of malnutrition, assessed indirectly pointed to an inadequate food and nutrition situation during the review period. For instance, the food balance sheets compiled for the country suggested that a large proportion of the population was malnourished not only because the average person was likely to have less than the average needs of essential nutrients, but also because the food diet had a bias for starchy foods. In addition, the low levels of real incomes and education suggested that many

Nigerians continued to face greater risks of malnutrition owing to inadequate purchasing power. A direct assessment of malnutrition from available data of food expenditure and consumption surveys generally confirmed the indirect evidence.

In Chapter VI the analysis focussed on the evaluation of regional food production and consumption potential. It was found that a wide range of tropical food products can be raised within each region, but ecological factors have encouraged some degree of specialization. The North is noted for cereals, grains and livestock products, while the West and East account for the bulk of roots, tubers and vegetable oils. The Middlebelt forms a unique zone in which all food items can be grown. Food production increased in the regions up to the early 1970s, but subsequently declined significantly. An assessment of the nutrient content of food production in each region indicated that the North and Middlebelt were generally self-sufficient in food production, while the West and East were not.

In the regional breakdown of consumption potential, broad conclusions arrived at in Chapter V were also confirmed. These include the high risk of under - and malnutrition in the four regions - North, Middlebelt, West and East. The situation in the Middlebelt was however relatively tolerable in the supply of both calorie and protein. But the most disturbing aspect was that the food situation deteriorated since 1973 in all the regions. In addition, the high rates of growth of population and incomes

in the regions induced a rapid growth in the demand for food items. Consequently, large food deficits prevailed. The regional analysis also brought out the differential effects of population size and ecological factors. The Middlebelt, for example, which has potentials for the production of wide range of food items such as roots and tubers, cereals and livestock products, also has the smallest population and an extensive land area. With a right policy strategy, the Middlebelt could be made to produce food surpluses to satisfy the needs of less ecologically - suited or thickly-populated regions.

In Chapter VII, the main finding was that public sector food policies presently under implementation did not fit well into the suggested framework outlined in Chapter IV and this largely explains their ineffectiveness in solving the food problems. The specific shortcomings in food policy design and execution were the adoption of inappropriate policy instruments and programmes, ineffective institutions charged with policy implementation, lack of coordination in food policies and inadequate monitoring of policy implementation. Some developments in the country such as rising costs and the incidence of drought also posed serious constraints to food policy implementation.

9.1.3 Framework of Food Policies

In Chapter VIII, some new directions were charted for public sector food policies so as to produce the necessary positive impact on the food and nutrition situation. The

main features of the new policies are: further articulation of the objectives of food policy, reorientation of policy instruments and programmes towards solving the problems of smallholders, a definition of the respective roles of the public and private sectors in policy execution, a definition of the roles of the three tiers of government, reorganization of key public institutions so as to increase their effectiveness and setting up of a monitoring and evaluation system for detecting shortcomings in policy design and execution.

9.2 Conclusions

In the context of the purpose of the study, it can be said to have made the following contributions:

1. It has provided a general framework of analysis for food and nutrition problems and policies in the Nigerian situation. The general framework indicates four stages of action: the food and nutrition problem analysis, the design of food and nutrition policies, the execution of the policies and monitoring and evaluation. The main elements of each stage were discussed and articulated. This is an important contribution because of the important role of food and nutrition in economic development. The provision of such a framework can assist the planning process because it gives a scientific basis for actions on food and nutrition matters.

2. The actual application of the framework for an analysis of Nigeria's food problems and policies over the long-term is a major contribution to the existing literature because it has unearthed many of the dynamic factors of the

situation and thus helped to put in perspective the magnitude of the food and nutrition problems facing the country, thereby providing an informed basis for some of the generalizations on this subject.

3. The study can provide a more objective basis for effective policy formulation as a result of the regional analysis undertaken. This can aid policy flexibility and enhance policy achievements since it can permit the specification of regional contributions to national targets on the basis of resource endowments and potentialities.

4. The long-term appraisal of food policies is also an important contribution because it can assist policy makers to make adjustments to existing policies. On the basis of the empirical policy analysis, the study has, for instance, suggested adjustments to the formulation of national food policy objectives, the incentives to smallholders, the roles of the various tiers of government, reorganization of important policy implementing institutions and the system of monitoring and evaluation.

APPENDIX 1

DOMESTIC FOOD PRODUCTION IN NIGERIA, 1961 - 1982

('000 Metric tons)

A: 1961 - 1970

	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970
1. CEREALS										
Maize	1,069	1,109	993	1,169	1,120	1,160	1,133	1,100	1,056	1,247
Millet	1,565	2,649	2,530	2,732	2,484	2,729	1,747	2,590	2,186	3,052
Sorghum	3,485	3,966	4,509	4,069	4,239	4,235	3,160	3, 89	2,821	4,080
Rice	156	153	258	196	221	232	200	86	353	325
Wheat	16	16	15	15	15	15	16	15	15	15
Other	20	20	25	25	30	30	30	30	30	32
2. GRAIN LEGUMES										
Groundnuts	748	881	978	1,147	1,183	1,081	1,180	1,107	1,163	1,053
Cowpea	372	431	508	611	616	646	581	552	650	899
Other	50	55	60	65	68	72	80	85	82	85
3. ROOTS & TUBERS										
Cassava	6,682	7,400	7,600	7,800	8,000	8,200	8,400	8,600	5,040	5,153
Yams	12,109	13,474	13,102	15,885	14,563	14,736	11,963	10,670	10,000	11,219
Sweet Potato	149	150	155	160	165	170	175	180	185	190
Irish Potato	18	18	19	20	21	22	25	23	24	25
Cocoyams	652	1,150	1,549	1,555	1,625	1,606	1,437	1,625	1,000	1,258
Plantains	810	800	820	835	855	880	900	920	945	970
4. OIL SEEDS & NUTS										
Melon Seeds	52	99	101	116	110	127	83	79	103	65
Other	10	10	10	10	10	10	10	10	10	10
5. VEGETABLES & FRUITS										
Vegetables	1,120	1,230	1,420	1,615	1,810	1,980	2,100	2,160	2,220	2,270
Fruits	1,500	1,650	1,710	1,890	2,000	2,120	2,210	2,280	2,310	2,300

A: 1961 - 1970 CONT'D

	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970
6. VEGETABLE OILS										
Palm Oil	669	671	641	659	678	710	715	603	601	623
Groundnut Oil	68	70	89	96	139	120	134	135	164	168
7. SUGAR										
All Products	18	18	18	20	20	20	20	25	25	25
8. BEVERAGES										
All Products	80	94	102	112	121	132	145	155	165	175
9. LIVESTOCK PRODUCTS										
Beef	135	139	142	143	151	157	158	161	162	164
Small Stock	124	130	138	137	143	146	152	153	154	155
Poultry	49	50	51	52	53	54	56	59	60	62
Other Meat	50	50	50	50	50	60	60	60	60	60
Eggs	82	82	82	82	82	88	88	88	88	88
Milk	115	120	121	123	125	128	131	133	136	139
Butter	4	4	4	4	4	4	5	5	5	5
Cheese	3	3	3	3	3	3	4	4	4	4
Fish	207	230	251	272	298	326	343	348	356	373

B: 1971 - 1982

	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982
1. CEREALS												
Maize	1,434	1,274	639	808	528	1,332	1,068	1,250	1,300	1,330	1,357	1,384
Millet	3,088	2,835	2,391	2,794	2,554	2,550	2,893	2,579	2,386	2,475	2,525	2,576
Sorghum	4,029	5,794	2,298	3,125	4,798	2,926	2,950	3,286	2,409	2,720	2,774	2,829
Rice	279	279	447	487	525	715	818	811	900	925	944	963
Wheat	15	15	15	16	16	15	15	15	15	15	15	16
Other	32	33	34	35	40	43	47	50	56	60	61	62
2. GRAIN LEGUMES												
Ground-nuts	1,580	1,381	1,350	878	500	449	400	350	280	180	184	188
Cowpea	879	801	408	530	1,099	858	727	408	498	855	872	889
Other	90	92	100	105	110	120	125	128	130	135	138	141
3. ROOTS & TUBERS												
Cassava	5,191	4,516	2,573	2,912	3,382	2,324	6,540	6,580	6,620	6,660	6,793	6,929
Yams	12,120	9,766	6,900	6,936	7,160	8,621	6,470	6,376	5,866	7,865	8,022	8,182
Sweet potato	192	197	164	170	185	193	190	195	199	215	219	223
Irish Potato	25	22	20	24	24	30	30	35	30	30	31	32
Cocoyams	1,373	800	1,357	1,106	1,180	1,104	1,620	1,650	1,670	1,690	1,724	1,758
Plantains	1,270	1,400	1,520	1,710	1,800	1,920	1,945	1,965	1,985	2,005	2,045	2,086
4. OIL SEEDS & NUTS												
Melon Seeds	80	85	65	75	95	98	100	120	135	140	143	146
Other	13	13	13	15	15	15	20	20	20	23	24	24

