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FOOD
POLICY
RESEARCH
INSTITUTE**

REPORT 1980

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IFPRI REPORT
1980

INTERNATIONAL FOOD POLICY RESEARCH INSTITUTE

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INTRODUCTION

This year the International Food Policy Research Institute (IFPRI) initiates a policy of including in its annual report a statement by the director describing major issues of food policy and how they relate to IFPRI's research program. This year's statement addresses three major dynamic factors that will affect food policy during the next few decades. These are: rising real food prices, the increasing instability of food supplies and prices in the international market, and growing trade in food commodities. These factors provide the direction for IFPRI's research and define the environment within which the policies suggested by the research must operate. They underline the sense of urgency associated with improving food production growth rates and the necessity of linking food production growth to increased employment and incomes of low-income people.

IFPRI has taken an integrated approach to its research, defining the major areas of concern as research thrusts. Although research activities are conducted through its administrative programs, the thrusts pull together elements from the projects within the programs. The four thrusts focus on overall food balances, food security, development strategy, and production policy.

The *national and international food imbalances* thrust examines the current world food supply and demand situation and how it is affected by population growth, rising incomes, production, and the effects of shifting commercial world trade. It attempts to identify how the imbalances are affected by policies of food production, consumption, trade, and foreign assistance.

The *food security* thrust deals with fluctuations in international and national food supplies and the impact these fluctuations have on the food intake and nutrition of the poor. IFPRI is attempting

to define short- and long-term policies to ensure secure, adequate, and stable food consumption in low-income countries.

The *development strategy* thrust considers the link between agricultural growth and a country's overall development. Policies are examined in light of how they can contribute to multiple goals of production growth, income distribution, and employment.

The *agricultural production policy* thrust defines the policies needed to accelerate agricultural production in the areas of research, inputs, infrastructure, and price incentives.

Research is also being conducted on a regional basis. The second phase of the Rice Policies in Southeast Asia Project was initiated during 1980. This project, which has been undertaken in conjunction with researchers in the International Rice Research Institute and the International Fertilizer Development Center, is examining policies that affect rice demand, supply, and trade in Indonesia, Malaysia, the Philippines, and Thailand.

Research is administered through four programs. During 1980 the Food Trends Analysis, Food Production and Development Strategy, Food Trade and Security, and Food Consumption and Nutrition Programs initiated, continued, and/or completed work on more than 35 projects. Results were reported in eight Research Reports and a new abstract series, *IFPRI Abstract*. Five abstracts, which summarize the results and highlight the policy implications of the Research Reports, were published.

In addition to the research efforts initiated at IFPRI, during the year members of the IFPRI staff were called upon by international agencies and national institutions to participate in the examination of specific agricultural development problems. Among others, researchers worked with the Food and Agriculture Organization of the United Nations (FAO), the United Nations Conference on Trade and Development (UNCTAD), the World

Bank, the Rockefeller Foundation, the United States Agency for International Development (USAID), the Inter-American Institute of Agricultural Sciences, and the governments of Mexico and Bangladesh. The activities in the areas of research and consultation are reported in the research program sections of this report.

In February of 1980 IFPRI held its annual Board of Trustees meeting for program review in New Delhi, India, initi-

ating a policy to hold all future program meetings of the Board in a Third World country and thereby using the opportunity to discuss the particular food needs of that country or region. IFPRI's research efforts continue to be directed at the objective of contributing to the reduction of hunger and malnutrition through the analysis of alternative national and international strategies for meeting world food needs, particularly in low-income countries.

FOOD TRENDS AND THE RESEARCH AGENDA

The global food situation will be unusually dynamic in the coming years. Powerful developmental forces are likely to substantially raise the real price of food. Those same forces will lead to extensive changes in the composition of diets and hence in production patterns. Measures taken by some nations to stabilize their food supplies will further destabilize international supplies and prices. And increased fluctuations in production are likely to result from more variable weather patterns than the unusually stable patterns of the past two decades. The relative wealth of countries is likely to shift, creating a more active agricultural trade environment, which may have repercussions on domestic food production and availability.

These forces will reduce the availability of food to the countries with the most laggard development and to the poor in all countries. Even more than in the past, policies are urgently needed that will improve the growth rates of production, increase the stability of food supplies, facilitate trade, and perhaps most of all, protect the disadvantaged from lack of food and nutritional deficiencies.

THE GROWTH OF DEMAND

A surge in demand for food will be driven by several sources, inducing global food prices to rise. First, some populous Third World countries are now experiencing rapid growth in per capita income. Second, political pressures for an increase in per capita food consumption are growing stronger in centrally planned economies. And third, although some of this rapid growth represents a shift of income from developed countries,

little or no decline in per capita food consumption can be expected in these countries.

Eight of the major oil-exporting Third World countries (Algeria, Indonesia, Iran, Iraq, Mexico, Nigeria, Saudi Arabia, and Venezuela) had an aggregate 1977 population of approximately 361 million people. A simple average of per capita income growth rates (1970-77) for these countries is 5.6 percent per year, and the average per capita income in 1977 was \$2,078. Food imports have risen in real terms an average of 19 percent a year. Even if real energy prices were to stabilize, an increasing proportion of income in the future is likely to be allocated to consumption; thus the demand for food will continue to increase. Expected growth in population and per capita income will lead to a rise in the real expenditure for food of more than 6 percent per year. Agricultural production has rarely achieved such a rate and, given the early stage of development of many of these countries, certainly will not do so in the near future.

Turning to the data for 12 selected rapid-growth Third World countries that are not major exporters of oil, it can be seen that their aggregate average growth rate of per capita income is also 5.6 percent for the period 1970-77. This represents an average income in 1977 of \$800 per year. The countries included are Brazil, Hong Kong, the Democratic People's Republic of Korea, the Republic of Korea, Malaysia, the Philippines, Singapore, Syria, Taiwan, Thailand, Tunisia, and Turkey. Taken together they had a 1977 population of 349 million people and an average population increase of 2.4 percent a year in the 1970-77 period. The demand for food rose by well over 5 percent per year. If these

growth rates continue, as is likely for at least the group aggregate, it will be difficult for production growth to keep pace. But given the dynamic nature of these countries, it is possible that some will do so. On the other hand, the historical record shows that developing countries experiencing rapid agricultural growth tend to increase their food imports. Productivity growth in these countries will in general be sufficient to sustain high growth rates despite the slow growth in their traditional OECD trade partners.

Thus an aggregate population of more than 710 million people in Third World countries will be experiencing growth in demand for food at rates rarely matched in the past by growth in food production. The resultant pressure to import is clearly presaged by the doubling of food imports, in real terms, by the developing countries from 1970 to 1977.

India, which also has a population of about 700 million, is not included here. India has probably developed the institutional basis to sustain a 3.5 percent growth rate in foodgrain production and overall growth rates in gross national product of about 6 percent. Planning failures, particularly for the growth of power and transport, account for the peculiar phenomenon of industrial growth rates that are only slightly higher than those of agricultural growth, whereas the norm is for industrial growth rates to be some three times higher than agricultural growth rates for countries at India's stage of development.

India's success in agriculture and unusually low growth in demand for food has resulted in a shift from being an importer of 4-6 million metric tons of foodgrains to being a slight exporter—a trade shift at present grain prices of about \$1 billion. However, India has moved from being a net exporter of vegetable oil to a \$1 billion-a-year importer. So even this story of relative success in agriculture has served more to shift the composition of agricultural imports than to eliminate them. Once India adopts policies designed

to accelerate industrial growth and employment, demand for food will rise sharply and be difficult to meet with domestic production alone. The precise effects on food imports will depend on complex price and trade policies and hence are difficult to predict. For rapid overall growth it would probably be better to return to importing foodgrains, even in a situation of rising real food prices, in addition to accelerating domestic grain production to sustain the growth of employment and the accompanying increased demand for food.

Particular note should be made of the growth in demand for livestock commodities in developing countries. Overall livestock consumption has been growing rapidly at 3.3 percent per year between 1961-65 and 1973-77. But consumption of poultry and pork has been growing even faster at 4.5 percent. Increments in these products are produced largely from concentrate feeds, which again places a drain on grain supplies.

The development strategy of the centrally planned economies has usually been to constrain food consumption below what would be expected in a market economy at the same level of income. The Soviet Union, however, now is clearly attempting to increase and stabilize the availability of livestock products. The result has been a major expansion of grain imports, a tendency that is likely to increase. Recent IFPRI research predicts that the Soviet Union will import 15-18 million metric tons of cereal grains annually during the next five years, and there is a 60 percent probability that the Soviets will import as much as 30 million metric tons in any given year. The Soviet Union is expected to maintain consumption even if production is highly unstable. These figures are based on a conservative estimate of 3 percent projected growth in livestock and livestock product consumption per year.

It may well be that recent sharp increases in food imports by the People's Republic of China can also be explained

by political pressures for an increase in food consumption, although occurring at an earlier development stage and at lower per capita income than in the Soviet Union. The U.S. Department of Agriculture expects net grain imports into the People's Republic of China to reach 15.5 million metric tons in 1980/81. They averaged 4.5 million metric tons from 1961 to 1977, then rose rapidly to 8.7 million metric tons in 1977/78 and to about 11 million metric tons in the following two years. Although oil exports from the People's Republic of China represent only about 1 percent of GNP, they do ease the foreign exchange situation, making it feasible to import grain if political conditions so demand. Political decisions to allow more rapid urban growth, to increase incomes in the countryside, and to increase worker incentives in nonagricultural sectors would all serve to encourage increased food imports, particularly if efforts to accelerate traditionally low growth rates in domestic food production fail to produce results in the near future.

The large increases in oil prices that are so important to the increase in demand for food in the major oil-exporting Third World countries retard or even depress income growth in the OECD countries. (For comparison, the OECD countries have an aggregate population of 758 million.) Some, such as Japan, may increase labor productivity and overall efficiency sufficiently to maintain significant growth in per capita income. But even in those high-income countries that are dealing with the problem less satisfactorily, food consumption responds so little to either high prices or stagnating income that food consumption growth rates are likely to be depressed only slightly.

Thus unprecedented growth in demand for food seems inevitable in the next few decades. That growth arises from the rapid increase in per capita income for extraordinarily large populations and at a stage in the development of countries in which population growth

rates are still rising rapidly and in which people tend to spend a large proportion of income increments on food. It is also a stage in which growth in agricultural production leads to increases in employment in other sectors, which in turn accelerates growth in demand for food. Again, note that the developing countries with the fastest growth of agricultural production have substantially increased their net food imports.

The United States met 44 percent of the expanded demand for world exports of cereals in the 1970s. It was able to do so because of the stocks and acreage reserves it had built up in the 1960s. Those reserves are now drawn down. Moreover, increases in yield could well be slowing because research for increasing production was reduced during the surplus years of the 1960s. As a partial offset, some Third World countries could increase their exports sharply. These include Argentina and perhaps Brazil (despite rapid growth in domestic demand).

FLUCTUATIONS IN FOOD SUPPLIES

Although food intake will gradually improve in many Third World countries, the rising real price of food will continually squeeze the poor, and increased fluctuations of food supplies and prices will exert extreme pressure on them in some years.

From the 1960s to the 1970s the fluctuations (coefficients of variation) in wheat and rice prices increased from 4 percent to 30 percent and from 13 to 40 percent, respectively. In addition, much of the increase in production, particularly in the Soviet Union, has been in areas where weather extremes cause frequent production fluctuations. Although the debate on whether the climate is changing is unresolved, it is clear that weather has been unusually consistent and favorable for the past few decades. At least one should not be surprised if climatic

fluctuations are somewhat greater in the future.

The People's Republic of China has recently shown indications of smoothing fluctuations in domestic supplies through imports. Historically, China has been a major stabilizing influence on world rice markets, exporting in years of relatively high prices and importing in low price years.

If the United States, the supplier of 39 percent of world grain exports during the 1970s, were to stabilize domestic food prices in a time of global shortage by embargoing exports, there would be a sharp upsurge in international prices. In response to the substantial increase in food price instability a number of countries—most notably the European Community—have successfully insulated themselves from domestic and global fluctuations in supplies. The effects on world markets have been exacerbated by reduced stockholding by major surplus producers, particularly the United States. As a result fluctuations in the remaining markets are magnified.

THE NEW DYNAMICS OF TRADE

Rapid increases in oil prices in some developing countries and in productivity in others have introduced a major new dynamic to the world food situation. On the one hand, foreign exchange requirements, particularly for fuel and to some extent fertilizers, have increased greatly. On the other hand, much income has been transferred to countries with elastic demand for food. Thus the incentive for trading food for fuel and fertilizer has increased greatly. These tendencies are reinforced by the Soviet Union's emergence as a major supplier of fertilizer at the same time that its demand for food imports is rising sharply.

It is attractive for low-wage developing countries to expand their production and

export of commodities that require labor-intensive cultivation such as livestock, fruits, and vegetables. Although increased employment will add to the purchasing power of low-income people, it will further tighten global grain supplies, as livestock feed is imported, land is diverted from cereals, and more grain is consumed by the newly employed.

