Food Policy Issues in Low-Income Countries

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A Background Study for World Development Report 1981

The paper considers food policy issues in Zambia, Bangladesh, and India from the viewpoints of short-term adjustment to the energy crisis and the longer-term effects of food policy on poverty, malnutrition, and food security. Parts 2-4 present the country case studies; Part 1 is an overview drawing upon the case studies. As a general conclusion, the paper suggests that external pressures during the 1970s intensified problems of agricultural production and food supply, but that in none of the countries studied were such external pressures the cause for a serious food supply problem.

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TABLES

ACRONYMS AND ABBREVIATIONS

AGREP	Agricultural and Rural Development Department, Economics and Policy Division (World Bank)
AICMIP	All-India Co-ordinated Millet Improvement Program
AICRIP	All-India Co-ordinated Rice Improvement Program
BARC	Bangladesh Agricultural Research Council
BRRI	Bangladesh Rice Research Institute
CFB	Commercial Farmers' Bureau (Zambia)
COMECON	Council for Mutual Economic Assistance (also CMEA)
CSO	Central Statistical Office (Lusaka, Zambia)
EEC	European Economic Community
ESCAP	Economic and Social Commission for Asia and Pacific (U.N.)
FAO	Food and Agriculture Organization
HYV	High-yield variety
JASPA	Jobs and Skills Program for Africa, ILO
IBRD	International Bank for Reconstruction and Development (the World Bank)
ICDD	International Center for Diarrheal Diseases
ICRISAT	International Crops Research Institute for the Semi-Arid Tropics
IDS	Institute of Development Studies
IFAD	International Fund for Agricultural Development
IFPRI	International Food Policy Rsearch Institute
ILO	International Labour Organisation
IMF	International Monetary Fund
IRRI	International Rice Research Institute
MAWD	Ministry of Agriculture and Water Development (Zambia)

mmt	Million metric tons
OECD	Organisation for Economic Co-operation and Development
PCM	Protein-calorie malnutrition
t/ha	Metric tons per hectare
UNDP	United Nations Development Programme
USAID	U.S. Agency for International Development

Preface

These four papers consider food policy issues in three countries, Zambia, Bangladesh, and India, from the viewpoints of short-term adjustment to the energy crisis and the longer-term impact of food policy on poverty, malnutrition, and food security. The first paper presents an overview of these issues drawing upon the three country case studies.

As a general conclusion, the papers suggest that external economic pressures during the 1970s aggravated agricultural production and food supply problems, but in none of the case study countries were such external pressures the cause for a serious food supply problem. International measures, such as the IMF's cereal financing facility or international grain price stabilization measures and food aid could ameliorate the problems of food insecurity. Less easy to generate is the efficacy of public intervention in food systems, which is widespread among low-income countries. Such interventions are frequently of benefit only to urban groups (but often including the poorest among them); they can undermine producers' incentives and pose major problems of food supply management, especially the use of stocks and imports. At the same time, there is scope for manipulating the supply and price of basic food staples to produce cheap calories for the poor.

The paper on Zambia describes the dimensions of poverty and food insecurity and distinguishes the groups affected: urban dwellers, subsistence farmers, emergent farmers, and commercial farmers. Although in general public intervention through subsidies and parastatal marketing has not favored producers, there is a case for subsidizing and fortifying roller meal (the cheaper maize product) and for better nutrition education. For rural groups, production-oriented measures appear most appropriate -- agricultural research, better infrastructure and services, higher prices, and "micro capital" for the poorest.

Bangladesh's complex and vulnerable food system is examined through the analysis of its three crises of the 1970s: the Sylhet floods of 1977, the drought of 1978/79, and the Bangladesh famine of 1973-75. Some clear implications for policy emerge: the need for better monitoring and information systems, more flexible and longer-term commitments of food aid, and higher levels of domestic food stocks at or near distribution points. The food distribution system, which employs rationing, appears to have more benefits than costs, but its benefits are skewed towards groups whose need is not the greatest. Systems employing more open market sales would be a lower-cost method of stabilization, but there are reasons for proceeding cautiously in raising food prices: the disproportionate effect on low-income groups and possibly disproportionate benefits to larger producers.

In aggregate, India's food security at the outset of the 1980s appears healthy, even in the face of external shocks; foodgrain output has outpaced population growth, reflecting technical improvements, greater resources and incentives devoted to food production, and high levels of public-sector foodgrain stocks during 1975/76-1978/79. But serious risks still affect the 15 percent or so of India's population at or below the margin of caloric adequacy. (This relatively low estimate of the undernourished is elaborated in the paper.) These groups are concentrated in districts and

states where relatively little progress has been made in raising yields or double-cropping; the variability of crop output remains high; "poor people's crops" remain the most vulnerable to input fluctuations. But the "international" causes of food insecurity -- scarcer energy, global food supply fluctuation -- will probably continue to have relatively small effects on total domestic food supply.

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Part 1

Food Policy Issues in Low-Income Countries: An Overview

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Part 1
Contents

I. INTRODUCTION

This paper and the other supporting background country case studies focus simultaneously on two sets of issues that have an important place in World Development Report 1981. First, there are the problems of a short-term adjustment to a second international energy crisis and the recession in the world economy that impinge upon agriculture and food consumption in low income countries. Second, there is the longer-term question of agriculture and rural development that has significant effects on poverty, malnutrition, and food insecurity in low-income countries.

A recurrent theme in the analysis of the agricultural production problem is the importance, but frequent lack of, adequate material incentives for producers in developing countries (e.g. Schultz, 1978). This lack of incentives is seen to be in large measure the consequence of the complex of interventions in food markets by governments preoccupied with short-term problems of providing cheap (relative to world prices) and secure supplies of basic food staples, particularly for urban consumers.

The problem of incentives is therefore a problem of public policy. However, the central aspect of this problem is the extent to which there is genuine tension in public policy and inevitable trade-offs between containing short-term problems of food insecurity and the provision of incentives for the longer-term solution of these problems. There is near-unanimity on the point that sustained production and productivity increases require time to bring about. The area of dispute is in the character and significance of the problems of food insecurity and the other pressures that shape food policies in low-income countries. This is the concern of this paper and the accompanying country case studies, which focus largely on the consumption side issues within the food systems of low-income countries and the associated public policy problems at national and international levels.

In considering these issues, we have chosen to focus on a small number of case study countries that have experienced serious food system problems during the 1970s and also have significantly different economic structures. These differences include resources, demographic and socio-political characteristics, and size. The countries chosen for study are Zambia, Bangladesh, and India (Parts 2, 3, and 4 of this volume). In addition we have drawn upon the experiences of Indonesia and Sri Lanka, as documented in recent studies of their food systems.[1/] Our starting point was to indicate the dimensions of the problems of poverty, malnutrition, and food insecurity in each of the case study countries. These terms are frequently used very loosely, and we have endeavored to use specific terms in talking about malnutrition and food insecurity at national, regional, or individual levels. Within this context, we looked at three sets of issues:

(1) The problem of adjustments to instability in domestic production and the extent to which problems of malnutrition and food insecurity are essentially issues within the national economy resulting from the structure of that economy and fluctuations in food supply.

(2) The role of external economic pressures from the international economy, in particular adjustments to events such as the substantial rises in oil prices and problems of foodgrain supply.

(3) The role of public policy, both domestic and international, in either worsening or ameliorating the problems of malnutrition and food insecurity.

In undertaking this structured review of problems on a case-study basis, the question most in mind was the extent to which there are common themes and problems that transcend wide differences in the economic structures of low-income countries. Are all problems of food insecurity country- and region-specific, reflecting different structural problems? To what extent are the issues problems of policy? If they are, what are the problems to be tackled? To what extent do policy prescriptions need to be modified for different contexts and different periods? For example, Schultz (1978) and others have suggested that the problems of poor food sector performance have been severely aggravated by public interventions. In general, the change required to put the agricultural economies of low-income countries on a better footing is to roll back the frontiers of the state and leave a wider area of activity in food production and agricultural distribution to market forces. If problems are country and region specific rather than general in character, does this have implications for the appropriate forms of assistance the international community should provide for low-income countries and the appropriate forms of international food security? For example, international food security buffer stocks represent an attempt to improve simultaneously the international environment of all low-income countries, whereas a food-financing facility is more obviously a mechanism that can be tailored to a variety of circumstances, (see Goreux, 1981).

1/ In particular we drew extensively on the work of Timmer (1980) and others on the rice economies of South East Asia. The Food and Nutrition Policy Planning Division of the Ministry of Plan Implementation (1980) surveyed nutritional status and the impact of a range of nutrition interventions including food stamps immediately after the sweeping food policy reforms in Sri Lanka. A Harvard Group (Levinson, 1980; Timmer, 1980a) has also reviewed the provisional evidence on the income and nutritional effects of these reforms. Another important source of material has been the studies of public food systems undertaken by the Economic and Policy Division, Agriculture and Rural Development Department (AGREP) of the World Bank during 1970/80 (Scandizzo, 1970, 1980, 1980a).

II. SOME COMMON THEMES OF FOOD INSECURITY AND POVERTY

The country case studies, though few in number, indicate some plausible generalizations about the nature of malnutrition and food insecurity problems in low-income countries and provide some common themes for policy analysis. Food insecurity is a problem most often conceptualized as a macro phenomenon -- deviations from trends in aggregate consumption. However, as a human problem it is primarily one of the welfare vulnerability of distinct categories of people within the population. The case studies show the importance of clearly recognizing the distinct poverty problems and sources of vulnerability of these groups.

First, it is important to differentiate between the problems of the urban poor and the rural poor. The majority of urban households in low-income countries spend a high proportion of income on basic foods. The effects of fluctuations in food prices on income are therefore significant and present severe difficulties in obtaining food for those on fixed incomes.1/ The problems are most acute for the poor: low wages, irregular employment, unemployment, and disabilities make them especially vulnerable. Their access to capital markets is more restricted, and the cost of credit is higher. The poorest urban dwellers are also likely to be the most directly affected by crisis in the countryside, which produces an influx of migrants who will compete for unskilled and casual employment. When compensating measures are absent, higher food prices have direct and adverse effects on the welfare of the urban poor.

The major sources of rural proverty, malnutrition, and food insecurity lie in the structure of domestic agricultural production. Characteristically, poverty and malnutrition have a well-defined regional, seasonal, demographic, and social structural character. However, there is a considerable difference between the structure of asset-holding and production in South Asian peasant economies and the less densely settled countries of Sub-Saharan Africa.

In terms of their access to and control over productive assets the poor are differentiated in three broad categories: the rural landless, near-subsistence households, and poor farmers producing marketable surpluses.

In rural South Asia the poorest and most vulnerable groups are the landless and the marginal agricultural producers. These broad categories include groups that are subject to different pressures on food consumption and have varying capacities to adjust to short-term difficulties. The main group among the landless we will categorize as "village labor": households

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1/ For example, over one-third of the expenditure of more than 75 per cent of urban households in Bangladesh was accounted for by rice and wheat in 1973/74.

whose primary source of income is work on the holdings of other rural households. These earnings are supplemented by a range of ancillary activities such as porterage, food processing, and petty trading, as well as their own cultivation. Fluctuations in production also directly affect the level of agricultural and related employment. When a crop is lost or yields are severely damaged due to drought or flood, there is less work in inter-cultivation, harvesting and post-harvest operations, also probably putting downward pressure on real wage rates at a time of rising food prices.

Established seasonal migration of labor and traditional forms of payment in kind for operations such as harvesting have been important mechanisms for coping with the problems of periodic underemployment and food insecurity among agricultural laborers. However, these traditional payment systems are being displaced in many regions by market-determined wages (Asian Development Bank, 1977), sometimes facilitated by the increasing flow of migrant labor (Clay, 1976). Such institutional changes, by forcing agricultural labor to bear a greater share of the adjustment costs of upward food price fluctuations, increase the food insecurity of this most vulnerable group within rural society.

The landless group is roughly coterminous with those identified as landless, i.e. without agricultural land, and near landless, i.e., with holdings too small to provide more than a fraction of household food. In Bangladesh a number of surveys show that over 30 percent of rural households are without agricultural land, and in some districts of north-east India the proportion is over 40 percent. In Bangladesh a further 20 percent of households have occupancy rights to less than 0.2 ha (0.5 acres). Existing patterns of tenancy do not have a significant redistributive effect in favor of these groups. The typical tenant is a peasant, with his own draft animals and equipment, holding in excess of 0.4 ha, who rents additional land.[1/] The share-cropper is more likely to belong to the third category (poor farmers producing marketable surpluses) and share rentals to represent a significant proportion of the marketed output of, for example, jute.

Plantation workers are a numerically significant subgroup among the landless in some regions of Bangladesh, India, and particularly, Sri Lanka (Isenman, 1980a). They are paid in cash and depend largely upon marketed food supplies. Their employment is seasonal and also affected, as are wage rates, by the profitability of export crop production. Their real incomes are therefore more sensitive than those of village labor to movements in domestic food prices and the state of the world economy.

1/ There is now considerable empirical evidence in the form of Ph.D theses to substantiate these generalizations, which find an early statement in Bell's (1977) review of evidence on the productivity effects of share-cropping in N.E. Bihar.

The circumstances in which plantation labor was permanently recruited also created a spatially and culturally isolated workforce. The factors have in turn resulted in poor, nutritionally-vulnerable populations by inhibiting or precluding seasonal and longer-term migration to find supplementary employment or alternative livelihoods. Plantation labor in South Asia constitutes a special problem group, whose circumstances are reflected, for example, by their explicit inclusion in public ration distribution in Bangladesh.

The wholly landless are nutritionally more vulnerable than those with homestead plots and access to grazing for animals. The next most vulnerable category are marginal farming households. They differ from the near-landless by obtaining the greater part of their income from their own cultivation. Their holdings, whether or not supplemented by produce from rented land, yield incomes that are barely adequate to provide for family subsistence. Households are locked into patterns of seasonal food deficits and indebtedness that amplify fluctuations in food prices through "forced" post-harvest sales and pre-harvest purchases. Long-term debt is also slowly forcing marginal producers to dispose of assets. Periods of crisis, such as the 1973/74 famine in Bangladesh, precipitate this process of pauperization. In the short term, possession of saleable assets provides a line of credit that makes the marginal farmer less vulnerable than the landless. But in the long term the dynamic instability of this group threatens to aggravate problems of proverty and food insecurity by swelling the ranks of the landless, and interventions to improve the position of the marginal and small farmers have been an important feature of agricultural policy during the past decade.

The high levels of landlessness, secular patterns of computation of wage payments and the seasonal food deficits of marginal producers all contribute to make the rural poor an important segment of the market for food staples (Clay, 1980; Part 3 of this volume). In the still predominantly rural economies of Bangladesh and the more backward states of India, the poor constitute an important segment of the market for food staples. For example, in Bangladesh rural consumers probably represent two-thirds of the market for food grains (Clay, 1980).

In contrast, almost all rural people in Africa are engaged in subsistence production. The market impinges upon them to the extent that they are surplus producers of agricultural commodities (see Chambers and Singer, 1980; Part 2 of this volume).[1/] These differences of

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1/ Nomadic pastoralists are an important group in many African societies. Their distinctive food security problems are centered on the difficulties and long time periods required to rebuild herds and flocks after these have been decimated by drought or disease. The problems of pastoralists, which are outside the scope of this review, have become the focus of important international activities such as those of the International Livestock Center for Africa and the International Laboratory for Research of Animal Diseases.

economic structure have significantly different implications in terms of the trade-offs involved in price policy. In Africa the short-term distributional conflict involved in price policy is essentially between rural producers and urban consumers. Chambers and Singer see the conflict of interests involved in price policy in Zambia as rural-urban, complicated by discrimination between commodities. In densely-settled countries with large numbers of rural consumers the trade-offs are more complex and also involve the welfare of the rural poor. In the case of Bangladesh (Ahmed, 1979; Pitt, 1980; Part 3 of this volume) Indonesia (Timmer, 1980) and Sri Lanka (Timmer, 1980a) there is a potential short-term conflict of interest between surplus and potential surplus agricultural producers and the rural poor. The problem is well summarized by Timmer (1980a, p.7): "This skewing effect of high food price policy is not unique to Sri Lanka, it is quite characteristic of any market-oriented society at low levels of per capita income. In such societies low food prices have a strong equalizing effect on the distribution of calories, while high food prices cause an inevitable skewing in the absence of alternative policy initiatives or program interventions."

There is also a problem of effective demand for food staples in the market-oriented economies of South Asia. As the experience of India during the late 1970s has shown, increasing aggregate food supply does not necessarily reduce malnutrition, which is concentrated in marginal groups and marginal regions within society. Short-term problems of excess supply can build up, as for example in Bangladesh in 1975/76 and again in 1980/81, while the under-employed rural poor lack the purchasing power to raise their consumption to nutritionally satisfactory levels.

It is important to recognize the significance of this tension, the potential in food policy, and the potential trade-offs implied by "cheap" food or incentive price policies. The price of cheap calories today is probably some combination of food import dependence and low rates of agricultural growth. The costs of an incentive price policy are immediate pressures on the real incomes and nutritional status of the most vulnerable groups, both urban and rural, if there are no effective compensatory interventions.

In Zambia and probably many other African economies still only partially integrated into wider markets, the problem is subtly different. Increasing the supply of commodities for which a substantial demand exists, e.g. maize, will have a significant impact on the incomes of maize-surplus producing households in the major maize-growing regions. Areas of subsistence production, where marketed crops are insignificant, would be little influenced by the growth of marketed output.

In each of the case study countries poverty and malnutrition are shown to have clearly defined seasonal and regional dimensions. However, the nature of these problems of seasonality and regional imbalance are country-specific, reflecting variations in environmental conditions and the demographic and economic structure of the society. For example in Zambia (Chambers and Singer, Part 2 of this volume) the problem of seasonality is closely linked to the pattern of rainfed cultivation under a unimodal tropical rainfall regime. However, in Bangladesh the problem of seasonality reflects both the pattern of rainfall and geohydrology resulting in a more complex region-specific seasonal incidence of nutritional stress (Clay, 1978).

Seasonal stress on rural households also reflects the demographic and social structure of different rural societies. In Zambia the more vulnerable are typically households headed by females. The problem of individual food insecurity strongly reflects patterns of rural/urban migration. In Bangladesh, the problem of interseasonal smoothing of consumption is particularly a problem for the landless and near-landless, due to seasonal underemployment and their lack of assets. Again, however, female-headed households are the most vulnerable groups among the poor (Cain, 1979).

The regional dimension of poverty and malnutrition, which are again country-specific, reflect classic problems of location and remoteness from the metropolis; environmental and technological factors limit agricultural productivity growth and market demand for agricultural commodities. For example, in thinly peopled Zambia, it is in the remoter rural regions, where marketed production of maize, the major staple, is least important and a high proportion of households are within the subsistence sector, that poverty and malnutrition are most severe.

In India and Bangladesh, where there are problems of regional backwardness and remoteness, malnutrition and poverty are most acute in regions where the pressure of population on the land is extremely severe. And with traditional agricultural technologies, there are major problems in increasing productivity. For example the semi-arid coarse grain staple regions of India are areas of high food insecurity. The rice-growing region of eastern India is another poverty zone. Increasing the productivity of the main monsoon rice crop and the deep-water rices raises technical problems that were not solved by the development of the first generations of high-yielding semi-dwarf rices. The discussion of price policy is broadened by recognition of the seasonal and regional patterns of involvement of poor rural households as buyers and sellers in agricultural markets. Interventions that reduce the range of interharvest fluctuations in agricultural prices are likely to benefit the rural poor. Similarly, the improved articulation of marketing systems and reductions in transport costs from interior areas to major marketing centers would benefit producers and consumers disadvantaged by location. Measures that narrow the intertemporal and spatial range of price outcomes are likely to have strong anti-poverty implications.

III. DOMESTIC SOURCES OF FOOD INSECURITY

The regional, social, and seasonal profile of malnutrition and food insecurity may vary between countries. However, in each of the case study countries the major cause of short-term food insecurity is fluctuation in regional or national agricultural production. In Zambia, subject to severe adjustment problems resulting from a 40 percent fall in the purchasing power of its major export, copper, and the effects of war in neighboring Zimbabwe, it was the disastrous fall in maize production over the last two years that led to a "food-system crisis," i.e., a situation in which the food supply of insignificant sections of the population was threatened, typically provoking emergency response by government.

A second aspect of food insecurity is the rapidity with which food system crises develop. In part this is because of the high degree of individual food insecurity and vulnerability of disaster-prone regions. The risk of considerable crop damage until the harvest is completed also makes it difficult, even with a reliable crop forecasting system in place, to anticipate the magnitude of a shortfall in production. 1/ However, as the Bangladesh case study indicates, the rapidity with which a crisis can develop is a reflection on the weakness of the monitoring and food system management in low-income countries.

The circumstances that may precipitate food crises are varied. Drought or untimely rainfall are the most widespread causes of serious shortfalls in production where rainfed cultivation predominates. 2/ In largely deltaic and floodplain regions such as Bangladesh a food crisis can also be precipitated by abnormal flooding, as in 1973/74 and 1976/77. 3/ Other sources of falls in production are cyclones and political instability. Another potential

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1/ The problems the authorities as well as international agencies such as the International Wheat Council seem to have faced in estimating the 1980 wheat crop in the USSR is a reminder of the universality of these problems.

2/ Irrigated cultivation can also be affected by drought, low water tables and the volume of natural or artificially created reservoirs of surface water. Thus, irrigated dry season rice cultivation in Bangladesh is estimated to have fallen by 14 percent in 1979.

3/ The cropping patterns of floodplains are adapted to seasonal flooding. Disasters result from abnormal flood conditions in terms of the timing and duration of the floods as well as maximum water levels.

but difficult-to-predict source of instability is genetic vulnerability. The risks of significant crop losses, including total crop failure, from disease or pest attack, have been increased by the extensive cultivation of varietal types with a narrow genetic base. 1/

Finally, one must recognize the role of domestic food policy. In every case study country, there is massive public intervention in the operation of domestic food systems. This can both considerably aggravate or ameliorate the effects of fluctuations in domestic production that are primarily a consequence of year-to-year variations in environmental conditions.

1/ Recent examples of the problem created by genetic vulnerability are the brown plant hopper infestation of rice in Bali and Java in the mid-1970s, associated with the widespread adoption of non-resistant semi-dwarf varieties. In 1978 the Pakistan wheat crop was severely reduced by widespread rust attacks. In 1980 both the sugar and tobacco crops in Cuba were devasted by fungus attack. The number and scale of the recent production problems created by genetic vulnerability are an example of food insecurity problems that raise issues of science and production policy rather than food system management (See Biggs and Clay 1981).

IV. ADJUSTMENT TO EXTERNAL ECONOMIC PRESSURES AND THE DOMESTIC FOOD SYSTEM

The rapid rise in energy prices, as well as problems of supply of fossil energy based products, created serious economic adjustment problems for low-income countries in the early 1970s. A second energy crisis is once again placing these economies under severe pressure. During the early 1970s sharp upward price movements were coupled with the reduction in availability of concessional food aid supplies, placing further pressures on low-income food-importing economies (World Food Council, 1979).