B: 1971 - 1982 CONTD

	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982
5. VEGETABLES AND FRUITS												
Vegetables	2,325	2,375	2,430	2,480	2,538	2,590	2,680	2,785	2,886	2,985	3,045	3,106
Fruits	2,315	2,320	2,420	2,520	2,640	2,760	2,880	3,000	3,117	3,230	3,295	3,361
6. VEGETABLE OILS												
Palm Oil	600	580	560	550	600	610	620	622	625	615	627	640
Groundnut Oil	1 6	145	82	85	162	165	170	170	160	150	153	156
7. SUGAR												
All Products	25	25	25	28	30	36	40	48	60	75	77	79
8. BEVERAGES												
All Products	185	195	205	215	225	275	325	375	428	475	485	495
9. LIVESTOCK PRODUCTS												
Beef	158	154	151	151	153	150	148	150	145	140	143	146
Small Stock	162	155	153	153	155	157	152	145	150	140	142	145
Poultry	62	61	61	61	64	68	70	72	75	80	82	84
Other Meat	75	75	75	75	75	80	80	80	80	80	82	84
Eggs	105	105	105	105	135	158	160	165	175	185	189	193
Milk	143	151	159	167	176	185	190	194	204	215	219	223
Butter	6	6	6	6	6	6	6	7	7	7	7	7
Cheese	5	5	5	5	5	5	5	6	6	6	6	6
Fish	410	446	471	473	466	497	507	525	530	500	510	520

Sources:
(i) Rural Economic Surveys of Nigeria, Crop Estimation (Federal Office of Statistics, Lagos)
(ii) Fisheries Statistics of Nigeria, (Federal Dept. of Fisheries, Lagos).
(iii) Production Year Book (FAO)
(iv) Official Estimates (Federal Dept. of Agriculture, Lagos)

APPENDIX 2

QUANTITIES OF FOOD IMPORTS INTO NIGERIA, 1961-1982

('000 Metric tons)

	Maize	Rice	Wheat	Vege-tables	Fruits	Ground-Nut Oil	Sugar	Beef	Small Stock	Milk	Fish	Beve-rages
1961	-	-	21	-	14	-	151	15	1	12	36	5
62	-	-	27	-	11	-	195	18	2	15	40	6
63	-	-	49	-	12	-	131	21	1	15	44	7
64	-	-	36	-	8	-	101	24	2	20	48	8
65	-	-	54	-	12	-	247	26	2	23	52	9
66	-	-	177	-	12	-	151	29	2	25	58	10
67	-	-	122	-	8	-	200	30	2	24	61	10
68	-	-	105	-	6	-	89	31	3	23	61	10
69	-	-	175	-	7	-	170	33	3	38	63	12
70	-	-	258	10	3	-	220	35	4	65	66	13
71	-	-	359	12	9	-	388	35	4	65	54	15
72	-	-	296	15	7	-	321	35	4	78	63	16
73	-	-	388	20	15	-	331	40	4	63	71	21
74	5	-	318	30	7	-	185	42	5	68	75	21
75	7	-	407	35	10	-	282	45	6	80	114	22
76	10	45	733	40	12	15	214	45	7	100	134	23
77	12	50	720	45	34	20	363	45	8	149	161	23
78	66	566	879	40	20	6	501	50	10	133	202	23
79	75	650	1000	45	20	1	600	50	10	150	223	24
80	75	650	1490	50	20	100	235	50	10	170	200	25
81	77	663	1520	51	20	102	240	51	10	173	204	26
82	79	676	1550	52	21	104	245	52	10	177	208	27

Sources: (i) Nigerian Trade Summary (Federal Office of Statistics, Lagos.)
(ii) Official Estimates (Federal Dept. of Agriculture, Lagos.)

TABLE 5.1

DOMESTIC FOOD PRODUCTION IN NIGERIA, 1961 - 1982

('000 tonnes of grain equivalent)

YEAR	CEREALS	GRAIN LEGU-MES	ROOTS & TUBERS	OIL SEEDS & NUTS	VEGE-TABLES & FRUITS	VEGE-TABLE OILS	SUGAR	BEVE-RAGES	LIVE-STOCK PRO-DUCTS	TOTAL
1961	6059	1241	5309	91	210	1769	19	6	354	15058
1962	7596	1449	5978	160	230	1778	19	8	372	17590
1963	7997	1639	6044	163	250	1752	19	8	387	18259
1964	7878	1932	6826	185	280	1812	21	9	393	19341
1965	7785	1979	6300	176	305	1961	21	10	418	18955
1966	8066	1907	6660	201	328	1992	21	11	444	19629
1967	6035	1951	5954	137	345	2038	21	12	459	16952
1968	7210	1848	5725	131	355	1771	27	12	465	17544
1969	6203	2009	4470	166	362	1836	27	13	472	15558
1970	8401	2159	4892	110	361	1898	27	14	483	18345
1971	8522	2702	5273	137	371	1814	27	15	518	19379
1972	9821	2410	4342	144	376	1740	27	16	533	19409
1973	5591	1969	3259	115	388	1540	27	16	546	13451
1974	6974	1604	3343	132	400	1524	30	17	550	14574
1975	8123	1811	3622	161	414	1829	32	18	568	16578
1976	7278	1513	3690	166	428	1860	39	22	601	15597
1977	7479	1327	4367	176	445	1896	43	26	606	16365
1978	7671	939	4368	206	463	1900	51	30	618	16246
1979	6783	962	4256	228	480	1884	64	34	631	15322
1980	7224	1242	4801	240	497	1836	80	38	622	16580
1981	7369	1265	4897	244	507	1872	82	38	635	16909
1982	7517	1290	4995	248	517	1910	85	40	648	17250

Source:

(i) Rural Economic Surveys of Nigeria (crop Estimation), Federal Office of Statistics, Lagos, Annual Publication.

(ii) Fisheries Statistics of Nigeria, Federal Dept. of Fisheries Lagos, Annual Publication

(iii) FAO Production Yearbook, Annual Publication

(iv) Official Estimates, Federal Dept of Agriculture, Lagos.

TABLE 5.2

QUANTITIES OF FOOD IMPORTS INTO NIGERIA, 1961 - 1982

('000 tonnes of grain equivalent)

YEAR	CEREALS	VEGE-TABLES & FRUITS	VEGE-TABLE OILS	SUGAR	BEVERAGES	LIVESTOCK PRODUCTS	TOTAL
1961	21	1		162		29	213
1962	26	1		209		35	271
1963	47	1		140	1	37	226
1964	35	1		108	1	43	188
1965	52	1		264	1	47	365
1966	170	1		162	1	52	386
1967	117	1		214	1	52	385
1968	101	1		95	1	54	252
1969	168	1		182	1	63	415
1970	248	1		235	1	72	557
1971	345	2		415	1	73	836
1972	284	2		343	1	83	713
1973	372	3		354	2	82	813
1974	310	3		198	2	87	600
1975	397	4		302	2	115	820
1976	756	4	36	229	2	132	1159
1977	751	6	48	388	2	167	1362
1978	1451	5	14	536	2	182	2190
1979	1656	5	2	542	2	199	2506
1980	2126	6	240	251	2	198	2823
1981	2187	6	245	257	2	202	2899
1982	2212	6	250	262	2	206	2938

Source: Nigerian Trade Summary, Federal Office of Statistics, Lagos; Annual Publication

TABLE 5.3

SOME SELECTED CONVERSION FACTORS FOR NIGERIAN FOODS

FOOD ITEM	CALORIE CONTENT (KCAL. PER GM.)	PROTEIN CONTENT (PROPORTION OF GM.)	WASTE AND NON-FOOD USES (PER CENT	EXTRAC-TION RATE (PERCENT
Maize	3.34	0.122	20	95
Millet	3.32	0.065	10	95
Sorghum	3.43	0.101	15	95
Rice	3.60	0.067	5	70
Wheat	3.34	0.122	2	72
Ground-nuts	5.46	0.256	75	-
Cowpea	3.42	0.234	35	-
Cassava	1.09	0.009	15	-
Yam	0.90	0.021	40	-
Sweet Potato	0.97	0.011	20	-
Irish Potato	0.70	0.017	20	-
Cocoyam	0.86	0.015	40	-
Plantain	0.75	0.008	5	-
Melonseeds	5.69	0.250	25	-
Vegetables	0.22	0.014	10	-
Fruits	0.25	0.036	10	-
Palm Oil	8.84	-	5	-
Groundnut Oil	8.49	-	-	-
Sugar	3.87	-	-	-
Beverages	0.26	-	-	-
Beef	2.25	0.147	-	-
Small Stock	1.19	0.141	-	-
Poultry	1.29	0.120	-	-
Eggs	1.44	0.110	-	-
Milk	0.65	0.035	60	-
Butter	8.84	-	-	-
Cheese	-	0.423	-	-
Fish	1.32	0.188	20	-

Sources: (i) FAO Agricultural Commodity Projections, 1970-1980

(ii) Nigeria, Federal Department of Agriculture, Lagos.