If low-income countries become grain exporters themselves, it will adversely affect the poor in two ways. First, domestic grain prices will rise and thus the basic cost of subsistence will rise. Second, this increase in the cost of living will cause nominal wages to rise, making labor more expensive, and consequently employment opportunities will be reduced.

As the potential for expanding agricultural trade grows, domestic production decisions become more complex. The net food importers must make realistic judgments about which foods to import and what constitutes an optimal composition of imports and domestic production.

For the developing countries that are net food exporters, it may be more profitable to increase imports of certain agricultural commodities in order to allow exports of others to expand. It is urgent that domestic production allocations, including agricultural research emphases, be made in light of the increasing trade opportunities.

POPULATION GROWTH

Although income growth will be the major cause of rising food demand in the next decade, population growth will play an indirect role in forcing transfer payments and in interacting with other growth processes. (It will also enlarge the number of those who will experience a lack of real income.)

It is not accidental that food production growth in low-income countries usually keeps pace with population growth. In such countries population growth en-

larges the rural labor force and the capacity to produce food. If mounting pressure on land resources reduces labor productivity, per capita income declines, and per capita food consumption decreases by roughly the same amount. These effects may be reduced by working longer hours or by cutting back on production and consumption of nonfood goods and services.

Population growth may push more rural youth into urban areas, bringing about increased unemployment and depression of wage rates. The resulting national political pressures may then cause governments to provide transfer payments to lower-income people through food subsidy and distribution programs. Foreign assistance programs, motivated by concerns for equity or stability, may help to relieve the foreign exchange burden of consequent food imports. These programs, interacting with rapid population growth, may be important sources of growth in demand for food in the next decade in low-income countries still not experiencing rapid growth in productivity and income.

When an economy undergoes a transformation, with capital formation and technological change occurring rapidly in the nonagricultural sector, rapid population growth fuels that process. Consequently difficult-to-match growth in the demand for food takes place. Unless rapid technological change in agriculture accompanies it, the growth momentum will be difficult to sustain. If technological advances occur, the pressure on real food prices to rise is then the product of complex relations between the rate and nature of technological change in agriculture and the rate of growth in nonagricultural employment and income. Rapid application of modern high-yield agricultural technology will in itself restrain the rise in agricultural prices; large capital transfers, including higher oil revenues, will have the opposite effect.

There should, of course, be no misunderstanding about the deleterious eco-

nomie effects of rapid population growth simply because the effective demand for food keeps roughly in pace with supply or eventually encourages faster overall economic growth. Rapid population growth tends to decrease labor productivity in agriculture, reduce the pace of transformation of the economy from agricultural to nonagricultural, and hence discourage growth in per capita income, in food intake, and in nutritional status. Its burden falls on the poor, whose income is derived solely from labor.

LOOK FOR INCOME DISTRIBUTION

The burden of rising real prices of food and increased instability of supplies and prices falls largely on low-income people, especially in countries that are dependent on imports. The poor already spend the bulk of their income for an inadequate diet; they have few alternatives for reducing consumption. Thus for a given increase in grain prices in a low-income country, India for example, those who are in the lowest quintile on the income distribution scale reduce their grain consumption 10 times as much as those in the top 5 percent of the income distribution.

In the developing countries experiencing large increases in income, the impoverishing effect of rising food prices can be averted by expanding employment, accelerating domestic agricultural production, and allocating foreign exchange to food imports. Increased international financing and stocking may be important to these countries. For the portion of their populations that have still not benefited from the growth process, food and employment subsidies may be needed.

The problem is much more serious for those developing countries that have not yet experienced major increases in productivity or in the real prices of their export commodities. Countries where poverty is increasing and nutritional status

declining include the bulk of the nonoil-exporting countries of Sub-Saharan Africa. For these countries population has been growing faster than food consumption. Considerable shortfalls in domestic agricultural production growth have been made up by increasing imports that have already become difficult, perhaps impossible, to finance.

Since most of these countries are at an early stage of economic development and they are short of trained people, developmental institutions, and physical infrastructure, it is not likely that currently slow growth rates in agriculture can be greatly accelerated in the near future. Area expansion is slow and yields are increasing only one tenth as fast as in the more successful Asian countries. The long-term potential is great, but it will take complex research, education, input delivery, and policy analysis systems to achieve it. For now the relevant tasks are to lay the groundwork for future rapid growth and to find means of mitigating the short-run problems of declining real income and nutritional status of the poor. The international community will be under pressure to assist in these tasks.

IMPLICATIONS FOR DEVELOPMENT STRATEGY

The incentive to emphasize food production in development strategies will rise sharply over the next few decades, most obviously because of higher real food prices. But from a more sophisticated view, labor in the next decade will be relatively cheaper except when higher food prices occur. Thus increased food production raises income directly and relaxes a labor constraint more than in earlier periods.

The current plight of low-income people only serves to reinforce the need for expanded food supplies. Without increased food supplies, any effort to raise the incomes of the poor, whether through redistribution or employment, is cancelled

out by further increases in food prices. Because the principal means of increasing food production also raises labor productivity, there is both an opportunity and a need to increase employment in other sectors. The more food production is accelerated, the greater is the need and the opportunity to increase employment.

Thus, the appropriate development strategy for the coming decades will be to emphasize agricultural production more than ever before and to utilize the resulting increase in farm income to stimulate other sectors, thereby increasing employment, the incomes of low-income families, and hence their effective demand for food.

IFPRI'S RESEARCH PROGRAM

Research at the International Food Policy Research Institute is conditioned by this analysis and much of the foregoing data is drawn from recent IFPRI research. The details of the research effort are discussed in succeeding sections of this report.

To summarize briefly, a series of research projects are investigating the causes and geographic distribution of the food problems foreseen for the near future. The effect of rapid growth in consumption of livestock products is emphasized because of its influence on general food availability. The dynamic food situations in the Middle East and in the People's Republic of China are also being studied. These analyses will provide an improved diagnostic framework for the rest of IFPRI's programs.

IFPRI researchers are increasingly concerned about the potential for severe cyclical crises and continuing unrelenting deterioration in the nutritional status of low-income people in the face of rising real food prices. IFPRI's research on food consumption has two focuses. First, analysis is under way on the range of national policies that either directly through food subsidies and other inter-

ventions or indirectly through growth and commercialization affect income distribution and nutritional status. Second, IFPRI researchers are continuing to study international schemes for stabilizing food supplies and meeting emergency needs. These efforts will be even more important for the poor in coming decades than they were in the past.

Because of IFPRI's concern for the increasingly difficult food production problem, much research is concentrated on analysis of agricultural research resources, inputs such as fertilizer and irrigation, the effect of changing trade relations on the kinds of agricultural commodities produced, and price policy. In all this work participation of small farmers and the inclusion of poor resource areas receive attention, although it is clearly recognized that the bulk of improvement for the poor must be from other directions.

A substantial portion of IFPRI research deals with development strategy as it

relates to food policy and food availability. Although agriculture plays a dominant role in the economies of low-income countries, it still must compete for resources with other sectors. Thus solutions to rural poverty should be sought by examining the interactions of agriculture with other sectors, not by considering agriculture as an isolated entity. IFPRI's largest effort on development strategy therefore concerns linkages—how vigorous agricultural growth stimulates employment and growth in other areas.

IFPRI research reveals a wide range of options to policymakers. The pressures of conflicting objectives bring growing recognition by policymakers of the value of policy research if it is defined in terms relevant to their needs. Such recognition leads to increasing application of the Institute's work.

John W. Mellor

April 1981
Washington, D.C.

FOOD TRENDS ANALYSIS PROGRAM

The Food Trends Analysis Program conducts research to determine the size, composition, and dynamics of the food problem in the Third World both at present and in the future. It derives general indications of the possible extent and locations of serious food gaps in the coming decades from the analysis and projection of the historical trends of food production and consumption in the developing countries. The analysis of food trends forms the basis for research in IFPRI's other programs and highlights the problems that need to be addressed through national and international action.

FOOD GAP ANALYSIS FOR THIRD WORLD COUNTRIES

The core project of the Food Trends Analysis Program has been the periodic assessment of the current and future food situation in developing countries. The ongoing effort is the third assessment. The first, in 1976, analyzed and projected cereal production and consumption to 1985; the second expanded the analysis to include important noncereal food crops and viewed food gaps in 1990; and the present analysis, which includes livestock and poultry products, makes projections to 2000. The coverage of Third World countries has expanded from about 80 to more than 100 developing countries, including the People's Republic of China.

The present study, which primarily uses data from the Food and Agriculture Organization of the United Nations (FAO), examines the 1961-77 trends of food production, consumption, and trade in the developing countries and, using trend-based projections, develops a scenario of their food situation in the year 2000. In projecting future consumption, it uses United Nations population data and the historical series of income estimates developed by the World Bank.

The work on livestock and poultry products represents IFPRI's first attempt to analyze and project the production and consumption of these commodities for all developing countries. The analysis attempts to relate the growth of livestock and poultry production with the growth in the demand for animal feeds. With rapidly rising incomes in a number of Third World countries, the increasing use of major food crops, especially grains, as animal feed necessarily competes with their demand for direct human consumption by the poorer segment of the population in these countries.

In projecting livestock and poultry output, there was initial concern that the possible existence of livestock cycles in developing countries might disturb the estimation of long-term trends in livestock products from small sample historical time-series data. A method devised for calculating the trend equation with major cyclical influences removed gave findings leading to the tentative conclusion that, where cycles appear to exist, their effects on trend-based projections of ruminant meat output in developing countries for the period 1961-77 are generally minimal.

During 1980 data analysis was completed for 40 countries in Sub-Saharan Africa. Analysis of developing countries of Asia, North Africa/Middle East, and Latin America is still in progress. Preliminary findings for Sub-Saharan Africa indicate that production of major food crops between 1961 and 1977 expanded at an average rate of about 1.6 percent a year,

one percent slower than population. Specifically, output in the Sahelian countries remained practically unchanged during the 16-year period, and that of Nigeria increased at an annual trend rate of only 0.5 percent (see Figure 1). In addition, about 80 percent of the production growth of these crops came from increases in crop area and only 20 percent from improvements in output of area already under cultivation. Extreme weather variations in the 1961-77 period, especially in the Sahel, caused severe production fluctuations, which magnified the food problems in the region.

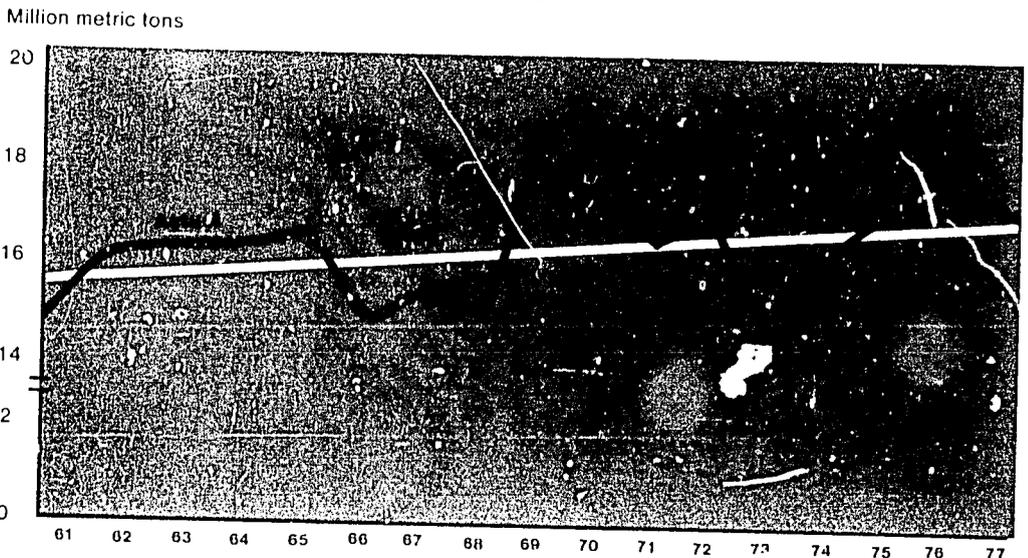
Meat, milk, and egg output in the region expanded at yearly rates of 2.3 percent, 1.5 percent, and 3.4 percent, respectively. Although livestock and poultry production generally increased during the period, the output of some specific commodities, such as ruminant meat in Ethiopia and cow milk in the Sahel, stagnated.

About 80 percent of the production of

major food crops in Sub-Saharan Africa is consumed directly as food. The share of production used for animal feeds is relatively small (about 2.5 percent during 1973-77). The analysis indicates that per capita consumption (domestic use) of major food crops generally declined for the region as a whole and significantly decreased in Ethiopia, Kenya, Nigeria, and the Sahel. Increases occurred in Ghana, Madagascar, and Senegal. Data on livestock products show that meat and milk consumption lagged behind population growth for the region as a whole. Rapid growth in consumption occurred for meat in Zimbabwe and Tanzania, for milk in Nigeria, and for eggs in Uganda, Kenya, Somalia, and Tanzania.