As the evidence from case study countries indicates, these external pressures unquestionably aggravated agricultural production and food supply problems in many low-income countries. For example, the coincidence of a domestic food production crisis in Bangladesh with a tight international cereal market compounded problems of food import supply by intensifying severe short-term balance-of-payments problems (see Part 3). However, in none of the case study countries were external economic pressures the cause of a serious food supply problem. External pressures such as those on the Zambian economy during the past five years resulted in adjustment problems that weakened the capacity of the agricultural production and food supply systems to cope with problems that resulted from shortfalls in domestic supply.1/ External economic presures can also contribute indirectly to domestic food system problems when the adjustment process is characterized by shortages and inflation. In these circumstances, food system management becomes an important instrument of policy seeking to assure economic and political stability. For example, in Bangladesh, Indonesia, and Zambia, public food system management is used to cushion the real incomes of urban consumers and groups essential to the functioning of the state against effects of price inflation.

Even if the external environment is not the major factor contributing to instability in domestic food supply, the case studies confirm that international measures could ameliorate the problems of food insecurity. For example, the availability of a food financing facility or measures to stabilize international grain prices would improve the environment of domestic policy. The capacity and willingness of governments to use import policy as a way of containing the effects of fluctuations in food production will be influenced by what they can take for granted in the external environment. Again, food aid, when programmed on a longer-term basis, could make an important contribution to limiting the damaging effects of instability in domestic food supplies. However, the use of food aid in domestic food system management raises complex problems of planning and logistics for which there are no simple prescriptions. 2/

1/ For example, Chambers and Singer document in Part 2 how adjustment pressures led to the rundown in agricultural extension and other services provided to agriculture.

2/ See Siamwalla and Valdes, 1980, for a comprehensive review of the problems of food insecurity defined as deviations in trends in domestic food consumption and international measures that could provide greater food security.

V. FOOD POLICY ISSUES

There is massive intervention by governments in the food systems of all the case study countries. Problems of food insecurity at regional and national levels make government intervention necessary and inevitable. But the characteristic forms of intervention raise many policy issues. First, a virtually universal objective of public intervention would appear to be to provide food security and to stabilize real incomes of urban consumers. These interventions, apart from questions of operational efficiency or leakages, are therefore only partially targeted at one of our four poor and nutritionally vulnerable categories, the urban poor.

In some Asian countries, governments have attempted to extend a food insecurity and welfare safety net to wider segments of the population. For example, the ration system in Sri Lanka was, until recent reform, extended to provide guaranteed and subsidized food supplies to rural consumers. A framework for the supply of food to rural consumers, at least in periods of emergencies, also exists in Bangladesh and most Indian states. In view of the severity of individual food insecurity and lack of effective demand for food on the part of poor rural consumers, there is a clear rationale for such systems of distribution and subsidization of consumption. This is particularly so in view of the limitations of production measures as a way of dealing with both structural problems of poverty and malnutrition and short-term problems of food insecurity. Recent studies of the operation of such distribution systems have shown that significant nutritional effects can be achieved. 1/ Scandizzo (1979, 1980a) and others have found distribution programs to have positive cost ratios. These results are important in providing a much-needed balance to discussion of public rations system programs otherwise severely criticized for weakening incentives to agricultural producers. Public food system interventions nevertheless raise many questions.

First, there is a tension between guaranteeing consumption and sustaining real income levels and the disincentives to domestic agricultural production resulting from low food prices and a ration system sustained by imported concessional supplies of food. Second, the costs of public distribution are a direct function of the size of the target group covered. The burden of a general ration system on a low-income country such as Sri Lanka may in the end be difficult to sustain. Again, the scale of subsidized public ration operations in Bangladesh would create major financial problems, if it were to be based largely on domestic food supplies and large-scale concessional food imports were to be phased down. Such experiences point to the need for more narrowly targeted and cost-effective distribution measures.

1/ See Gavan (1979) and George (1979) on distribution systems in Sri Lanka and Kerala.

Close analysis of public food systems indicates other problems besides cost-effectiveness. In virtually all countries, public food interventions are used first and foremost as a way of providing food security and a cushion against inflation to urban consumers. In Zambia the zone of distribution of imported and price-controlled domestic food staples is coterminous with the areas of urban consumption. However, because access to limited supplies of price-controlled staples is restricted in practice to certain favored categories of urban residents, the urban poor are often those least likely to acquire food at controlled prices. Experiences in the case study countries and elsewhere, for example in Sri Lanka, indicate that this is a difficult policy area. There is an encouraging growth in recognition of the problems and in attempts to make public intervention more effective in cost and distribution.

In each of the case study countries the consumption characteristics of basic food staples are seen as providing some area of operational flexibility. For example, in Bangladesh as well as Sri Lanka, where rice is the major staple, wheat is an inferior good (Part 3 of this volume; Timmer, 1980a). In Zambia, roller meal is noted as the important staple of the urban poor, whereas cassava and millet are important for consumers in relatively poorer rural regions. Supply manipulation and differential price policies for major food staples therefore offer some opportunity for a cheap calories policy for the poor. There are implications for agricultural science and production policies in raising productivity of previously neglected staples of poorer consumers in poor regions (Lipton, Part 4 of this volume; Chambers and Singer, Part 2 of this volume).

The implementation of policies discriminating among commodities should, however, be recognized as raising complex problems for some countries. In Bangladesh and Sri Lanka, because wheat is largely imported, price discrimination would be relatively easy to implement. However, as wheat production becomes more significant in Bangladesh, so the potential costs in terms of disincentives to increased agricultural production grow. In many African countries the imported commodities, especially rice and wheat, which are directly available to government to use in food operations, are superior goods especially significant in consumption of high-income urban households. In India there are widely different regional patterns of food staple production. Price discrimination between commodities has regional as well as income group implications, with possible trade-offs between poor consumers of coarse grains and producers in regions where these crops predominate.

Another way of increasing the effectiveness of direct distribution programs is to restrict the target group through the choice of intervention. For example, the experimental food stamp program in Sri Lanka is an attempt to limit food subsidies to a narrower, nutritionally vulnerable group of low-income households, while food prices can be raised for other parts of the population to

provide increased incentives for domestic producers. 1/ The increased priority accorded to food-for-work programs in Bangladesh also attempts to target income-generating employment and food on poor rural consumers. Problems over eligibility criteria, for example in the case of a food stamp program, or leakages from direct distribution activities such as food-for-work are indications of the considerable problems for the organization and implementation of what are potentially more cost-effective forms of intervention.

There are equally difficult policy choices in macro food system management, which are illustrated in the recent experiences of the case study countries. The build-up of domestic food security stocks offers a way of combining consumption stabilization with price support for domestic producers. Experience in India shows how domestic stockpiles can play such a dual role effectively, but at a high cost. Other countries have relied upon imports to stabilize food supplies. Recent experiences in the case study countries illustrate the complexities of the choices involved, which must take account of the external environment as well as domestic situation. Food supply management, when faced with difficult to anticipate and substantial fluctuations in domestic production, would be made easier by levels of domestic stocks that could sustain supply for more than three to four months. In Bangladesh the lags between the onset of domestic supply difficulties, recognition and response, and the scheduling and deliveries of imports, involve difficult problems of macro system control. Nevertheless, the recent experience of Bangladesh, India, Indonesia, and Sri Lanka is that there has been considerable learning about the management of domestic food systems. Both Bangladesh and India were able to contain the effects of the 1979 drought. Sri Lanka is seeking to find an alternative to the increasingly burdensome general rationing policy of previous decades that will also provide greater incentives to domestic food production.

Food insecurity results in pressures that divert attention from longer-term priorities of agricultural development. Experiences in the case study countries indicate some of the ways in which assistance from the international community can contribute to more effective food system managment as well as attacking the problems of instability in domestic production that contribute so much to the problem of food insecurity. The poorly developed

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1/ This bold experiment provides valuable insights into the complex issues raised by a shift from general food subsidies to a more narrowly targetted system (Food and Nutritional Policy Planning Division, 1980). For example, the introduction of eligibility criteria based on money income and money income equivalent raises problems of comparability between households receiving cash incomes, such as plantation workers, and cultivating households. There are severe problems of verification where what is at stake is entitlement to an income supplement. Another problem is that imputation of money values to incomes in kind from a range of sources -- paddy production, vegetable gardens, coconut trees, etc., is likely to be downward biased. The criteria of Rs.300 a year household income resulted in the inclusion of half of the population but the near exclusion of plantation workers, a relatively vulnerable group within the rural population as evidenced by the high incidence of child malnutrition, morbidity, and mortality.

distribution and storage systems of many low-income countries hamper effective food system management. Improvement in food production monitoring is another requirement of better food system management.

There is still considerable room for improvement in the coordination and logistics of food aid. However, the 1980 Food Aid Convention and the proposed food financing facility represent significant steps toward more effective international food security measures for low-income, food-importing countries.

Much of the contribution that the international community can make, however, is indirectly through supporting investments in agriculture, particularly irrigation, that would increase productivity and stabilize production. Coarse grains and root crops, for long relatively neglected by agricultural science, as well as the problems of rice cultivation in rainfed and deep water environments, are priority areas for agricultural research.

Until recently, little work was done on the problems of public ration and direct distribution systems. Yet the few studies already undertaken have begun to modify the views of analysts and policymakers on the role and consequences of such interventions. The tentative nature of many of the conclusions reached in these case studies is also an indication that work needs to go farther on many of these issues raised by poverty, malnutrition, food insecurity, and the public response to these problems.

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Part 2

Poverty, Malnutrition, and Food Insecurity in Zambia

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Part 2

Contents

Overview

Despite per capita incomes of $480 (1978) and for most of the 1970s a fair degree of self-sufficiency in the main staple, maize, the levels of living of most Zambians have deteriorated over the past decade; and malnutrition, especially among children, has increased. Poverty and malnutrition have regional and demographic, seasonal, and rural-urban dimensions. Deterioration is shown in the declining per capita GDP (down 46 percent in real terms from 1974 to 1979), among the causes of which were the Zimbabwe war, unstable and generally low copper prices, heavy subsidies, inefficient parastatals, foreign exchange shortages, and biases of marketing, prices, and services against those who are poorest in the rural areas. A large area and thin population create chronic problems of transport, distribution, and access to public services.

National food security gives cause for concern after two years of poor maize production and the prospect of a third poor year. It is unlikely to be solved by large projects but rather from price incentives and efficient services to farmers, especially emergent farmers (small farmers with marketable surplus). Improvement in the international environment would help but is entirely speculative. National food security, in terms of self-sufficiency, should not be confused with household food security. It is relevant for urban and some rural households. But for the majority of 3 million of the poorer rural households it is largely or entirely irrelevant. For them, food security can best be achieved by enabling them to grow more, eat more, and sell more at better prices, building up from the resources they already have where they are. This would support changes already occurring in agricultural research (with attention to farming systems and to cassava, millets, and sorghum). Other changes needed include higher prices for produce such as cassava, millets, sorghum, fish, charcoal, and honey; technology to reduce drudgery and improve productivity for the poorer and weaker (especially female-headed) households; and the extention of services to remoter areas.

A long-term strategy for national and household food security should balance rural and urban livelihoods, resources, and interests. Zambia has extensive uncultivated but reasonably fertile land, acute urban unemployment, and a rural labor shortage that limits agricultural production. A long-term strategy to develop and encourage productive and remunerative livelihoods in rural areas should try to improve off-season incomes and the articulation of rural producers' interests. This could lead to greater food production, less acute urban unemployment by stemming the drift to the towns, and less poverty and malnutrition.

For donors, the major implication of this analysis is the need for a more precise approach to the resources and problems of those who are poorer, weaker, more remote, and less visible. A corollary is the need for structural adjustment and program lending and, above all, for helping with operating expenses of programs such as rural health services, agricultural extension, collection of farmers' production, and distribution of fertilizer and other prerequisites. On a macro view, the stabilization and raising of copper prices and compensatory financing of copper export deficits are needed to provide the overall stability required for food security and other basic needs.

I. DIMENSIONS OF POVERTY

Poverty in Zambia, as elsewhere, has many dimensions. To analyze the links among poverty, malnutrition, and food supply, five dimensions are particularly relevant: regional and demographic; farming systems; seasonal; biases against poor rural producers; and trends in livelihoods over the longer run.

A. Regional and Demographic

The population of Zambia is estimated to have been 5.6 million in mid-1979 (Table 2.1). Of this total, 2.1 million, or 3 out of 8, were in the large urban centers of the line of rail provinces and the copperbelt, 1.5 million, or 2 out of 8, were in the more favored rural areas, and a further 3 out of 8, almost exactly the same number as in the large urban centers, were in the less favorable rural areas. The more favored rural areas -- central and southern provinces and parts of the eastern provinces -- have better communications, are more prosperous, and produce the bulk of marketed production for the market. In contrast, the less favored areas -- Western, Northeastern, Luapula, Copperbelt, and Northern Provinces, and other parts of the Eastern provinces -- are remote and have poorer communications, very few farmers who produce consistently for the market, and the greatest concentration of very poor people.

In the urban areas, the concentrations of poverty are often in squatter areas, especially in Lusaka.

Table 2.1

The Population of Zambia - 1979 Mid-year Estimates
(Thousands)

Province	Total	Large Urban a/	Rural & Small Urban: Less Favored Areas	Rural & Small Urban: More Favored Areas
Central, including Lusaka Province	1208	738	-	470
Copperbelt	1367	1280	87 b/	-
Eastern	650	-	196 c/	454 d/
Luapula	358	-	358	-
Northern	638	-	638	-
Northwestern	292	-	292	-
Southern	602	80	-	522
Western	534	-	534	-
Totals	5469	2098	2105	1466
Percentages of total populations	100	37	37	26

Source: CSO 1978, pages 2 and 3

Notes: a/ The Copperbelt except for Ndola Rural Kobwe, Lusaka.
b/ Ndola Rural
c/ Chadia, Choma, and Lundazi Districts
d/ Chipata, Katete, and Petuake Districts

Other demographic features directly linked with poverty and malnutrition are very high birth rates, heavy and continuing (although at a somewhat reduced scale) rural-urban migration, and (partly as a result of this) a high proportion of separated or disrupted families and female-headed households.

Recent estimates suggest that about 25 percent of urban households and about 80 percent of rural households are below a basic minimum needs level of food and income. 1/ The 100,000 urban households below the line represent some 400,000 people, and the 600,000 rural households below the line represent some 3 million people. Of this 3 million, the bulk are in the peripheral areas and are the great majority of rural dwellers.

The less favored and more remote rural areas differ in their demographic composition from those that are more favored. Outmigration, especially of males, has been marked and sustained from Western, Northwestern, Luapula, and Northern Provinces in particular. In those provinces, female-headed households are a high proportion of the total. In Luapula, for instance, these constitute a third of all households. Marter and Honeybone's 1975 survey of 683 rural households in seven provinces confirmed that the less favored areas had higher proportions of small and physically weak households than the more favored areas. 2/ Their survey also found that the less favored areas had a higher ratio of dependents, both children and old people, to active adults (1.5 against 1.2), usually about half the average farm size, and very much smaller per caput marketed crop incomes (K5.8 against K34.0). 3/ Weakness, small households, lack of tools and equipment, small areas cultivated, and low incomes were closely associated.

B. Farming Systems

The same regional division into more favored and less favored areas is reflected in the distribution of types of farming households. These are loosely described as subsistence, emergent, and commercial, and their characteristics are sketched in Table 2.3.

There is a marked concentration of almost all the commercial farmers and a substantial majority -- probably at least 90 percent of the emergent farmers -- in the more favored areas. Althouth there are no reliable figures for this, one indication is that in 1977-78 no less than 88 percent of all agricultural loans were issued to farmers in the more favored line of rail provinces (not including Eastern Province). In contrast, the majority of subsistence farming households were in the less favored areas. This distribution is also reflected in cropping patterns: most of the marketed maize is produced along the line of rail provinces, whereas the main subsistence staple elsewhere is sometimes maize, but often cassava, millet, or sorghum.

1/ ILO/JASPA (Jobs and skills program for Africa) Basic Needs Mission, 1980, personal communications.

2/ A slight difference between Marter and Honeybone's definition of more favored and less favored areas, and that used above (Table 2.3 and elsewhere) is unlikely to affect these generalizations.

3/ Marter and Honeybone, op. cit., pages 53, 63 and 68.

Table 2.2

Regional Distribution of Rural Household Size and Household Composition

Number of adults in household	More favored Central, Southern, Eastern	Less favored Northern, Luapula, Western, Copperbelt
1	7	19
2	30	49
3	24	16
4	15	7
5+	24	9
Total	100	100

Table 2.2(a)

Rural Household Composition (average number of household members in each category)

Rural Household Composition	More favored Central, Southern, Eastern	Less favored Northern, Luapula, Western, Copperbelt
Children under 8 years	1.6)	1.3)
	3.1	2.3
Children 8-14 years	1.5)	1.0)
Male adults 15-55 years	1.4)	0.8)
	3.0	1.9
Female adults 15-55	1.6	1.1
Men and Women over 55	0.4	0.6
Average Household size	6.4	4.8

Source: Marter and Honeybone 1976, pages 54 and 53.

Table 2.3:

Broad Characteristics of Main Types of Zambian Farms

	SUBSISTENCE	EMERGENT	COMMERCIAL
Main Starch Staple	Cassava, Millet, Sorghum, Maize	Fertilizer, seed, Pesticide	Fertilizer, Seed Pesticide, Herbicide, Veterninary Products, Drugs
Main source of cash	Occasional food surplus sale. Fishing, beer, charcoal, etc.	Deliberate production of cash crop surplus for sale	Deliberate production of cash crop surplus for sale
Production of new cash crops (cotton, sunflower, soyabean, tobacco)	None	Some	Some
Power Source	Hand	Hand and oxen, and a few tractor hire or ownership	Tractor ownership, Possibly some oxen
Labor Source	Family, communal and some casual	Family, communal, casual, and occasionally permanent	Permanent and Casual
Size of Farm	Up to 5 ha. but usually less than 2 ha.	2-4 ha.	50 ha. and over
Number of Households	610,000	90,000	1,500 - 2,000
Percentage of total households	87	13	0.2 - 0.3

Notes:

The figures in this table are very approximate. Successive surveys have used different categories. The estimates of numbers of households by type of farm are derived from attempts to reconcile data from the Census of Agriculture 1970-71 (First Report), CSO, May 1974; Agricultural and Pastoral Producing 1971-72 (Non-Commercial Sector) CSO, November 1976; Marter and Honeybone 1976; and population data from CBO 1980. The resulting estimates of 610,000 subsistence households and 90,000 emergent farming households only give rough orders of magniture. The rounding is to the nearest 20,000. The characteristics of the types of farming households are adapted from a table provided by the Planning Unit, Ministry of Agriculture and Water Resources, with additions.

The pattern is thus of the more favored central and more accessible areas having a population of about 1.5 million, with generally larger and stronger families, lower outmigration, larger farms, higher per caput incomes, and more production, especially of maize, for the market; and of the contrasting less favored or peripheral areas, with a population of about 2.1 million, with higher outmigration, smaller and weaker families, many of them with only female adults, smaller farms, much lower per caput incomes, and much less production for the market. There are many poor households in the more favored areas, but they form a higher proportion of the population in the less favored areas.

The more favored areas also enjoy superior access to public services of all kinds and better distribution of goods and marketing facilities.

C. Seasonal

Rural Zambians suffer the effects of unimodal tropical seasonality. For most small farmers, only one crop is possible during the rains. Irrigation is insignificant, except in small local pockets. All indications are that rural deprivation has the marked seasonal character noted elsewhere in Africa, mirroring south of the equator problems that exist north of the equator in a similar band of unimodal rainfall. During the rains, and especially during the period January to March, many adverse factors coincide and interact: shortages of food, less variety of food, less nutritious food, difficulties in transporting food, harder work, less time available for child care, higher exposure to infections (especially malaria and diarrheas), and difficulties of travel and access to health facilities.

Problems that accompany the rains are especially acute for weak households and for the many women who have to manage households on their own. As housewife, mother, cook, gatherer of firewood, fetcher of water, farmer, food processor, and marketer, a woman heading a rural household faces extreme difficulty at this time. In the nothern half of the country, where heavier rain and leached acidic soils give cassava some advantage, the weak households grow cassava disproportionately, not least because the labor requirements are more evenly spaced than for maize. 1/ As the food of last resort, especially during the food-short season of the rains, cassava is critical for perhaps 2 million rural Zambians. But during the rains, the time-consuming work involved in cassava processing competes for labor needed for new cultivation, and drying cassava becomes difficult. The combination of heavy seasonal demands for labor, food shortages, and sickness, not least among children, makes this the time of year when poverty and deprivation are most acute.

1/ Marter (1978, p. 27) gives the relative labor requirements of maize and cassava cultivation as follows (hours per hectare):

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
Maize	67	121	198	158	8	-	-	-	-	-	-	-	552
Cassava	5	7	47	81	97	98	43	24	16	12	10	8	448

It is, however, also the time of year when rural deprivation is least observed by urban-based professionals and officials. Travel in rural Zambia during the rains is difficult except on all-weather roads, which do not reach many of the poorest. The worst rural deprivation therefore goes largely unseen. When the rains are over, travel is easier, the harvest is in, conditions are healthier, and deprivation is less pronounced.

D. Biases against Rural Producers, Especially the Poor

A fourth dimension of poverty is the biases against the poorer rural producers. At one level, these can be seen as urban-rural biases; at another, they are biases in favor of those rural producers who are better off against those who are poor.

First, the urban-rural bias is reflected in changes in terms of trade and in unequal income distribution (Table 2.4).

Table 2.4

Indices of Real Wages, Barter, and Income Terms of Trade (1965-77)

	Real wage, Zambian	Price index, low income	Price index, agricultural production	Barter terms of trade
1965	100.0	100.0	100.0	100.0
1966	102.1	110.2	106.4	96.0
1967	135.1	115.6	114.9	99.4
1968	130.6	128.2	90.4	70.5
1969	135.0	131.3	64.4	49.0
1970*	161.7	135.4	54.2	40.0
1971	171.4	139.1	64.5	46.4
1972	167.1	145.9	72.9	50.0
1973	175.9	155.4	72.0	46.3
1974	160.4	168.2	70.0	41.6
1975	147.8	185.1	60.5	32.7
1976	161.7	219.9	81.2	36.9
1977	142.9	263.5	95.6	36.3
1978		306.7	101.0	32.9
1979		336.5	119.6	35.5

* Change in base year of price index and of a different national account system.

Source: Working Paper of the ILO/JASPA Basic Needs Mission, 1980.

The rural-urban barter terms of trade shifted against rural producers (Table 2.5) from a base of 100 in 1965 to 35.5 in 1979. In 1979, a rural producer had to market three times as much as in 1965 in order to buy the same urban goods. Part of this shift results from subsidies, especially on maize meal. Maize is purchased at a fixed uniform price and resold, mainly to urban consumers, at a subsidized price. There is a larger fertilizer subsidy; but, because of a controlled producer price, this has been in effect a consumer, not a producer, subsidy.