TABLE 5.4

AVAILABLE FOOD SUPPLY IN NIGERIA, 1961-1982

('000 tonnes of grain equivalent)

YEAR	IMPORTS	DOMESTIC SUPPLY	TOTAL SUPPLY	TOTAL CALORIES (billion cals)	TOTAL PROTEIN (million gms)	PER CAPITA CALORIES (cals)	PER CAPITA PROTEIN (gms)	TOTAL POPULATION (million)
1961	213	11637	11850	114.7	2751	2169	52.0	52.9
1962	271	13661	13932	135.0	3236	2487	59.6	54.3
1963	226	14277	14503	140.0	3364	2513	60.4	55.7
1964	188	14948	15136	146.0	3643	2561	63.8	57.1
1965	365	14850	15215	147.3	3609	2518	61.7	58.5
1966	386	15259	15645	151.3	3756	2521	62.6	60.0
1967	385	13073	13458	132.1	3248	2151	52.9	61.4
1968	252	12698	12950	136.4	3383	2165	53.7	63.0
1969	415	12015	12430	119.6	3159	1852	48.9	64.6
1970	557	14853	15410	143.2	3780	2163	57.1	66.2
1971	836	14757	15593	150.5	4013	2216	59.1	67.9
1972	713	15112	15825	150.1	4084	2154	38.6	69.7
1973	813	10383	11196	104.9	2910	1467	40.7	71.5
1974	600	11621	12221	115.7	3189	1579	43.5	73.3
1975	820	13457	14277	134.9	3752	1794	49.9	75.2
1976	1159	12581	13740	129.2	3649	1671	47.2	77.3
1977	1362	13502	14864	141.5	3697	1780	46.5	79.5
1978	2190	13417	15607	148.8	3799	1821	46.5	81.7
1979	2506	12678	15184	144.8	3704	1724	44.1	84.0
1980	2823	13582	16405	156.1	4164	1807	48.2	86.4
1981	2899	13832	16731	163.7	4369	1844	49.2	88.8
1982	2938	14131	17069	171.8	4574	1882	50.1	91.3

Source: Derived from Tables 5.1, 5.2 and 5.3

TABLE 5.5

CALORIE CONTENT OF AVAILABLE FOOD SUPPLY IN NIGERIA, 1961-1982
(cals per capita per day)

Year	Cereals	Grain Legumes	Roots & Tubers	Oil-seeds and Nuts	Vege-tables & Fruits	Vege-table Oils	Sugar	Beve-rages	Live-Stock Pro-ducts	Total
1961	904	105	725	13	28	304	34	1	55	2169
1962	1112	119	796	21	30	307	42	1	57	2487
1963	1148	132	792	23	32	300	28	1	57	2513
1964	1099	161	856	26	35	303	22	1	58	2561
1965	1064	151	813	23	37	320	48	2	60	2518
1966	1092	144	809	26	39	317	30	2	62	2521
1967	802	142	723	17	40	316	47	2	62	2151
1968	925	132	692	16	40	267	19	2	62	2165
1969	789	140	498	20	40	270	32	2	61	1852
1970	1054	155	528	12	40	273	39	2	60	2163
1971	1057	179	550	16	39	254	57	2	62	2216
1972	1143	157	444	16	39	238	53	2	62	2154
1973	650	119	325	13	39	205	53	2	62	1467
1974	802	103	327	14	39	199	31	2	62	1579
1975	914	128	352	17	40	232	44	2	63	1794
1976	843	105	320	17	39	233	34	3	67	1671
1977	846	90	429	17	43	232	54	3	66	1780
1978	919	61	417	19	41	223	71	3	67	1821
1979	834	63	399	21	41	213	83	4	66	1724
1980	903	83	426	21	41	228	38	4	63	1907
1981	921	85	425	21	42	233	39	4	64	1844
1982	939	87	444	22	43	238	40	4	65	1882

Source: Computed from Tables 5.3 - 5.4

TABLE 5.6

PROTEIN CONTENT OF AVAILABLE FOOD SUPPLY IN NIGERIA, 1961-1982
(Grams per capita per day)

Year	Cereals	Grain Legumes	Roots and Tubers	Oilseeds and Nuts	Vegetables and fruits	Livestock Products	Total
1961	25.5	6.0	11.4	0.6	3.3	5.3	52.0
1962	30.1	6.8	12.6	1.0	3.5	5.5	59.6
1963	31.2	7.6	12.5	1.0	3.6	5.6	60.4
1964	29.8	9.4	12.9	1.1	3.9	5.7	63.8
1965	29.1	8.7	12.9	1.0	4.1	5.9	61.7
1966	29.7	8.4	12.8	1.1	4.3	6.2	62.6
1967	22.5	8.2	10.9	0.7	4.4	6.2	52.9
1968	24.8	7.6	10.1	0.7	4.4	6.2	53.7
1969	21.4	8.2	8.0	0.9	4.4	6.1	48.9
1970	28.2	9.3	8.6	0.6	4.3	6.2	57.1
1971	28.5	10.3	9.1	0.7	4.3	6.3	59.1
1972	31.1	9.1	7.1	0.7	4.2	6.3	58.6
1973	17.7	6.6	5.3	0.5	4.2	6.4	40.7
1974	21.1	6.0	5.2	0.6	4.2	6.3	43.5
1975	24.7	8.2	5.5	0.7	4.3	6.5	49.9
1976	23.0	6.6	5.6	0.7	4.4	6.8	47.2
1977	22.5	5.7	5.9	0.7	4.8	6.8	46.5
1978	24.7	3.8	5.7	0.8	4.5	7.0	46.5
1979	22.3	4.1	5.4	0.9	4.5	7.0	44.1
1980	24.7	5.5	6.1	0.9	4.6	6.5	48.2
1981	25.2	5.6	6.2	0.9	4.7	6.6	49.2
1982	25.7	5.7	6.3	0.9	4.8	6.7	50.1

Source: Computed from Tables 5.3 - 5.4

TABLE 5.7

CALORIE AND PROTEIN SUPPLY AND REQUIREMENTS IN NIGERIA, 1961-1982

Year	calorie				protein			
	Supply (kcal)	Requirement (kcal)	Supply as percent of Requirement	Calorie gap (percent	Supply (gms)	Requirement (gms)	Supply as percent of Requirement	Protein gap (percent)
1961	2169	2420	90	-10	52.0	65.0	80	-20
1962	2487	2420	103	3	59.6	65.0	92	- 8
1963	2513	2420	104	44	60.4	65.0	93	- 7
1964	2561	2420	106	6	63.8	65.0	98	- 2
1965	2518	2420	104	4	61.7	65.0	95	- 5
1966	2521	2420	104	4	62.6	65.0	96	- 4
1967	2151	2420	89	-11	52.9	65.0	81	-19
1968	2165	2420	90	-10	53.7	65.0	83	-17
1969	1852	2420	77	-23	48.9	65.0	75	-25
1970	2163	2420	89	-11	57.1	65.0	88	-12
1971	2216	2420	92	- 8	59.1	65.0	91	- 9
1972	2154	2420	89	-11	58.6	65.0	90	-10
1973	1467	2420	61	-39	40.7	65.0	63	-37
1974	1579	2420	65	-35	43.5	65.0	67	-33
1975	1794	2420	74	-26	49.9	65.0	77	-23
1976	1671	2420	69	-31	47.2	65.0	73	-27
1977	1780	2420	74	-26	46.5	65.0	72	-28
1978	1821	2420	75	-25	46.6	65.0	72	-28
1979	1724	2420	71	-29	44.1	65.0	68	-32
1980	1807	2420	75	-25	48.2	65.0	74	-26
1981	1844	2420	76	-24	49.2	65.0	76	-24
1982	1882	2420	78	-22	50.1	65.0	77	-23

Sources: (i) Compiled from Tables 5.5 and 5.6

(ii) Olayide et. al., 1972

TABLE 5.8

AVERAGE CALORIE AND PROTEIN GAPS UNDER SENSITIVITY ANALYSIS

(Per cent)

Scenarios	1961-1965	1966-1970	1971-1975	1976-1982	1961-1982
Scenario I					
A (i) Calorie	1.4	-10.2	-23.8	-25.2	-15.4
(ii) Protein	- 8.4	-15.4	-22.4	-26.3	-18.9
B (i) Calorie	1.4	- 6.0	-15.8	-12.0	- 8.5
(ii) Protein	- 8.4	-11.0	-14.4	-13.1	-11.9
Scenario II					
A (i) Calorie	1.4	-10.2	-20.2	-22.1	-21.3
(ii) Protein	- 8.4	-15.4	-19.0	-23.4	-21.6
B (i) Calorie	10.4	- 1.4	-16.0	-17.1	- 5.5
(ii) Protein	4.6	- 6.6	-14.4	-19.4	- 9.9
Scenario III					
A (i) Calorie	1.4	-10.2	-25.8	-29.0	-17.1
(ii) Protein	- 8.4	-15.4	-25.6	-29.9	-20.7
Scenario IV					
A (i) Calorie	1.4	-10.2	-23.0	-22.9	-14.5
(ii) Protein	- 8.4	-15.4	-22.0	-25.9	-18.7

Source: Computed from new assumptions specified in the text.