In the area of trade, the study found that Sub-Saharan Africa shifted from a position as a minor net exporter of mostly noncereal food crops in the early 1960s to that of a major net importer of mostly cereal food crops in the mid-1970s. Between 1973 and 1977, the region had

Figure 1
Major staple food crop production in Nigeria, 1961-77



Source: Leonardo A. Paulino and Patrick Yeung, "The Food Situation in Sub-Saharan Africa: A Preliminary Assessment," in "Food Policy Issues and Concerns in Sub-Saharan Africa," papers prepared by researchers at the International Food Policy Research Institute for preliminary discussion with colleagues in Ibadan, Nigeria, February 9-11, 1981.

Figure 2
Major food crop production and consumption in Sub-Saharan Africa, 1977 and 2000

Million metric tons
of cereal equivalent

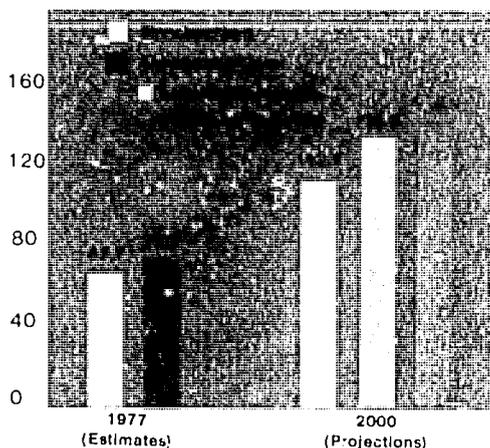
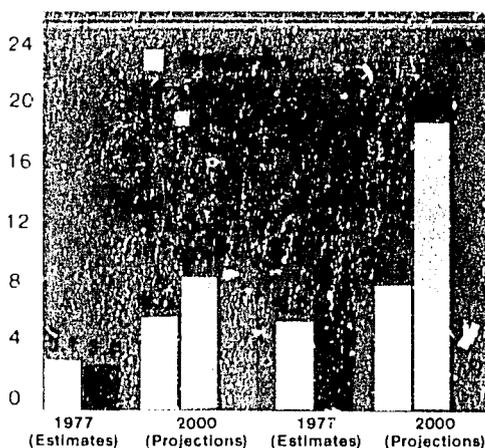


Figure 3
Livestock product production and consumption in Sub-Saharan Africa, 1977 and 2000

Tons



Source: Leonardo A. Paulino and Patrick Yeung, "The Food Situation in Sub-Saharan Africa: A Preliminary Assessment," in "Food Policy Issues and Concerns in Sub-Saharan Africa," papers prepared by researchers at the International Food Policy Research Institute for preliminary discussion with colleagues in Ibadan, Nigeria, February 9-11, 1981.

net food crop imports averaging 5 percent of its total domestic use of these commodities. Nigeria's very slow growth of food production combined with its fast growth in food consumption due to increases in income resulted in rapid growth of the country's food imports including cereal and livestock products.

The study indicates that by the year 2000 the region will have aggregate deficits of 36-40 million metric tons of major food crops, 10-15 million metric tons of milk, and 4-7 million metric tons of meat, for low and high growth rates of income (see Figures 2 and 3). Although aggregate deficits of 0.5-0.9 million metric tons of eggs are indicated for the region in that year, egg consumption will continue to be limited by local availability.

Assuming that food self-sufficiency in the region by the year 2000 is the long-

term goal, food production in Sub-Saharan Africa must expand much faster than it has. The "required" average annual growth rates of food output during the period 1977-2000 are 3-4 percent for the major food crops, 5-6 percent for meat and milk, and 6-7 percent for eggs.

DATA BASE IMPROVEMENT As a part of its continuing development of a sound data base for the food-gap analysis, the Food Trends Analysis Program completed a study in 1980 that examined the differences between the data on the major staple food crops that are published by the FAO and the United States Department of Agriculture (USDA). A *Comparative Study of FAO and USDA Data on Production, Area, and Trade of Major*

Food Staples, Research Report 19, by Leonardo A. Paulino and Shen Sheng Tseng, identifies the areas of divergence between the statistics of these two organizations and the possible causes of data differences. The report compares FAO and USDA estimates on the production, area, and trade of cereals and on the production of the major noncereal food crops for all countries and the aggregates for geographical regions, economic groups, and the world as a whole.

The study found that data divergences between the FAO and USDA statistical systems, which generally are both based on the same sources of country statistics, are in part due to the unequal number of countries reported by the systems, and the difference in the reference period used for their estimates. USDA reports on four fifths as many countries as FAO for the production and area of cereals, on two thirds to three fourths as many for cereal trade, and on half as many for the production of the major noncereal food crops (see Table 1). Differences in country numbers do not appear to contribute much to the divergences between FAO and USDA aggregates of cereal area, production, and trade. Regional aggregates of cereal production, for example, diverge largely because of the estimates of a few, mostly developing, countries. However, the uneven number of reported countries in the two systems clearly causes divergences between the aggregates for noncereals.

The FAO statistics refer to the calendar year from January to December, whereas those of USDA are generally oriented to the split-year period from July to June. Because most crop harvests in Northern Hemisphere countries occur between July and December, production and area data for these countries are reported under the same designated reference year and are in close agreement in the two systems. But for many countries in the Southern Hemisphere, the major crop harvests that occur after December result in a one-year lag be-

Table 1
Countries reported by FAO and USDA for food crop production and area and cereal trade, 1975

	FAO	USDA	Common
Crop production/area			
Cereals	161	124	114
Noncereals	180	92	91
Cereal trade			
Imports	188	126	119
Exports	145	110	93

Source: Leonardo A. Paulino and Shen Sheng Tseng, *A Comparative Study of FAO and USDA Data on Production, Area, and Trade of Major Food Staples*, Research Report 19 (Washington, D.C.: International Food Policy Research Institute, 1980), pp. 48-51.

tween FAO and USDA data on production and area. The difference between the FAO and USDA reference periods can be expected to contribute more to the observed discrepancies between their statistics on cereal trade which follow specific accounting periods. However, data divergences in cereal imports and exports may have to be attributed to other causes because the comparison of six-year averages, which should minimize discrepancies arising from this factor, gave results in the general magnitude of single year comparisons.

The study concludes that data divergences unexplained by these two factors can be traced in part to the difference in approaches and in the methods of collecting and handling country statistics by the two organizations. FAO assembles data reported by member governments and avails itself of unofficial sources when necessary; it generates preliminary estimates when national governments report inconsistent data or are unable to provide the needed information. USDA gathers country statistics through its ag-

ricultural attachés abroad, who use both official and unofficial sources; it assesses these statistics for reliability and historical consistency and revises them when deemed appropriate. Because most of the differences between FAO and USDA agricultural data are accounted for by developing countries with apparently weak data-collecting systems, it seems likely that the data changes and independent estimations being made by these agencies are a major source of these differences.

During 1980 the Food Trends Analysis Program continued its assembly and analysis of Chinese statistics in its efforts to expand its data base. Two research reports on the People's Republic of China were completed. *Food Production in the People's Republic of China*, Research Report 15, by Anthony M. Tang and Bruce Stone, contains two analyses. The first reviews China's development strategy and its relation to China's agricultural sector between 1952 and 1977. This work by Tang predicts that China's plans for food production and imports should provide the Chinese people with basic nutritional needs through the year 2000. The second analysis, by Bruce Stone, examines current Chinese agricultural policies and goals based on China's past agricultural record. Although it concludes that China will be able to attain its goal of 400 million metric tons of grain by 1985, such achievement will take an immense effort.

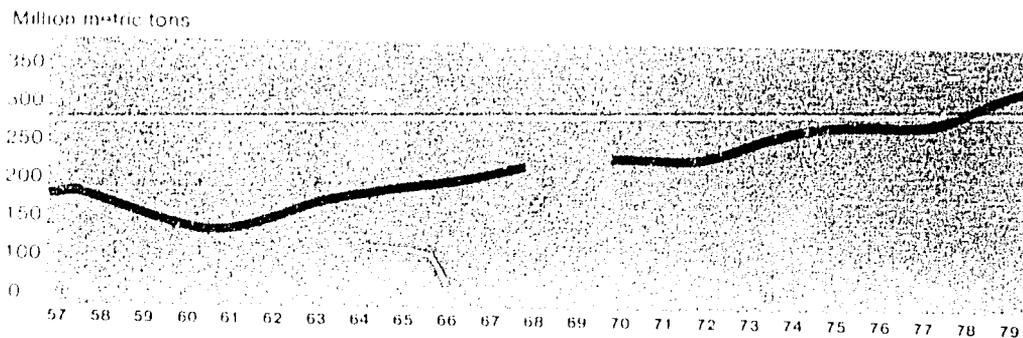
Supplementing the data made available from these studies, *A Review of Chinese Agricultural Statistics, 1949-1979*, Research Report 16, by Bruce Stone, presents a collection of statistics useful for understanding problems of foodgrain supply and demand in the country during the last 30 years. The *Review* is primarily concerned with national data from official government series, separate estimates, and unofficial attempts to reconstruct official series from various Chinese materials. It also includes discussions of discrepancies among series, general data quality, prob-

able future trends, and other issues of significance.

The systematic publication and dissemination of Chinese official statistics, which ceased in the late 1950s, resulted in the paucity of agricultural data for the 1960s and most of the 1970s. Consequently, research dealing with the agricultural economy of China during this period required the painstaking and time-consuming process of gleaming scraps of information and isolated figures from the Chinese press and radio, visitor and refugee reports, and data-lean government and academic publications. Publication of official data was resumed in June 1979 when the State Statistical Bureau presented a collection of production statistics for 1977 and 1978, followed months later with mid-year estimates for 1979. In the succeeding year, final production figures for 1979 were published together with comparisons of output for the years 1949, 1952, and 1978. The *Review* includes these and other current official statistics that were made available later.

The study assumed that Chinese official data, some of which needed adjustments for consistency, and series generated from official material can better reflect actual events than wholly independent estimates made outside the country. As indicated by the available statistics, foodgrain production in China expanded 1.8 percent a year in 1958-70 and 3.5 percent during 1970-79 (see Figure 4). After a rapid recovery of output during 1949-52 following the wartime decline, a production growth rate of 3.5 percent a year was achieved in 1952-57 based largely on traditional techniques and organizational changes. An output decline due to natural disasters and the poorly conceived and executed policies of the Great Leap Forward during 1958-60 was followed in 1961-67 by recovery and rapid growth centered in areas that adopted modern agriculture. China underwent another brief wave of decline and recovery in 1968-70, which lagged during the first phase of the Cultural

Figure 4
Foodgrain production in the People's Republic of China



Source: Bruce Stone, "China's 1985 Foodgrain Production Target: Issues and Prospects," in Anthony M. Tang and Bruce Stone, eds., *Production in the People's Republic of China*, Research Report 15 (Washington, D.C.: International Food Policy Research Institute, 1980), p. 88.

Note: This includes soybeans and tubers valued at one fifth of their natural weight.

Revolution. Periods of alternating stagnation and rapid expansion occurred between 1971 and 1976, arising from widespread adoption of modern agriculture accompanied by bad weather and by rural policy problems during the end of the second phase of the Cultural Revolution. From 1977 to 1979 China was in a period of transition, featuring auspicious policy changes, large increases in application of industrial inputs to agriculture, and rapid growth.

Based on the assembled data, the study also examines the changes in population, livestock, international grain trade levels, per capita foodgrain and total caloric consumption, cultivated area, multiple cropping, crop distribution and yields, fertilization, farm mechanization, crop pest and disease control, irrigation, rural electrification, and the rural terms of trade. The *Review* relates these to the changes of Chinese agricultural policy during the past three decades.

derived statistics drawn from data related to food policy that IFPRI has collected over the years. The compilation includes information on food production and consumption, agricultural production and trade, agricultural inputs, food aid, national expenditures for agriculture and agricultural research, and other food-related matters. These are being presented on a country basis and mostly in terms of relationships between variables and of their trends and other indicators of change. Currently a larger set of these derived data is being organized for internal use by the IFPRI research staff. A smaller compilation of the data will form the basis of a "facts book," which will be published as a service to the research community.

IFPRI continues to share its data library on food and agriculture with sister institutions within the CGIAR system. Requests have been answered for time-series and processed data on wheat, maize, and barley by the International Maize and Wheat Improvement Center (CIMMYT), on root crops by the International Potato Center (CIP), and on sorghum, millet, chickpeas, pigeonpeas, and groundnuts by the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT).