Table 2.5

Changes in Some Rural Producer Prices (1971-80)

	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	Changes 1971-1980
Maize a)	4.00	4.30	4.30	4.30	5.00	6.30	6.30	6.80	9.00	11.70	192
Sorghum b)	4.70	4.70	4.70	5.00	6.00	6.00	6.00	6.00	6.00	6.00	28
Dried Fish c)	31	31	31	40	40	40	40	50	50	50	61
Charcoal d)	1.75	1.75	1.75	1.75	1.75	1.75	1.75	2.50	2.50	2.50	43
Low Income Urban price Index e)	100	1.04.9	111.7	120.9	133.1	158.1	189.4	220.5	241.9	n.a	

Note: If account is taken of changes in the fertilizer subsidy, this will probably reduce the comparative increase in the maize price

a/ Dodge 1979, table 3. Prices are for a 90 kg. bag.

b/ Ministry of Agriculture Farm Survey 1980, vol. 4. The price is for a grade A 200lb/90kg bag.

c/ Statutory Instruments 380 of 1967, 156 of 1974, and 38 of 1989. Prices are ngwee per kg (1971) - 14 Ngwee per lb).

d/ Relevant Statutory Instruments. The price is in Kwacha per 200lb/90kg grain bag measure.

e/ Calculated from data prepared for the ILO/JASPA basic needs mission to Zambia 1980.

E. Changing Livelihoods: Trends over the Longer Run

Rural and urban poverty are subject to long-term trends. Urban real incomes are reduced by stagnation or fall in formal sector employment, reductions in formal sector real wages, continued migration to the cities, and consequent overcrowding of the informal urban sector. In the absence of any real expansion of earning potential, there is evidence that the urban informal sector is saturated. Declining urban opportunities may be a major factor in the slowing of the growth of population in the urban areas from 66.4 percent in 1963-69 to 39.5 percent in 1969-74 and 37.1 percent in 1974-79, and a corresponding speeding up in the rate of increase in the rural population.

In the more favored rural areas, several studies (Mutemba 1979, Siegel 1979, Pletcher 1980) have shown a growth of agriculture for the market but at the same time households with weaker labor dropping out of modern sector agriculture. In the less favored areas, with more permanent out-migration, especially of males, agriculture has stagnated or declined. The removal of male labor has undermined traditional farming systems in which labor peaks were evened out by a division of labor between men and women. The citemene system of shifting cultivation based on a fire climax required that men lop the trees; with fewer men it has declined, and other cultivation practices that are more labor-demanding have partly taken its place. Land under non-staple crops has declined, with less variety of garden types and crop mixes and greater reliance on cassava and other starchy crops such as sweet potatoes. The greater reliance on fewer crops has simplified the diet but sacrificed nutritional balance.

These processes, especially in the less favored and labor-scarce areas, have created a large, depressed, scattered, and largely unseen population of small, weak, and very poor households. Although hard evidence is lacking, there are strong suggestions that remittances from urban areas have declined and are not a significant source of rural income. Those who depend largely on subsistence cultivation number about 3 million people, over half the total population of Zambia. Most are trapped at subsistence or below subsistence levels. Some have taken part in a gradual shift of population over the past two decades towards roads, river, and service centers. One effect has been a decline in shifting cultivation and an increase in continuous cropping of the same land, leading to declining fertility and yields. Subsistence households have been almost completely left out of agricultural development programs, which are designed for, and only feasible for, stronger and better-off households that can, for example, cultivate with oxen. The neglect of marketing for traditional crops (cassava, sorghum, millets) and the lower prices offered where they are accepted, make it even more difficult for this very large depressed population to improve its lot and to obtain a cash income, even though, in earlier, less-depressed times, many of them became accustomed to making cash purchases for basis goods. Many of these -- soap, salt, sugar, blankets, needles, paraffin -- are now both very expensive and very difficult to obtain, since urban areas take priority for limited supplies. Over the past decade most rural shops outside district headquarters have gone out of business. Households that in the past might have relied on the market to even out seasonal shortages have been driven back to the more precarious existence of subsistence farmers.

II. MALNUTRITION AND INCOME DISTRIBUTION

The inevitable consequence of the conditions and trends described above has been widespread malnutrition and disease interacting in a vicious circle. Hospital admissions due to malnutrition/anemia show a rising trend, both in urban and rural hospitals and clinics, although, in view of the close interaction of malnutrition and ill-health, data are less than conclusive. There are also some countervailing improvements, such as the conquest of smallpox and the improved provision of under-five clinics and other mother and child health services that have led to a creditable reduction of mortality and increase in life expectation, more or less in line with world trends.

The Nutrition Survey undertaken in 1970-72 with the assistance of the FAO in remoter rural areas showed a particularly heavy incidence of malnutrition and ill-health among children, especially in poorer regions relying on cassava as a staple (and often also a weaning food). In the absence of reliable longitudinal data it is difficult to establish trends over time, but a new survey conducted in 1979 by the WHO-supported Tropical Health Institute of Ndola seemed to show retardation of growth and (less clearly) weight of children since 1970-72. Malaria continues to be endemic and with worm parasites, measles, and iron deficiency, forms a formidable quadruple threat to health and child development. In the north, lack of Vitamin A combined with measles can lead to irreversible blindness among children and adults alike. Vaccination of children and the efficient running of rural clinics generally are threatened by lack of drugs and dependable cold chain and storage facilities, as well as lack of transport and access for the remoter -- and usually poorest -- households.

Data for urban malnutrition are scare, but with recent declines in real wages there are signs that, even in such relatively privileged areas as the mining towns in the Copperbelt, malnutrition among children is a problem.

In purely monetary terms, the costs of providing drugs, cold chain, vitamin tablets etc. is often quite small, and the resulting benefit/cost ratio of improvements would be extremely high. For example, the total cost to protect a child threatened by blindness due to Vitamin A deficiency/ measles interaction is of the order of 5 US cents per child. However, there are logistic, transport, administrative, and education difficulties in providing such protection to children in remote areas and very poor households.

The popular staple food of poorer urban families (roller meal) is nutritionally superior to the more refined product (breakfast meal) preferred by better-off groups. Yet the price margin between the two has narrowed in recent years, and there is a strong case for discontinuing the subsidy on breakfast meal, while maintaining it, at least for the time being, on roller meal. In the poor rural households the main staple is cassava, which is nutritionally inferior and particularly unsuitable for children, unless supplemented by meat, fish, vegetables, fruit or at least cereals. For poorer households, beans would be the most economical required supplement.

Lack of household food security and adequate nutrition stems primarily from the poverty and weakness of households. If they were less poor, rural households would have the resources to cultivate larger areas and to increase yields or to purchase food. Urban households would be able to purchase food, since it is always available at a price. But for the urban poor and for those of the rural poor who depend partly on purchased food, national food security and the assurance of adquate supplies of staples, especially maize meal at moderate prices, are vital.

Since it is a product of poverty, malnutrition is directly related to income distribution as well as trends in average income. As far as trends in overall incomes are concerned, the general picture was that, up to 1976 or 1977, average urban incomes were reasonably well maintained -- at the cost of widening the rural/urban income gap -- but in the last two or three years average urban incomes, and especially real wages, have been declining quite sharply, by perhaps 20 percent per caput. In the informal sector, which largely determines living standards in the squatter settlements, the decline in incomes has been much more continuous since the early 1970s. What happened was that the larger numbers crowding into the urban areas exerted increasing pressures on the jobs in the informal sector, given the stagnation or decline of the modern sector. Thus a given volume of jobs had to be shared out among increasing numbers of people, leading to falling real income.

This simultaneously had its effect on income distribution. Not only has the rural/urban gap within the urban sector increased, but the modern/informal gap within the urban sector has also increased, and larger portions of the urban population were in the low-income informal sector.

Data on income distribution are neither very up-to-date nor particularly reliable, but Table 2.6 gives a fairly clear picture of urban income distribution in 1976. It shows a very high degree of inequality of income distribution for the urban population as a whole (a Gini-coefficient of 0.50), which is almost certainly higher than the inequality of income distribution in the rural sector. The fact that the Gini-coefficient for urban population as a whole is higher than the separate coefficients for squatters, low-income or high-income groups separately, is due to the particularly sharp inequalities between these groups. The higher-income group (typically more skilled workers in the formal sector, as well as civil servants and other white-collar workers) had median incomes some 6 to 7 times higher than the squatters or lower-income groups. Incomes among squatters (typically informal sector workers) in turn were distinctly lower than those of low-income earners outside the squatter areas (typically unskilled workers in the modern sector). However, the real difference was not between these two categories but between either of them and the higher-income group.

Table 2.6

Income Equality According to the 1976 Household Budget Survey, Urban Areas Only

	Percentage of total income							
	Squatter		Low-cost		High-cost		All urban	
% of Population		cum.		cum.		cum.		cum.
0-20	4.6	4.6	7.4	7.4	8.8	8.8	4.6	4.6
20-40	11.8	16.4	9.8	17.2	12.0	20.8	8.0	12.6
40-60	14.4	30.8	14.8	32.0	16.3	37.1	12.1	24.7
60-80	22.3	53.1	21.5	53.4	23.6	60.9	19.4	44.1
80-90	18.0	71.1	15.3	68.7	16.9	77.8	18.9	63.0
90-95	11.3	82.4	12.0	80.7	22.2	100.0	13.0	76.0
95-100	17.6	100.0	19.3	100.0			24.0	100.0
Gini-ratio	0.41		0.41		0.33		0.50	
Average yearly income per person	238.18		270.04		1,432.51		353.85	
Median yearly income per person	179.90		213.40		1,212.32		287.89	
Average household size	5.47		6.41		4.87		5.95	

Source: UNDP/ILO: Second Report to the Government of Zambia on Incomes, Wages and Prices in Zambia (1978) Vol III, Table D4 (Mission estimates)

III. FOOD PRODUCTION

There are no statistics that cover all food production in Zambia. The Ministry of Agriculture compiles an annual forecast for the current crop, covering maize, seed maize, sunflower, shelled groundnuts, soya beans, paddy rice, wheat, sorghum, mixed beans, seed cotton, and tobacco. Conspicuously absent are the two main subsistence staples apart from maize and sorghum, mainly cassava and the millets (finger millet and bulrush millet). Yet both are very widely grown, especially in the peripheral areas. Cassava is grown by some 2 million Zambians, 1/ for some of whom it is the main staple, and for most of whom it is the fall-back food of last resort. Millet is somewhat less significant, but it provides the main source of cash income for many rural women through brewing. Statistics and policies are dominated by maize (See Table 2.7), because it is the basic staple for the urban areas and for the more favored rural areas and is also grown in some less favored areas.

The attention paid to maize is partly justified by the sheer scale of maize production and by its growing predominance. As a percentage of total marketed production of crops, its value rose from 61 percent in 1964/65 to 1968/69, to 67 percent in 1969/70 to 1972/73 and to 76 percent in 1973/74 to 1976/77. 2/ Contrary to common impressions, Zambia appears to have been largely self-sufficient in maize from 1972 to 1978. Production was adequate for or exceeded domestic demand for human consumption. At the end of 1979 the domestic requirement of maize was estimated to be 648,000 metric tons. 3/ During the period 1971-79 the annual percentage growth in marketed maize meal was 5.5 percent, 4/ which suggests that self-sufficiency was achieved from 1972 through 1978, a conclusion supported by recorded exports totalling 276,000 metric tons over the 7-year period, 61,000 metric tons in 1978 and by the small percentage of foreign exchange spent on imported cereals and cereal preparations, which include wheat and which only once in 1973-78 (in 1975) rose above 3 percent of all imports (see Table 2.8).

1/ This estimate is very approximate. It is based on Schultz 1974; the Agricultural Census of Zambia 1970/71; Marter and Honeybone 1976; population estimates adjusted to 1980; and advice from the Planning Unit, Ministry of Agriculture and Water Development.

2/ Dodge 1979, page 8.

3/ Evans and Jiggins do not make it clear to which year this refers. Since their paper was written well into the 1979/80 crop year, it is assumed here that it refers to 1980.

4/ UNDP/FAO 1974, and Planning Unit, Ministry of Agriculture and Water Devlopment.

Table 2.7

Selected Statistics for Maize

(All units thousands of metric tons of maize - except where otherwise stated)

		1972	1973	1974	1975	1976	1977	1978	1979	1980
A	Annual Comsumption Requirements from Marketed Maize a/	(424)	(448)	(472)	(498)	(526)	(552)	(582)	(614)	(648)
B	Marketed Production b/	617	460	495	559	746	693	583	338	360
C	Implied Surplus (B-A)	193	12	23	61	220	141	1	-276	-288
D	Recorded Exports c/	2	50	111	17	9	26	61	NIL	n.a.
E	Imports of Cereals d/ and Cereal Preparations K. '000	n.a.	6,011	10,931	18,388	10,902	13,363	14,672	70,000 -80,000	n.a.
F	E as percentage of total imports	n.a.	1.7	2.2	3.1	2.3	2.5	3.0	n.a.	n.a.

n.a. Not available

a/ 648,000 tons of maize is the estimated requirement in Evans and Jiggins 1979. Since 1972 consumption of maize meal has risen at 5.5% p.a. Annual requirements for years before the 1980 have been estimated by reducing this figure annually by 5.5%.

b/ Table 1 in Evans and Jiggins 1979, citing CSO and MAWD for 1972-1977.

c/ CSO 1980, p.22 (December 1979 n.a. and assumed to be nil)

d/ CSO 1980, p.21.

Food Imports, 1973-78
(K.'000)

	1973	1974	1975	1976	1977	1978 *
A. Meat and Meat Preparations	5,244	5,854	2,729	1,135	81	439
B. Dairy Products and Eggs	3,555	10.750	4,781	5,347	4,619	3,701
C. Fish and Fish Preparations	1,536	2,828	1,887	922	1,161	1,009
D. Cereals and Cereal Preparations	6,011	10,931	18,388	10,902	13,363	14,672
E. Fruit and Vegetables	1,472	2,938	2,036	939	1,428	773
F. Sugar, Sugar Preparations, and Honey	1,519	1,352	589	308	689	141
G. Coffee, Cocoa, Spices, Tea, and Manufactures	1,555	1,947	1,423	1,212	1,332	1,086
H. Animal Foods (not unmilled cereals)	1,439	3,506	1,334	1,710	3,091	7,497
I. Miscellaneous Food Preparations	2,191	2,991	2,107	1,500	2,278	1,758
J. TOTAL FOOD IMPORTS (A-1)	24, 522	42,927	35,274	23,975	28,042	31,076
K. GRAND TOTAL ALL IMPORTS	346,867	506,636	597,611	468,748	529,970	493,887
L. FOOD IMPORTS AS PERCENTAGE OF ALL IMPORTS (J/K x 100)	7.1	8.5	5.9	5.1	5.3	6.3

* Provisional

Source: CSO 1980, page 21

In 1979 and 1980, however, marketed production of maize dropped sharply to 338,000 and 360,000 metric tons (provisional figure) respectively, compared with an average of 593,000 for the previous seven years. The question is whether this drop is an aberration or whether it represents a long-term or more deeply-rooted shift. An aberration is more plausible for 1979 than for 1980. In 1979 there was bad weather; the credit squeeze resulting from policies agreed with the IMF in 1978 meant that many farmers had no credit for the 1978/79 crop season, and the war in the south disrupted the supply of inputs and spare parts and raised costs. A long-term trend might be indicated by the shift of commercial farmers out of maize, running down their machinery and not making new purchases, and moving into livestock, which they regard as more profitable and less risky. Even, however, if there is a longer-term trend here, commercial farmers produced only some 40 percent of marketed maize in the two recent years for which figures are available.

The major factors in the low marketed production of 1980 were almost certainly to do with prices, institutions, and effects of Zambia's prolonged economic crisis.

Throughout the 1970s Zambia followed a policy of negative protection for maize producers, paying them a controlled price well below borders prices. However, the producer price for maize was raised from K6.80 a bag in 1978 to K9.00 in 1979 and K11.70 in 1980. A further rise to K13.50 is promised for 1981. This has, however, coincided with other changes. First, costs of production, especially for commercial farmers who use more fertilizer and energy-intensive cultivation, have risen sharply. At the same time, attractive prices for cotton and oilseeds have induced widespread substitutions of those crops for maize by both commercial and emergent farmers. Meanwhile, however, Zimbabwe to the south, after a disastrous maize crop in 1979, raised producer prices by a quarter, and a large surplus for export was predicted for 1980. It might appear, therefore, that by raising producer prices further, perhaps to import parity prices, a large recovery in Zambia's production could be induced, especially since the domestic (white) variety is preferred to imported yellow maize.

Although there is every indication that Zambia's farmers, both commercial and emergent, are price responsive, there are two intractable problems that impede a dramatic recovery. The first is institutional. All maize is supposed to be marketed through the inefficient parastatal Namboard, which is reportedly slow to collect crops and slow to pay farmers for them. There are many cases of farmers not receiving payment for their previous crop until after preparations should have begun for the next one. Few conditions could be more designed to discourage subsistence farmers from emerging, or emerging farmers from becoming fully commercial. Those who do are attracted to crops for which payment is more prompt, as for example cotton paid for by the parastatal Lintco.

The second set of problems stems from Zambia's prolonged and deep economic crisis, due to low copper exports and other adverse external circumstances. This has prevented imports of agriculture inputs and incentive goods, has contributed to transport difficulties due to lack of vehicles,

spare parts, and gasoline, and has led to cuts in allocations vital for the operation of essential public services. It has also led to grey and black markets in a number of scarce commodities, and price controls have favored the urban over the rural areas, especially over the remoter rural areas.

The adverse conditions for commercial and emergent farmers have been many. The Ministry of Agriculture's extension service has been virtually grounded and severely demoralized. The Lima program to encourage the growing of maize has had some successes, but has also been promoted in areas where growing maize makes neither agronomic nor economic sense. Maintaining the program has been extremely difficult, with many government vehicles either dilapidated, commandeered for the Zimbabwe war (in 1979) or for the Party elections (during the run up to the 1980/81 crop season), or in long queues for repair by the Mechanical Services Branch. Harsh cutbacks on government recurrent expenditure have sharply reduced activities such as farmer training (over 1,000 courses held in 1970/71 declined to only 365 in 1977/78 and probably even fewer since). The amount of gasoline that could be purchased by the Ministry of Agriculture in 1980 was only one-fifth of the amount that could be purchased in 1973. The effects of reduced contact between agricultural staff and farmers, deteriorating roads, lack of spare parts (for ox-drawn as well as tractor equipment), uncertain supplies of inputs, and rapid inflation have created a high-costs and risky environment that discourages bold expansion of production by either emergent or commercial farmers.

IV. NATIONAL FOOD SECURITY: SOLVING THE PRODUCTION PROBLEM

The Government's current food production strategy is heavily oriented towards maize, with some attention to wheat. The maize strategy has the following components:

(1) Transferring the responsibilities of Namboard to Regional Cooperative Unions. The objective is to decentralize and to increase efficiency. In the short term at least, the effect of this move, if it occurs, is widely expected to be a further decline in services for emergent farmers.

(2) Raising the producer price. This has been set at K13.50 for 1981, but the incentive effect will depend on the extent to which the fertilizer subsidy is maintained in the face of pressures (e.g., from the IMF for it to be abolished), and on other cost components of production.

(3) A foreign exchange incentive to commercial farmers. Commercial farmers who market significant quantities of maize are to receive 50 ngwee a bag in foreign exchange.

(4) Operation Food Production, a program announced in 1980, to create two large-scale state farms, each of 20,000 ha., in each of Zambia's nine provinces. The farms are to be managed by technical assistance personnel and will, it is hoped, solve the food production problem.

There are many reasons why Operation Food Production could be a disaster. Costs would be very high, including clearing access roads; housing, electricity, and water for expatriates and Zambians; and the high input costs envisaged. With different countries adopting different projects, many varieties of tractors can be anticipated, with consequent problems of spare parts and servicing. Most of the few countries that have shown any interest have little expertise in tropical agriculture. Past experience with state farms has not been encouraging. The last major project of this sort in Zambia -- the Rural Reconstruction Centers -- was an economic and social failure. One estimate of the current costs of production of a bag of maize from a RRC is US$1125 approximately (Garner 1980) (18,900 bags from 3,000 ha at a cost of US$21 million, approximately). Above all, Operation Food Production, to the extent that it materializes, would divert scarce resources, including administrative capacity and foreign exchange, from more productive endeavors.

An alternative approach, in our view more likely to succeed, would aim for a long-term shift to less import-intensive production through encouraging emergent farmers and ox-cultivation. Emergent farmers already grow some 60 percent of the marketed maize crop. For this strategy to succeed, would require:

(1) careful assessment of incentive prices, including prices relative to alternative crops;

(2) concentrating maize production and resources for it in areas where maize grows best (mainly in the southern half of the country) and where ox-cultivation is possible, outside the areas infected with tsetse;

(3) providing an efficient marketing system, inputs, and credit;

(4) revitalizing agricultural extension and providing it with adequate recurrent resources.

V. HOUSEHOLD FOOD SECURITY: SOLVING THE CONSUMPTION PROBLEM

It is misleading, however, to view the problems of poverty and malnutrition in Zambia in terms of maize and wheat production. If maize or wheat are short, they will be imported. The costs will be born by the economy as a whole, but it is unlikely, short of war, a major international food crisis, or gross mismanagement, that there will be a serious absolute shortage of maize in Zambia. Maize production is thus part of the problem of the Zambian economy and effects the poor and malnourished only indirectly.

Malnutrition and deprivation are much more the result of poverty and consumption. For all Zambians to be able to eat adequately requires that they have adequate flows and stocks of food and income around the year.

A. The Urban Poor

For the urban poor and the small minority of the rural poor who depend on purchases of meal, the need is for a favorable relationship between income and costs of food. An argument can be made here for maintaining a subsidy on roller meal, on grounds both of income distribution and nutritional superiority. Improved income opportunities in the urban informal sector and more jobs in the formal sector though increasing existing capacity are vital, but depend partly on an improvement in external circumstances. For pronounced shortages of iron and riboflavin, food fortificants could be a cost-effective nutritional improvement. There is also much need for nutrition education, especially in relation to urban food plots ("gardens"), breastfeeding, weaning foods, and the disadvantages of breakfast meal.

B. The Rural Poor

Higher incomes for the small minority of rural households that regularly produce maize for the market can only indirectly, and to a slight extent, improve the livelihoods of the great majority who are subsistence cultivators. It is with these 3 million or so Zambians, and especially the 1 million or so who are in female-headed or otherwise physically weak households, that the problems of consumption mainly lie. For most of that 3 million, maize meal is irrelevant. It is either not for sale, or not on sale when needed, or they lack the money to buy it. Other measures are required to see that they have enough to eat.

Four complementary measures are suggested. All address the problems of poverty. The first three are designed to increase the production of incomes of poor households, starting with the resources they have where they are.

1. Agricultural Research

(a) Zambia is pioneering an agricultural research program with Agricultural Research Planning Teams (ARPT). The approach, entailing the analysis of farming systems, promises to bring agricultural research close to subsistence farmers and to identify research priorities that fit their resources, needs, and opportunities.

(b) Crops such as cassava, the millets, and sorghum have been neglected in the past; and there is still only one agronomist working on cassava research. The importance of root crops for the poor (Goering 1979) applies strongly in Zambia (Marter 1978) where cassava and to a lesser extent seed potatoes are grown, especially by the poorest familes in areas that are agronomically suitable. There is an opportunity for research on cassava and other crops of the poor to include the labor requirements of processing. In the case of cassava, varieties may be bred that are less labor-demanding in peeling.

(c) Another priority is research to identify cropping systems that can maintain fertility with continuous cultivation on some of of the less fertile soils, especially on the leached acidic soils of the higher rainfall areas.