TABLE 5.9

FOOD DEMAND ESTIMATES FOR NIGERIA, 1961 - 1982

(000 tonnes of grain equivalent)

YEAR	CEREALS	GRAIN LEGU-MES	ROOTS & TUBERS	OILSEEDS & NUTS	VEGE-TABLES & FRUITS	VEGE-TABLE OILS	SUGAR	BEVE-RAGES	LIVE-STOCK PRO-DUCTS	TOTAL
1961	5811	740	4287	124	208	1432	83	8	275	12968
1962	6207	782	4485	131	225	1545	103	9	315	13802
1963	6521	818	4659	137	239	1633	116	9	344	14476
1964	6828	852	4828	143	253	1721	129	10	372	15136
1965	7183	890	5011	149	269	1823	145	11	406	15887
1966	7265	904	5103	152	271	1838	142	11	404	16090
1967	7012	885	5074	149	254	1747	115	10	355	15601
1968	7156	904	5668	152	258	1780	117	10	360	16405
1969	8064	994	5567	167	306	2057	172	12	471	17810
1970	9040	1091	5972	183	357	2354	233	15	590	19835
1971	9518	1141	6199	191	380	2492	257	16	641	20835
1972	9853	1178	6378	198	389	2587	272	17	672	21544
1973	10187	1214	6561	204	411	2683	287	18	704	22269
1974	10686	1266	6793	213	436	2828	313	19	757	23311
1975	10966	1303	6957	219	448	2907	325	19	782	23926
1976	11395	1344	7174	226	469	3031	345	20	825	24830
1977	11792	1387	7382	233	487	3143	363	21	863	25671
1978	11997	1413	7522	237	495	3196	368	22	876	26126
1979	12447	1460	7749	245	516	3325	390	23	921	27076
1980	12707	1491	7908	250	527	3396	398	23	941	27641
1981	12960	1521	8068	255	538	3463	406	24	960	28195
1982	13219	1551	8227	260	549	3531	414	24	979	28754

TABLE 5.10
ESTIMATED FOOD GAPS FOR NIGERIA, 1961 -1982
(000 tonnes of grain equivalent)

YEAR	SUPPLY	DEMAND	TOTAL GAP	PER CAPITA GAP (kg)	TOTAL POPULATION (million)
1961	11850	12968	- 118	- 21	52.9
1962	13932	13802	130	2	54.3
1963	14503	14476	27	1	55.7
1964	15136	15136	0	0	57.1
1965	15215	15887	- 672	- 12	58.5
1966	15645	16090	- 445	- 7	60.0
1967	13458	15601	-2143	- 35	61.4
1968	12950	16405	-3455	- 55	63.0
1969	12430	17810	-5380	- 83	64.6
1970	15410	19835	-4425	- 67	66.2
1971	15593	20835	-5242	- 77	67.9
1972	15825	21544	-5719	- 82	69.7
1973	11196	22269	-11073	-155	71.5
1974	12221	23311	-11090	-151	73.3
1975	14277	23926	-9649	-128	75.2
1976	13740	24830	-11090	-144	77.3
1977	14864	25671	-10807	-136	79.5
1978	15607	26126	-10519	-129	81.7
1979	15184	27076	-11892	-142	84.0
1980	16405	27641	-11236	-130	86.4
1981	16731	28195	-11464	-129	88.8
1982	17069	28754	-11685	-128	91.3

Source: Computed from Tables 5.4 and 5.9

TABLE 5.11

AVERAGE EXPENDITURE ON MAJOR FOOD ITEMS IN MAJOR CITIES

(percent of total)

Food Item	LOWER INCOME GROUP[1]					MIDDLE INCOME GROUP[2]				
	Lagos	Ibadan	Enugu	Kaduna	Sokoto	Lagos	Ibadan	Enugu	Kaduna	Sokoto
Staples[3]	42.2	59.0	48.4	43.5	55.7	35.0	38.7	37.3	41.6	45.3
Livestock Products	36.9	27.4	30.9	22.4	23.8	39.0	32.6	32.8	27.5	27.4
Oils & Fats	4.7	4.5	4.6	6.2	6.8	6.5	7.4	6.0	5.9	7.0
Fruits and Vegetables	8.5	6.2	10.8	12.0	10.4	9.7	9.4	11.2	11.2	9.7
Other Foods	7.7	2.9	5.3	5.9	3.3	9.8	11.9	12.7	13.8	10.6

1/ Self employed persons earning below ₦900 per annum.

2/ Persons earning between ₦900 and ₦2,400 per annum.

3/ Include cereals, grain legumes, roots and tubers.

Source: Derived from Federal Office of Statistics data in Urban Consumer Surveys for Lagos for (1959/60), Ibadan (1961/63) Enugu (1961/62) Kaduna (1962/63 and Sokoto (1964/65, 1965/66).

TABLE 5.12

AVERAGE EXPENDITURE ON MAJOR FOOD ITEMS IN RURAL AND URBAN AREAS IN NIGERIA, 1975

(Percent of total)

Group	URBAN				RURAL			
	Local Food Stuffs	Processed Food Stuffs	Other Food	Total	Local Food Stuffs	Processed Food Stuffs	Other Food	Total
Lower Income 1/	75.9	14.5	9.6	100.0	78.9	12.3	0.8	100.0
Middle Income 2/	73.0	15.6	11.4	100.0	-	-	-	-
Upper Income 3/	69.7	17.3	13.0	100.0	-	-	-	-

1/ Persons earning below ₦1700 per annum.

2/ Persons earning between ₦1700 and ₦3980 per annum.

3/ Persons earning above ₦3980 per annum

Source: Derived from Federal Office of Statistics data in Report of National Consumer Surveys 1975, Appendix III.

TABLE 5.13

DAILY PER CAPUT CONSUMPTION OF CALORIE AND PROTEIN IN NIGERIA, 1963/64

Food Item	Calories (KCAL)				Protein (GMS)			
	West	East	North	Nigeria	West	East	North	Nigeria
Staples	1690	1530	2000	1800	28.8	26.0	34.0	30.6
Livestock Products	120	100	100	105	12.9	11.0	11.0	11.6
Fruits and Vegetables	170	60	60	95	9.1	2.4	2.4	3.8
Oils and Fats	300	230	140	210	-	-	-	-
Others	20	10	-	5	-	-	-	-

Source: Calorie data adopted from Gusten (1968) and protein data computed from the calorie data.

TABLE 5.14

DAILY PER CAPUT CONSUMPTION OF CALORIE AND PROTEIN IN NIGERIA, 1963/64

(Percent)

Food Item	C A L O R I E				P R O T E I N			
	West	East	North	Nigeria	West	East	North	Nigeria
Staples	73.5	79.5	87.0	81.3	56.7	65.0	71.7	66.5
Livestock Products	5.0	5.0	4.5	4.7	25.4	27.9	23.2	25.2
Fruits and Vegetables	7.5	3.0	2.5	4.3	17.9	6.1	5.1	8.3
Oils and Fats	13.0	12.0	6.0	9.5	-	-	-	-
Others	1.0	0.5	-	0.2	-	-	-	-
TOTAL	100	100	100	100	100	100	100	100

Source: Computed from Table 5.13

TABLE 6.1

DOMESTIC FOOD PRODUCTION - NORTH, 1961 -1982

('000 tonnes of grain equivalent)