INTERNATIONAL
FOOD POLICY
RESEARCH
INSTITUTE
STATISTICS

Another project in progress is the organization of a set of

RESEARCH RESULTS

FOOD PRODUCTION AND DEVELOPMENT STRATEGY PROGRAM

Research priority and design in the Food Production and Development Strategy Program are based on three premises: the process of growth must be consciously guided to ensure maximum participation of the poor in its benefits; the forces governing agricultural growth are complex, interrelating agriculture with other sectors; and technological change is central to the process of acceleration in agricultural production. The program has moved progressively toward empirical research designed to generate conclusive evidence and to conceptualize policy issues. These conclusions are expected to influence the production policies of developing nations in direct and indirect ways.

Researchers in the production program have been working on 12 inter-related projects in 1980. These projects focus on policy issues in three broad areas: specific production policies, production strategies, and linkages between agriculture and the rest of the economy.

SPECIFIC PRODUCTION POLICIES

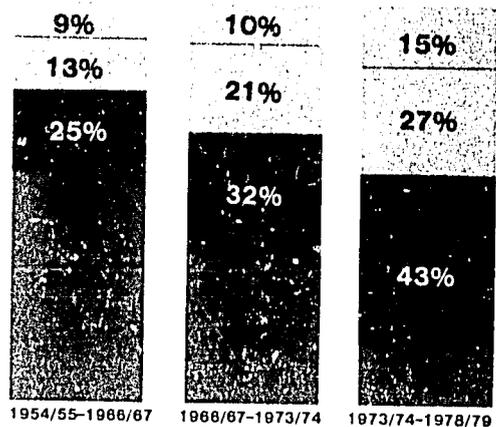
Research is being undertaken in four areas.

FERTILIZER

Research completed in the continuing project on fertilizer shows that although chemical fertilizer use began in the 1840s, over 90 percent of the growth in world fertilizer consumption has occurred since World War II, more than half since the

mid-1960s, and more than a quarter after the oil crisis of 1973/74. Between 1973/74 and 1978/79, the developing countries, which currently use only a quarter of the world's fertilizer, increased their consumption by 9 million metric tons—as much as the growth in the entire world's consumption in the first century of fertilizer use. In the five years after the oil crisis, developing countries accounted for more than 40 percent of the total increment in world fertilizer consumption (see Figure 5).

Figure 5
Share of total growth in world fertilizer use by country group



Country Group

- Developed Market Economies
- Centrally Planned Economies (Eastern Europe and USSR)
- Developing Market Economies
- Centrally Planned Economies (Asia)

Source: Estimates made by Guntant Desai from data in several FAO publications on fertilizer consumption.

A common element underlying the rapid growth in fertilizer consumption at different times and in several countries is the push from the supply side which often originated from events and variables exogenous to farmers' effective demand for this input. Expanded fertilizer supply accelerated growth in consumption not only through lowering fertilizer prices but also, and often more decisively, by exerting pressure for the development of systems for fertilizer promotion and distribution, agricultural research, extension, and credit.

Three major considerations underscore the importance of the supply side in generating sustained growth in fertilizer consumption of the developing world. They are substantial untapped potential for fertilizer use, the complementarity between yield-increasing technologies and high levels of fertilizer use in the developing countries, and the continued heavy dependence of developing countries on fertilizer imports. These considerations raise a number of policy questions about making increased fertilizer supplies available to the developing world, particularly because of the shifting locations of fertilizer surpluses from the developed market economies to the centrally planned economies of the U.S.S.R. and Eastern Europe.

In its second phase, the research on fertilizer is examining the complexities of interdependence among the essential elements in the process of growth in fertilizer use. This will make it possible to identify key policy areas and alternative policy instruments. Research has also begun on a detailed study of Nigeria.

IRRIGATION

Research on the impact of irrigation on rice production has been conducted as a part of the collaborative Rice Policy in Southeast Asia Project which is reported in the Regional Projects section.

AGRICULTURAL RESEARCH

Agricultural growth is likely to falter without a steady flow of tested technology. Effective institutions for agricultural research are the primary sources of new technology. Unfortunately, developing nations have frequently failed to appreciate the crucial role of agricultural research. Francis S. Idachaba's *Agricultural Research Policy in Nigeria*, Research Report 17, published in 1980, supports this conclusion. It points out that, although the agricultural sector is of major importance in Nigeria's national economy, allocations to agricultural research have been reduced drastically in the last 20 years. Idachaba suggests that the funding for agricultural research should be a joint federal and state responsibility and that new investments should be made in research on farm labor and mechanization. Furthermore, efforts should be made to integrate institutional and university research.

IFPRI will undertake a major project on agricultural research. The emphasis will be less on traditional cost-benefit analysis of research and more on the resource allocation mechanism for agricultural research, management of research resources, and manpower development for research. Analysis of national research systems will be the main focus of these investigations.

RISK MANAGEMENT POLICIES

When agricultural prices and yields are uncertain, the allocation of resources is often inefficient. Domestic food supplies and export earnings fluctuate. Government interventions in risky markets may be desirable to mitigate these effects, but not enough research has been conducted to provide sound guidance on the appropriate mix of intervention policies. As an initial effort in this area, IFPRI is developing and testing an analytical framework that could be used in evaluating risk management policies in collabo-

ration with researchers from other institutions. Particular attention is being given to price stabilization schemes and crop insurance programs.

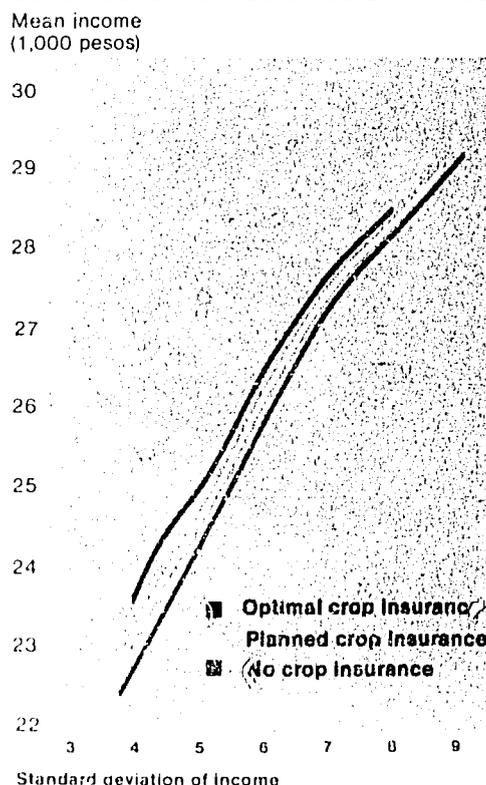
Research completed in 1980 indicates that the social gain from price stabilization may be large but the size of the gain is sensitive to market parameters. For example, if demand and supply elasticities are both 0.5 and the coefficient of variation of yields is 0.1, then for each \$200 transacted in the stabilized market (equivalent to about one ton of wheat), the maximum social gain from price stabilization ranges from \$3.36 when producers plan on the basis of average revenue forecasts to \$60.15 when producers expect last period's price. These gains increase to \$17.85 and \$166.78, respectively, when the coefficient of variation of yields is 0.25. Because the gains are consistently small when producers plan on the basis of average revenue forecasts, a program of data collection, appropriate forecasting, and information dissemination could encourage producers to act on the basis of more accurate predictions, thus achieving a large part of the gains of a buffer stock scheme. If producers consistently use the average revenue forecast, price stabilization is unlikely to return an attractive gain in social welfare unless the coefficient of variation of yields is exceptionally high.

Other research in this area has developed a method for evaluating price stabilization policies that takes into account the interactions between markets arising from interdependencies in the supply and demand of commodities. It also allows for adjustments in resource allocation patterns and changes in average supply, domestic prices, employment, and export earnings that result from the reduction in price risk confronted by producers. The method is illustrated by the evaluation of a hypothetical bean price stabilization scheme in Guatemala. The results suggest that the social welfare gain from such a scheme is likely to be modest but producers' incomes might be significantly increased (by about 2 percent). National

bean production might increase by 4 percent on average, whereas the domestic price would decline by about 14 percent.

Research also shows that the effectiveness of crop insurance depends on the level of development of other risk-sharing institutions (such as rural credit markets), on complementary government policies (such as price stabilization schemes), and on farmers' ability to insure themselves through savings or crop diversification or both. Experiments with a model of the temporal rainfed areas in Mexico showed that there are situations where crop insurance may be quite beneficial to farmers (see Figure 6). The converse is also true. An analysis of food

Figure 6
Levels of mean income and income risk with and without crop insurance schemes for rainfed areas of Mexico



Source: Peter B. R. Hazell, "Economic Considerations in the Design of Crop Insurance for Small Farms," International Food Policy Research Institute, Washington, D.C., 1980. (Mimeographed.)

crop insurance using an agricultural sector model of Guatemala suggests that the supply response effects of insurance can be significant and that social welfare might be increased through crop insurance. Therefore the main beneficiaries might be consumers; producers' incomes decline when the additional supplies of food are sold in the domestic market (because of inelastic demand). This result counters the argument that crop insurance should be left to the private sector; private insurance agencies have no means of capturing any of the gains when they accrue to consumers. This work was undertaken at the request of the Mexican government, which is attempting to design government risk-sharing schemes for farmers in temporal rainfed areas in an effort to boost national food production. IFPRI has also been asked by the Inter-American Institute of Agricultural Sciences to look into the feasibility of crop insurance schemes for small farmers in other Latin American countries.

PRODUCTION STRATEGIES

Determining the effects of various policy choices is crucial for many developing countries because of sharp conflicts in policy objectives and the need for the appropriate use of resources. A number of research projects in the production program are designed to explore the scope of this strategic adjustment in production policies. Also, researchers have participated in discussions on production-related issues outside of the Institute. At the request of the Bangladesh government, IFPRI was called upon to comment upon on the strategy and design of the agricultural sector of Bangladesh's Second Five-Year Plan. Participation has also occurred in country missions organized by multilateral donors. Missions to Bangladesh and Nepal under the initiative of the International Fund for Agricultural Development (IFAD) were concerned with production strategies in agriculture.

MULTIPLE CROPPING

In *Impact of Irrigation and Labor Availability on Multiple Cropping: A Case Study of India*, Research Report 20, Dharm Narain and Shyamal Roy examine the factors that contribute to multiple cropping from state to state and in areas within selected states and identify those factors most important for increasing cropping intensity.

Multiple cropping, the planting of successive crops on the same land in the same year, is assumed to depend on three factors: availability of labor per unit of sown area and extent and quality of irrigation. The pressure of population expansion produces the incentive to grow more food and also provides the labor needed. However, where rainfall is insufficient or the soil cannot retain moisture, irrigation is the most essential factor. Regression equations show that in 12 of 17 selected states these three factors account for 80 percent of variance in multiple cropping. Data on these variables appear in Table 2.

Widespread irrigation facilities are of little use if the source of water dries up in the postmonsoon season. Therefore the quality of irrigation explains 43 percent of the variance in multiple cropping, whereas the extent of irrigation explains only 8 percent. An attempt to determine the relative value of the various kinds of irrigation for multiple cropping shows that tubewells have the most positive effect—double that of dug wells and canal irrigation. A 1.0 percentage point increase in area irrigated by tubewells increased the cropping intensity index by 0.9 percentage points.

This report concludes that the amount of irrigation expansion called for in the Sixth Five-Year Plan (15 million hectares) would yield a 5-6 percentage point increase in cropping intensity or a 1 percent increase per year in gross cropped area. Even without an increase in the growth rate of productivity, this would lead to a 3.5 percent increase per year in agricultural production. If a larger portion

Table 2

Factors influencing multiple cropping in India by state, 1973/74

State	Crop-land Irrigated ^a	Average Crops/ha ^b	Cultivated Area Multiple Cropped ^c	Net Irrigated Area ^d
Andhra Pradesh	114	0.5	27	28
Assam	125	1.1	22	24
Bihar	129	1.0	21	28
Gujarat	108	0.4	13	14
Haryana	144	0.4	49	49
Himachal Pradesh	163	1.6	66	17
Jammu and Kashmir	133	1.2	20	44
Karnataka	106	0.4	18	12
Kerala	136	0.5	40	21
Madhya Pradesh	114	0.4	5	9
Maharashtra	106	0.4	20	8
Orissa	122	0.6	35	15
Punjab	146	0.4	55	72
Rajasthan	112	0.4	13	15
Tamil Nadu	129	0.8	31	46
Uttar Pradesh	134	0.9	17	42
West Bengal	121	0.7	4	24

Source: Dharm Narain and Shyamal Roy, *Impact of Irrigation and Labor Availability on Multiple Cropping: A Case Study of India*, Research Report 20 (Washington, D.C.: International Food Policy Research Institute, 1980), p. 27.

^a Gross cropped area as a percent of net sown area.

^b Cultivators per hectare.

^c Multiple cropped area irrigated more than once as a percent of net irrigated area.

^d Net irrigated area as a percent of net sown area.