(d) With livestock, research on the diseases and productivity of smallstock (hens, sheep, goats, pigs, etc.) should specially benefit large numbers of poorer rural households.

2. Marketing and Higher Prices for What Poor People Produce

Higher and more reliable incomes for poor rural people are best assured by marketing what they produce and paying them more for it. Prices offered for cassava, sorghum, and the millets appear designed to discourage marketing; open market prices, though low, are usually higher. Similarly, the price offered for honey, produced by some of the poorest people (especially in the Northwestern Province) is very low, leaving excessive "profit" margins for the Forestry Department. Again, controlled market prices for fish and charcoal have both risen much more slowly than inflation.

The opportunity here is to increase the incomes of the poorer producers in two ways: with staple crops (cassava, millets, sorghum, and honey) by assuring a market and providing a higher floor price; and with fish and charcoal, either by deregulating prices or by sharply raising producer prices.

3. Micro-Capital for the Poorest

The opportunity here is to reduce the drudgery and increase the labor productivty of poor households. Since many of the poorest households have high dependency ratios, and often only one, female, adult, the benefits both to production and to better care of children should be high. Suggestions

include improved tools and instruments for cultivation, food proccessing (especially), and cooking; new crop varieties and crop mixes that are less labor-demanding, higher-yielding, more disease resistant, less risk-prone, better in storage, easier to process, and more nutritious; smallstock and simple equipment for improving wells and reducing the labor requirement for water drawing and carrying.

4. Infrastructure and Services

Better production and consumption by subsistence households also depends on support from infrastructure and services. Better and more roads improve access and may reduce adverse terms of trade. Health services can reduce losses from sickness during the seasons of cultivation, quite apart from other benefits. Rural water in small-scale accessible sources can reduce drudgery and release labor for other purposes.

Pursued together, these four measures could transform the food security for many rural people. Their effect should be to increase food production by the poor and to enable them to earn modest incomes. There is danger, however, in analyzing the rural and urban sectors independently, of zero sum policies. Relative urban prosperity can mean rural impoverishment, as it has in the past; but the reverse could also occur with sharp rises in urban prices. A national strategy has to balance the interests and potential of each sector and create favorable interactions between them.

VI. A LONG-TERM URBAN-RURAL STRATEGY

Any long-term strategy to enable Zambians to gain adequate livelihoods must consider where employment takes place and at what cost. There is no prospect that formal sector employment can absorb more than a negligible proportion of new entrants to the labor force. Employment in mining and manufacturing in 1979 at 105,000 was virtually identical with 1972 (104,000). Meanwhile, the urban population had increased by 45 percent. Urban informal sector employment is saturated. This has been reflected in the decline in rural-urban migration. Given the deprivation that results from lack of male and adult labor in rural areas (especially the misery of so many female-headed households and the children of those households) and the wastefulness of unemployed urban labor, measures to reduce further rural-urban migration deserve to be examined. Evidence from several areas suggests the male out-migration is least in those rural areas where incomes are highest and where there are opportunities for income (from fishing, charcoal-burning, etc.) in the slack season. A long-term strategy might seek through local-level planning to improve year-round flows of food and income to rural people, assuring them of more stable and more substantial livelihoods. The long-term effect would then be to increase the productivity of Zambia's people and to reduce the pressure on the towns. Food production, national food security, and household food security should all benefit.

An essential complement to these measures is organization by the rural poor themselves. The distribution of resources in Zambia is determined partly by the strength of the elite (urban and rural) and partly by urban interests, well-organized and articulated through bodies such as the Zambia Confederation of Trade Unions. If resources are to be redistributed and rural producer prices raised, then the interests of the rural poor have to be better represented. Those who grow and sell maize can argue for higher prices through bodies such as the Commercial Farmers' Bureau. There is no equivalent body for the growers of cassava, sorghum or millet, and the interests of bee-keepers, charcoal-burners, and fishermen are but weakly represented.

VII. CONCLUSIONS FOR DONORS

In selecting measures to support, the World Bank, the EEC, and other bodies as well have their attention directed to obvious and easy activities that directly concern national food security and self-sufficiency. These are important, but they will not affect significantly the food security of the mass of poor rural households. To do that requires a quite different set of more finely pointed actions to enable the rural poor, especially those who are more remote and weaker, to secure adequate livelihoods. Problems of malnutrition are, of course, not merely problems of food production and incomes; and education and services must complement other measures. But without production and incomes, the poorer rural families will remain vulnerable; malnutrition and deprivation will persist and even deepen. The great pitfall is that the visible and measurable problems of the urban population and of food production for the market will be solved while the invisible problems of the poor rural majority go untouched.

Even for the urban population, better income and employment opportunities for the poorer sections are more fundamental to food security than merely the supply of additional food. And both urban and rural sectors would gain from a further reduction of urban drift numbers that exceed the income-earning opportunities in the towns.

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Part 3

Poverty, Food Insecurity, and Public Policy in Bangladesh

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Part 3

Contents

I. INTRODUCTION

This paper focuses largely on the consumption side of the Bangladesh food system and the food policy issues that have emerged from Bangladesh's difficult experiences since independence in 1971. The production side of the food system is not considered here in detail. A separate study of food security policy in Bangladesh and other countries is forthcoming from the World Bank's Agriculture and Rural Development Department.

The issues of slow growth, low productivity, the limited impact of modern rice varieties, and underutilization of irrigation, as well as the evidence on unequal development and increasing poverty and landlessness in the countryside, have been frequently reviewed. 1/ Many have given prominence to structural factors -- a social organization of production that constrains the realization of the still vast untapped productive potential of this fertile delta country. There are also technical problems in increasing the productivity of many of the cropping systems of this complex region. There are no high-yielding varieties of deep-water rice. The earlier semi-dwarfs were forcefully rejected by farmers as unsuited to main monsoon season cultivation. Others emphasize negative and short-sighted government policies that have failed to provide economic incentives to agriculture. The context for the policy failures implied in such analyses -- the inability and unwillingness of the state to tackle structural problems or "get the prices right" -- include social and political pressures, the complex of interests of urban consumers and bureaucratic and military groups that weak governments pamper with concessionally supplied food imports rather than take the tough-minded decisions that would lead to food self-sufficiency. There are also the periodic natural calamities that devastate crops and spread human misery. The objective of this paper is to explore these issues of food insecurity, poverty, and public policy a little more deeply in the light of the experience of the seven years from the famine of 1974 to the record harvest of November-December 1980.

The record clearly underscores the tension between longer-term agricultural development and short-term problems of food policy that have preoccupied the government and the donor community, whose assistance, amounting to approximately $1.5 billion a year, underwrites the Bangladesh economy. Beginning with a review of the salient dimensions of the now well-documented problems of mass poverty, this paper seeks, if tentatively, to develop a fresh theme. Striking, repeated characteristics can be identified in the behavior of the food system. Stochastic shocks of flood or an unfavorable mansoon have established the rhythm of a veritable food system cycle. However, the amplitude of these fluctuations is as much the consequence of the processes of macro control that involve the interaction of donors and government. In stressing, with an earlier historian of the food problem in Bangladesh (A.H. Khan, 1973), this man-made aspect of the problem, my hope is that something can be learned from a dispassionate review of the record about ways of improving macro food

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1/ For example Ahmed, 1977; Alamgir, 1978; Stepanek, 1979; World Bank, 1979.

system management. The paper ends by considering some of the points in the system where there are possibilities for small but difficult-to-achieve improvements in short-term food policy. 1/

1/ Khan (op. cit. p. 2) summarized his personal experiences of the period 1942 - 1971: "Nature was not the chief culprit. Extensive crop failure was very rare. Contrary to recent newspaper stereotypes, flood or cyclones, though frequent, were mostly limited in extent. Nature no doubt was sometimes over-exuberant, but usually generous." He drew from these experiences the still relevant lesson that there are no "magical cures" and warned against those proposing "a one-day hike to the mountain top".

II. SOURCES OF FOOD INSECURITY

Food security is most often considered as a problem at the national or international level. Food security discussions are then first of all concerned with minimizing instability in aggregate food supplies (fluctuations around the trend in consumption). 1/ Second, there is the related question of minimizing the costs of stabilizing supply to low-income countries with food insecurity problems. Third, there is the question of measures to limit fluctuations in prices and production at an international level.

However, stabilization of supply and the containment of price fluctuations are not the objectives of economic policies, but are ways to achieve implicit, but often unclearly specified, social welfare goals through limiting the human costs of quantity and price stability. There is the further objective of avoiding the socio-political disruption and negative impact on longer-term economic development of the emergency measures that governments feel compelled to take in response to periodic food crises. Finally, stabilization measures have a directional, positive impact on production by reducing the uncertainties of the economic environment within which the producer makes his decisions. 2/

Food insecurity manifests itself in the short term as the increased incidence of distress and higher levels of malnutrition and mortality, particularly among the economically most vulnerable sections of society. Food intake falls to levels at which people are unable effectively to continue productive activity. Such periods of stress also have adverse long-term consequences. Damage is done to the physical growth of children. The distress selling of assets and disruption of family units increases the numbers of destitute and vulnerable people who are even more at risk in any subsequent disaster or crisis and also represent a long-term poverty problem.

In a largely rural society such as Bangladesh (with approximately 10 percent of population classified as urban) food insecurity is an aspect of the wider structural problems of poverty and mass malnutrition that make the majority of the population vulnerable to any instability in their economic environment, whether from environmental factors or from economic fluctuation generated within or outside the economy. It is the structure of its economy

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1/ For example, World Food Council, 1979; Siamwalla, 1980; Reutlinger, 1978.

2/ Levels of return of 80-100 percent on direct costs are commonly mentioned as necessary to provide sufficient incentive to encourage more intensive use of productivity-augmenting inputs -- higher fertilizer use, High Yield Variety (HYV) seeds, etc. Such high levels of return must in part reflect the considerable uncertainties surrounding production, including output prices that have experienced severe short-term fluctuations. Stabilization measures that limit these fluctuations are likely to result in a "rightwards shift" in the supply function.

and society that makes Bangladesh so vulnerable to variations in production that are small compared with fluctuations in most developed countries (Siamwalla, 1980).

For example, the largest recorded fall over a period of 12 months in aggregate production of food grains since independence in 1971 was approximately 8 percent over the period up to the main monsoon crop (aman) of 1979/80, largely the result of a severe drought following the record production year of 1977/78. 1/ However, with population growing at approximately 3 percent a year, the implied shortfall in production against the minimum rate of growth in food requirements is 11 percent. Shortfalls in production of this level, or even less in the famine year of 1973/74 (see Table 3.1), precipitate a serious food crisis in Bangladesh because of the low level of carryover of stocks, the highly unequal impact of shortfalls in supply, and the vulnerability of large sections of the population living close to, or even at, nutritional levels below those necessary for normal bodily function, resistance to disease, and growth in the child population.

An analysis of the problems of food insecurity in Bangledesh and possible policy responses at national and international levels must begin with an understanding of the poverty and malnutrition that make a substantial proportion of the population vulnerable to fluctuations in food supply. There is another important political dimension to the problem of food insecurity in a low-income country. The high proportion of income spent, even by relatively well-off groups, on basic foodstuffs and the high income elasticities of demand for food make the supply of food to the small urban population and industrial and tertiary sectors an issue of primary political significance. 2/ This is an aspect of the food security problem -- sharing supply and limiting real income effects of changes in food price levels -- that confronts the government of a low-income country. An analysis of possible policy responses to food insecurity will have to accommodate this consideration.

1/ It is conventional to estimate production in Bangladesh for an agricultural year, July-June, beginning with the early monsoon rice crop (aus) harvested in July and August. In the absence of reliable estimates of production on a monthly basis or of private levels of stocks, a better method would be a seasonally adjusted estimate. Year-on-year comparisons beginning with the main aman crop are probably a better measure of fluctuations in supply since there is least carryover of stocks beyond the beginning of the main aman harvest.

2/ The public ration system is intended to cover the resident population of six major urban centers as well as all public sector employees, whatever their location.

Table 3.1

Bangladesh: Aggregate Foodgrain (Rice and Wheat) Requirements, Supply 1972/73-1979/80
(Million long tons)

	1972/73	1973/74	1974/75	1975/76	1976/77	1977/78	1978/79	1979/80	1980/71
Foodgrain requirements a/	11.7	12.0	12.3	12.7	13.1	13.5	13.8	14.3	14.7
Production (net) b/	9.0	10.6	10.1	11.5	10.6	11.8	11.7	12.0	13.6
Procurement c/	-	0.07	0.13	0.42	0.31	0.55	0.36	0.35	1.1
Imports	2.8	1.6	2.5	1.4	0.8	1.6	1.2	2.7	1.1
Distribution d/	2.6	1.7	1.8	1.7	1.5	1.8	1.8	2.4	1.6
Availability e/	11.6	12.3	11.7	12.8	11.8	13.1	13.2	13.8	14.1
Availability f/ Gap (%)	-0.7	+2.5	-4.8	-0.8	-8.6	-0.9	-2.6	-	-0.6
Distribution as % availability	22.5	14.0	15.0	13.1	12.5	14.1	13.6	17.4	11.3

Sources: Ministry of Planning, Ministry of Food, World Food Programme.

Notes: (p), provisional.

a/ Assume 15.5 oz. per person per day of rice or wheat equivalent for population on January 1 of each year.

b/ Gross production of rice and wheat less 10% for losses and seed.

c/ Domestic purchase by government.

d/ Distribution by public ration system including food-for-work and relief.

e/ Net production less procurement plus public distribution.

f/ Food requirements minus food availability as percent of requirements.

III. POVERTY AND MALNUTRITION IN RURAL BANGLADESH

Bangladesh is a largely rural society with one of the highest densitites of rural people in relation to its agricultural land resource in the world. Rural population to agricultural land will have risen to approximately 10 persons per hectare by 1990 (World Bank, 1980, Table 4.1.). Agricultural yields are comparatively low -- less than 1.5 tons(t)/ha in rice and wheat production in 1977/78, or a gross output of less than 200 kg per person. The Bangladesh Government's own definition of minimum food requirements (15.5 oz. a person a day) implied an average food production deficit or "availability gap" of 15 percent over the period 1972/73 - 1980/81.

Imports of food publicly distributed have augmented supply by between 10 and 20 percent over the past decade. Public distribution, including domestically procured food, has accounted for between 10 and 23 percent of estimated availability. But imports and public distribution have only partially counteracted the effects of fluctuation in supply resulting from variations in domestic production (Table 3.1). 1/ This is considered in more detail below (see Section VI). Apart from fluctuations in supply, official estimates of foodgrain availability also suggest that supply measured against average requirements has been substantially inadequate in at least three of the past eight years. The consequence has been severe levels of malnutrition for low-income households in both town and countryside 2/.

The highly skewed pattern of expenditure on food in rural areas reflects the structure of both asset and income distribution. High population densities are also associated with a highly unequal distribution of agricultural land. Approximately 30 percent of the rural population is landless, and another 20 percent of householders own less than half an acre (0.2 ha) of cultivable land (Bangladesh Bureau of Statistics, 1977). The landless and near landless are obliged to find their livelihood, or to supplement their incomes, from agricultural wage labor and non-agricultural activities such as cottage industry, petty trading and porterage. 3/ At current levels of land productivity, many

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1/ Variations around the trend of domestic production averaged 11 percent over the period 1965-76, whereas variations in "availability," including publicly distributed imports, have averaged 7 percent around the trend (Ahmed, 1979, p. 17).

2/ The Bangladesh Bureau of Statistics (1978) surveys of consumer expenditure provide evidence on low levels of food intake by low-income urban and rural households. The Institute of Nutrition and Food Science (1977) survey of rural Bangladesh provides more detailed, cross-section evidence on food intake and the incidence of malnutrition (Table 3.2). The work of the International Center for Diarrheal Diseases (ICDD), in its laboratory area in Matlab Thana, Comilla District, provides comparative evidence on the impact of the war of independence, 1971, and environmental stress (the floods of 1974) on levels of nutrition-related morbidity and mortality (Chen, 1981).

3/ See Clay, 1977, and Ministry of Agriculture, 1978, for estimates of rural employment.

households with up to a hectare of land will also find it difficult to do more than meet minimum nutritional requirements from cultivation alone. 1/

Table 3.2

Bangladesh: Regional and Seasonal Dimensions of Dietary-Energy Gap, 1975/76
[Mean calories/person (percent of calorie standard)] a/

Period	Location b/		
	Chittagong	Dacca	Rangpur
May-July 1975	2766 (130)	1584 (75)	1757 (83)
Aug.-Sept. 1975	2664 (126)	2012 (95)	2014 (95)
Oct.-Nov. 1975	2586 (122)	1766 (83)	1731 (82)
Feb.-April 1976	2754 (130)	1060 (95)	2129 (100)

Source: Nutrition Survey of Bangladesh, 1975/76.

Notes: a/ Daily calorie standard of 2122 calories per person.
b/ Purposive survey including 140 households in 3 locations.

Aggregate labor requirements of agricultural and other major sources of earned income in the countryside result in significant levels of under-employment, estimated as up to 40 percent of available labor time (Ministry of Agriculture, 1978). This, taken in combination with the seasonality of employment, particularly for hired labor, and the low wage rates, results in poverty that is massive in dimension by any definition. Focusing on malnutrition as a direct and quantifiable consequence of rural poverty, it emerges that the

1/ Average land productivity is currently less than 1.5 t/ha. Where seasonal flooding or lack of irrigation preclude multiple cropping, net production, allowing for seed, would on many land types range between 1 and 2 t/ha. See Banladesh Rice Research Institute (BRRI) crop-cut reports for estimates of yield. Labor requirements of rice cultivation make it difficult for a family having less than the equivalent of two full male field workers to retain more than a ton of food grains. [See U.S. Agency for International Development (USAID), Dacca and Ministry of Agriculture, Agro-Economic Research Farm Management Studies for estimates of labor requirement.]

proportion of the population suffering from serious shortfalls in calorie intake is approximately equivalent to the proportion of landless and near landless in the rural population. 1/

In addition, almost 50 percent of the population had deficient or low levels of riboflavin and vitamin A; and anemia was widespread (70 percent of the total population and 82 percent of children had less than the minimum acceptable level of hemoglobin in blood). Variations in nutritional status within families and between socio-economic groups defined by landholding size confirmed that certain segments of the population are most likely to suffer from malnutrition and to be more vulnerable to variations in food supply. 2/

The present intra-family distribution of food implies that malnutrition is most acute for small children and lactating and pregnant women and least severe for adult males (Chen, 1981; Institute of Nutrition and Food Science, 1977). Poverty and malnutrition and associated problems of disease and mortality have a powerful seasonal dimension. The labor requirements of agriculture have seasonal peaks, with a major period of inactivity at the end of the monsoon season before the main crop. 3/ The disproportionate significance of the main aman harvest presents a major problem for marginal cultivating households as well as the landless dependent on wage employment. The pattern of debt forces many households in physical food surplus to sell a part of their output immediately after harvest when prices are usually lowest (Table 3.3). They are then obliged to enter into further debt or to try to finance food purchases by agricultural work in the period of least activity and relatively high food prices before the next main harvest. Table 3.2 suggests the extent to which the seasonality of agricultural activity shapes the pattern of nutrition. The same is true for disease and mortality 4/ (Chaudhury, 1978). A seasonal pattern of the run down of food stocks and movement into deficit of many cultivating households, combined with unemployment and lack of purchasing power on the part of the landless, is an important dimension of the food insecurity problem in Bangladesh. In years of relatively tighter food supply or natural disaster, the potential exists for near-total social disintegration. Large numbers of cultivating households may be forced to sell off their assets to sustain consumption. This exacerbates the long-run structural problem of poverty by increasing the pool of landless and destitute.

1/ The 1975/76 Rural Nutrition Survey found that 46 percent of households studied had a significantly inadequate calorie intake (Institute of Nutrition and Food Science, 1977). See also Lipton (Part 4 of this volume) for critical discussion of estimates of calorie malnutrition with reference to India.

2/ The average intake of all families having less than 3 acres of land was found to be deficient in calories, calcium, vitamin A, riboflavin and vitamin C.

3/ There are marked regional variations in the pattern of employment in agriculture, but everywhere there is little activity in the pre-harvest period 6-10 weeks in September to November (Clay, 1978).

4/ It should be noted that the amplitude of seasonal fluctuations in average calorie consumption is considerably greater than the variations in aggregate consumption around trend levels.

Table 3.3

Bangladesh: National Monthly Average Wholesale Price of Coarse Rice, 1972-80
(Actual and Seasonally Adjusted)

Month	1972	1973	1974	1975	1976	1977	1978	1979	1980
				Takas per Maund					
January	40	69	88	212	113	101	133	139	194
February	42	75	97	239	113	111	133	145	196
March	51	82	114	261	107	118	143	159	197
April	54	91	131	235	104	130	147	176	204
May	63	91	130	202	105	129	137	183	190
June	62	87	134	193	101	139	131	217	178
July	61	85	138	197	105	150	130	233	166
August	72	83	170	160	104	142	129	225	161
September	73	86	209	153	106	145	139	220	162
October	71	90	256	130	110	145	139	204	162
November	67	85	213	105	107	129	137	194	160
December	63	82	186	106	98	125	132	182	156
Annual Average	60	84	156	183	106	130	136	190	177

Month	1972	1973	1974	1975	1976	1977	1978	1979	1980
				Seasonally Adjusted Index (1976 = 100) b/					
January		71	89	216	115	103	136	142	198
February		75	97	240	103	114	137	153	189
March		79	110	251	103	114	137	153	189
April		85	122	219	97	121	137	1o4	190
May		83	117	182	95	116	124	166	172
June		79	121	174	92	120	119	196	166
July	54	75	123	175	95	134	116	207	148
August	65	76	154	145	95	129	117	205	147
September	65	77	186	136	94	129	124	196	144
October	65	82	233	118	100	132	126	185	147
November	63	80	201	99	101	122	130	183	151
December	66	85	194	110	102	130	138	190	162
Annual Average	57	79	147	173	100	123	128	179	167

Source: Directorate of Agricultural Marketing.

Notes: a. Combined unweighted average of all varieties of coarse rice.
b. Seasonal adjustments based on monthly average prices as a percentage of 12 month moving average price July 1958 - June 1970. This index is to be regarded as illustrative of seasonally adjusted price movements. Closer analysis would show significant changes over time in the pattern contribution of different rice crops to production and marketed output. For example, the increasing significance of boro (Spring-harvest) rice and the later planting and harvesting dates of high-yielding varieties of boro.

Food insecurity also has a regional dimension, with what are, by Bangladesh standards, abnormally high levels of malnutrition and human distress. Pressure of population has resulted in the settlement of lands that are marginal, not only in terms of productive potential 1/, but also because of high risk of natural disaster leading to partial or total loss of crop as well as of any capital investment in land improvement and equipment.

Kurigram subdivision, the area worst affected in 1974 famine, 2/ exemplifies this. It is a region of 970 square miles with an estimated population of 1.29 million in 1974 and a ratio of seven persons/hectare of cultivated land. Geographically the area consists of flood plains of the Brahmaputra and Tista river system. Flood damage to crops and erosion are annual phenomenia. The floods erode previously settled land and deposition creats new chars (sand banks and Riverine Islands), which are rapidly taken into cultivation, often by families dispossessed by earlier erosion. Rice yields average one t/ha, only two-thirds of average national productivity; and gross output per person is below the official minimum requirement of 15.5 oz. a day per person. Low productivity combined with a high risk of large-scale crop failure, which can be caused by either drought or severe flooding, makes Kurigram one of the areas most prone to disaster and subsequent famine.