YEAR	CEREALS	GRAIN LEGU-MES	ROOTS & TUBERS	VEGE-TABLES & FRUITS	VEGE-TABLE OILS	LIVESTOCK PRODUCTS	TOTAL
1961	3992	961	12	15	115	175	5268
1962	5297	1125	12	16	118	183	6752
1963	5585	1276	12	18	149	190	7229
1964	5463	1503	13	20	161	193	7353
1965	5070	1534	13	22	233	201	7073
1966	5594	1489	14	24	202	211	7534
1967	3955	1510	14	26	226	216	5947
1968	4919	1419	15	26	226	219	6830
1969	4150	1566	15	27	276	221	6257
1970	5808	1717	15	27	283	225	8072
1971	5810	2114	16	28	262	241	8471
1972	6786	1885	16	28	242	244	9203
1973	3959	1490	13	29	137	249	5880
1974	4919	1232	14	30	142	250	6592
1975	5842	1495	15	31	271	262	7918
1976	4695	1230	16	32	276	276	6525
1977	5019	1065	16	33	285	277	6705
1978	4993	731	16	34	286	282	6342
1979	4249	767	16	36	269	288	5625
1980	4557	1034	17	37	252	288	6179
1981	4648	1051	18	37	257	296	6307
1982	4741	1070	18	38	262	300	6431

Source: Derived from Table 5.1

TABLE 6.2 -

DOMESTIC FOOD PRODUCTION - MIDDLEBELT, 1961 -1982

('000 tonnes of grain equivalent)

YEAR	CEREALS	GRAIN LEGU-MES	ROOTS & TUBERS	OILSEEDS & NUTS	VEGE-TABLES & FRUITS	VEGE-TABLE OILS	SUGAR	BEVE-RAGES	LIVE-STOCK PRO-DUCTS	TOTAL
1961	1476	182	2086	57	48	17	19	1	60	3945
1962	1689	217	2322	106	53	17	19	1	62	4486
1963	1832	242	2279	109	57	22	19	1	63	4624
1964	1760	282	2706	123	64	24	21	1	65	5046
1965	1785	290	2516	118	69	34	21	1	67	4901
1966	1817	269	2549	135	74	29	21	1	70	4965
1967	1442	287	2136	90	78	31	21	1	72	4159
1968	1622	273	1951	96	80	31	27	1	74	4153
1969	1415	286	1731	110	82	38	27	1	74	3766
1970	1863	277	1923	71	82	41	27	1	75	4361
1971	1897	387	2087	88	84	38	27	1	81	4692
1972	2301	340	1689	93	84	34	27	2	82	4654
1973	1178	315	1204	72	87	19	27	2	83	2987
1974	1509	223	1222	84	90	19	30	2	84	3263
1975	1865	170	1282	104	93	38	32	2	88	3675
1976	1708	148	1466	109	99	38	39	3	93	3703
1977	1692	132	1282	112	103	41	43	3	93	3499
1978	1820	104	1271	132	107	41	51	3	94	3623
1979	1624	94	1196	148	111	38	64	3	97	3375
1980	1735	92	1502	154	112	36	80	4	97	3812
1981	1769	93	1531	157	115	36	82	4	99	3886
1982	1805	94	1562	160	117	38	85	4	100	3967

Source Derived from Table 5.1

TABLE 6.3

DOMESTIC FOOD PRODUCTION- WEST, 1961-1982

('000 tonnes of grain equivalent)

YEAR	CEREALS	GRAIN LEGU-MES	ROOTS & TUBERS	OILSEEDS & NUTS	VEGE-TABLES & FRUITS	VEGE-TABLE OILS	BEVE-RAGES	LIVESTOCK PRODUCTS	TOTAL
1961	439	65	1711	19	78	660	3	45	3019
1962	453	64	1889	34	86	660	3	47	3236
1963	433	74	1901	34	93	636	3	50	3224
1964	486	96	2095	38	105	658	4	52	3534
1965	508	100	2046	37	114	684	4	55	3548
1966	491	95	2085	41	123	710	4	59	3608
1967	474	100	1947	29	129	718	5	61	3464
1968	503	99	1900	28	133	612	5	61	3339
1969	479	101	1394	35	136	614	5	63	2829
1970	544	105	1487	24	137	638	6	64	3006
1971	604	131	1593	28	139	614	6	69	3186
1972	545	120	1369	29	141	593	6	73	2877
1973	345	109	965	24	146	557	7	75	2227
1974	417	89	1034	28	150	550	7	75	2350
1975	322	87	1148	34	155	614	7	77	2445
1976	666	80	1087	35	160	626	9	81	2744
1977	589	76	1515	37	166	636	10	82	3109
1978	658	62	1518	43	173	638	12	84	3188
1979	696	61	1495	47	180	638	14	86	3217
1980	714	69	1623	50	186	626	15	86	3369
1981	729	70	1656	51	190	638	16	88	3438
1982	743	71	1689	53	194	650	16	90	3508

Source: Derived from Table 5.1

TABLE 6.4

DOMESTIC FOOD PRODUCTION, - EAST, 1961 - 1982

('000 tonnes of grain equivalent)

YEAR	CEREALS	GRAIN LECU-MES	ROOTS & TUBERS	OILSEEDS & NUTS	VEGE-TABLES & FRUITS	VEGE-TABLE OILS	BEVE-RAGES	LIVESTOCK PRODUCTS	TOTAL
1961	153	34	1500	12	69	979	3	74	2826
1962	157	43	1754	18	76	984	4	80	3117
1963	146	48	1851	18	82	946	4	86	3181
1964	168	53	2011	19	92	972	4	90	3409
1965	163	55	1985	19	99	1010	5	97	3433
1966	168	54	2011	21	107	1051	5	105	3522
1967	164	56	1857	16	112	1061	6	109	3382
1968	165	57	1859	15	116	902	6	110	3228
1969	158	57	1330	18	118	905	7	113	2706
1970	183	60	1465	13	119	938	7	117	2903
1971	206	72	1577	15	121	902	7	128	3030
1972	185	67	1268	16	122	871	8	137	2675
1973	106	60	1076	13	126	826	8	142	2357
1974	130	55	1073	16	130	814	9	143	2370
1975	94	59	1177	19	135	902	9	144	2540
1976	209	55	1120	19	139	919	11	153	2625
1977	177	53	1554	21	145	934	13	155	3052
1978	201	45	1563	24	151	936	15	159	3093
1979	211	47	1548	25	157	938	17	161	3105
1980	217	53	1658	28	162	922	19	155	3214
1981	222	54	1691	28	165	941	19	158	3278
1982	227	55	1725	29	169	960	20	161	3346

Source: Derived from Table 5.1

TABLE 6.5

CALORIE AND PROTEIN CONTENT OF DOMESTIC FOOD PRODUCTION -NORTH

	TOTAL PRODUCTION	TOTAL CALORIES (billion cals)	TOTAL PROTEIN (million gms)	PER CAPITA CALORIES (cals)	PER CAPITA PROTEIN (gms)	TOTAL POPULATION (million)
1961	5268	53.1	1765	2870	95.4	18.5
1962	6752	67.7	2155	3561	113.4	19.0
1963	7229	72.7	2350	3727	120.5	19.5
1964	7353	74.3	2448	3713	122.4	20.0
1965	7073	71.8	2474	3500	120.7	20.5
1966	7534	75.3	2564	3586	122.1	21.0
1967	5947	60.7	2161	2823	100.5	21.5
1968	6830	69.0	2270	3136	103.2	22.0
1969	6257	63.6	2183	2812	96.6	22.6
1970	8072	80.6	2675	3473	115.3	23.2
1971	8471	62.4	2954	2023	124.1	23.8
1972	9203	92.8	3116	3805	127.7	24.4
1973	5880	60.6	2093	2425	83.7	25.0
1974	6592	65.9	2153	2574	84.1	25.6
1975	7918	77.2	2589	2947	98.8	26.2
1976	6525	61.6	2117	2289	787	28.9
1977	6705	65.1	2058	2349	74.3	27.7
1978	6342	61.7	1895	2166	66.5	28.5
1979	5625	54.4	1717	1858	58.6	29.3
1980	6179	59.3	1950	1970	64.8	30.1
1981	6307	60.5	1984	1958	64.2	30.9
1982	6431	61.7	2013	1940	63.3	31.8

Source: Computed from Tables 5.3 and 6.1

TABLE 6.6

CALORIE AND PROTEIN CONTENT OF DOMESTIC FOOD PRODUCTION - MIDDLEBELT

YEAR	TOTAL PRODUCTION	TOTAL CALORIES (billion cals)	TOTAL PROTEIN (million gms)	PER CAPITA CALORIES (cals)	PER CAPITA PROTEIN (gms)	TOTAL POPULATION (million)
1961	3945	38.9	1099	4096	115.7	9.5
1962	4486	44.2	1252	4557	129.1	9.7
1963	4624	45.7	1299	4616	131.2	9.9
1964	5046	49.8	1415	4934	140.1	10.1
1965	4901	48.5	1393	4664	133.9	10.4
1966	4965	48.8	1407	4564	131.5	10.7
1967	4159	41.3	1209	3757	109.9	11.0
1968	4153	41.3	1202	3658	106.4	11.3
1969	3766	37.4	1129	3226	97.3	11.6
1970	4361	43.0	1274	3615	107.1	11.9
1971	4692	46.6	1416	3821	116.1	12.2
1972	4634	46.1	1414	3687	113.1	12.5
1973	2968	30.2	873	2358	68.2	12.8
1974	3263	32.1	992	2451	75.7	13.1
1975	3675	35.9	1080	2678	80.6	13.4
1976	3703	35.9	1087	2602	78.8	13.8
1977	3499	34.2	998	2408	70.3	14.2
1978	3623	35.4	1034	2428	70.8	14.6
1979	3375	33.0	959	2198	63.9	15.0
1980	3812	39.8	1006	2585	65.3	15.4
1981	3886	37.8	1098	2390	69.5	15.8
1982	3967	38.5	1121	2362	68.8	16.3