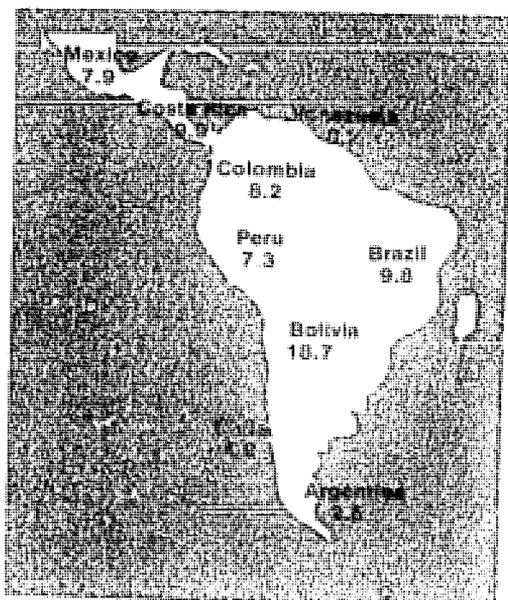
is irrigated by tubewells, the expansion of gross cropped area would probably be even greater. The resulting growth in productivity, especially if yield-increasing technologies are used on these newly irrigated areas, could put the targeted annual growth rate of 4 percent well within India's reach.

PUBLIC RESOURCE ALLOCATION TO AGRICULTURE

Allocation of public financial resources is generally used to accelerate agricultural growth. IFPRI's initial research effort in this area developed homogeneous expenditure series for governments of nine Latin American countries. A preliminary

paper has been prepared presenting the expenditure series and some conclusions. It shows that aggregate government expenditures for the agricultural sector have increased at an annual rate of 8 percent in the nine countries (see Figure 7 for the individual growth rates), but the expenditures varied greatly from country to country and from time to time. The government expenditure for the agricultural sector as a percentage of aggregate gross domestic product ranged from about 1 to 4 percent, and as a percentage of the value added in the agricultural sector ranged from 3 to 20 percent. The average share of agriculture in the total government budget was greater than 5 percent but was highly variable primarily because expenditure for agriculture fluctuated.

Figure 7
Annual average rates of growth of government expenditures on agriculture, 1950-78



Source: Victor J. Elias, *Government Expenditures on Agriculture in Latin America*, Research Report 23 (Washington, D.C.: International Food Policy Research Institute, 1981).

There was a high degree of association between the output-land ratio and the public input-land ratio in the countries under study. This is indicative of the effectiveness of public expenditure in improving agricultural productivity. But this requires further inquiry before arriving at firm conclusions.

PRICES AND INCENTIVE POLICIES

IFPRI is also studying price and incentive policies in West Africa, Southeast Asia, and Bangladesh. Work continued throughout 1980 on a project to examine whether technological change in West African agriculture could help resolve conflicts between the need for food and export crops. A first phase of this research dealt with the introduction of cultivation with oxen to Mali and Upper Volta, a new farming method in most of the savannah. Research indicates that animal traction

technology can boost overall farm productivity if used in conjunction with new seed-fertilizer technologies. But because of seasonal labor shortages and the lack of modern technology, the use of animal-driven mechanized equipment is unlikely to increase cereal output in these countries appreciably. A second phase of the project considers the price policy options for accelerating coarse grain production in West Africa, taking into account the technologies available to farmers, the elasticities of factor supplies, and farmers' response to income incentives.

The collaborative Rice Policy Project in Southeast Asia, discussed in the Regional Projects section, is considering price policies. A recently completed study on agricultural price policy in Bangladesh shows that formulation of agricultural price policies is an extremely complex task requiring identification and evaluation of the multiple effects of price changes on production and consumption activities as structured by specific conditions of a given country. Production response to prices of rice, measured as a supply elasticity, is estimated to vary from 0.18 to 0.26, reflecting almost equal effects from changes in area and yield. However, since the increase in rice area is realized mostly at the cost of jute, an export crop, it does not represent a net gain to the economy. A loss is evident in overall production and employment. Thus, a moderate change in relative prices in favor of jute is desirable. This can be done by withdrawing the export tax on raw jute or by keeping the price of rice down. The study emphasizes that the agricultural price policy should be used along with technological change. It is the balanced combination of prices, technology, and institutions that sustains production growth. Without appropriate technology and effective institutions, a unilateral push in prices of the main staple may actually accelerate the process of land transfer from small to large farms.

The outstanding impediment to maintaining a high foodgrain price is consider-



ity in agricultural output. Schemes designed to neutralize the adverse effects of instability, such as buffer stocks and crop insurance, are costly. IFPRI, therefore, is examining ways to encourage stability through production. Preliminary studies of data from Indian agriculture suggest that variability does in fact increase as agricultural production grows. However, the use of tubewell irrigation rather than other forms of irrigation to increase production tends to minimize fluctuations.

GROWTH

LINKAGES

Agricultural development strategies can strongly affect income and employment in the economy at large. However, the strength of their impact depends on the policies pursued. Therefore, an understanding of the mechanism of growth linkages and the identification of factors that determine the size of these effects is essential in formulating comprehensive production policies. Currently there are a number of research projects on this topic.

In 1979 IFPRI published *Intersectoral Factor Mobility and Agricultural Growth*, Research Report 6, by Yair Mundlak. It concluded that the major contribution of Japanese agriculture to the development of the economy was that of labor and not

of savings, as is generally believed. Mundlak received the annual "quality of research discovery" award of the American Agricultural Economics Association for this report and at present is extending the model to the economy of Argentina.

Two other projects adopt a microeconomic approach. One is tracing and evaluating the indirect impact on income and employment of the new agricultural technology in Punjab State and North Arcot District of Tamil Nadu State in India. The other project is measuring the impact of rural infrastructure on agricultural productivity, income, and employment in Bangladesh. This project also involves a collaborative effort by IFPRI researchers in the production, trade, and consumption programs and the Bangladesh Institute of Development Studies (BIDS) to evaluate the short- and long-term effects of the Bangladesh Food-for-Work program. Input of the production program is concerned with determining the impact of the Food-for-Work program on agricultural production.

Household survey data from Nigeria, Malaysia, and India are being analyzed to measure the linkage effects of household demand. Previous studies indicate that the major source of indirect growth in income and employment resulting from an initial investment in agriculture is the consumption expenditures of households.

FOOD CONSUMPTION AND NUTRITION PROGRAM

Research of the Consumption and Nutrition Program focuses on the effects of various public policies and programs on real incomes, food consumption, and nutrition of low-income households and individuals. In 1980 some studies considered the impact of price subsidy policies on food consumption of the poor, others emphasized the effects of technological change, and others the causes of malnutrition.

FOOD PRICE POLICY

The realization that general economic growth is unlikely in the short run to eliminate severe poverty and its associated nutritional problems is causing governments of many market-oriented economies to turn to short-run schemes for the transfer of real income to the poor. Furthermore, rising food prices caused by growing food gaps in some low-income countries could result in a worsening of the standard of living of the poor unless appropriate changes are made in food price policies. Although direct income transfers may not be politically palatable, transfers of goods such as food staples to fill basic needs may be acceptable. Governments are looking to policies and programs that make basic food staples more accessible to the poor. The costs, however, may be high, both in government outlays and actual resource costs. Efficiency is frequently low and leakage high.

Research that can be used in formulating and evaluating policies in this area is limited; there is a strong demand for additional work of this kind. The Food Consumption and Nutrition Program places high priority on such research. Its

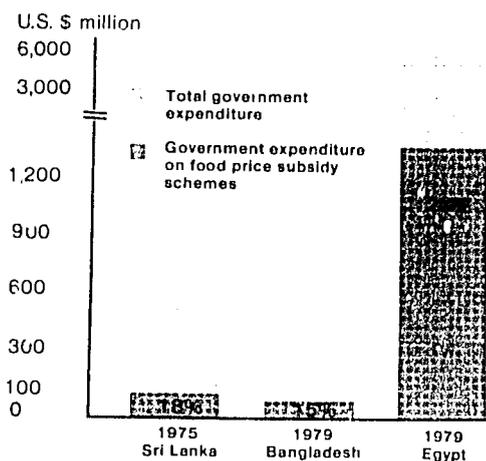
principal purpose is to generate new conceptual and empirical knowledge that can be used to improve the diets of the poor. Although carried out on selected national policies, the goal is to develop knowledge and test analytical methods that can be used beyond the particular study.

In 1980 studies were initiated on food price subsidies in Egypt, the Sudan, and Zambia. These are expected to complement the work completed in 1979 on public food distribution schemes in India, Bangladesh, and Sri Lanka. The government expenditures on the food subsidy schemes in three of these countries appear in Figure 8. The study of food subsidies in Egypt will estimate the impact of subsidies on real income, food consumption, and nutrition for various population groups, with emphasis on the poor. Effects on domestic food production, farm sector incomes, and incomes of the rural poor will also be estimated and fiscal and foreign exchange costs considered. The behavior of low-income households, their reaction to selected policy measures, and the impact of such measures on their real income, food consumption, and nutrition will be at the core of this research.

Another study will analyze the recent removal of wheat subsidies in the Sudan. Its purpose is to estimate how the removal of the subsidy affected real incomes and food consumption of the poor. As in the study for Egypt, emphasis will be on the generation of conceptual and empirical knowledge which, with similar studies elsewhere, may contribute to the general body of knowledge.

Consumer price subsidies take several forms. One kind commonly instituted in Africa involves a subsidy to consumers

Figure 8
Costs of food price subsidies in Sri Lanka, Bangladesh, and Egypt



Sources: Data from the International Monetary Fund; James D. Gavan and Indrani Sri Chandrasekera, *The Impact of Public Foodgrain Distribution on Food Consumption and Welfare in Sri Lanka*, Research Report 13 (Washington, D.C.: International Food Policy Research Institute, 1979); Raisuddin Ahmed, *Foodgrain Supply, Distribution, and Consumption Policies within a Dual Pricing Mechanism: A Case Study of Bangladesh*, Research Report 8 (Washington, D.C.: International Food Policy Research Institute, 1979); and Karima Koryem, "The Impact of the Elimination of Food Subsidy on the Cost of Living of the Urban Population in Egypt," paper presented to the International Labor Office, 1980.

of a local staple brought about by producer price control, government monopoly of domestic marketing, and subsidized marketing and selling of grain. Additional knowledge is needed on how the real-income effects of these subsidies are distributed among the population, and how they affect food consumption and nutrition. A collaborative study with Zambian institutions recently initiated attempts to improve the understanding of the differential impacts on welfare of such a policy. This study centers on how the food marketing boards and related producer policies, primarily for maize, affect real incomes, food consumption, and nutrition among low-income, food-producing households. The effectiveness of selected policy options will be compared in the light of the policy goals.

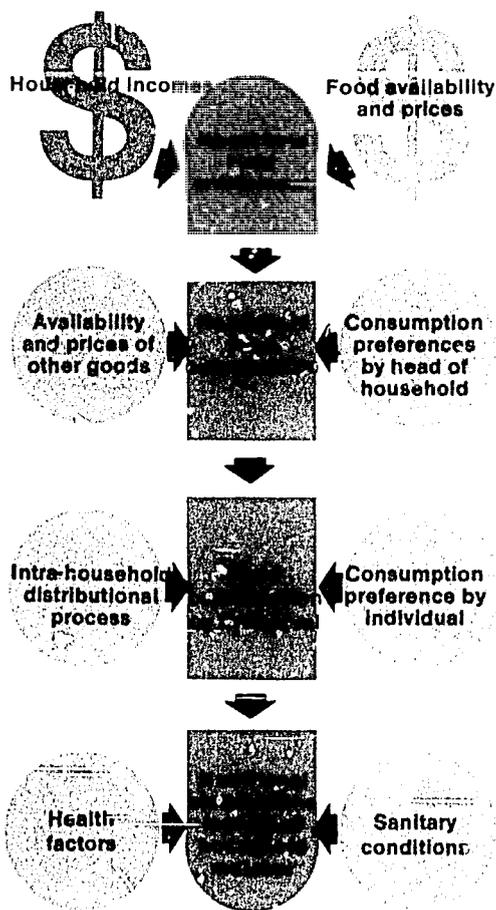
If food is available, for example from foreign aid, food-for-work projects may be effective in promoting development in rural areas with excess labor supply by improving the rural infrastructure and by expanding employment and incomes of the poor. They may also increase food consumption and improve nutrition among food-deficit households. However, the actual effects of food-for-work projects are not well documented. The efforts of the Food Consumption and Nutrition Program in the Bangladesh Food-for-Work project will assess changes in employment, income, and nutrition of the population affected by the project; examine the change in agricultural productivity in the area; and compare nutritional improvements obtained through the project with possible improvements from alternative policies.

EFFECTS OF TECHNOLOGICAL CHANGE AND RELATED PROJECTS AND POLICIES

Although alleviating short-run problems of severe poverty and malnutrition requires market intervention programs and policies such as those mentioned above, an effective, self-sustaining solution can be attained only through a development strategy that considers growth as well as equity. In food and agriculture this strategy depends heavily on technological advances to boost food production and public policies to encourage the spread of technological change and assure the desired effects on the poor.