The mapping of areas liable to famine (Currie, 1978) shows that the worst effects of drought and flood are highly regionalized. An important aspect of short-term food insecurity is the problem of intracountry distribution and effective targeting of supplies on severely-affected areas. This factor is elaborated below (Section III). Quite different are the problems of food shortage and famine that occur during countrywide shortfalls in food supplies (see below Section IV and Section V).

The high level of marketed food is another, and perhapss surprising, characteristic of this still largely rural economy. The expanding urban population has increased the market demand for food, but urban demand accounted for no more than 11 percent of expenditure of foodgrains in 1973-74. Market demand is also increasing in rural areas because of the growing proportion of landless and near landless in the population. The as yet unquantified scale of post-harvest sales and pre-harvest purchases by households that in terms of gross output are net surplus producers also increases the marketed share of foodgrain

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1/ Seen as the level of land productivity with existing technology in favorable environmental conditions.

2/ Akbar, 1975, provides a detailed account of the famine and its impact in Kurigram. See also Stepanek, 1979, p. 63-6.

consumption. Taken together, these factors suggest that market purchases, including the public ration sales, account for between 40 and 50 percent of total expenditure on foodgrains. 1/ With public distribution accounting for approximately 15 percent, this in turn implies an open marketed share of domestic foodgrain expenditure in the range of 25 to 35 percent. 2/ Rural and urban low-income households also constitute the greater part of the market for foodgrains.

Public food distribution, established in the wake of the 1943 famine, has become an integral and major component of the Bangladesh food system. Public supply through rationing focuses primarily on the population of the major urban centers, public sector employees, and industrial workers. There is a limited distribution of food grains through "modified rationing" to rural areas as well as relief activities including food-for-work programs. Approximately two-thirds of food distributed through the public system is allocated to the above-mentioned priority groups (Table 3.4). The poorest consumers, excluding low-paid public sector employees, are therefore left to depend on the residual commercial market for food grains and will bear the brunt of adjustments to fluctuations in domestic supply. Without exploring the operations of the public sector in detail, it should be noted that, to the extent to which it increases domestic supply through importation of food grains, the public sector dampens the effects of fluctuations in domestic production. 3/

1/ Urban expenditure on food accounted for 11 percent of aggregate foodgrain expenditure in 1973-74 (Bangladesh Bureau of Statistics, 1978). The poorest 53 percent of rural consumers accounted for 41 percent of rural cereal consumption. Taking account of factors such as rural wages being largely monetized and the real value of wage being sensitive to food price movements as well as the purchases of those in seasonal deficit, it is probable that market purchases of food in rural areas are not significantly different from this 41 percent of expenditure by poorest consumers. Ahmed (1979) estimates market demand for food as 24.5 percent of gross rice production, also using the 1973/74 household expenditure data. However, subsequent evidence on land distribution indicating that the poorest 50 percent of rural households are largely dependent on market supplies would suggest a higher figure.

2/ The publicly distributed share of availability has only exceeded 15 percent in 1972/73 (22 percent) and in 1978/79 (17 percent). But periods of food crisis, when public distribution is more important, are also times when more people are forced into the market by their household food deficits.

3/ Ironically, the higher the level of leakages from the public system, the more significant are the effects on the open market. The existence of a sizeable market for food grains in the countryside also provides part of the economic explanation for the high level of leakages of inferior grains, notably wheat, from public distribution activities, including food-for-work. See Ahmed, 1979, for a fuller description of public distribution.

Table 3.4

Public Foodgrain Distribution by Category of Beneficiary Group, 1968/69 - 1979/80 (percent of total)

	Statutory Rationing (Urban) a/ (1)	Other Priority Groups b/ (2)	All Priority Groups (1) + (2) (3)	Modified Rationing c/ (4)	Relief d/ (5)	Food for Work e/ (6)	Total Percent (7)	Total Thousand tons (8)
1968/69	21.5	13.6	(35.1)	58.2	6.7	-	100.0	1,038
1969/70	17.9	12.6	(30.6)	68.3	1.1	-	100.0	1,354
1970/71	15.9	7.4	(23.3)	59.0	17.7	-	100.0	1,318
1971/72	16.2	9.3	(25.5)	50.2	24.3	-	100.0	1,734
1972/73	17.8	13.5	(31.3)	60.8	7.9	-	100.0	2,618
1973/74	29.1	22.9	(52.0)	45.0	3.0	-	100.0	1,728
1974/75	26.7	31.4	(58.1)	32.8	9.1	-	100.0	1,764
1975/76	21.4	35.5	(56.9)	29.5	6.6	6.9	100.0	1,676
1976/77	25.6	41.3	(66.9)	19.6	2.2	11.3	100.0	1,473
1977/78	24.4	40.8	(65.2)	19.4	1.6	13.8	100.0	1,847
1978/79	23.2	44.9	(68.2)	17.3	2.5	12.0	100.0	1,796
1979/80	20.5	42.8	(63.3)	16.0	2.1	18.3	100.0	2,402

Source: Ministry of Food.

Notes: a/ Ration card holders in six urban centers: Dacca, Narayanganj, Chittagong, Khulna, Rajshahi, Rangamati.
b/ Government, police, armed forces, mills and the large-scale industrial enterprise employees, student hostels, etc.
c/ Distributed by Union Councils at half statutory level.
d/ Disaster relief (Ministry of Relief and Rehabilitation).
e/ Food-for-work programs (Ministry of Relief and Rehabilitation).

Some of the trade-offs and tensions in food policy in Bangladesh are now apparent. First, attempts to provide incentives for producers through higher relative prices of food grains are potentially highly regressive in their short-run implications. The income and nutritional impact of increases in relative food grain prices will be most severe for poor consumers in both the towns and the countryside. 1/ Second, public sector distribution would have less political but greater real income and nutritional effect, to the extent to which it delivered food to the poorest consumers. Third, in the short-run, reliance on imports, especially food aid, provides the lowest cost way of augmenting domestic food supplies and building up food security stocks. But a high level of food imports in relation to market demand for food restricts the possibilities for encouraging the expansion of domestic production. A high and relatively stable level of imports could force back upon domestic producers the adjustment costs of fluctuations in production beyond their control.

The way the government has responded to the fluctuations in domestic supply illustrates the complex and difficult trade-offs that exist in food policy. There have been three domestic food crises in Bangladesh since independence. These were the famine of 1974, the Sylhet flood disaster and public food system crisis of 1977, and the drought of 1979. The problems of food policy emerge more clearly when these events are considered not chronologically but in terms of the relative scale of the food crisis. The 1977 crisis was largely a regional phenomenon. The 1979 drought was more widespread, with its effects felt nationally. The 1973/74 crisis was complicated and intensified by unfavorable changes in the external environment and consequent adjustment pressures on the Bangladesh economy.

1/ Pitt (1980, p. 41), who has quantified the impact of a shift to free trade prices, finds that "the greatest absolute losses (of calories) are incurred by middle expenditure groups and the greater proportionate losses are incurred by low expenditure groups." See also Ahmed, 1979, for an elaboration of this argument. The low employment elasticities of output in agriculture (see Clay, 1977) suggest that additional employment associated with increased output would do little in the short run to ameliorate the impact of higher food prices on real incomes of the rural landless.

IV. SYLHET FLOODS, 1977

The precursor to this disaster was the build-up of import levels in early 1975 and subsequent bumper harvests. This led to a 60 percent fall in wholesale rice prices by November and December, 1975, from a peak in March the same year (Table 3.3). For the producer, there was a 53 percent fall in aman harvest period prices between 1974/75 and 1975/76 (Table 3.5). Such was the buildup of stocks with two further good harvests (boro and aus) and high import levels that there was a further softening of prices in spite of a poorer aman harvest in late 1976. With harvest prices then at disincentive levels there was a reduction in plantings for the following boro (winter) season. This was most clearly reflected in a lower level of hiring out of pump sets for irrigation. There was also a cutback in the level of food aid shipments. 1/ There was a short and sharp turnaround in the supply position in the following months.

In April 1977 the boro and aus crops were devastated by early floods in Sylhet (the most northeastern district of Bangladesh). 2/ The major sufferers in this disaster were, as always, the landless and marginal farmers who are affected directly through a reduction in employment and increases in food prices. However, the price increases were ameliorated by the integration of regional markets within Bangladesh and by large-scale relief measures. 3/ The immediate problem after such a disaster is the lack of effective demand on the part of vulnerable groups rather than a problem of food supply. Relief and rehabilitation measures included for the first time a significant level of employment-creating, food-for-work activities during the summer and monsoon to tide the most seriously affected over the period up to the main rice harvest beginning in November (Brundin, 1978).

In spite of the high level of crop losses, grower prices in the region rose only 44 percent on a annual basis for boro rice and 38 percent higher for aus, against respective national movements in prices of 23 and 38 percent (Table 3.5). The integration of regional markets significantly dampened the effects of production shortfalls on prices, containing the scale of windfall losses and gains of a highly regionalized crisis. There were also rehabilitation measures

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1/ The cutbacks in food imports were a reflection of the concern among donors at the disincentive effects of the build-up of large food stocks during 1975/76 and low levels of procurement prices.

2/ Boro production fell 88 percent between 1976 and 1977 and aus production by 75 percent. Floods are a perennial hazard in Sylhet district, a largely monocrop region in which the spread of modern rice varieties during the dry season has been inhibited by the early incidence of floods. Many producers engage in multi-year storage of rice.

3/ Retail coarse rice prices rose by 50 percent between March and April 1977 but fell again by 11 percent in May in Sylhet District. Nationally prices rose by 11 percent and then fell by 1.4 percent during the same months.

Table 3.5

Primary Market Harvest Period and Official Procurement Prices for Paddy Rice, Sylhet District and Bangladesh, 1974/75 - 1978/79
(Takas/maund) a/

Season b/	1974/75 c/			1975/76 c/			1976/77 c/			1977/78 c/			1978/79 c/		
	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C
Aus	86	102	np	79	82	74	53	55	70	72	76	70	75	74	80
Aman	148	137	74	165	67	74	64	66	74	81	83	80	81	88	80
Boro (local)	83	109	74	45	56	74	65	69	70	70	73	80	90	104	86
Boro (Irrigated)	96	116	74	52	57	74	70	72	70	75	74	80	105	114	86

Source: Ministry of Agricultures and Forests, Directorate of Marketing.

Notes: np. no procurement;
A. Sylhet District;
B. Bangladesh;
C. Procurement, IRRI, International Rice Research Institute.

a/ Unweighted average of daily prices at selected "interior hats" (primary markets) during harvest and immediate pool harvest period.

b/ Aus: July - September; Aman: December - February; Boro (local): April-May.

c/ Procurement prices exclude the transport premium of Taka 3 (November 15, 1976-February 18, 1977 and Taka 4 (February 19, 1977 - November 14, 1979).

for producers including, for example, the distribution of wheat seed for the 1977/78 winter season. However, as with the relief of food-for-work measures, there is some uncertainty about the extent to which the most seriously affected and vulnerable groups were the direct beneficiaries of these interventions. 1/

The potential scale (involving hundreds of thousands or millions of people) and the frequency of such disasters (occurring almost every other year) underscore the need for large-scale relief and rehabilitation measures at a regional and even national level. The problems are those of finding efficient, decentralized forms of organization that can respond quickly and effectively to problems that are large in scale but regional in character. 2/

The Sylhet crisis took place at a time of reduced national production accounted for both by producer decisions and natural disaster. This quickly resulted in pressures on prices and the public distribution system as the gap widened between open market and ration system prices. The government responded by increasing the scale of commercial food imports. The level of food aid commitments was also increased in light of the developing crisis. These decisions proved to be badly timed, given the limited public storage capacity. The build-up of imports coincided with a sequence of favorable harvests, which resulted in record production levels in 1977/78. Food prices stabilized, public distribution and public stocks of imported food grains rose, and the government was left with little capacity to use domestic procurement as a way of providing floor prices for producers. Problems of macro control arise in Bangladesh when production is subject to fluctuations that are large and rapid in relation to the lags in import operations. As subsequent events in 1978/79 were to demonstrate, these problems are compounded by the decision process involved in determining the levels of food imports, particularly the levels of food aid.

1/ During a field trip in January 1978 the author observed that the location and size of wheat plots suggested that little of the seed in fact reached those who were most in need of rehabilitation. The Bangladesh Agriculture Research Council (BARC) has undertaken a subsequent study that suggests that 75 percent of wheat supplied for food-for-work projects in part of Sylhet District failed to reach the intended beneficiaries.

2/ The problems of decentralized administration are best documented for the pre-independence period by Sobhan (1968).

V. THE DROUGHT OF 1978/79

The drought of 1978/79 1/ was the most severe in living memory and resulted in the first food crisis of national dimensions since the famine of 1974. It provided a measure of the improved capacity of Bangladesh to cope with instability in domestic production. In retrospect it will be seen to highlight some of the problems that result from Bangladesh's continued high level of dependence on concessional food imports and its failure to build up adequate emergency food stocks.

The food situation had considerably improved by early 1978. There had been both record harvests and the highest levels ever of procurement from domestic sources during 1977/78. High levels of commercial and concessional imports programmed in the wake of the 1976/77 food crisis also contributed to the build-up of public stocks. These were thought likely to reach 1 million metric tons by late 1978. However, the early withdrawal of the southeast monsoon in October 1978 was to change abruptly the domestic food situation. Unfortunately, it was to be some time before there was a reappraisal of the situation by the government and members of the Aid-to-Bangladesh Consortium, who were still thinking in terms of the more optimistic appraisals of the food situation made earlier in the year. 2/

The first indication of the severity of the drought was the modest fall in open market rice prices from pre-harvest October peak levels during November and December 1978. 3/ The aman harvest only disguised an upward movement in prices on a seasonally adjusted basis. As the gap between open market prices and public system procurement and ration prices widened, the procurement program faltered and off-take from the ration system rose in early 1979 to monthly levels unprecedented since 1972/73 (Table 3.6).

1/ This account of the drought of 1979 and its impact and the policy response to food crisis is based on H. Brammer, 1979 (a valuable account of the agricultural aspects of the drought), and interviews by the author in Bangladesh during August September 1979.

2/ At the June 1978 Aid-to-Bangladesh Consortium meeting, aid commitments of 1.6 million metric tons (mmt) for 1978/9 were made in the context of expected domestic procurement of 500,000 mt and the continuous build-up of stocks towards the storage capacity limit of around 1 mmt.

3/ There is no official, seasonally adjusted index of rice prices for Bangladesh despite the considerable seasonal fluctuations in prices. A relatively simple seasonally adjusted series suggests that prices began to harden from October and November 1978 (Second half of Table 3.3). This upward tendency is confirmed by another approximate measure of seasonal movements in prices -- the percentage fall in prices from the pre-aman harvest high of September-October. This was less in November and December 1978 than in any year since the famine year of 1973/74. The behavior of the rice market in late 1978 provided warning signals of what was to follow.

Table 3.6

Monthly Off-take of Cereals from Government Stocks, 1972-81

	1972-76 Average monthly off-take	1976/77	1977/78	1978/79	1979/80	1980/81
July	166	114	160	118	200	105
August	178	97	168	118	225	105
September	188	104	186	145	248	132
October	193	143	202	160	277	143
November	151	112	151	121	223	123
December	116	68	115	114	168	89
January	131	106	143	154	174	108
February	138	147	155	166	182	140
March	143	148	166	179	194	
April	146	156	149	163	200	
May	147	136	127	167	162	
June	147	141	127	190	150	

Source: World Food Program.

The drought continued to affect agricultural production in subsequent seasons. The largely irrigated boro crop (estimated as 14 percent down from 1978) was affected by the low levels of open waters that provide the major source of water in this season for a crop irrigated by traditional and mechanized lift technology. The subsequent aus rice (estimated as 20 percent below 1978 level of production) and jute crops were also severely affected by lack of soil moisture at planting times. The effects of the drought were most severe in relatively well-drained high areas and on heavy soils. It was broken only by rains late in the aus season. Even the following aman crop was partially affected by late plantings.

The crisis was nationwide in its effects because of the integration of food markets. The cutback in production affected both producers and, probably more severely, those most dependent on agricultural wage employment. The landless were doubly hit by high prices and curtailed employment, especially due to reduced aus and jute plantings. 1/ Some of the most severely affected areas were the more remote rural regions of the north and west, including the ever vulnerable Kurigram, where near famine conditions prevailed for a period. Elsewhere the main effects were felt through rising food prices (Cain, 1979).

The close monitoring of the effects of the drought on agricultural production by Brammer (1979) and others showed how producers are able to respond flexibly to such a crisis. Some crops, including the increasingly important rain-fed winter wheat, were little affected. Subsequently, there was a considerable increase in the planting of many minor millets where inadequate soil moisture prevented plantings of rain-fed rice. Clearly, agricultural research, extension, and rehabilitation measures involving the supply of drought-resistant varieties could considerably help producers to cope with the effects of drought and possibly also flood. However, this would imply a flexibility of response and a knowledge of local conditions that would probably require the build-up of a considerable decentralized capacity to monitor disasters and support agricultural rehabilitation. As with previous disasters, the full extent of the human and economic costs of this drought will remain a matter of speculation.

This drought tested both the capacity of the government in a period of relative stability to cope with the problems of a food crisis and rehabilitation and the effectiveness of the support the international community can provide to Bangladesh in a period of crisis. Things began badly. Only the rice market and a few agricultural specialists appear to have recognized the seriousness of the drought as early as October and November 1978. Official estimates of production for the 1978 aman season suggested a fall of only 1.3 percent from the record harvest of the previous year. But this appears quite unrealistic in the light of the developments in the rice market. A government preoccupied with elections suddenly became aware of the magnitude of the crisis as the sustained

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1/ The time of aus and jute planting and subsequent intercultural operations are in a normal year the periods of most intense activity and relatively full employment (Clay, 1977, 1978). There is a serious lack of reliable quantitative information on the nutritional and wider economic impact of the drought.

and unseasonally high level of off-take from the ration system in early 1979 threatened to exhaust public food stocks. This international community seems to have been even slower to recognize the extent of the abrupt turnaround. The food situation was in fact aggravated by the curtailment of U.S. food aid shipments. U.S. officials felt that the Bangladesh Government was failing in its commitment under the new PL480 Title III agreement to set sufficiently high prices to sustain domestic production through procurement. The apparent lack of evidence on the effects of drought on production and the low levels of procurement in December-January 1979 appeared to support their view. 1/ As a consequence food aid shipments during the period July 1978 through June 1979 were below the level committed in 1978.

Once the extent of the crisis was recognized, the government responded by rapidly increasing the level of commercial and concessional food imports from all possible sources. Successful in scheduling an increase in food imports over a 12-month period to 2.6 mmt, the government was equally effective in organizing rapid unloading and distribution of imported food to inland storage and centers of consumption. Thus it was able to halt the price rise at mid-1979 levels and maintain the high flow of foodgrains through its public distribution system (Table 3.6).

However, to achieve this the handling and distribution of foodgrain had to be given priority over all other bulk goods in transshipment and within internal transport systems. If, for example, fertilizer stock levels had not been already high, then these emergency measures could have had an adverse effect on domestic production in subsequent seasons, thereby aggravating the domestic supply situation. Again, if there had been substantial stocks of food held in major consumption centers, the scale and urgency of such emergency measures would not have been so great.

Public and nongovernmental agency relief activities in most affected areas are thought also to have been successful in limiting the human costs of the severe drought. However, the worst effects appear to have been felt in remoter rural regions, and the limited capacity to monitor such events makes it difficult to be certain how severe the problems of intensified malnutrition and distress were, or how effective relief activities were in combating these consequences of the drought.

1/ This incident is a classic example of the problems that are raised by an attempt to give a longer-term "development focus" to food aid policy, i.e., to make aid conditional on performance criteria with respect to agricultural or rural development policies. The operation of such a policy, which involves if necessary the unilateral curtailment of aid, presupposes a monitoring and interpretation capacity within the aid agency that was lacking in 1978/79. When public statistics are unreliable and there is a rapid turnover of aid staff, it is difficult for an aid agency to develop and sustain such a capacity.

The crisis continued into 1980 after a second, disappointing aman crop. Higher levels of commercial as well as concessional imports were used to sustain public distribution at a level that contained the upward pressures on food prices. Bangladesh then moved into a relatively more favorable period. There was a succession of four record harvests, beginning with the wheat and boro crops of 1979/80. Food stocks also rose to a record level. Imports scheduled during the food crisis continued to arrive, resulting in port congestion in late 1980. Large-scale procurement measures were initiated to hold up prices for producers. At this writing Bangladesh has again swung rapidly from food crisis towards the problems of short-term over-supply. However, food stocks are still less than recently experienced year-on-year changes in the level of production, and food imports have also been cut back. The situation could again deteriorate rapidly.1/

There are a number of lessons to be learned from the drought of 1979/80. First, Bangladesh can cope with a rapid deterioration in the domestic food supply through an emergency program to step up the level of imports and ensure the rapid distribution of these augmented supplies within the public distribution system. However, such emergency measures have substantial balance-of-payments costs and, as discussed above, involve serious risks of disrupting economic activity. The scale of purchases in 1979 had immediate as well as continuing implications for the balance of payments. 2/ Giving priority to commercial imports of food crowds out other imports, in the absence of an international facility to meet the balance-of-payments costs of emergency measures. 3/

Such a crisis comes very quickly. A second lesson of the events of 1978/79 is that, in the absence of adequate monitoring and statistics, delays in recognizing the problem both by government and by donors may intensify the crisis. Practically, the monitoring of production still raises considerable problems, and there will inevitably be time lags in recognizing and responding to such problems. Clearly much higher levels of domestic stocks would allow governments to absorb the first effects of such a crisis without running stocks down to dangerously low levels and being forced into costly emergency measures.

1/ There already seems to have been some hardening of rice prices on a seasonally adjusted basis by the end of 1980 (second half of Table 3.3). But this firming of prices is at least partially explained by the record level of domestic procurement in 1980/81 (Table 3.1).

2/ During 1979/80 foodgrain imports increased to nearly US$700 million (Table 3.7). Commercial purchases of approximately 1 mmt entailed a foreign exchange outlay of $110 million (f.o.b) and purchases on deferred terms. In addition there were the increasing freight costs of commercial and food aid shipments to be financed.

3/ Imports were projected to increase by 26 percent during 1978/79. In fact imports rose in value terms by only 9 percent, excluding petroleum products, representing a decline in real terms. In 1979/80 the value of imports rose by more than 50 percent, with food imports accounting for 54 percent of this increase (Table 3.7) and petroleum products for 27 percent. Imports of other categories, apart from largely aid-financed capital goods, again fell in real terms.

TABLE 3.7

Bangladesh: Food Imports, Food Aid, and Merchandise Exports since 1973/74.