Source: Computed from Tables 5.3 and 6.2

TABLE 6.7

CALORIE AND PROTEIN CONTENT OF DOMESTIC FOOD PRODUCTION-WEST

YEAR	TOTAL PRODUCTION	TOTAL CALORIES (billion cals)	TOTAL PROTEIN (million gms)	PER CAPITA CALORIES (cals)	PER CAPITA PROTEIN (gms)	TOTAL POPULATION (million
1961	3019	30.7	553	2326	41.9	13.2
1962	3236	33.1	614	2450	45.5	13.5
1963	3224	33.0	620	2390	44.9	13.8
1964	3534	35.9	697	2543	49.4	14.1
1965	3548	36.0	696	2483	48.0	14.5
1966	3608	36.7	708	2465	47.5	14.9
1967	3464	35.4	678	2311	44.3	15.3
1968	3339	34.1	666	2174	42.4	15.7
1969	2829	28.4	613	1762	38.1	16.1
1970	3006	30.0	653	1820	39.6	16.5
1971	3186	31.8	727	1883	43.0	16.9
1972	2877	28.6	659	1655	38.1	17.3
1973	2227	21.9	515	1235	29.1	17.7
1974	2350	22.9	541	1266	29.9	18.1
1975	2445	24.0	526	1288	28.3	18.6
1976	2744	26.5	649	1386	34.0	19.1
1977	3109	31.0	649	1584	33.1	19.6
1978	3188	31.8	677	1581	33.7	20.1
1979	3217	32.1	689	1549	33.3	20.7
1980	3369	33.6	728	1570	34.2	21.3
1981	3438	34.1	745	1558	34.0	21.9
1982	3508	34.9	765	1549	34.0	22.5

Source: Computed from Tables 5.3 and 6.3

TABLE 6.8

CALORIE AND PROTEIN CONTENT OF DOMESTIC FOOD PRODUCTION - EAST

YEAR	TOTAL PRODUCTION	TOTAL CALORIES (billion cals)	TOTAL PROTEIN (million gms)	PER CAPITA CALORIES (cals)	PER CAPITA PROTEIN (gms)	TOTAL POPULATION (million)
1961	2826	28.4	445	2428	38.0	11.7
1962	3117	31.3	508	2606	42.3	12.0
1963	3181	31.8	525	2588	42.7	12.3
1964	3409	34.0	595	2702	47.2	12.6
1965	3433	35.6	588	2759	45.6	12.9
1966	3522	35.2	610	2667	46.2	13.2
1967	3382	33.9	583	2512	43.2	13.5
1968	3228	32.3	575	2343	41.7	13.8
1969	2706	26.7	516	1897	36.6	14.1
1970	2903	28.6	555	1975	38.3	14.5
1971	3030	29.7	603	1996	40.5	14.9
1972	2675	26.2	552	1714	36.1	15.3
1973	2357	22.7	498	1448	31.7	15.7
1974	2370	22.9	502	1420	31.2	16.1
1975	2540	24.6	518	1488	31.4	16.5
1976	2625	25.2	539	1480	31.7	17.0
1977	3052	29.9	600	1708	34.3	17.5
1978	3093	30.3	614	1684	34.1	18.0
1979	3105	30.4	618	1642	33.4	18.5
1980	3214	31.2	650	1654	34.2	19.0
1981	3278	32.0	661	1640	33.9	19.5
1982	3346	32.7	675	1627	33.6	20.1

Source: Computed from Tables 5.3 and 6.4

TABLE 6.9

AVAILABLE FOOD SUPPLY - NORTH, 1961 - 1982

(000 tonnes of grain equivalent)

YEAR	IMPORTS	DOMESTIC SUPPLY	TOTAL SUPPLY	TOTAL CALO-RIES (billion)	TOTAL PROTEIN (million gms)	PER CAPITA CALORIES (cals)	PER CAPITA PROTEIN (gms)	TOTAL POPULATION (million)
1961	41	3844	3885	39.0	1222	2108	66.1	18.5
1962	52	5270	5322	51.0	1505	2684	79.2	19.0
1963	43	5661	5704	54.2	1619	2779	83.0	19.5
1964	36	5854	5890	54.7	1689	2735	84.5	20.0
1965	69	5514	5583	53.2	1662	2595	81.1	20.5
1966	73	5829	5902	56.0	1747	2667	83.2	21.0
1967	73	4464	4537	43.7	1407	2033	65.4	21.5
1968	47	4875	4922	51.1	1539	2323	70.0	22.0
1969	79	4744	4823	46.1	1443	2040	63.8	22.6
1970	106	6498	6604	61.1	1860	2634	80.2	23.2
1971	158	6264	6422	62.8	1936	2639	81.3	23.8
1972	135	7063	7198	68.4	2095	2803	85.9	24.4
1973	155	4390	4545	43.1	1317	1724	52.7	25.0
1974	115	5216	5331	50.2	1525	1961	59.6	25.6
1975	155	6311	6466	61.5	1941	2347	74.1	26.2
1976	221	5296	5517	52.0	1676	1933	60.4	26.9
1977	259	5537	5796	55.0	1650	1986	59.6	27.7
1978	417	5254	5671	54.1	1537	1898	53.9	28.5
1979	477	4677	5154	48.4	1430	1652	48.8	29.3
1980	537	5119	5656	53.0	1637	1761	54.4	30.1
1981	551	5214	5765	55.7	1720	1803	55.7	30.9
1982	559	5320	5879	59.0	1793	1855	56.4	31.8

Source: Derived from Tables 5.2, 5.3 and 6.1

TABLE 6.10

AVAILABLE FOOD SUPPLY - MIDDLEBELT, 1961-1982

(000 tonnes of grain equivalent)

YEAR	IMPORTS	DOMESTIC SUPPLY	TOTAL SUPPLY	TOTAL CALORIES (billion)	TOTAL PROTEIN (million gms)	PER CAPITA CALORIES (cals)	PER CAPITA PROTEIN (gms)	TOTAL POPULATION (million)
1961	17	2660	2677	26.6	746	2800	78.5	9.5
1962	22	3176	3198	30.5	855	3144	88.1	9.7
1963	18	3353	3371	32.1	877	3242	88.8	9.9
1964	14	3602	3616	34.0	935	3366	92.5	10.1
1965	29	3547	3576	33.9	943	3260	90.7	10.4
1966	31	3562	3593	34.3	957	3206	89.4	10.7
1967	30	2950	2980	28.7	815	2609	74.1	11.0
1968	20	2746	2766	29.1	824	2575	72.9	11.3
1969	33	2677	2710	25.9	765	2233	65.9	11.6
1970	45	3282	3327	30.5	868	2563	72.9	11.9
1971	67	3521	3588	32.4	946	2656	77.5	12.2
1972	57	3405	3462	32.6	970	2608	77.6	12.5
1973	65	2142	2207	19.9	677	1555	52.9	12.8
1974	48	2354	2402	23.4	705	1786	53.8	13.1
1975	65	2824	2889	26.9	808	2007	60.3	13.4
1976	92	2752	2844	26.5	777	1920	56.3	13.8
1977	108	2682	2790	26.4	742	1859	52.3	14.2
1978	175	2797	2972	27.7	813	1897	55.7	14.6
1979	199	2602	2801	26.4	772	1760	51.5	15.0
1980	225	2896	3121	29.4	853	1909	55.4	15.4
1981	231	2956	3187	31.3	894	1981	56.6	15.8
1982	235	3018	3253	33.8	933	2074	57.2	16.3

Source: Derived from Tables 5.2, 5.3 and 6.2

TABLE 6.11

AVAILABLE FOOD SUPPLY - WEST, 1961 - 1982
(ooo tonnes of grain equivalent)