There are a number of interacting factors that affect food consumption and nutrition (see Figure 9). Although considerable research has been done on the effects of technological change on income and asset distribution in the rural sector, very little is known about its effects on the food consumption and nutrition of

Figure 9
Factors influencing food consumption and nutrition



Source: Per Pinstrup-Andersen, "Policy Options for Short-Run Expansions of Food Consumption Among Deficit Households in Sub-Saharan Africa," in "Food Policy Issues and Concerns in Sub-Saharan Africa," papers prepared by researchers at the International Food Policy Research Institute for preliminary discussion with colleagues in Ibadan, Nigeria, February 9-11, 1981. (Mimeographed.)

low-income urban and rural households. Additional knowledge on this topic is likely to be useful in formulating public policy and agricultural research priorities. Analyses in the Food Consumption and Nutrition Program, begun in 1980 are developing ways to assess the effects of selected technological changes in agriculture on the amount of food consumed

and the presence of energy-protein deficiencies among the people of regions in Malaysia and Nigeria. A study of dairy development projects in India may be initiated in 1981.

In related efforts the staff of the Food Consumption and Distribution Program worked with FAO and the World Bank during the year on the development of methods for incorporating considerations about nutrition into agricultural projects.

CAUSES OF MALNUTRITION Increasing food consumption and eliminating malnutrition by raising real incomes is a central concern of consumption-oriented policy analyses. However, there are several basic issues involved in the allocation of household income and its resulting effects on nutrition that require further analysis. These issues concern how available food is allocated among the members of a family, thus determining the nutrition of each member. It also concerns how food is acquired, and how family income is used. Based on evidence from household surveys, a study is under way to examine the influence on nutrition of sources of income, their characteristics, and the energy expenditure required for the work; control of incomes and budget allocation within the household; and increments in food availability at the aggregate and household levels.

Understanding how these factors can cause malnutrition should provide a better basis for analysis of consumption and nutritional effects of food subsidies, distribution, and production-oriented policies.

Preliminary results from evidence obtained in various African countries suggest that in this region there may be a close association between domestic food availability, production systems, and nutrition. Possible effects of malnutrition and seasonal food shortages on labor supply will be analyzed. In addition, the relationship between nutritional status and adoption of improved technological practices will be explored further.

FOOD TRADE AND SECURITY PROGRAM

The aim of research conducted in the Food Trade and Security Program is to evaluate the short- and long-run effects of trade and aid policies on food consumption and on the incentives for agricultural production growth in the developing countries.

IFPRI's research priorities in trade policy stem from two premises. First, the conditions developing countries face in world markets largely determine the options open to them in formulating their domestic strategies. Second, developing countries' trade policies cannot be separated from their more general food consumption and agricultural production strategies.

The Food Trade and Security Program evaluates possible future international developments and the scope for global cooperation and analyzes national trade policies with special reference to food supply strategies of developing countries.

INTERNATIONAL POLICY ISSUES

A pressing issue facing many developing countries today is the choice between the desire to be more self-sufficient and the need to provide adequate and stable food supplies at a relatively low social cost. One external factor influencing the choice is the instability and uncertainty of supplies in world markets. Developing countries have two distinct food supply problems. The major one is the large and growing long-term deficits in domestic food supply. The second problem, referred to as food

insecurity, is the inability to meet immediate consumption level targets.

Every developing country can take important initiatives to reduce food insecurity. The remedies will include larger investment in food distribution systems, transportation, communications, and early warning systems; clearly delineated production incentives; and the appropriate mix of stock and trade policies. Except for the very large importing countries, past research indicates that heavy reliance on domestic grain reserves beyond those required as "working" stocks can be costly when trade is possible as an alternative.

International initiatives such as financial and world price stabilization schemes reduce the costs to developing countries associated with reducing food insecurity. They do not, however, solve the food supply problem. For example, lower price instability in world markets would reduce the "optimal" carryover stock levels in most developing countries. Similarly, access to food and external financial insurance such as that provided by a food financial facility would substantially reduce the need for grain reserves in developing countries and thus would provide consequent savings in interest and storage costs.

In order to provide more food security, the performance of the food-trade system needs to be improved in two ways. First, world market prices must be made more stable. This would influence the ability of developing countries to pursue more trade-oriented policies and diminish the disruptive impact of sudden changes in import prices. Second, there needs to be a system allowing individual developing countries to purchase grain on world

markets when their own production is deficient. This requires that imports be available and affordable.

Research on international issues in the Food Trade and Security Program has been centered on an assessment of the relative merits of different initiatives, which include a food financial facility, an international wheat agreement, trade reform, and food aid.

FOOD FINANCIAL FACILITY

Recently attention has been given to initiatives that address the foreign exchange problems of food-deficit, developing countries, which are derived from the variability of food import costs resulting from unanticipated domestic production shortfalls and fluctuations in world food prices and export revenues. One such initiative is a food financial facility, which is designed to protect countries against fluctuations in the cost of food imports by providing foreign exchange in years when food imports exceed the trend. Fluctuations in export revenues and prices of nonfood imports, which affect the capacity of developing countries to import food, must also be considered.

An ongoing project on the feasibility of financial arrangements for food security is examining the potential benefits, costs, and feasibility of an intergovernmental initiative on a financial facility for food imports.

In an effort to provide a quantitative assessment of the approximate magnitude of the total borrowing capacity under such a financial facility, part of the project involves estimating the financial resources required to compensate for imports above the trend during the 1965-75 period. The estimated financial resources for this hypothetical situation that would have been required to compensate for the extra observed food import bill (above trend, independent of fluctuations in export earnings) were approximately \$1 billion per year for 67 developing countries. If a food consumption stabilization rule were used instead, the average an-

nual financial resources required would be approximately \$2 billion. If, on the other hand, the country coverage were reduced to the 34 most seriously affected countries only, these figures are reduced by approximately half.

Alternatively, if the financial requirements to finance food imports are adjusted for the variability in, and correlation with, export earnings, the results indicate that during the 1965-75 period the net increment necessary to compensate for the actual value of food imports would have been only \$253 million annually, or approximately \$1.1 billion per year if a consumption stabilization rule were used. These results suggest the considerable sensitivity of the magnitude of the overall financial flows required to stabilize food consumption according to country coverage, the type of consumption stabilization rule followed, and the adjustment made for changes in the overall balance of trade. Moreover, the results suggest that the low-income countries, in particular, would benefit from such a facility.

WORLD MARKET INSTABILITY: WHEAT AND RICE

The performance of the world's agricultural economy must be judged ultimately by the extent to which production increases can meet the needs of a growing population and by the demand for steady improvements in diets. Government agricultural policies all impinge upon the achievement of these objectives. Many such policies encourage appropriate investment decisions and reduce uncertainty about agricultural production. Other policies offset these favorable effects by causing investment funds to be misdirected or by increasing market uncertainty. The charge is often made that developed-country policies, by promoting the production of high-cost foodstuffs in industrial countries and exacerbating the instability of world markets, make it difficult for LDCs to evolve their own food policies.

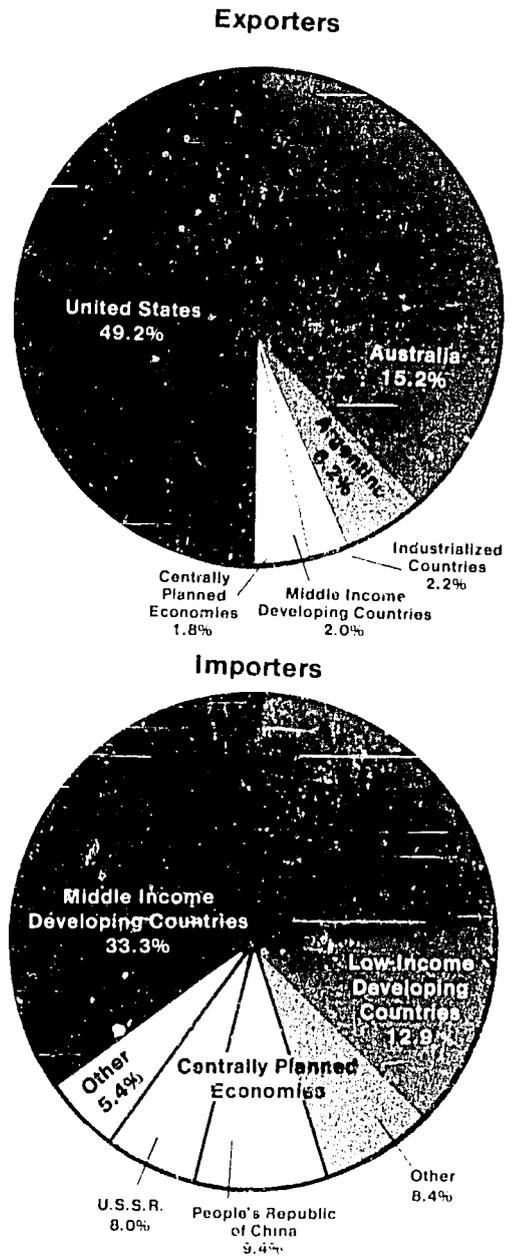
Developed-Country Agricultural Policies and Developing-Country Supplies: The Case of Wheat, Research Report 14, by Timothy Josling, examines the impact of the agricultural price policies pursued by a group of developed countries on the price and availability of wheat sold to developing countries. The study identifies those aspects of these policies that have particular significance for other countries and for food-importing developing countries and estimates the magnitude of this impact in recent years.

It argues that domestic policies designed to protect consumers and producers in developed countries shift the burden of short-run adjustments in the world market to the poor in other countries. In general, whenever stock adjustments do not equal the suppressed change in production and consumption, the country concerned exacerbates international market instability.

The group of developed countries selected for the study were those likely to have the most influence on the world grain trade: Australia, Canada, the European Community, Japan, the United States, and the Soviet Union. The role of the Soviet Union in the wheat market cannot be underestimated; during the 1970s Soviet wheat consumption exceeded the combined total consumption of all the other countries listed above. Figure 10 shows the influence on the world wheat market of the major wheat traders.

The study presents the effects of price policies on net trade (called the trade-volume effect) and availability during the 1970s. Results indicate that during the first half of the decade, stocks were released into markets as a way of exporting overproduction, and were accumulated when consumption was higher and production lower than would have been the case under freer markets. This is contrary to what is required for world price stability. For example between 1972/73 and 1973/74, a time when developing-country production was down, the net trade-

Figure 10
The average shares of the major exporters and importers in the world wheat market, 1976-78



Sources: Food and Agriculture Organization of the United Nations, "Production Yearbook Tape, 1978," Rome, 1979. The countries are classified as the International Monetary Fund classifies them in *International Financial Statistics*.

volume effect was -36 million metric tons; this "squeeze" on the market was clearly a major reason why the export price increased 70 percent over the year.

Sharing the burden of maintaining stocks as a contribution to stability is a point of contention. Canada, for instance, contributed 1.21 million metric tons to stability, whereas the contribution of the European Community was negative (-1.04 million metric tons). Although it may not matter to the developing countries which developed countries contribute to stability, if Europe's domestic policy continues to have a destabilizing influence on the world wheat market, Canada and the United States could adopt more aggressive policies to the detriment of developing countries. Because burden-sharing is necessary to any international effort to improve market stability, the differences in country reactions to world price changes give a rational and political basis for apportioning the costs of stability schemes. It is only reasonable that countries should offset the effects of their domestic price policies by more flexible stock management.

In *The Economics of the International Stockholding of Wheat*, Research Report 18, by Daniel T. Morrow, the behavior of the world wheat economy since 1960 is examined and predictions for stockholding in the near future are drawn from this analysis. The pros, cons, and possible parameters of an international stockholding agreement are also considered.

The report outlines the theory of economically optimal stockholding in a market without government intervention and then shows how government policies cause stockholding patterns to change. In comparing theory with the actual history of stockholding since 1960 it can be seen that major exporters held more stocks than was financially profitable in the 1960s to support domestic farm prices. These larger stocks helped to stabilize world prices.

In the 1970s, however, exporters turned to production controls and direct pay-

ments to support farm prices, which reduced stock levels. At the same time, the Soviets bought more grain on world markets to expand their livestock supplies, and importers, fearing export controls, sought to expand their stocks. These unforeseen demands caused world stocks to be reduced. Stockholding was larger than expected when supplies were short, and world prices fluctuated considerably.

The stocks increased in 1975/76, but this probably does not indicate a return to the policies of the 1960s. Morrow predicts stockholding in the near future will be slightly larger than is financially profitable when supplies are large and much larger when supplies are short. Unexpected policy decisions can, of course, cause deviations from this pattern.

The justification for the cost of maintaining international stocks of wheat beyond profitable levels is based on the premise that developing countries benefit when world prices are more stable. But even if a new Wheat Trade Convention were to succeed in reducing world price instability, it would not eliminate the need to cope with a highly unstable food import bill. A country's production fluctuations have a major influence on the variability in its food import bill. Thus a financial facility to help developing countries finance food imports when requirements are unusually high appears to be necessary.