	1972/73	1973/74	1974/75	1975/76	1976/77	1977/78	1978/79	1980/81
1. Value of food imports (c.i.f. in US$ million)	321	344	582	408	169	284	251	691
2. Food aid disbursements (US$ million)	183	229	382	314	121	178	179	375
3. Merchandise exports (US$ million)	347	373	359	389	455	496	614	719
4. Food aid as % of food imports a/	57	67	66	77	72	63	71	54
5. Non-aid food imports as % of merchandise exports b/	40	28	56	24	11	21	12	44

Sources: Ministry of Finance, External Resources Division, Planning Commission; Bangladesh Bureau of Statistics.

Notes: a/ (4) = [(2)/(1)] x 100.

b/ (5) = [((1) - (2))/(3)] x 100.

Third, there is a clear need for measures to reduce the vulnerability of Bangladeshi agriculture to the effects of drought as well as flood. The flexible response of producers to the drought, documented by Brammer (1979), through switching to more drought-resistant crops, indicates one way in which disaster preparedness and rehabilitation measures could help contain the effects of a drought or flood. The rapidly expanding wheat crop was virtually unaffected by the drought. Crop diversification, supported by research and extension efforts, can contribute to reducing the vulnerability of Bangladeshi agriculture to environmental disaster. Extending the area under irrigation can also reduce the vulnerability of agriculture to unfavorable environmental conditions.

Finally, this crisis brought sharply into focus some of the problems in multi-party decision-making on the flow of concessional food imports. Government action, as in previous crises, reflected the political reality that the urban population and the bureaucratic-military complex that sustains the state will have first claim on food supplies distributed through the public system. 1/ This is a fact of life in Bangladesh and elsewhere. However, where these demands can be met by rapidly increasing the level of food imports, or by using domestic buffer stocks if available, such action is positive if far from ideal in taking pressure off the rest of the food system. What is more worrying is the outcome of complex decisions by the government and donors over the level of food imports over the period from the lead into the 1976/77 crisis until the present day. These decisions threaten to amplify the effects of fluctuations in food supply resulting from the instability of domestic production.

Government decisions are strongly influenced by short-term pressures -- to maintain supplies to priority groups and as far as possible to build up stock levels to minimize future risks to these supplies. Financial considerations of minimizing the costs of imports as well as taking advantage of the revenue-raising opportunities of concessional imports to sustain a public ration system also contribute to a desire to maintain high levels of concessional food imports. Donors take a longer view of the potential dangers of high import levels to domestic agricultural development and doubtless also wish to limit commitments to supply concessional food. They therefore consider the evolving food supply situation in making food aid commitments. On the whole this multi-party decision process has not been very effective and is possibly destablizing in its impact on Bangladesh because of the lags between decisions and their effect on the level of food imports. As "good" years have followed "bad" for agricultural production, the lagged response in the planning of food imports and aid commitments has meant that food imports have had a limited effect in smoothing out fluctuations in the supply of food grains (Table 3.1). 2/

1/ The share of priority urban and other groups increased during 1978/79 to 68 percent of total public foodgrain distribution (Table 3.4).

2/ Ahmed (1979) finds average fluctuation around local level production of 11 percent and 7 percent in consumption availability. This implies a much higher level of fluctuation in consumption than occurs in better managed systems of developed countries where much of the adjustment in grain consumption occurs in the livestock sector.

VI. THE BANGLADESH FAMINE

The events of 1973-75 have to a considerable degree shaped views on domestic food policy both in Bangladesh and internationally. 1/ An extraordinary combination of circumstances produced the most disastrous conditions since the Bengal Famine of 1943. Postwar disorder still affected the transport and distribution system. A government still trying to gain social control as well as one inexperienced in internal economic management and external economic and political relations proved poorly equipped to cope with the crisis. Bangladesh was in the midst of domestic hyper-inflation. The rapidly deteriorating external economic environment was a result of rising oil prices and worsening terms of trade for jute and jute goods, Bangladesh's major exports. Finally, a sequence of relatively poor harvests culminating in disastrous floods in some lower-lying regions led to near famine conditions.

Looked at after the food production crisis of 1978/79 that could have resulted once more in famine conditions, the aspect of the earlier crisis that remains of most interest is how an unfavorable external economic and political environment can be seen to have exacerbated the crisis. Only by good fortune did the emergency program of food imports in 1979 occur when grain markets were relatively soft, thus enabling Bangladesh successfully and rapidly to acquire imports on a range of favorable terms from many sources. 2/ During 1978/79 India was also able to prevent a serious food supply situation by drawing down on its massive domestic reserves. In 1973/74, Bangladesh lacked any such reserves. The concessional supply of imported food was also curtailed as commercial sales led to a sharp reduction in the availability of food aid from North America. The priority assigned to sustaining ration system supplies forced the Bangladesh Government into making commercial food imports equivalent in value to 56 percent of the value of merchandise exports in 1974/75. 3/ Balance-of-payment pressures at the height of the crisis began to constrain the supply of other imports essential for post-war reconstruction. 4/

1/ See, for example, McHenry, 1977; Alamgir, 1978; Sobhan, 1979.

2/ In addition to imports from the major developed-country grain exporters, Bangladesh obtained grain on a variety of terms from Burma, China, India, Japan, Nepal, Pakistan, and Thailand in 1979 and 1980.

3/ Due to uncertainties of definition the estimates in Table 3.7 should be regarded only as approximations. The presentation of imports on an annual basis in fact underestimates the severity of the balance-of-payments pressures felt in the middle of 1974. It was only later in the year that sizable food aid shipments began to make an appreciable impact on the food situation.

4/ Post-war reconstruction involved initially an attempt to move back towards pre-war levels of capacity utilization. Balance-of-payments constraints on the inputs of raw materials therefore disrupted production, whereas shortages of a wide range of basic consumer goods intensified the inflationary pressures of 1973/75.

The government also sought to augment public system food supplies by forced procurement at below open market prices from agricultural producers and the grain trade. Whatever the short-term rationale for such measures, 1/ disruption of private trade only intensified the pressures on consumers outside the public distribution system. With supplies at a low ebb in mid-1974 distribution also contracted in a highly regressive way through the limitation of rural (modified) rationing and food-for-work activity (Table 3.4). The system proved least effective in moving supplies to the remoter rural regions where famine conditions prevailed. 2/ Thus in this severest of crisis, exacerbated by problems of external supply, it was the remote and poor who bore the brunt of the adjustment process.

Food production was further hit in 1974 by the breakdown of the plant that was the major domestic soure of nitrogenous fertilizer (World Bank, 1979, Tables 3.1, 8.1). 3/ Fertilizer distribution fell by 100,000 tons (26 percent) between 1973/74 and 1974/75. Both problems of foreign exchange and difficulties of arranging supply in the short term in a tight market prevented Bangladesh from making good this shortfall, which probably reduced cereal production by 350,000 - 500,000 tons. Again, the response of the government was to use rationing and administrative allocation to ensure supply to priority groups. Where the effect of re-trading on prices and supply was documented, it appears that administrative allocation was again highly regressive in its impact (Von Martius, 1975). 4/ The fertilizer shortages of 1974/75 illustrate a problematic aspect of the increased use of modern inputs. The disruption of domestic production or supply difficulties with imports introduces a new source of food insecurity.

1/ Nurul Islam provides some clue to the framework of ideas within which the forced procurement was organized: "To the extent that the Government was able to procure food from the surplus farmers, it would be possible to reduce their consumption and import less. It was also thought that the purchases of food in the domestic market might reduce the stocks of food available to farmers and traders for speculative operations in times of shortage...." Compulsory procurement was favored because "there was a possibility that voluntary purchase, even if the purchase price was not unfavorable compared to the ruling market price, might not secure enough foodgrains for the Government if farmers or traders decided to hold on to their stocks in anticipation of further shortages" (Islam, 1977, p. 115).

2/ Akbar (1975) reports how in Rangpur the famine problem was recognized too late and, with restrictions in the supply through modified rationing, relief began only after there were widespread famine deaths, large-scale sale of land and assets by marginal farmers, and mass migration of the destitute towards the towns. See also Stepanek, 1979, pp. 63-66.

3/ This might appear to be a chance event, a further piece of bad luck. But when an economic system is under intense pressure and there are maintenance and spare parts problems, it is probably more likely that such a breakdown will occur.

4/ During the 1978/79 drought the government again introduced anti-hoarding regulations, restricting the level of stocks maintained by the private grain sector. If such regulations were effective, the carryover of stocks would have been reduced, tightening the food situation in subsequent months.

VI. FOOD POLICY: PROBLEMS AND POSSIBILITIES

In each of the food crises, we have seen how crop failure can bring whole regions to the edge of disaster and have a severe impact on food consumption throughout Bangladesh. The scale and rapidity of such fluctuations in production and localized devastation have inevitably given overwhelming importance to government intervention. Yet in each crisis a number of factors have impeded effective action by government. Political and social pressures on the government have been reflected in an ordering of priorities that does not give primary concern to maintaining the food supply for the more vulnerable 30 to 50 percent of the population.

This is a difficult problem area because government has, at least in the short term, limited freedom of maneuver. There is a long history of food insecurity, and recent experiences of hyper-inflation and savage cuts in real incomes have affected almost all strata of society. At low levels of real incomes the nature of the Engel Curve relationships for food consumption gives importance to ensuring supplies of basic foodstuffs in urban areas and for those on whom the functioning of government depends. 1/ The record of the past decade nevertheless provides some indication of where specific changes would make policy more cost effective, as well as tilting the balance of benefits towards the poorer consumer.

First, our review of each crisis has demonstrated the importance of reliable monitoring and information systems in bringing detailed and credible information before the government. Otherwise, a disastrous situation builds up. The government is subsequently forced to respond by emergency measures that are inherently disruptive of the longer-term development of the economy. This destabilizing pattern of reactive intervention as well as supportive action by the international community is reflected in the behavior of the food sector since Bangladesh's independence. The domestic supply situation has swung from dearth to short periods of over-supply and reduced incentives to producers, as in 1975/76 and again in 1980/81. These fluctuations have been aggravated by the lags in the flow of imports as well as slippage on food aid commitments. 2/

Second, because food import policy is obviously an important measure of macroeconomic control as well as a critical element in food consumption policy, it is questionable whether an annual pattern of commitments is optimal. Food aid agreements should be made on a basis comparable to longer-term commercial contracts, which allow flexibility to the importer within a pre-agreed total. Otherwise, an import-financing facility such as that proposed at the 1980 International Monetary Fund (IMF) annual meeting would seem to be a more flexible form of support to macro food policy in a country such as Bangladesh with a serious problem of short-term food insecurity.

1/ It is worth remembering that in richer societies similar priority is often given to maintaining real incomes and indexation of the pensions of public employees.

2/ Some of these lags reflect the cumbersome procedures of aid donors. For example, EEC (European Economic Community) Food Aid involves sanction by both Commission and the Council of Ministers.

Third, a much higher level of domestic stocks and stockholding capacity of foodgrain as well as agricultural inputs is called for. A high proportion of stocks should be held at points from which final distribution can be readily undertaken. This would provide a breathing space for coping with a rapid deterioration in the production situation as well as the disruption of input supplies. A higher level of domestic stocks would also imply the need for considerable infrastructural development. The poorly developed system for channelling domestic food surpluses into the public distribution network limits the possibilities for using domestic procurement as a method of price stabilization. A system is needed that can hold considerably more than the build-up of stocks from a single good harvest combined with the spillover of high import levels in the wake of a food crisis as in 1977 and again in 1980. This has been accorded priority by the government and forms part of the program of development assistance by the World Bank and other donor agencies. 1/

Fourth, an aggressive food import policy has been shown capable of containing the economic and human costs of shortfalls in domestic food supply. However, the record of the past three crises leaves room for concern. Food aid supplies have not, as already mentioned above, had obvious stabilizing effects on the food situation. Balance-of-payments support such as that also discussed could play a valuable role in allowing Bangladesh to use imports for stabilization purposes. For when, as in 1973/74, a domestic food crisis coincides with a tight world food market, Bangladesh could still encounter serious problems in scheduling and financing supplies.

Studies of the economic benefits and costs of public distribution activities such as the Bangladesh ration system 2/ have shown that large-scale operations have positive cost-benefit ratios. Studies of large-scale food aid to support such activities have similarly shown that benefits in terms of increased food supply as well as balance-of-payments and budgetary support have been large compared with the disincentive impact on domestic production. 3/ However, experience in Bangladesh indicates that there is no reason for complacency about the effectivenss of such public supply operations. The distribution of rations appears to be highly skewed towards priority groups who do not comprise the poorest consumers, among whom there is widespread malnutrition. These priority consumption groups have become increasingly entrenched as the major beneficiaries of subsidized public distribution (Table 3.4). The broader

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1/ Ideally, with production subject to substantial swings and at least half the population almost immediately vulnerable to the effects of any deterioration in the food supply situation, a highly flexible system is required that can handle a large volume of domestic surpluses as well as a rapid build-up of imports. This rather than a massive stock-building policy as in India would intuitively seem to be the optimal solution for Bangladesh.

2/ See Scandizzo, 1980, as well as Scandizzo, 1979, 1980a, 1980b.

3/ See, for example, the preliminary findings of Nelson, 1979, and for India, Blandford, 1977.

benefits of public system operation have been through the expansion of domestic food supply. Imports have eased the overall food situation. 1/

There have also been some developments in food production and the food distribution system that have encouraging distributional and nutritional implications. The increasing importance of wheat in both domestic production and food consumption is one such development. Household expenditure surveys confirm that wheat, the major commodity distributed through the public ration systems, is an inferior good that is relatively more important in consumption by the poor (Bangladesh Bureau of Statistics, 1978). Augmenting domestic food supply through concessional imports of wheat has been more equitable in its consumption distributional impact than imports of rice. 2/ Following the introduction and diffusion of more productive wheat technology since 1974/75, domestic wheat production has risen from around 115,000 tons to over 1 million tons in 1979/80 (Clay, 1978a; 1980). The crop is largely unirrigated. So far wheat, which was little affected by adverse weather conditions such as the drought of 1978/79, also promises to have stabilizing effects on domestic food supply. 3/

1/ Ahmed, 1979, reached the different conclusion that rationing had been quite successful in providing support for the rural and urban poor. This conclusion is, however, directly dependent on assumptions about the operation of the system that are not supported by the evidence. He assumed that ration quotas were drawn by all cardholders and that the incidence of false cards was proportional to the size of various income classes. The validity of these assumptions for 1973/74 cannot be tested. However, lack of cash income has been a constraint on the ability of the lowest-income groups to use a ration or food-entitlement scheme elsewhere, e.g., Sri Lanka (Alailima, 1978). Many low-income families also had difficulty establishing eligibility because of residence requirements. The large number of bogus ration cards cancelled in 1975/76 were was believed to be concentrated in the hands of the politically and economically influential, who were using blocks of cards to operate, in effect, as wholesale intermediaries. Nor is Ahmed's assumption that rural rations were distributed to lower-income groups as intended by the conditions of eligibility supported by survey findings. Karim (1980) found the percentage of cereal consumption by rural households drawn from the ration system to be small and independent of economic status, so that, in absolute terms, consumption of food from the ration system increased with income levels.

2/ Ironically, given the pattern of demand for wheat, leakages from the public distribution system augment the open market supply and (all other things being equal) have, through price effects, had a relatively greater impact on the incomes of poor consumers. The high level of wheat imports, which has established a sizeable domestic market, has provided the context for the rapid expansion of wheat production.

3/ This probably contributed to the 67 percent increase in wheat production in the following year. In 1978/79 significant levels of wheat were also procured domestically (50,000 tons) for distribution through the public system.

The increasing importance of wheat consumption and production is an example of a fruitful interaction of agricultural science, production, and food distribution policies. Grown as a rainfed crop in the winter season, wheat has also led to an increase in agricultural employment and effective demand for food. 1/

Other encouraging developments in food policy indicate an increasing awareness of the need to take account of the consumption characteristics of basic staples. Domestic procurement of rice has traditionally concentrated on the finer long-grain types, which command higher market prices and are purchased predominantly by richer consumers. Recent decisions to extend procurement to the boro and aus crops, predominantly shorter staples with a high proportion of modern semi-dwarf varieties, not only benefits the producers but also increases the supply of coarse grains, acceptable to lower-income consumers, through the public distribution system. However, this encouraging development is to a considerable degree counterbalanced by an increased share of rice in actual public ration distribution, an inevitable consequence of increasing domestic procurement of food grains for the public system.

In 1978 there was an experimental program for the distribution of sorghum through selected ration shops in urban and rural areas. This provided an opportunity to test the possibility of targeting part of public food distribution towards the poorer and malnourished by introducing an even lower status, but nutritionally valuable, food. Off-take was low in urban areas, suggesting the predominance of middle-and high-income consumers. However, in rural areas the off-take of sorghum, particularly among lower-income groups, was very high. This program confirmed that in Bangladesh as elsewhere (Timmer 1980, 1980a) the use of such "self-targeting" foods has a considerable potential for affecting malnutrition and to a lesser extent the distribution of income. But careful monitoring of this experiment also indicated that limited coverage and the meagerness and uncertainty of supplies through rural ration distribution stood in the way of making the programs an effective instrument for combating malnutrition (Karim, 1980).

1/ Khan, 1980, has criticized the expansion of wheat because of what is seen as the unfavorable distributional impact on employment. This inference is derived from a cross-section comparison of the labor requirements of irrigated winter boro rice with those of wheat. However, studies of changes in cropping patterns suggest that the dominant substitution has been of rainfed winter wheat for lower productivity rainfed oil-seed and pulse crops (Clay, 1980), with positive employment effects. Such substitution can increase annual labor requirements by up to 30 percent (Clay, 1978). Where irrigation is necessary for wheat cultivation the lower water requirements of wheat also allow producers to irrigate up to three times the area of boro.

Another attempt to increase the effectiveness of public distribution on malnutrition and the incomes of the rural poor has been to build up the scale of food-for-work activities. In principle such developments are highly desirable. The problem of effective demand for food among the landless and near-landless, intensified in periods of disaster, gives an added importance to food-for-work and other wage-earning rural works activity. The food-for-work programs have built up to a level where around 250-300,000 tons of food grain is being disbursed annually, which, if fully utilized, would generate over 100 million person-days of employment in rural areas. Following the Sylhet floods, attempts have also been made to increase activity in the monsoon high flood-level period. Experimental programs have also shown that rural works can provide an important source of income for particularly vulnerable disadvantaged groups, such as rural women (Chen and Ghaznavi, 1977). However, studies and reports suggest that major organizational problems stand in the way of considerably expanding the level of rural works activities (Brudin, 1978). In particular, there is a need to establish satisfactory decentralized capacity to handle the supply of foodgrains and organize labor, all as part of a program of works that takes into account local variations in patterns of agricultural activity and possibilities for labor-intensive capital formation. In the absence of such trained, well-motivated organization capacity, the food-for-work programs are likely to be beset by high levels of leakage and to prove an inefficient and inegalitarian form of capital formation. 1/

The combination of domestic procurement of foodgrain, imports, and open market sales to stabilize the domestic food market has been widely advocated. 2/ This would integrate "the two food worlds in Bangladesh" (Stepanek, 1979, p. 69) of the protected urban consumer, and the rural poor and the farmer. Assuming a competitive grain market, open market operations represent a lower-cost method of stabilization than subsidized ration distribution (with its income effects on the consumption by ration card holders). This method of stabilization could also reduce the administrative costs of intervention. USAID supported an experimental open market operation in wheat during 1978/79 as part of an innovative Title III Food Aid Agreement. In practice, wheat was sold to millers at substantially below open market prices, making the operation in effect an extension of the existing system of subsidized distribution. The timing of this first experiment in the midst of a food crisis was unfortunate. Yet this is also part of the problem of increasing the effectivness of public interventions. 3/

1/ Brundin (1978) in a USAID study suggests 25 percent leakages. Independent nongovernmental organization estimates cited by Henshaw, 1980, suggest that leakages can go as high as 75 percent. The Bangladesh Institute of Development Studies and International Food Policy Research Institute (IFPRI) are undertaking a major appraisal, supported by the World Bank and the World Food Programme, of food-for-work program.

2/ The first fully worked-out proposal was made by Stepanek, 1976. See also Stepanek, 1979, p. 67-69

3/ As rice represents the bulk of the food graintrade, open market operations in rice would be more effective. Whereas open market operations in wheat could play an important role in extending the private market in this commodity, or, if handled insensitively, could undermine the existing market for domestic producers.

Bangladesh has now committed itself to moving more broadly in the direction of open market operations and limiting the extent of subsidized ration distribution. An extended period of relative food price stability is probably required to allow a substantial transfer of food distribtuion to the private grain trade. Meanwhile the build-up of domestic stocks, guarantees of large-scale emergency food import finance, or food aid availability would also be necessary to provide the capacity for large-scale stabilization operations. This would give credibility to and reduce the risks of such a move to market distribution. There is a long history of fears about food insecurity, an inherent distrust of, or at least lack of confidence in, the private grain trade, and a preference for visible administrative measures in periods of crisis that stand in the way of a move toward a market-oriented food system. Such a change also requires the build-up of experience in operating such a system and establishing a monitoring capability to provide a basis for sophisticated market interventions.

Administrative and logistic capacity in the agricultural and food sector have come to be extended piecemeal over a range of price controls and physical procurement operations for rice, wheat, jute, sugar, tobacco, and, most recently, cotton. In addition to foodgrains, vegetable oil and sugar are distributed through a fair price public ration system. There have even been interventions to assure urban supplies and contain retail price levels of commodities such as onions and tea. However, a review of the effectiveness of this complex of potentially inconsistent interventions would probably indicate that scarce administrative resources should be concentrated on interventions in foodgrain markets. There are strong cross-price relationships between rice and wheat consumption and other commodities, too, because of the large income effects of changes in rice prices (Clay, 1980; Pitt, 1980). Foodgrains also dominate agricultural production, and there are major substitution possibilities with other commodities: rice and jute and wheat with oil seeds, pulses, and sugarcane. Effective stabilization operations for foodgrains would limit the destabilizing effects of volatile foodgrain prices on the production of other commodities.

Finally, it must be recognized that apart from the benefits of price stabilization, which with inelastic demand schedules probably benefits all consumers, a market-oriented food system does little to meet the needs of the poor and malnourished (Stepanek, 1979). Indeed stabilization at relatively higher prices could even have short-term negative implications for the nutritional status of the poor rural and urban consumers (Pitt, 1980). The wholly inadequate nutritional status of these groups needs to be carefully taken into acount in moving the ground of discussion from stabilization to providing incentive prices to producers.

There are two equity arguments for proceeding cautiously on the incentive price issue. As Pitt (1980) has shown, the potential short-term negative nutritional impact of higher food prices will fall disproportionately on lower income groups. Comparable analysis based on more sophisticated data bases in Indonesia (Timmer, 1980) and Sri Lanka (Timmer, 1980a) suggests that the pattern of income and price elasticities of basic consumption staples for different income groups implies that relatively higher food prices have a

negative impact on consumption by the poorest 20 percent of consumers. Second, higher output prices may disproportionately benefit larger producers who account for a disproportionate share of marketed output. Nor does the available evidence support the view that additional employment would increase the incomes of the rural poor as agricultural laborers sufficiently to compensate them for their losses as consumers (Ahmed, 1979; Clay, 1978).