YEAR	IMPORTS	DOMESTIC SUPPLY	TOTAL SUPPLY	TOTAL CALORIES (billion)	TOTAL PROTEIN (million gms)	PER CAPITA CALORIES (cals)	PER CAPITA PROTEIN (gms)	TOTAL POPULATION (million)
1961	100	2836	2936	25.4	428	1924	32.4	13.2
1962	127	2659	2786	27.5	476	2037	35.3	13.5
1963	106	2654	2760	27.4	455	1986	33.0	13.8
1964	88	2786	2874	29.5	546	2092	38.7	14.1
1965	172	2942	3114	31.2	533	2152	36.8	14.5
1966	181	2970	3151	31.4	555	2107	37.2	14.9
1967	181	2858	3039	30.8	543	2013	35.5	15.3
1968	118	2563	2681	29.0	538	1817	34.3	15.7
1969	195	2339	2534	24.6	507	1528	31.5	16.1
1970	262	2584	2846	26.8	575	1624	34.8	16.5
1971	393	2536	2929	29.0	622	1716	36.8	16.9
1972	335	2386	2721	25.9	546	1497	31.6	17.3
1973	382	1872	2254	20.5	481	1158	27.2	17.7
1974	282	2016	2298	21.6	501	1193	27.7	18.1
1975	385	2130	2515	23.7	517	1274	27.8	18.6
1976	545	2311	2856	26.7	680	1398	35.6	19.1
1977	640	2685	3325	32.7	705	1668	36.0	19.6
1978	1029	2737	3766	36.4	801	1811	39.9	20.1
1979	1178	2758	3936	38.2	827	1845	40.0	20.7
1980	1327	2856	4183	40.6	943	1906	44.3	21.3
1981	1363	2905	4268	42.1	995	1922	45.4	21.9
1982	1381	2971	4352	44.7	1052	1987	46.8	22.5

Source Derived from Tables 5.2, 5.3 and 6.3

TABLE 6.12

AVAILABLE FOOD SUPPLY - EAST, 1961 - 1982
(000 tonnes of grain equivalent)

YEAR	IMPORTS	DOMESTIC SUPPLY	TOTAL SUPPLY	TOTAL CALORIES (billion)	TOTAL PROTEIN (million gms)	PER CAPITA CALORIES (cals)	PER CAPITA PROTEIN (gms)	TOTAL POPULATION (million)
1961	55	2297	2352	23.7	355	2026	30.3	11.7
1962	70	2556	2626	26.1	402	2175	33.5	12.0
1963	58	2611	2669	26.3	412	2138	33.5	12.3
1964	49	2707	2756	27.8	473	2206	37.5	12.5
1965	95	2847	2942	29.0	471	2248	36.5	12.9
1966	100	2899	2999	29.6	497	2242	37.7	13.2
1967	100	2802	2902	28.9	483	2141	35.8	13.5
1968	65	2516	2581	27.2	478	1971	34.6	13.8
1969	108	2255	2363	23.0	444	1631	3[illegible].5	14.1
1970	145	2488	2633	24.8	478	1710	33.0	14.5
1971	217	2437	2654	26.3	509	1765	34.2	14.9
1972	185	2259	2444	23.2	473	1516	30.9	15.3
1973	211	1979	2190	21.5	434	1369	27.6	15.7
1974	156	2034	2190	20.5	459	1273	28.5	16.1
1975	213	2194	2407	22.7	486	1376	29.5	16.5
1976	301	2222	2523	24.0	566	1412	33.3	17.0
1977	353	2600	2953	27.4	599	1566	34.2	17.5
1978	569	2629	3198	30.7	648	1706	36.0	18.0
1979	653	2640	3293	31.8	675	1719	36.5	18.5
1980	734	2711	3445	33.3	731	1753	38.5	19.0
1981	754	2757	3511	34.6	761	1774	39.0	19.5
1982	764	2821	3585	34.3	796	1706	39.6	20.1

Source: Derived from Tables 5.2, 5.3 and 6.4

TABLE 6.13

CALORIE AND PROTEIN GAPS BY REGION, 1961 - 1982

(Percent)

	CALORIE				PROTEIN			
YEAR	NORTH	MIDDLEBELT	WEST	EAST	NORTH	MIDDLEBELT	WEST	EAST
1961	-13	16	-20	-16	2	21	-50	-53
1962	11	30	-16	-10	22	36	-46	-48
1963	15	34	-18	-12	28	37	-49	-48
1964	13	39	-14	- 9	30	42	-40	-42
1965	7	35	-11	- 7	25	40	-43	-44
1966	10	32	-13	- 7	28	38	-43	-42
1967	-16	8	-17	-12	1	14	-45	-45
1968	- 4	6	-24	-19	8	12	-47	-47
1969	-16	- 8	-37	-33	- 2	1	-52	-52
1970	9	6	-33	-29	23	12	-46	-49
1971	9	10	-29	-27	25	19	-43	-47
1972	16	8	-38	-37	32	19	-51	-52
1973	-29	-36	-52	-43	-19	-19	-58	-58
1974	-19	-26	-51	-47	- 8	-17	-57	-56
1975	- 3	-17	-47	-43	14	- 7	-57	-55
1976	-20	-21	-42	-42	- 7	-13	-45	-49
1977	-18	-23	-31	-35	- 8	-20	-45	-47
1978	-22	-22	-25	-30	-17	-14	-39	-45
1979	-32	-27	-24	-29	-25	-21	-38	-44
1980	-27	-21	-21	-28	-16	-15	-32	-41
1981	-25	-18	-21	-27	-14	-13	-30	-41
1982	-23	-14	-18	-30	-13	-12	-28	-39

Source: Computation based on results from Tables 6.1 - 6.4 and the assumed calorie and protein minimum requirements.

TABLE 6.14

CALORIE AND PROTEIN GAPS BY REGION - SENSITIVITY ANALYSIS I

(Percent)

	CALORIE				PROTEIN			
YEAR	NORTH	MIDDLEBELT	WEST	EAST	NORTH	MIDDLEBELT	WEST	EAST
1961	-13	16	-20	-16	2	21	-50	-53
1962	11	30	-16	-10	22	36	-46	-48
1963	15	34	-18	-12	28	37	-49	-48
1964	13	39	-14	- 9	30	42	-40	-42
1965	7	35	-11	- 7	25	40	-43	-44
1966	10	32	-13	- 7	28	38	-43	-42
1967	-16	8	-17	-12	1	14	-45	-45
1968	- 4	6	-24	-19	8	12	-47	-47
1969	-16	- 8	-37	-33	- 2	1	-52	-52
1970	9	6	-33	-29	23	12	-46	-49
1971	9	10	-29	-27	25	19	-43	-47
1972	16	8	-38	-37	32	19	-51	-52
1973	-29	-36	-52	-43	-19	-19	-58	-58
1974	-19	-26	-51	-47	- 8	-17	-57	-56
1975	- 3	-17	-47	-43	14	- 7	-57	-55
1976	-19	-20	-41	-41	- 6	-12	-44	-48
1977	-17	-22	-30	-34	- 7	-19	-44	-46
1978	-21	-21	-24	-29	-16	-13	-38	-44
1979	-31	-26	-23	-28	-24	-20	-37	-43
1980	-26	-20	-20	-27	-15	-14	-31	-40
1981	-24	-17	-20	-26	-13	-12	-29	-40
1982	-22	-13	-17	-29	-12	-11	-27	-38

Source: Computation based on new assumptions specified in the text.

TABLE 6.15

CALORIE AND PROTEIN GAPS BY REGION - SENSITIVITY ANALYSIS II

(Percent)

	C A L O R I E				P R O T E I N			
YEAR	NORTH	MIDDLEBELT	WEST	EAST	NORTH	MIDDLEBELT	WEST	EAST
1961	-13	16	-20	-16	2	21	-50	-53
1962	11	30	-16	-10	22	36	-46	-48
1963	15	34	-18	-12	28	37	-49	-48
1964	13	39	-14	- 9	30	42	-40	-42
1965	7	35	-11	- 7	25	40	-43	-44
1966	10	32	13	- 7	28	38	-43	-42
1967	-16	8	-17	-12	1	14	-45	-45
1968	- 4	6	-24	-19	8	12	-47	-47
1969	-16	- 8	-37	-33	- 2	1	-52	-52
1970	9	6	-33	-29	23	12	-46	-49
1971	13	14	-25	-23	29	23	-39	-43
1972	20	12	-34	-33	36	23	-47	-48
1973	-25	-32	-48	-39	-15	-15	-54	-54
1974	-15	-22	-47	-43	- 4	-13	-53	-52
1975	1	-13	-43	-39	19	- 3	-53	-51
1976	-17	-18	-39	-39	- 4	-10	-42	-46
1977	-15	-20	-28	-32	- 5	-17	-42	-44
1978	-19	-19	-22	-27	-14	-11	-36	-42
1979	-29	-24	-21	-26	-22	-18	-35	-41
1980	-24	-18	-18	-25	-13	-12	-29	-37
1981	-21	-14	-17	-23	-10	-10	-27	-37
1982	-19	-10	-14	-26	- 9	- 8	-24	-35

Source: Computation based on new assumptions specified in the text.