Another research project completed during 1980 projects Soviet grain imports from 1980 to 1985 using three methods. Results indicate that Soviet wheat imports may average from 15.4-17.7 million metric tons annually in the 1980-85 period. Because these imports can severely affect world supply, they must be planned for if Third World countries that need to import grain are not to suffer.

Research conducted on issues pertaining to rice indicate that the world rice market is vastly different from the wheat market. Countries that are major rice consumers, located almost entirely in monsoon Asia, are also the major pro-

ducers. Consequently, very little rice is traded between countries. Of a total of 250 million metric tons of rice produced in the late 1970s, only 12.5 million metric tons, or about 5 percent, crossed national frontiers. Because the volume traded is so low, one would expect that a large amount of rice would be stored within countries to be used in stabilizing domestic prices. But at least until 1975, few importing countries stored rice extensively. Most relied instead on import adjustments. Exporting countries, including the United States, also store small quantities of rice (8 percent of total production compared to 16 percent for wheat, according to the U.S. Department of Agriculture). All these factors combine for greater price instability in the world rice market than in the wheat market.

The direction of trade in the rice market is also unstable. Importing countries are highly self-sufficient, relying on trade volume adjustment to cope with production shortfalls. Countries abruptly enter the world rice market and leave it just as abruptly. Some countries enter as importers and then become exporters; others move in the opposite direction. Without a central market or a central exchange, it is much more difficult for countries to participate in world rice trade than in wheat trade. Current research is trying to trace the source of the instability adjustment mechanisms in this market and to define ways of coping with that instability. Two exporting countries, the United States and the People's Republic of China, and the non-Asian rice importers appear to play crucial roles in somewhat allaying instability.

During 1980 IFPRI was invited to participate in discussions initiated by UNCTAD on these and other issues associated with instability in food trade and its effect on food security in developing countries.

TRADE REFORM

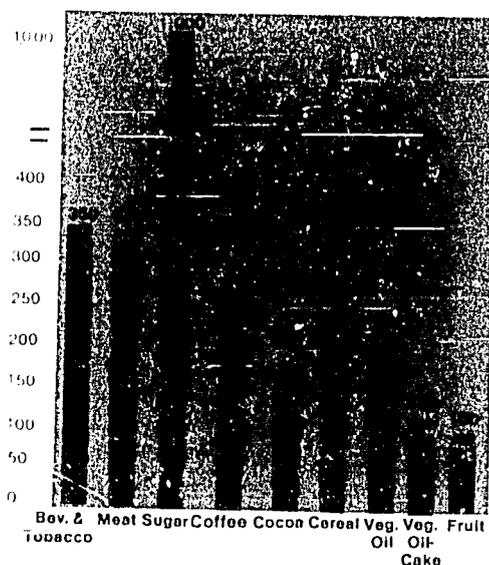
Research in the Trade Program during 1980 was also concerned with the agri-

cultural export potential of trade liberalization in the OECD countries. *Agricultural Protection in OECD Countries: Its Cost to Less-Developed Countries*, Research Report 21, by Alberto Valdés and Joachim Zietz, assesses the export earnings and real income gains of selected developing countries if trade barriers for 99 agricultural commodities were reduced by 50 percent.

It concludes that such a reduction would increase world trade by \$8.5 billion a year (in 1977 prices, using 1975-77 as a base). This would result in an increase in export revenues of approximately \$3 billion a year and an increase in real income of approximately \$1 billion a year for the 56 developing countries analyzed in the study. About \$1.8 billion would accrue to OECD exporters.

Figure 11
Potential increase in developing countries' export earnings from trade liberalization, by commodity group

U.S. \$ million
1977 prices



Source: Alberto Valdés and Joachim Zietz, *Agricultural Protection in OECD Countries: Its Cost to Less-Developed Countries*, Research Report 21 (Washington, D.C.: International Food Policy Research Institute, 1980).

Of the commodities analyzed, raw sugar, refined sugar, and beef and veal would net the greatest gains for the exporters. When the commodities are viewed according to the groups commonly used in international trade negotiations, the sugar and wheat groups capture about 47 percent of the total increase in export revenues in the developing countries (see Figure 11). The large export-oriented developing countries such as Brazil, Argentina, and India would benefit the most from such liberalization. However, middle-income countries and a number of low-income, developing countries would also benefit.

FOOD AID

During the past two decades the absolute level of food aid has declined only slightly. However, because developing countries are now importing substantially more grain on a commercial basis, food aid has dropped sharply as a proportion of total cereal imports. Further, as Table 3 indicates, there has been a striking shift in the country distribution of food aid flows.

IFPRI's current research on food aid attempts to look behind these trends to assess the probable roles of commercial imports and food aid for meeting effective demand in developing countries during the coming decade.

Economic growth prospects are good for most Latin American and Asian countries that were formerly large food aid recipients. In Latin America, Brazil, Chile, Colombia, Mexico and Peru are examples of countries which have substantially increased their cereal imports but depend on food aid only in small amounts to finance special feeding programs in low-income regions of their countries. The smaller countries of Central and South America are more nearly self-sufficient, though at relatively low levels of consumption, and food aid for special feeding programs and emergency relief represents a fairly stable but small proportion of their modest cereal imports.

In Asia the drive to self-sufficiency has virtually eliminated India's import requirement. Except for Bangladesh, Indonesia, and Sri Lanka, most other large importers have greatly reduced their reliance on food aid as a proportion of total imports. Smaller Asian countries import very little, and food aid flows to them are only for emergencies and are negligible in amount. If improvements in agricultural production performance and overall economic growth persist, the trend toward higher commercial import levels and phasing out food aid should continue.

The picture in North Africa and the Middle East is less clear. All of the Maghreb countries of North Africa, plus Iran, Iraq, and Saudi Arabia have substantially increased their commercial purchases of foodgrains to the point that they now rank among the leading importers of the world and depend very little, if at all, on food aid. However, except for oil exporters, the economic base upon which these countries are building is still quite fragile, and economic development plans emphasize improving agricultural production performance and reducing the rate of long-term cereal import growth. Even Egypt, which is very dependent on food aid, has quadrupled total cereal imports since 1961 and now commercially finances two thirds of its cereal imports. Other Middle Eastern countries have increased their total levels of cereal imports while maintaining food aid at fairly stable levels. Only Turkey, once a large importer and food aid user, has followed India's route and is now virtually self-sufficient in wheat, its most important foodgrain.

Domestic production and import requirements in this region are highly variable, and food aid flows do vary from year to year. For some of these countries, food aid dependence is high, and the prospects are not good for any immediate improvements in their capacities to be self-reliant in basic foodgrains. Others have been successful in their efforts to improve domestic production performance. Over the longer-run the Sudan,

Table 3
Total cereals imports and the proportion received as food aid by selected developing countries, 1961 and 1978

Country	1961 (1,000 metric tons)	1961 (percent)	1978 (1,000 metric tons)	1978 (percent)
Sub-Saharan Africa				
Nigeria	1,221	1	2,044	0
Others	1,378	8	3,898	13
Asia				
Bangladesh	n.a.	n.a.	1,646	59
China	4,891	0	12,640	0
Hong Kong	607	4	805	0
India	3,956	98	396	23
Indonesia	1,216	10	2,731	23
Korea, DPR	480	0	406	0
Korea, Rep. of	533	100	3,647	16
Malaysia	696	...	1,513	0
Pakistan	1,086	100	1,053	24
Philippines	547	1	797	4
Singapore	569	1	997	0
Sri Lanka	712	16	1,146	27
Viet Nam	94	n.a.	1,676	n.a.
Others	316	10	494	4
Latin America				
Brazil	1,936	51	5,722	...
Chile	128	58	1,222	1
Colombia	262	50	529	1
Cuba	549	1	1,844	0
Mexico	99	23	2,853	0
Peru	470	24	984	4
Venezuela	406	0	1,413	0
Others	961	11	2,598	10
North Africa/ Middle East				
Algeria	587	2	2,850	...
Egypt	1,373	82	5,954	35
Iran	214	100	3,048	0
Iraq	484	8	1,707	0
Lebanon	296	21	596	14
Libya	140	56	650	0
Morocco	589	23	1,689	9
Saudi Arabia	179	3	1,378	0
Syria	329	100	413	10
Tunisia	485	44	793	18
Turkey	877	58	37	0
Others	730	25	2,547	10
Total	29,369	33	74,716	9

Sources: Food and Agriculture Organization of the United Nations, "Trade Yearbook Tape," Rome, various years; International Food Policy Research Institute, "Food Aid Data Base," Washington, D.C., 1980. These sources show countries that imported more than 300,000 tons in 1961 or more than 500,000 tons in 1978.

Note: n.a. means not available.

^a The food aid shares in 1978 are underestimated by the amount distributed by the World Food Programme and not counted as part of bilateral food aid contributions. Minor bilateral food donations are also excluded. This underestimation primarily affects the flows to "other" countries in each region.

now a reasonably large importer, could become a grain supplier for the region.

The food needs of Sub-Saharan Africa have received considerable attention because of the negative effects of drought and civil disturbance on consumption in a number of countries. Most African countries are importing more to offset declines in domestic production as well as to meet growing demand. Their capacity to sustain such increases in imports without commensurate economic growth is questionable. Food aid has been used as a temporary solution, although the increase in food aid's share of total imports has not been as striking as reports of need might indicate. Continued utilization of food aid in combination with domestic measures to achieve steady growth in staple crop production can be expected in the near future.

The work of the Food Trade and Security Program on food aid issues during 1980 also included research on food aid entitlements and national self-reliance for the World Food Council.

DEVELOPING COUNTRY TRADE POLICY ISSUES

Ultimately the purpose of food policy is to provide adequate and stable food supplies at minimum social cost. Food consumption policy in developing countries is generally constrained by trade and the balance of payments and is inextricably related to food import policies.

Furthermore, trade and exchange rate policies can greatly influence prices and incentives in the long run. Food consumption, income distribution, and investment in agricultural protection are all affected by these policies. Often policies that are not explicitly directed at either food consumption or production have substantial, sometimes unintended, impacts on them. In many developing countries the role of the agricultural sector is so large that repercussions for the

general economy must be considered in analyzing any food policy. Thus a comprehensive economic approach is necessary.

A central premise of IFPRI's approach is that in most developing countries where agriculture represents a large share of the national economy, the food and non-food markets are closely interconnected. Because of this interdependence, policy interventions outside agriculture will be transmitted to agriculture and vice versa. This makes available a wider range of policy instruments to deal with food consumption and growth objectives than is generally recognized.

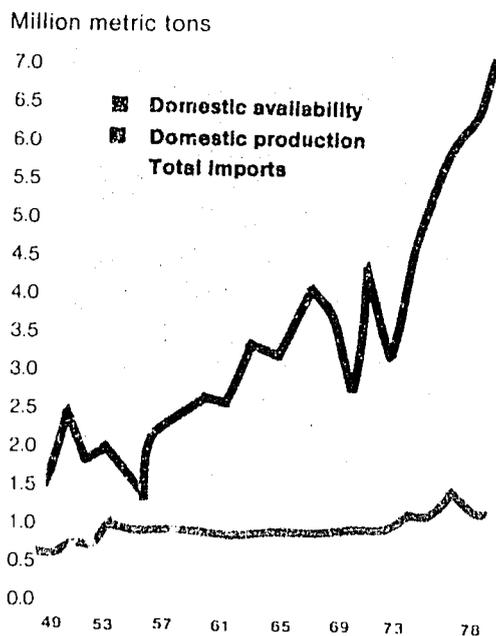
This viewpoint is relatively unexplored and major research gaps exist. The studies on the Sahel, Egypt, and Colombia provide a framework for further studies using this approach to food policy analysis.

FOOD SECURITY AND SELF-SUFFICIENCY

Work in the Food Trade and Security Program continued on approaches for short-run food supply management for food security in the Sahel and began on cereal import management in Egypt. This Sahel work, funded as a special project by the U.S. Agency for International Development and U.S. Department of Agriculture, was undertaken in an attempt to identify means of attaining food security in the region. Findings suggest that storing grain reserve supplies would probably be much more expensive than a food insurance or compensatory financing facility. Also, unless the region is completely isolated from world trade, regional grain reserves would probably be more expensive than grain reserves in individual countries.

The Egyptian project is examining the impact of domestic consumption and production policies on wheat imports. (Figure 12 shows wheat imports and wheat production and consumption in Egypt during the last 30 years.) Wheat imports are controlled by a state trading

Figure 12
Egypt: domestic production, domestic availability, and total imports of wheat, 1949-78



Source: Grant M. Scobie, *Government Policy and Food Imports in Developing Countries: The Case of Wheat in Egypt* (Washington, D.C.: International Food Policy Research Institute, forthcoming).

authority, an arrangement which is found in many developing countries. Because wheat imports represent a substantial proportion of total import expenditures, this study emphasizes the overall balance-of-payment adjustment problem in which food and nonfood imports and adjustments in reserve holdings compete for foreign exchange. Tentative results suggest that although the amount of commercial wheat imported depends on its foreign exchange position, Egypt tends to reduce nonfood imports in order to maintain wheat imports during periods of reduced foreign exchange supplies.