There are three other reasons for caution on the price incentive issue. First, social factors are widely held to constrain the realization of the productive potential of Bangladeshi agriculture, implying a low aggregate supply for agriculture in the absence of institutional changes (Ministry of Agriculture and Forests, 1978). Second, there are problems of adjustment. Rising real food prices, which imply reduction in the real incomes of urban as well as rural consumers in the short term, are all too likely to produce or add to inflationary pressures that undermine this whole strategy. Third, there is the questions of effective demand. As the record shows, every time there is a sequence of good harvests there are temporary problems of oversupply. Recent experiences in India provide some indication of the short-run problems to be faced in going for agricultural growth and self-sufficiency in food without simultaneously finding a way of massively augmenting the purchasing power of the poor consumer.

To summarize, developments since the economic crisis and famine of 1974 provide grounds for qualified optimism about the food consumption situation in Bangladesh. The government has demonstrated a capacity to contain the worst effects of short-term deterioration in the domestic food supply through emergency import and distribution measures. There is also a growing recognition of the need to make public interventions more cost-effective and to find ways of targeting food more successfully towards the poor. This is reflected in experimental programs and the high priority accorded to rural work activity in the second Five Year Plan. Success in limiting fluctuations in food supply and sustaining effective demand of low-income groups in periods of stress prevents the worsening of long-run problems of malnutrition, poverty, and widespread destitution. Nevertheless, these problems of massive structural poverty remain. It has yet to be shown whether a short-term food security net can be put into place to provide an alternative to crisis management of the food system and the economy.

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Part 4

Risk to Nutritional Adequacy of Food Output: Adjustments in India

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Part 4

Contents

I. INTRODUCTION AND SUMMARY

This paper deals with two related problems of adjustment: fluctuations in food output and availability and their impact on poverty and undernutrition. (The aggregate performance and prospects of Indian agriculture, in the context of adjustment to energy prices and world recession in 1973-90, are dealt with in another paper.) 1/

An observer from the perspective of the early 1970s, but armed with knowledge of oil price trends in the 1970s, would be amazed at the relatively healthy appearance of India's overall food position in 1980. Foodgrain output-per-person, after the rapid progress of the late 1960s, fell sharply from 1970-71 to 1974-75. 2/ Indeed, there was no uptrend in food output-per-person between 1956 and 1974; although technical progress (mainly HYVs) brought a net gain to food output of about 6 percent. Even by 1971, this was offset by stagnation in pulses and some cereals and by population growth. By 1974, many saw the green revolution as no more than a genetically vulnerable, one-time upsurge of rabi wheat output in one or two states. Stocks in 1972-74 reached dangerously low levels. The quadrupling of oil prices in 1973 and the further doubling in 1978-80 impinged on an agriculture increasingly dependent on energy-based inputs: nitrogenous fertilizer, diesel oil for pumpsets, and in some areas tractor fuel.

Yet India's foodgrain output in the 1970s, as Table 1 shows, outpaced population growth (which slowed down slightly). Good weather conditions during 1975/76-1978/79 permitted India to build up public-sector stocks to unprecedented levels, 15-20 percent of output, and in some years to eliminate net grain imports and even to emerge briefly as a net exporter of 1-2 percent of output. HYVs and (despite the price explosion) nitrogenous fertilizers appeared to be spreading their yield benefits to more crops, notably winter rice; more areas, notably coastal Andhra, eastern Uttar Pradesh, and northern Bihar, and even, to some extent, into monsoon-season crops. 3/

These improvements seem to be backed by some degree of all-party commitment to increase the resources and incentives to produce food. In 1980, as in the 1970s, the Indian farmer could have bought more of his production and consumption needs, per ton of grain sold, if he could have transacted on world markets than he could in fact buy on Indian markets; but this relative disadvantage has not widened much and may even have narrowed slightly. 4/ The proportion of public and private investments, realized as well as planned, going to the agricultural sector -- with 70 percent of India's workforce, and with new technologies waiting upon land and water development -- is still only 22-25 percent, but this is more than the 18-20 percent targeted and achieved in 1956-70. 5/

Are these improvements in agricultural policy getting the necessary institutional support? Some of the signs are hopeful. National crop research, which has a strong tradition in India, is increasingly receiving the necessary regional support. Some steps to improve watershed management are under way in

the Command Area Development Programs. Extension, especially in Rajasthan, may be transformed by the "training and visit" system. Much larger proportions of institutional credit, via nationalized banks, are reaching rural areas, though not much is getting to small food growers. Special programs for vulnerable food producers -- the Drought Prone Area Program, the Small Farmers' Development Association -- can report some successes, and they embody career structures that encourage some civil servants to direct energies towards poorer farmers. In Maharashtra and Karnataka especially, right-to-work programs have provided some basic food security even for some of the rural landless, and neither the actual distribution of rights in land, nor in some places the process of land reform, have moved as unfavorably as general reports suggest. 8/

So India's food security -- with well over 10 million metric tons of public-sector food stocks, a growing proportion of land irrigated, and an improved policy posture -- looks surprisingly healthy, even in the face of oil shocks and recession. But aggregate looks may deceive. Unknown proportions of grain stocks, coop-stored in the open, have been ruined. Gravity-flow irrigation depends on the monsoon for full functioning, as the 1979 drought reminded us. Present investment allocations do not suggest irreversible policy shifts in favor of food production, especially if an attitude of "all's well in food production" spreads. The near miss of 1972, and before that of 1965-67, shows how swiftly an apparently healthy food position can evaporate. The really serious risks affect the 15 percent or so of India's population at or below the margin of caloric adequacy. They have few, if any, food stocks or saleable assets or access to loans. In a bad year, they are in most states at high risk of unemployment. 9/ Lacking much land of their own, they cannot afford much food grown on other people's land either. Even in "normal" years, infant and child death rates among these vulnerable groups are alarmingly high -- each perhaps 80-100 per 1000 -- and, even without overt famine, calorie shortage is a major factor in the damaging synergism underlying about a third of these deaths. 10/

Four central issues affecting the nature of individual food insecurity (which in India means almost entirely, caloric inadequacy) 11/ have determined the structure of this paper.

First, caloric inadequacy affects many fewer person-days than is generally believed. The true proportion is 10-15 percent, not 50-60 percent. (The reasons are too complex for debate here but boil down to the facts that average dietary energy requirements are below the levels normally set and non-harmful bodily adjustments mean that below-average intakes tend to accompany below-average requirements, both within populations over a period and among person-days for an individual.) 12/ Hence, food insecurity in India is narrowly focused on small at-risk groups that may face a succession of days of worsening physical condition.

Second, these groups are concentrated in districts and states where relatively little progress has been made either in raising output-per-hectare or in increasing double-cropping. The 289 mainly rural districts of India averaged 2.75 percent annual compound growth in foodgrain output between 1962-65 and 1970-73, but 72 suffered declining output. 13/ Areas concentrating heavily on sorghum (of which output fell in 59 out of 93 districts), rice (56 out of 184) and gram (79 out of 150) 14/ remain at special risk. In such areas, small farmers are

especially prone to drought and flood and receive relatively little help from HYVs. Landless laborers get less income from work in the same "bad" seasons that make food scarce and expensive.

Third, the main causes of insecure access to food are local, not international. Despite the spread of irrigation and pest control, the variability of crop output remains high. This variability did not fall significantly in the 1970s. And it is most serious for the crops grown and eaten by the poorest groups. At the policy level the causes lie in the relatively low priority assigned to water management in marginally irrigated areas, to water control in rainfed areas, and to non-marketed crops. At the individual level the descending spiral of food insecurity often begins with illness.

Fourth, "international" causes of food insecurity -- especially scarcer or more expensive energy, and hence fertilizers -- probably will continue to have rather small effects on total food supply. However, it will continue to be the poor whose price elasticity of demand for such inputs is highest, and "poor people's crops" will continue to be the crops most vulnerable to input fluctuations. (The proportion of fertilizers going to such crops in a normal year is surprisingly high.) 15/

Section II of this paper considers how food insecurity affects India's poorest groups. Section III examines the impact on these groups of sudden changes in the world economy -- both directly and via alternative Indian policy adjustments to these changes. Section IV analyzes the impact of internal circumstances and changes in the access of at-risk groups to food. Section V reviews the interaction of internal and external shocks, especially between (a) Government of India attempts to secure the food position of at-risk groups by internal policy measures (e.g., irrigation policies), (b) vulnerability to external shocks, and (c) responses to these shocks.

II. POVERTY AND FOOD INSECURITY IN INDIA

About 40-45 percent of Indians, even if they spend 80 percent of outlay on food, cannot afford the average Indian dietary energy (in Kilocalories, kcals) standard; and this proportion showed no clear trend, up or down, between the mid-1950s and the mid-1970s. 16/ However, this standard is set higher than necesary. 17/ Also, many who can afford less -- less, even, than an appropriately reduced standard -- also require fewer kcals than that average. 18/ It is important to distinguish between the 10-15 percent of Indians who are truly undernourished in caloric terms (and who are hereafter called "the poorest") and the 30-35 percent immediately above these in the scale of income-per-consumer unit (who are hereafter called "the poor").

The "10-15 percent poorest" figure accords with clinical evidence 19/ and with the fact that only the poorest decile or two (ranked by income per person) spends most of any rise in income on simply raising the intake of very cheap food. The next two or three deciles up the income scale spend much of any rise on tastier food or on non-food. 20/ For these "poor but not poorest" really are poor -- often forced, in order to eat enough, to do without other near-essentials (decent shelter, the diversion of adolescent time from employment to education, etc.). However, food insecurity imposes immediate severe

hardship directly only upon the poorest 10-15 percent. Only indirectly -- because an unexpected food shortage 21/ must sometimes be met by the sale of assets, 22/ leading to increased personal insecurity and to a transition from "poor" to "poorest" -- does a shortage impose extreme hardship on the remaining "poor" 25-35 percent of Indians. The analytical and policy issues regarding "poor" and "poorest" in the face of food insecurity are distinct. They have to do with identifying and preventing or countering cost-effectively the causes and/or harmful results: for the poorest, of increased caloric stress and of bodily adjustments to it; for the poor, of non-bodily adjustments to (i.e., of avoidance of) increased caloric stress (e.g., via further sacrifice of near-essential non-foods or via pauperization.) 23/

This paper deals mainly with the first issue, the plight of the poorest, initially by clarifying two points.

First, it is not quite accurate to write of "10-15 percent of Indians" too poor to afford necessary dietary energy. Strictly, it is 10-15 percent of "consumer-unit days" in India. This is of, literally, vital policy importance: (a) because in any year undernutrition of one person for 30 days on end is much more harmful than that of 30 persons for one day each; and (b) because, if most of the underfed consumer units are among children, they will comprise not 10-15 percent, but perhaps 20 percent, of persons. Unfortunately, Indian undernutrition appears to be concentrated on long periods of child hunger -- involving more health risk than the 10-15 percent figure, although correct in itself, indicates. This heavy concentration on infants and small children, especially infected children, arises not because adequately fed adults heartlessly or ignorantly discriminate against their offspring, 24/ but because high infant and child death rates (and responsively high birth rates) mean that, among the poorest households (i.e., those likeliest to be underfed), there is a disproportionately large number of persons under five. Indeed, given the non-nutritional risks to children (and to their prospects of earning and remitting enough to support their parents in old age), parents may choose "many children, all hungry" rather than "few chidren, none hungry" as a rational strategy to maximize the family's survival prospects. 25/ Moreover, life-cycle effects probably mean that families have the least income, per consumer unit, when the mother must look after several small children, because then only one family member earns income.

Second, to say that 10-15 percent of Indian consumer-unit days involve the poorest in being underfed is to say that damaging bodily adjustments ensue. If such adjustments can be identified, the order of priority for steps to prevent, or cope with, further food shortage will be suggested. 26/ The damaging adjustments are:

- faltering of height/weight ratios (little damage, apparently, is done by low height/age or weight/age ratios alone) 27/ in persons under 18, and especially in under-fives;
- lethargy or loss of learning capacity;
- unwanted declines in work-seeking or work-performing capacity; 28/

- persistence of, or higher death rates from (rather than higher incidence of) 29/, illness, especially among under-fives;

- where observable, dangerously reduced fat/lean ratios 30/;

- where observable, dangerously reduced protective capacity against illness.31/

Where and when are which Indians most prone to these risks if, for any reason, calories become scarcer or more expensive? The "where" question has two parts: urban or rural, and in which areas of India. It is conventionally argued that a larger proportion of urban persons are underfed than of rural persons, and that their deficiency is more serious. The village's lower internal inequality, higher sense of mutual obligations, and cheaper food are believed to outweigh higher urban real income-per-person. This belief is out-of-date, in part irrelevant to policy, and based on misreading of evidence:

(1) The belief is out-of-date because of the substantial collapse of traditional mutual social security obligations (e.g., within the jajmani system, which tied craft families to work for farmer-patrons for standardized payments) in much of rural India in the wake of commercialization and market integration. 32/ These factors also probably reduce the (anyway small) 33/ disparity between urban and rural food prices and other prices.

(2) The alleged urban location of most hungry people after food insecurity strikes is also partly irrelevant, because hungry people wander between town and country in search of cheaper food. Such mobility renders major price gaps between town and country especially unlikely when food is scarce. Hence the limited relevance of distinctions between urban and rural location of the victims of hunger after the event, though locating its causes and cost-effective treatments remain highly relevant.

(3) The evidence -- namely, the (rather small) discrepancies between rural and urban intake of kcals per consumer-unit -- is misread by not setting these discrepancies against the probably much larger discrepancies in requirements. In 1971-2, 32.6 percent of urban households, as against 28.8 percent of rural, enjoyed fewer than 2300 kcals per consumer-unit per day. Less relevant was that average caloric intake per consumer unit was 2539 in urban areas and 2924 in rural. 34/ But these gaps must be set against the greater rural incidence of (a) parasites and infections; (b) relatively energy-demanding work, income earning (including walks to, among, and from plots), and domestic work (especially fetching water); and (c) pregnancy and lactation. All these substantially raise requirements of energy per consumer-unit. The sums have not been done, but there is strong supporting evidence in economic behavior 35/ that rural dietary requirements exceed urban, for the underfed, more than do intakes. Rural areas, unlike towns, also suffer from the perverse coincidence of seasons of hardest work, scarcest food, and greatest risk of infection. 36/

Rural India is probably more underfed relative to needs than urban India. Thus -- as marginal damage increases with caloric deprivation -- rural India is the priority area for "treatment" to prevent or to cure nutritional risk. To this pure "welfare" argument must be added two dynamic considerations. First, productive rural outlays not only provide income for the hungry, but normally increase food output. Second, urban outlays -- by attracting persons, income, and hence marketable food to the towns -- somewhat increase food losses in transport and storage.

Although the evidence on the direction of change in Indian poverty is unclear, the states in which it is most serious are less in doubt. Agricultural laborers, the most at-risk group, were likeliest to be below a rigorous poverty line in 1970/71 in Orissa (72 percent of households), Maharashtra and Karnataka (almost 60 percent), Uttar Pradesh (51 percent), and Rajasthan (43 percent). 37/ In most years, these show up as the most serious areas of poverty overall on National Sample Survey data, alongside West Bengal, Bihar, Madhya Pradesh, and (implausibly) 38/ Kerala. In these states, too -- except Uttar Pradesh, where there has been recent improvement in many areas -- Sen's poverty index is consistently highest. 39/

There are, in brief, two belts of extreme risk and exposure. One is Northeast India -- West Bengal, Bihar, and Orissa. This region still depends mainly on monsoon rice, for which high risks deter farmers from incurring investment and current costs. HYVs, except in a few northern wheat areas, have brought no real breakthrough. Moreover, agrarian structures are more unfavorable and overall income distributions more unequal 40/ than in the rest of India.

The second very exposed area is the unirrigated semi-arid heartland that covers most of Maharashtra, northern Karnataka, and western Madhya Pradesh. These areas depend mainly on millets, sorghum, and (in Madhya Pradesh) rainfed wheat. Bajra and wheat HYVs have made somewhat more progress in areas of moisture stress than rice HYVs, but the risks still deter major private investments, and tenurial conditions and land concentration are less unfavorable than in Northeast India.

Such "placing" of povery by states assumes highly imperfect markets. The relaxation of food zoning may permit poverty to be more evenly shared than in the past, though transport costs, delays, and bottlenecks will always keep food markets segmented and imperfect. Intra-rural migration is also an equalizing factor, although a growing rural work force, mechanization (usually ill-advised 41/ -- the 1981 decision to favor the use of combine harvesters involves, where implemented, a reduction of over 90 percent in harvest employment per acre), and ethnic separatism (from Shiv Senalto Assam) limit its scope. Shuttle migration between city and country, especially in time of hunger, renders the urban poorest to some extent an overflow of rural poverty. Shuttle migration is heavily concentrated, for reasons of language and distance, in intra-state movements. This fact, together with the operation of state-specific agricultural policies and to some extent of de facto foodgrain zoning, still makes it reasonable to expect differences in exposure to food risk to continue to cause larger differences in the incidence of poverty among states than within states.

Both the poverty belts, the Northeast and the West, also have high weather risk. This leads naturally to the question: When are the poorest most likely to be pushed below the margin of nutritional danger? For India as a whole (and for states containing three-quarters of the rural population in poverty), years of high agricultural output tend to have less poverty. 42/ Probably a regression of the proportion in poverty on annual food output would yield a stronger relationship, for more states and probably also for urban poverty. This suggests that both high agricultural growth and "good" years in a given growth sequence reduce the incidence of poverty -- i.e., of exposure to food insecurity. Bad water-control possibilities, in Northeast and West India, at once curtail the economic options for growth (including research) and raise the downward semi-variance of food output below the low levels produced by such curtailment.

The seasonal distribution of poverty has been neglected until recently. Especially in one-crop areas (most of Rajasthan, Maharashtra, Madhya Pradesh, and Karnataka), the second half of the wet season is a time when many stresses coincide, especially for deficit farmers and landless laborers. Food stocks run out; prices are high; work requirements are great; infections are prevalent; and transport of food and medicine is often difficult. In Bangladesh, the Cholera Research Laboratory has shown that both child and adult morbidity and mortality are highest at this time, and that this is related to peaks of undernutrition. 43/ (Implications for agricultural and health policy are considered elsewhere.) 44/ Improved household-level storage by deficit farm households 45/ and the introduction of crops or varieties that are robust in face of poor weather but can be harvested at unusual times may have advantages -- in reducing the seasonal food insecurity of the most vulnerable -- not captured in conventional benefit/cost analysis, even with income-distribution weights.

These indications of when and where food security is at risk are general. They do not, therefore, guide policy responses to particular events. If a bad monsoon affects a particular time, help is required at that place and time. "When and where" can, however, indicate to food security planners:

- the type and location of general measures of relief that need to be prepared; for example, employment guarantees have been relatively successful in Maharashtra and Karnataka, partly for administrative and political reasons, but partly because drought-prone and single-season agricultures, prevalent in most parts of these states, render employment protection a relatively effective safeguard; if so, Madhya Pradesh is a strong candidate for an employment guarantee scheme;

- the areas and times of year 46/ for which readily available food reserves and public health initiatives are likely to be most cost-effective;

- above all, the priority areas and seasons for investment and research to prevent or reduce food insecurity in the longer term: e.g., by producing more low-cost calories such as millets; by redistributing command over assets that produce relatively secure calorie sources (such as irrigated land or urban home garden plots); 47/ or by reducing the variation of output (especially of cheap calories) and of labor income over time (through better water control, catch crops, or varieties bred -- even at some cost in expected yields -- to resist moisture stress and/or photo periodicity and hence to perform relatively better in less favorable seasons or years).

Following up Visaria's work, 48/ analysis of data from the annual rounds of the National Sample Survey suggests characteristics of the poorest, as distinct from the poor, affecting nutritional risk. 49/ It is too early to give detailed results. Broadly, however, in the Western "poverty belt" farmers with below 1 to 2 ha. of land are nearly as likely to be in the lowest quintile of income-per-consumer-unit as the landless laborers or the poorest urban workers; in the Northeastern belt even mini-farmers are at considerably less risk than the landless. Unemployment is a much greater risk to the poorest than was once believed. Single-member families and families with several small children and only one working member are especially likely to be in the poorest quintile by income-per-consumer-unit. (This is consistent with evidence about nutritional and medical conditions in large, young families.) 50/ More familiarly, the individuals at greatest nutritional risk are pregnant and lactating women and children from six months to three years old 51/ (especially if they have many older siblings) 52/. In particular, diarrhea can worsen undernutrition, which in turn increases death risk -- but not infection risk -- from diarrhea; hence protection of drinking water may be a major, albeit tricky and expensive, 53/ weapon against food insecurity, 54/ especially in the infection-prone wet season, among the under-fives, for Harijans (the hereditary castes of ex-untouchables who remain the likeliest to have unclean water sources), and in rural areas and urban slums without standpipes.

III. ADJUSTMENTS TO WORLD ECONOMIC FLUCTUATIONS: EFFECTS ON PERSONS AT GREATEST NUTRITIONAL RISK

The main causes of food insecurity in India are domestic: low levels and unequal distribution of food output, of land and other assets to produce it, and of investments to increase and (especially via water control) to stabilize it. The really grave danger to the Indian poor posed by world economic fluctuations is the indirect risk that these fluctuations will again induce the Government of India -- as during the Second and Fifth Plans -- to shrink expansion to a "core" of investment that severely reduces outlays on agriculture, especially for increasing or stabilizing food production for consumption by deficit farmers in drought-prone or monsoon-dependent areas. To illustrate the relatively lesser direct effects of world economic fluctuations on the poorest -- via reduction in either food availability or in poor people's "exchange entitlements" (that give access to food in exchange for cash or work) -- I shall examine three possible areas of deleterious adjustment: energy supply to agriculture; fertilizer and its feedstocks; and food pricing.

There appears to be no good reason why Indian agriculture should be vulnerable to rises in the relative price of fossil fuels. Third World agriculture is much less fossil-fuel-intensive, especially in food production, per unit of value added than (a) Third World non-agriculture, (b) developed agriculture, (c) non-agriculture as compared with the use ratio between the two sectors in developed countries. First, agriculture, with some 70 percent of the work force and producing 40-45 percent of national product, used only 4.6 percent of India's commercial energy in 1970-71 55/ -- mainly for lifting and draught (indirect use via fertilizer is treated below). Second, agriculture is especially light in its demands on largely imported types of fossil fuel (oils and their most immediate substitute, coal); agriculture used about 4.3 percent of India's oil consumption in 1974, and 4.6 percent in 1976. 56/ Third, agriculture accounted for only 9.7 percent of India's growth in commercial energy consumption in 1970-77 (industry 75.4 percent). 57/ Fourth, rapid growth in agriculture's requirements of energy has taken place largely in the electricity sector -- from 0.2 billion kilowatt-hours (4.2 percent of Indian sales, as against 63.7 percent industrial and 12.5 percent domestic) in 1951, to 10.1 billion kwH (14.6 percent, as against 58.7 percent industrial and 9.8 percent domestic) in 1977-78. 58/ This pattern of growth in demand reflects the facts that conversion efficiency of engines declines with size much less rapidly when they run on electricity rather than fossil fuels and that agriculture (and even irrigation) on balance runs on much smaller engines than industry in India. The reliance on electricity by agriculture, therefore, will intensify with adjustments to energy price increases. Yet the dependence of much Indian electricity on non-peak uses of hydropower and the non-substitutability of electricity for imported oil in most transport uses render this energy source less vulnerable to world disruptions of energy supplies or prices than other commercial fuel sources.