TABLE 6.16
CALORIE AND PROTEIN GAPS BY REGION - SENSITIVITY ANALYSIS III

(Percent)

	CALORIE				PROTEIN			
YEAR	NORTH	MIDDLEBELT	WEST	EAST	NORTH	MIDDLEBELT	WEST	EAST
1961	-13	16	-20	-16	2	21	-50	-53
1962	11	30	-16	-10	22	36	-46	-48
1963	15	34	-18	-12	28	37	-49	-48
1964	13	39	-14	- 9	30	42	-40	-42
1965	7	35	-11	- 7	25	40	-43	-44
1966	10	32	-13	- 7	28	38	-43	-42
1967	-16	8	-17	-12	1	14	-45	-45
1968	4	6	-24	-19	8	12	-47	-47
1969	-16	- 8	-27	-33	- 2	11	-52	-52
1970	9	6	-33	-29	23	12	-46	-49
1971	7	7	-32	-30	22	16	-46	-50
1972	13	5	-41	-40	29	16	-54	-55
1973	-32	-39	-55	-46	-22	-22	-61	-61
1974	-22	-29	-54	-50	-11	-20	-60	-59
1975	- 6	-20	-50	-46	11	-10	-60	-58
1976	-22	-23	-44	-44	- 9	-15	-47	-51
1977	-20	-25	-33	-37	-10	-22	-47	-49
1978	-24	-24	-27	-32	-19	-16	-41	-47
1979	-34	-29	-26	-31	-27	-23	-40	-46
1980	-29	-23	-23	-30	-18	-17	-34	-43
1981	-27	-20	-23	-29	-16	-15	-32	-43
1982	-25	-16	-20	-32	-15	-14	-30	-41

Source: Computation based on new assumptions specified in the text.

TABLE 6.17

CALORIE AND PROTEIN GAPS BY REGION - SENSITIVITY ANALYSIS IV

(Per cent)

		CALORIE			PROTEIN			
YEAR	NORTH	MIDDLEBELT	WEST	EAST	NORTH	MIDDLEBELT	WEST	EAST
1961	-13	16	-20	-16	2	21	-50	-53
1962	11	30	-16	-10	22	36	-46	-48
1963	15	34	-18	-12	28	37	-49	-48
1964	13	39	-14	- 9	30	42	-40	-42
1965	7	35	-11	- 7	25	40	-43	-44
1966	10	32	-13	- 7	28	38	-43	-42
1967	-16	8	-17	-12	1	14	-45	-45
1968	- 4	6	-24	-19	8	12	-47	-47
1969	-16	- 8	-27	-33	- 2	1	-52	-52
1970	- 9	6	-33	-29	23	12	-46	-49
1971	11	12	-27	-29	27	21	-41	-45
1972	18	10	-36	-35	34	21	-49	-50
1973	-27	-34	-50	-42	-17	-17	-56	-56
1974	-17	-24	-49	-45	- 6	-15	-55	-54
1975	- 1	-15	-45	-41	-16	- 5	-55	-53
1976	-18	-19	-40	-40	- 5	-11	-43	-47
1977	-16	-22	-30	-34	- 7	-19	-44	-46
1978	-20	-21	-24	-29	-16	-13	-38	-44
1979	-30	-26	-23	-28	-24	-20	-37	-43
1980	-25	-20	-20	-27	-15	-14	-31	-40
1981	-23	-17	-20	-26	-13	-12	-29	-40
1982	-21	-13	-17	-29	-12	-11	-27	-38

Source: Computation based on new assumptions specified in the text.

TABLE 6.18

FOOD DEMAND ESTIMATES BY REGION, 1961- 1982
(000 tonnes of grain equivalent)

YEAR	NORTH	MIDDLEBELT	WEST	EAST
1961	4994	3129	2479	2366
1962	5344	3315	2628	2515
1963	5620	3467	2753	2636
1964	5890	3616	2874	2756
1965	6202	3784	3010	2891
1966	6271	3838	3052	2929
1967	6043	3744	2972	2842
1968	6160	4002	3195	3048
1969	6969	4232	3370	3239
1970	7841	4669	3723	3602
1971	8262	4891	3904	3778
1972	8557	5051	4031	2902
1973	8852	5214	4166	4037
1974	9292	5444	4354	4221
1975	9545	5577	4468	4336
1976	9920	5785	4628	4497
1977	10268	5975	4781	4647
1978	10446	6082	4868	4730
1979	10834	6297	5042	4903
1980	11070	6425	5144	5002
1981	11291	6553	5248	5103
1982	11515	6684	5352	5203

Source: Derived from assumed demand equation specified in the text.

TABLE 6.19

FOOD GAPS - NORTH AND MIDDLEBELT, 1961-1982

(000 tonnes of grain equivalent)

	N O R T H				M I D D L E B E L T			
YEAR	SUPPLY	DEMAND	TOTAL GAP	PER CAPITA GAP (kg)	SUPPLY	DEMAND	TOTAL GAP	PER CAPITA GAP (kg)
1961	3885	4994	-1109	- 60	2677	3129	- 452	- 48
1962	5322	5344	- 22	- 1	3198	3315	- 117	- 12
1963	5704	5620	- 84	4	3371	3467	- 98	- 10
1964	5890	5890	0	0	3616	3616	0	0
1965	5583	6202	- 619	- 30	3576	3784	- 208	- 20
1966	5902	6271	- 369	- 18	3593	3838	- 245	- 23
1967	4537	6043	-1506	- 70	2980	3744	-764	- 69
1968	4922	6160	-1238	- 56	2766	4002	-1236	-109
1969	4823	6969	-2146	- 95	2710	4232	-1522	-131
1970	6604	7841	-1237	- 53	3327	4669	-1342	-113
1971	6422	8262	-1840	- 77	3588	4891	-1303	-107
1972	7198	8557	-1359	- 56	3462	5051	-1589	-127
1973	4545	8852	-4307	-172	2207	5214	-3007	-235
1974	5331	9292	-3961	-155	2402	5444	-3042	-232
1975	6466	9545	-3079	-118	2889	5577	-2688	-201
1976	5517	9920	-4403	-164	2844	5785	-2941	-213
1977	5796	10268	-4472	-161	2790	5975	-3185	-224
1978	5671	10446	-4775	-168	2972	6082	-3110	-213
1979	5154	10834	-5680	-194	2801	6297	-3496	-233
1980	5656	11070	-5414	-180	3121	6425	-3304	-215
1981	5765	11291	-5526	-179	3187	6553	-3366	-213
1982	5879	11515	-5636	-177	3253	6684	-3431	-210

Source: Derived from Tables 6.1, 6.2 and 6.10

TABLE 6.20

FOOD GAPS - WEST AND EAST, 1961 - 1982
(000 tonnes of grain equivalent)

	W E S T				E A S T			
YEAR	SUPPLY	DEMAND	TOTAL GAP	PER CAPITA GAP (kg)	SUPPLY	DEMAND	TOTAL GAP	PER CAPITA GAP (kg)
1961	2936	2479	457	35	2352	2366	- 14	- 1
1962	2786	2628	158	12	2626	2515	111	9
1963	2760	2753	7	1	2669	2636	33	3
1964	2874	2874	0	0	2756	2756	0	0
1965	3114	3010	104	7	2942	2891	51	4
1966	3151	3052	99	7	2999	2929	70	5
1967	3039	2972	67	4	2902	2842	60	4
1968	2681	3195	-514	- 33	2581	3048	- 467	- 34
1969	2534	3370	-836	- 52	2363	3239	- 876	- 62
1970	2846	3723	-877	- 53	2633	3602	- 969	- 67
1971	2929	3904	-975	- 58	2654	3778	-1124	- 75
1972	2721	4031	-1310	- 76	2444	3902	-1458	- 95
1973	2254	4166	-1912	-108	2190	4037	-1847	- 118
1974	2298	4354	-2056	-114	2190	4221	-2031	- 126
1975	2515	4468	-1953	-105	2407	4336	-1929	- 117
1976	2856	4628	-1772	- 93	2523	4497	-1974	- 116
1977	3325	4781	-1456	- 74	2953	4647	-1694	- 97
1978	3766	4868	-1102	- 55	3198	4730	-1532	- 85
1979	3936	5042	-1106	- 53	3293	4903	-1610	- 87
1980	4183	5144	- 961	- 45	3445	5002	-1557	- 82
1981	4268	5248	- 980	- 45	3511	5103	-1592	- 82
1982	4352	5248	- 896	- 40	3585	5203	-1618	- 80

Source: Derived from Tables 6.3, 6.4 and 6.10

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