TRADE POLICIES AND AGRICULTURAL INCENTIVES

A special project partially financed by the Rockefeller and Ford Foundations on the impact of exchange rate and com-

mercial policy on incentives to agriculture in Colombia from 1953 to 1978 was completed in 1980.

This study shows how the allocation of resources between exports and imports not only results from the tariffs or subsidies specific to each of those activities but also depends on prices of nontraded goods. As a result of Colombia's trade policies, the food production sector in Colombia has become a nontraded sector.

The analysis indicates that import duties on manufactured goods are equivalent to export taxes on agricultural exports. In Colombia about 70 percent of export revenues come from agricultural products. Furthermore, the export subsidies that applied to some exports did not offset the overvaluation of the peso. This means that the production of cotton, tobacco, bananas, coffee, and flowers, among others (products for which Colombia has substantial comparative advantages), was largely discouraged. On the other hand, food products such as milk, wheat, vegetable oil, and sugar received relatively high protection during the 1950s and 1960s. For corn this rate was above 50 percent, for barley and rice more than 30 percent, for meats between 20 and 50 percent in the 1960s. There was a considerable reduction in protection to food products in general during the 1970s.

In the 1970s the group consisting of sugar, barley, and rice showed negative nominal rates of protection, in some cases reaching 50 percent. The 20 percent overvaluation of the peso in 1970 is an additional tax on these products on top of the quantitative export restriction imposed on them. Milk, wheat, corn, and vegetable oils continued to receive positive protection in the 1970s, but at lower rates, ranging between 25 and 50 percent. As an indirect effect and perhaps unintentionally, a third group of nontraded food commodities—cassava, potatoes, plantains, and other root products—was granted protection.

The study analyzes the effect on production of crops in each of these groups.

REGIONAL PROJECTS

RICE POLICIES IN SOUTHEAST ASIA PROJECT

In collaboration with the International Fertilizer Development Center and the International Rice Research Institute, IFPRI is examining the policies that influence rice production, consumption, price, and trade in Southeast Asia. This joint effort begun in 1979 involves researchers located at these centers and national researchers from Indonesia, Malaysia, the Philippines, and Thailand—the countries on which the project focuses.

The project, which involves researchers from three of IFPRI's four program areas, is looking at the costs and benefits of government policies pertaining to rice and the impact of these policies on rice production and consumption and the economies of the four countries. Among the aims of the project is to define an analytical framework and research methods that can be used to devise policies for particular situations.

The role of the Food Production and Development Strategy Program in the collaborative project is to estimate the impact of investment in irrigation on rice production, prices, and farm income in Southeast Asia and to examine the effectiveness of alternative investment policies. The studies completed in 1980 review past trends and projects for the next decade in area, yield, and production of rice, emphasizing the contribution of irrigation for the four study countries.

In Malaysia irrigation development has increased domestic production from about 55 percent of domestic consumption in the early 1960s to about 90 percent in the 1970s, despite rapid growth in consumption. Nearly 85 percent of rice is produced on irrigated

lands. Government priorities have shifted from expansion of irrigation to intensification of on-farm irrigation and drainage infrastructure and management.

In the other three countries irrigation faces a major challenge in the coming decade: it must foster greater growth although the most readily exploited irrigation projects have already been exhausted. Thailand has depended mainly on increases in area harvested to expand rice production; only 30 percent of land is irrigated. With land suitable for rice production almost fully utilized, emphasis has shifted to on-farm improvements in existing irrigation systems, increased double cropping, the spread of high-yielding varieties, and wider use of fertilizers and pesticides to boost production.

Half of Indonesian rice production is from irrigated land, which is highly concentrated in Java. Exploitation of potentially irrigable area in Java and of large water sources throughout Indonesia is nearly complete. Smaller-scale irrigation developments off Java now have priority. They include tidal basin development, run-of-the-river diversion dams, and labor-intensive *sederhana* projects.

Irrigated area now accounts for about 60 percent of Philippine rice production. However, because growth in physical land area planted with rice is limited and modern varieties have been almost fully adopted, irrigated area must expand more rapidly than in the past decade if growth in output is to continue. The potential exists for developing new large-scale irrigation projects and for intensifying multiple cropping by improving existing systems.

Work in the Food Trade and Security Program has centered on issues as they relate to food stability. For a country such as the Philippines, which is not a large rice trader, a buffer stock policy would be

a costly way of attaining stability in food consumption. Reliance on trade appears to be a better option. For Indonesia and Thailand, both major rice traders, the situation is somewhat more complex and dependent on the impact their import and export fluctuations exert on the world price. Related research on the structure of the world rice market in the Food Trade and Security Program is expected to shed light on this.

As part of the second phase of this study, detailed examination of the price policies in the Philippines has begun. The Philippines has been acquiring stocks of rice not as part of a conscious price stabilization policy but as a by-product of its price support policies. Consequently the workings of this policy and its costs and benefits to farmers, consumers, the government, and the overall economy are being investigated. A study that will examine optimal storage policy as it relates to locations in Indonesia is also planned.

The Food Consumption and Nutrition Program has been examining the struc-

ture and trends of food consumption patterns in the region by commodity and population group. Initial emphasis has been on the relationship between rice and other food commodities.

Preliminary results indicate that rice contributes roughly half of the total calories consumed in the countries studied. In rural areas and among low-income groups, roots, tubers, and maize are important contributors of calories; in urban areas a large proportion of the total food intake is of livestock and wheat products.

In view of the rapidly increasing urbanization in the region, the large differences in the consumption patterns of rural and urban consumers have significant implications for future trends in food consumption. The consumption of wheat relative to rice in urban areas is sensitive to the wheat/rice price ratio. Similarly, the consumption of rice, root crops, and maize in rural areas is sensitive to their relative prices. This indicates that pricing policy may be an effective tool for changing consumption patterns.

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PERSONNEL, 1980

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T. Moore, *Accounting Assistant*

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G. Briscoe, *Xerox/Messenger/Mail*

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J. Lamb, *Word Processor*

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R. Donaldson, *Senior Programmer*

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T. Klosky, *Librarian*

* Program director as of October 1980.

FINANCIAL STATEMENT

INTERNATIONAL FOOD POLICY RESEARCH INSTITUTE

BALANCE SHEET as at December 31, 1980 and 1979

	<u>1980</u>	<u>1979</u>
ASSETS		
Current Assets:		
Cash		
Accounts receivable	\$ 11,946	\$161,917
Employee and other receivables	42,955	11,123
Prepaid expense	25,094	21,665
	<u>11,910</u>	<u>2,690</u>
	91,905	197,395
Property and Equipment:		
Furniture and equipment	196,088	174,697
Leasehold improvements	26,716	11,090
Library	<u>2,080</u>	<u>2,080</u>
	224,884	187,867
Less—accumulated depreciation and amortization	<u>134,730</u>	<u>95,734</u>
	90,154	92,133
TOTAL ASSETS	<u>\$182,059</u>	<u>\$289,528</u>
LIABILITIES AND FUND BALANCE		
Current Liabilities:		
Accounts payable and accrued expenses	\$164,578	\$119,425
Advance Payment of Grant Funds	-0-	145,610
Fund Balance	<u>17,481</u>	<u>24,493</u>
TOTAL LIABILITIES AND FUND BALANCE	<u>\$182,059</u>	<u>\$289,528</u>

The accompanying notes are an integral part of these statements.

INTERNATIONAL FOOD POLICY RESEARCH INSTITUTE

STATEMENT OF REVENUE, EXPENSE, AND FUND BALANCE

For the Years Ended December 31, 1980 and 1979

	<u>1980</u>	<u>1979</u>
Revenues:		
Grants	\$2,375,764	\$1,667,752
Reimbursement of expenses	67,456	91,085
Investment income	16,345	17,633
Other income		5,864
	<u>\$2,459,565</u>	<u>\$1,782,334</u>
Expenses:		
Salaries	1,219,076	927,718
Employee Related Costs:		
Employee benefits	287,150	229,838
Recruitment and relocation	34,910	52,709
Staff travel	<u>118,662</u>	<u>104,960</u>
	440,722	387,507
Consulting Services and Contracts:		
Outside consultants	213,869	139,340
Fellowships		11,534
Trustee expenses	<u>44,651</u>	<u>34,583</u>
	258,520	185,457
Communications & Computer Services	230,862	195,583
Office Operation:		
Depreciation	38,996	33,260
Equipment rental	25,697	35,125
Office supplies & other operating expenses	42,783	32,797
Professional fees	27,544	17,913
Rent	118,019	90,333
Telephone & telegraph	33,702	27,671
Temporary & clerical services	<u>30,656</u>	<u>14,846</u>
	<u>317,397</u>	<u>251,945</u>
	<u>2,466,577</u>	<u>1,948,210</u>
Excess of Expenses Over Revenue	(7,012)	(165,876)
FUND BALANCE—BEGINNING	<u>24,493</u>	<u>190,369</u>
FUND BALANCE—ENDING	<u>\$ 17,481</u>	<u>\$ 24,493</u>

The accompanying notes are an integral part of these statements.

INTERNATIONAL FOOD POLICY RESEARCH INSTITUTE

STATEMENT OF CHANGES IN FINANCIAL POSITION For the Years Ended December 31, 1980 and 1979

	<u>1980</u>	<u>1979</u>
Source of Funds:		
Excess of expenses over revenue	\$(7,012)	\$(165,876)
Items not affecting working capital:		
Depreciation	38,996	33,260
Prepaid grant funds	<u>(145,610)</u>	<u>145,610</u>
	(113,626)	12,994
Use of Funds:		
Additions to property and equipment	<u>37,017</u>	<u>46,413</u>
DECREASE IN WORKING CAPITAL	<u>\$(150,643)</u>	<u>\$(33,419)</u>
Components of Increase (or Decrease):		
Cash	\$(149,971)	\$ 94,507
Accounts receivable	31,832	(109,631)
Employee and other receivables	3,429	(479)
Prepaid expense	9,220	\$ 904
Accounts payable and accrued expenses	<u>(45,153)</u>	<u>(18,720)</u>
DECREASE IN WORKING CAPITAL	<u>\$(150,643)</u>	<u>\$(33,419)</u>

The accompanying notes are an integral part of these statements.

INTERNATIONAL FOOD POLICY RESEARCH INSTITUTE

NOTES TO FINANCIAL STATEMENTS December 31, 1980 and 1979

Note 1. Summary of Significant Accounting Policies

The Institute is a non-profit, non-stock corporation qualified as an organization exempt from Federal Income Tax under Sec. 501 (c) (3) of the Internal Revenue Code as a publicly supported institution to which contributions are deductible by other individuals and organizations.

Income

Grant income is reported as revenue for the time period the grant is required to cover. Reimbursement of expenses from contracts is included in revenue when services are performed or expenses incurred and the right to reimbursement accrues.

Property and Equipment

Property and equipment is stated at cost. Depreciation is provided over an estimated useful life of 5 years for furniture and equipment and over the life of the lease for leasehold improvements. Expenditures for additions are capitalized and expenditures for maintenance and repairs are charged to earnings as incurred. When properties are retired or otherwise disposed of, the cost thereof and the related accumulated depreciation are removed from the respective accounts and the resulting gain or loss is reflected in earnings.

Note 2. The Institute occupies office space under various leases expiring through September 30, 1985. The leases provide for rent increases based on increases in building operating costs and increases in the Consumer Price Index. Minimum lease payments, net of sublease arrangements made by the Institute as sublessor, for all non-cancellable operating leases having a remaining term in excess of one year at January 1, 1981, are as follows:

1981	\$153,131
1982	\$132,189
1983	\$104,496
1984	\$104,496
1985	\$ 78,372

Note 3. The Institute is purchasing retirement annuity contracts for employees under agreement with the Teachers Insurance and Annuity Association and the College Retirement Equities Fund. The cost was \$158,531 and \$131,434 for 1980 and 1979 respectively.

RAYMOND E. LANG & ASSOCIATES, P.A.
CERTIFIED PUBLIC ACCOUNTANTS

8401 CONNECTICUT AVENUE
CHEVY CHASE, MARYLAND 20015
(301) 854-4900

March 18, 1981

Officers and Trustees
International Food Policy Research Institute
1776 Massachusetts Avenue, NW
Washington, DC 20036

We have examined the balance sheet of the INTERNATIONAL FOOD POLICY RESEARCH INSTITUTE as at December 31, 1980 and 1979, and the related statements of revenue and expense and changes in financial position for the years then ended. Our examination was made in accordance with generally accepted auditing standards and accordingly, included such tests of the accounting records and such other auditing procedures as we considered necessary in the circumstances.

In our opinion the financial statements present fairly the financial position of the Institute as at December 31, 1980 and 1979 and the results of its operations and the changes in its financial position for the years then ended in conformity with generally accepted accounting principles applied on a consistent basis.

RE Lang & Associates, PA