The poverty belts should be even less vulnerable. Unlike the Punjab, Haryana, and western Uttar Pradesh, they are seldom tractorized, though diesel and electrical pumpsets and major irrigation are important in the Northeast. Nor do they use much energy via fertilizer.

The poorest people in the less-poor areas, rural and urban, may be the most vulnerable to sharp price rises or supply failures in oil and petrochemicals. However, casual empiricism suggests that non-delivery, due to transport failure (at ports or railway marshalling yards) or to priority for urban users or for cash crops, is a more important cause of fuel supply shortfalls to food growers than are fluctuations in world availabilities or prices. The closer India moves towards self-sufficiency in energy and the more agricultural energy growth relies on electricity and on non-commercial energy types, the clearer it will be that food vulnerability is mainly an internal issue.

That is especially the case for the poorest. Many are purely manual laborers; in rural areas, their energy is a substitute for fuel-based mechanical energy (e.g., in animal plowing or rice husking), and demand for it rises if fossil fuels become scarcer or more expensive. (In urban formal employment, complementarity prevails, so energy shortages mean lay-offs; I know of no Indian data on this.) The crops grown by micro-farmers and eaten by the poorest urban and rural people are especially likely to be coarse grains and root crops, which probably -- though once again statistics are lacking -- are even less commercial-energy-intensive than agriculture as a whole.

One cloud on the horizon, as regards the impact of world energy problems on the poorest Indians, concerns (a) depletion of some non-commercial energy sources, especially firewood; 59/ (b) rising kerosene prices; and hence (c) rising real cost of buying -- or collecting, at even greater distances -- domestic fuel. If rising costs of feedstock, and hence of fertilizers, further encourage the diversion of dung from fuel to manure, the heating and cooking resources of the poorest will become even more vulnerable. Research into cereal varieties with high conversion efficiencies of nitrogen into grain (especially at low root nitrogen uptake) -- perhaps via nitrogen fixation -- gains added urgency.

Although neither average nor extra production in agriculture have been directly fossil-fuel-intensive, there remain indirect effects of scarcer, or more expensive, energy on food production. (Unfortunately the data are lacking to trace such effects systematically through an input-output table.) One recurring fear has concerned the effect of energy costs of incentives to use fertilizers on food crops, since fertilizers will "soon take the biggest share [45-55 percent] of the total commercial energy that goes into ... agricultural production, ... particularly in developing countries." 60/ Yet, after doubling in the eight months following the oil price quadrupling of October 1973, prices of most major fertilizers to Indian farmers fell back to about 150 percent of pre-October levels and stayed there until mid-1979. Paddy and wheat prices rose slightly faster than nitrogen prices and substantially faster than single-superphosphate prices from 1971/72 to 1978/79. Improved varieties and techniques, moreover,

raised the average return per rupee of nitrogen from Rs 2.64 in 1971-2 to Rs 3.24 in 1978-9 in paddy and from Rs 3.78 to Rs 4.29 in wheat despite the big rise in input levels. Returns per rupee spent on single-superphosphate fertilizer rose even faster. 61/

Thus fertilizer consumption for food grains -- which rose from 2.2 kg/ha in 1960-1 to 5.7 in 1965-6 and 19.5 in 1972-3 -- fell off only slightly to 18.4 kg/ha in 1974-5, rose to 29.1 in 1977-8 and probably to over 33 kg/ha (still very low) by 1970-80. 62/ Sustained growth in fertilizer input is the best proxy variable (in explaining food output) for, and delivers benefits in close conjunction with, other purchased inputs to food production. 63/ But can the dramatic growth of 1965-80 fertilizer input be sustained? Nitrogenous fertilizer, in particular, has been rendered, by past fossil-fuel price rises that have raised the share of feedstock in its cost especially vulnerable to future rises. Suppose the mid-1973 price of a bag of urea comprised 85 units of non-feedstock cost and 15 of feedstock cost. Quadrupling of the latter raises the price to (85 + 60), or by 45 percent, by mid-1973. But now feedstock represents (60/145) or 41.4 percent of total cost. If this element doubled in price in 1979-80, that represents a price rise for urea from (59.6 + 41.4) units to (59.6 + 81.8) units, namely by 41.4 percent -- almost as severe as the impact of the 1973-4 quadrupling. Since this new rise in feedstock prices raises the fossil-fuel (feedstock) component in urea costs to (81.8/(59.6 + 81.8)) or 57 percent, it has left the incentive to use urea even more vulnerable to future feedstock price rises.

So it cannot be assumed, because past fertilizer consumption resumed rapid growth after only one year following the 1973-74 rise in fossil fuel prices, that off-take of this key input for food security will be equally immune to higher fossil-fuel prices in the 1980s. Moreover, renewed growth in consumption owed much to government decisions to reduce domestic protection and to increase fertilizer subsidies 64/ -- a costly path with limited prospects for extrapolation. 65/ In the future, it would be wise to assume that:

- feedstock will comprise a growing proportion of fertilizer costs;
- price-elasticity of demand for fertilizer will rise, especially for poorer users;
- the government's capacity and wish to insulate fertilizer users from price rises due to more expensive feedstock will decline;
- therefore, the price of feedstock is potentially a growing threat to fertilizer off-take;
- unstable fertilizer prices (due to capacity cycles), combined with high and rising prices (which depress the growth of food output most in India's relatively

well-watered areas, at once the biggest fertilizer users and the most stable sources of food output) may still seriously threaten the year-to-year stability of India's food output.

Nevertheless, there are two factors that give hope. First, phosphatic (P2 05 equivalent) and potassic (K20 equivalent) fertilizers represent a rapidly growing share of total fertilizer use; tonnages distributed in 1979-80 were 1,010,000 of P2 05, 592,000 of K20, and 3,500,000 of nitrogen, as against only 7,000, 7,000, and 56,000, respectively, in 1950-51. The impact of fossil fuel prices upon production costs is much smaller for P and K than for N fertilizers -- a kilogram of N nutrient requires (in manufacture, packing, transport and application) about 2 kg. of fossil fuel, but of P only 0.33 kg and of K only 0.21 kg, including mining and concentration. 66/ Hence the faster growth of P and K reduces the energy input risk to overall fertilizers available for food production. Second, domestic production of utilized N from fertilizer reached 63.5 percent of use in 1979-80, and of P205, 75.5 percent; by 1987-8 they are to reach 87.1 percent and 84.4 percent, respectively, on quite modest assumptions about capacity use. This reduces vulnerability to prices and availability of imported energy, because within India natural gas from Bombay High and South Bassein has enormous comparative advantages for fertilizer production (in the strict sense -- i.e., if we consider assignment of all commercial fuels among all users), is available in large quantities, and has been assigned by the Government as the "preferred feedstock for fertilizer production." 67/

In recent years, and for the 1980s, it is probably not adjustments to world markets that -- as it were -- stand between fertilizers and the food security of poor and hungry people. Rather it is the lopsided concentration of fertilizers on:

- a minority even of the districts with assured irrigation: of 380 districts (289 substantially foodgrain-dependent) 68/, 55 use nearly 60 percent of fertilizers, and a further 54 use another 20 percent; 69/ it is the at-risk districts that are least supported by (and possibly, given research and irrigation biases, least economic for) fertilizer use;

- larger farms (despite lower levels of land productivity, of labor use per hectare, and of incidence of food crops), perhaps because of lower distribution costs; 70/

- non-foodgrains and fine grains, as opposed to the coarse grains and root crops that, especially in desperate times, provide the food of the poorest. 71/

The bitterest complaints about fertilizers -- from the industry 72/ and farmers alike -- concern, not absolute scarcity or price (as regards levels, trends, or fluctuations, whether energy-induced or otherwise), but poor distribution and port clearances, untimely arrivals, lack of timely supporting credit (especially for small users), and -- for small and hence

more risk-averse farmers, for Northeastern and semi-arid rainfed crops, and for many coarse grains -- the absence of varieties offering reliable and economic returns from fertilizer use. These factors, rather than international energy fluctuations, threaten the potential contribution of fertilizers to Indian food security in the 1980s.

How sensitive is India's food security to sudden fluctuations in world grain prices, stocks, or availability? Arguably, the "normal" delivered price of grains relative to other commodities -- the price of marginal food, which in general should still be seen in India as imported -- should, if measurable, be treated not only as shadow price but also as appropriate market price. It reflects, that is, what India would have to pay to import and deliver food to replace domestic output forgone. But this use of international food prices, however well justified, proves nothing about the effects of non-Indian grain, or of its harvests, stocks, markets, or prices, on the Indian economy -- let alone on the risks of hunger. There are, indeed, four good reasons to expect such effects to be fairly small in the 1980s:

(1) India is in normal years at or very near foodgrain self-sufficiency -- zero net imports. Admittedly, this is at a very low, and for 10-15 percent of consumer units grossly inadequate, level of kcal intake (dependent for that 10-15 percent largely on grain consumption). Sustainable improvements in this level, however, entail either rapid real-income growth or asset redistribution. Rapid growth was shown in the 1960s to produce unmanageable problems of wage-goods shortages unless matched by increasing food output. Asset redistribution involves major land transfers to poor hungry small farmers -- who are relatively more productive 73/ and foodgrain-intensive users of land. In both cases, near-self-sufficiency in foodgrains would survive a rising level of per-capita grain consumption in India.

(2) Unlike 1965-77 or 1972-74, the early 1980s see India with relatively large stocks of grain (currently 10-20 million tons) and, despite a worsening in 1980, substantial foreign-exchange reserves. One very bad year, or two rather bad years in succession, would eat up the grain stocks, but the combination with foreign-exchange reserves (and, recently, increased use of international private lending) gives the government a new choice between imports and stock reductions. Thus, in the main monsoon season of 1979, a scanty Indian monsoon coincided with a fairly easy world foodgrain position; in November 1980, the Food and Agriculture Organization (FAO) declared a food alert following widespread bad harvests, but Indian food production in the 1980 monsoon season was again above trend. 74/ Only in the 1-in-4 situation of 1973 (both Indian and non-Indian harvest below trend) is there a serious risk of aggregate food problems with foreign causes, and present stock levels in India should suffice to handle that risk.

(3) If grain is imported, transport costs from major exporters, to and within India, are substantial parts of total delivered costs, especially since the rises in oil prices of 1973-74 and 1979-80.

(4) Partly for these reasons, Indian price and stock policy can, to a considerable extent, remain independent of world fluctuations in grain harvests, stocks, and producer prices. In view of unpredictable year-to-year fluctuations in all these, such independence is probably wise, provided a trend price-relative between foodgrain and non-food, reflecting roughly the world year-to-year average price-relative, is sought. (It is not, of course, easy to establish.)

India therefore seems surprisingly, though by no means completely, immune to adjustment problems, generated by world fluctuations, for its food security. Agriculture depends substantially on non-commercial energy; to some extent on electricity, which is partly hydropower-based; and, if on fertilizers, on locally available feedstocks (natural gas). If anything, world energy price rises -- and fluctuations in supply -- increase India's comparative advantage in foodgrain production, which is relatively economical of commercial energy and especially of imported oil and its derivatives. Nor is a 95-105 percent self-sufficient foodgrain economy of 675 million persons obviously over-exposed to world grain uncertainties.

So all is well? Obviously not. The last paragraph is full of aggregates. At least 10-15 percent of Indians 75/ are seriously underfed. They live in poverty belts in Northeast and West India, where risks of downward fluctuation, both in food production and in the earning power of the poorest, are very high. The point is not that poor Indians are food-secure. It is that their food insecurity is not for the most part externally induced and aggregative -- even in the most general sense, the decelerating demand for Indian exported manufactures in the wake of the developed world's "slum protection" has had no identifiable nutritional impact -- but is intranational in origin and related to timely local availablity of cheap calories and of the resources to obtain them.

IV. INTERNAL FOOD INSECURITY IN INDIA

Table 4.1 shows that the instability of foodgrain output has not declined in India since the 1950s. The time-trend explains a smaller proportion of the variability of foodgrain output (56 percent) in the 1970s than in the 1950s (72 percent), though more than in the 1960s (27 percent), with India's once-in-a-century succession of monsoon disasters in 1965 and 1966. This evidence from regression coefficients is confirmed by the coefficients of variation. On both, too, there is a clear increase from the 1950s to the 1970s in variability of foodgrain area, whereas yield variability is clearly less in the 1970s than in the 1960s, but no less than in the 1950s. This is surprising. Gross irrigated area expanded from 13.7 percent of gross cropped area in 1951-2 to 28.2 percent by the mid-1970s, 76/ and is probably 30 percent now. The "New Strategy" for foodgrains after 1965 explicity, and it seems successfully, sought to concentrate grain output growth in areas of assured water supply, notably the Punjab and Haryana. How, then, is the apparent failure of output stabilization explained? What is its incidence among regions and crops? Is it likely to continue in the 1980s? And what are the likely effects on the food security of those most at risk?

Section III argued that the international "shocks" of the 1970s did not significantly retard or destabilize Indian foodgrain output. The rainfall index, measuring the quality of rainfall as an input to food production, also showed a lower coefficient of variation from 1970-71 to 1977-78 (namely, 9.7 percent) than during the 1950s (11.7 percent). 77/ We must therefore seek internal causes of increasing -- or at least non-declining -- instability. Which ones?

Blaming the HYVs, for instance, via the yield faltering of 8156-based North Indian wheats in the early 1970s, is implausible. New HYVs in several crops and regions are steadily coming on stream, are increasingly bred for low variability (robustness) instead of the maximal yield potential, 78/ and compensate for not only one another's failures (via the law of large numbers) but also the clear retardation in many unirrigated non-HYV districts. 79/ The growing stress of HYV research on robustness, coarse grains, and unirrigated areas, if encouraged, should continue to operate against instability and insecurity in foodgrain output.

To a substantial extent, expansion of irrigated area has failed to stabilize output. One sign is the very slow expansion of cropping intensity: 111.1 in 1950-51, 114.1 in 1955-56, 114.6 in 1966-67, in 120.2 in 1975-76. 80/

Larger top-end farmers use "excess" (but free) water to take high-value main crops, to drown weeds, etc., thereby denying poorer tail-enders water for a second (or sometimes even a first) crop. This is due mainly to poor management and control of irrigation systems above the outlet -- lack of incentives, lack of agronomic training on crop-water requirements, low priority for maintenance, and corruption -- and not, as often alleged, to the farmers' own faults. 81/ Since tail-enders are usually among the poorest and most labor-intensive farmers, their "water insecurity" directly increases

Table 4.1

Growth and Fluctuations of Major Indian Food Crops, 1950/51 - 1979/80

	Trend rate of growth (Percent per year)			Average output (m. metric tons)		Average area (kgs. per ha.)		Average yield (kgs. per ha.)		Variability (coefficient of variation about trend)			R^2 of output on time trend (adj.)		
	Output	Area	Yield	First 3 years	Last 3 years	First 3 years	Last 3 years	First 3 years	Last 3 years	Output	Area	Yield	Output	Area	Yield
Foodgrains															
50s	4.16	1.93	2.23	54.01	72.67	98.79	113.35	546	640	7.05	2.29	5.08	0.724	.845	.591
60s	1.84	0.52	1.32	81.63	96.19	116.88	121.80	698	790	8.84	1.75	7.32	0.272	.379	.122
70s	2.90	0.56	2.34	103.54	123.67	122.07	126.66	848	970	6.78	2.07	5.34	0.565	.255	.523
Wheat															
50s	4.62	4.17	0.04	7.35	9.43	10.00	12.58	734	747	8.16	6.13	6.74	0.6422	.765	.107
60s	6.33	2.23	4.10	11.28	18.05	13.36	15.87	844	1136	15.52	6.73	9.84	0.5504	.440	.541
70s	4.44	2.27	2.18	25.00	31.91	18.94	21.53	1320	1480	8.40	3.86	5.84	0.6010	.667	.414
Rice															
50s	2.59	1.51	1.08	25.55	30.11	30.44	33.13	838	908	7.27	1.04	6.74	.409	.931	.041
60s	1.28	0.80	0.48	34.49	39.15	34.83	36.95	991	1059	10.49	1.64	10.74	.100	.645	.105
70s	2.11	0.98	1.14	41.50	50.83	37.08	39.66	1108	1281	6.31	2.10	6.50	.436	.674	.059
Sorghum															
50s	4.22	1.01	3.22	6.3	8.7	16.3	17.7	384	495	11.85	4.05	9.46	.478	.274	.459
60s	0.70	0.13	0.61	9.2	9.8	18.3	18.6	500	530	8.62	1.51	7.74	.061	.054	.070
70s	4.86	-0.63	5.49	7.6	11.2	16.6	16.0	458	697	9.17	3.10	9.09	.670	.186	.760
Millet															
50s	2.40	1.51	0.89	6.07	7.41	16.53	18.23	367	406	8.68	4.87	7.47	.347	.397	.012
60s	1.47	0.82	0.65	7.85	8.47	18.51	19.67	405	430	10.00	2.41	8.69	.057	.454	.072
70s	-0.55	-1.09	0.54	9.56	9.55	19.08	18.05	497	528	16.71	3.91	13.80	.115	.360	.111
Maize															
50s	7.03	3.08	3.95	2.2	3.6	3.4	4.2	866	841	10.59	4.01	8.98	.733	.851	.566
60s	4.14	3.41	0.73	4.3	5.9	4.5	5.7	958	1029	6.48	3.43	4.77	.806	.886	.067
70s	-0.05	0.36	-0.91	6.3	5.7	5.8	5.7	1001	1012	12.40	2.57	11.43	.105	.044	.062
Wheat															
50s	4.00	3.01	0.93	8.7	11.5	19.2	23.9	450	480	8.93	3.11	6.47	.616	.884	.056
60s	-1.31	-1.34	0.03	11.9	11.4	24.0	22.0	500	518	11.66	2.45	11.45	.021	.701	.125
70s	1.49	0.97	0.52	10.9	11.9	21.9	23.3	500	507	8.96	3.81	6.92	.051	.226	.099

Sources and Methods: Outputs, areas, and yields from F.H. Sanderson and S. Roy, Food Trends and Prospects in India, pp. 20,26,33,40-41, except millets, where our data are for all millets (not just bajra) and are from Agricultural Situation in India, Jan. 1980, p. 765; FAO, Monthly Bull. Stats., Jan. 1980, p. 13; and FAO Production Yearbook, 1952, p.38; 1953, p. 39; 1954, p.33; 1955,p.33; 1957, p45; 1959, p.47; 1962, p47; 1972, p84; 1974, p54; 1976, p102; and 1977, p104. (Consistency was checked and most recent data were used.) 1978-9 and 1979-80 data from Agricultural Situation in India, loc. cit and FAO, Monthly Bull. Stat., loc. cit. 1950s are 1950-1 to 1959-60, 1960s are 1960-1 to 1969-70, 1970s are 1970-1 to 1979-80, except: Foodgrains exclude 1979-80; wheat excludes 1950-1 and 1959-80; rice excludes 1950-1; pulses exclude 1979-80. Trend rates of growth are best-fit exponential.

the vulnerability of at-risk groups to food shortage -- by raising the variability, not just of total output of food, but also of access by the poorest to income with which to buy food. The present unreliability of many major gravity-flow systems is a major barrier to food security, and it is not clear that "command area development programs" have improved matters much. In view of the increasing rarity of new, economic groundwater, plus the rapidly rising real cost of new gravity-flow systems, 82/ improved technical (agronomic, not just hydraulic) and managerial structures in existing systems are in the 1980s the most important potential source of better food security.

The shift from area expansion to yield expansion as a major source of growth in foodgrain output is shown in columns 1-3 of Table 4.1. The last three columns show that the fit of output to a time-trend, except for sorghum, is normally much better for area than for yield. Therefore the shift from area-based to yield-based expansion, a shift likely to intensify, normally tends to increase the variability of output about the time-trend (proportionate difference, in a year chosen at random, between actual output and what would be expected from a fluctuation-free time-trend). Table 4.1 is "incomplete" because it fails to disaggregate changes in foodgrain output due to changes in cropping pattern (a weight, not a cash, measure of grain output is used, as this is a better indicator of food-value) and in cropping intensity (aggregated into gross area measures, to permit comparison between total and specific foodgrains). Probably "completion" in this sense would stress even more the increasing reliance of output growth on crop-specific and season-specific yield increases. This too can be extrapolated, given the rapidly rising marginal cost of irrigation, plus the fact that most of the obviously attractive, HYV-technology-induced changes in cropping pattern have probably occurred already. Appropriately adapted, economic and robust HYVs will therefore become even more important in the 1980s, relative to other innovations, in determining stability of foodgrain output.

Most noticeably, the dramatic increase in the instability of output among coarse grains (with the partial exceptions of sorghum) and pulses has contributed to the failure of the "new strategy" to stabilize total Indian foodgrain output. This has been associated with poor growth performance. Hybrid bajra gives far too favorable a picture of millets as a whole, which -- due to the poor performance of ragi and minor millets -- showed very slow output growth in the 1960s, decline in the 1970s, and no significant time-trend for yield in either decade (or in the 1950s), as well as a clear rise in variability of output in the 1970s, with (increased) yield variability reinforcing, not correcting, area variability (itself somewhat reduced). Maize presents a similar picture. Both are clearly being pushed off the better, more stable, irrigated areas, in favor of crops where HYVs have made more progress. That, dramatically, was the fate of pulses in the 1960s. For sorghum, the HYVs make the 1970s look rather better, but this is probably due in part to absence of the 1979-80 data (probably well below trend); output and yield, even here, show higher coefficients of variation in the 1970s than in the 1960s and almost as high as in the 1950s.

Hence the factors responsible for the reduced stability of most foodgrain outputs and yields have been: expansion of irrigation into less certain areas; poor management and poor reliability of these exported

gravity-flow areas for tail-enders; increasing dependence of growth on yield expansion (inevitably less sure than area expansion); and relative neglect -- and pushing out of safer areas -- of coarse grains. Unlike the external factors we have largely absolved of blame for growing instability -- oil markets, world grain prices, rainfall variability -- these are in principle policy variables. Also the damage from output variability is mitigated by higher mean output (and stocks) per person; but the mitigation is limited, because the extra output is mostly not the right food, in the right place, at the right time. The coarse grains afflicted by instability are, especially in hard times, the staples of the poorest people, as well as important sources for them of income (to buy food) from wage employment and self-employment. The incidence of rural unemployment is highest, not just among the poorest quintile of persons, but in times, and presumably places, of relatively low agricultural output. 83/ Coarse grains have experienced slow growth (or decline) as well as high and increasing instability. This deprives the poorest, who are most at risk of undernutrition, at one and the same time of local or self-produced food availability and of prospects to obtain work to earn "exchange entitlements" for food; 84/ and it does so at times and places of relatively costly purchased food.

Doubtless, were disaggregated crop and area data up to date and reliable, it could also be shown that kharif rice, in unirrigated or badly-drained districts, showed similarly low and worsening growth and stability. If so, the above conclusions about the internally originating food insecurity of India's Western poverty belt would apply also to the Northeastern belt. Of course, even in a country of vast distances (and with roads that are often unreliable during the monsoon), one must not argue as if every state, district, and village should be self-sufficient in food-grains. Markets do exist; so do comparative advantages. But very poor people, without reserves, and who rely wholly on such abstractions, may die in the short run. A clear implication of the very different patterns of changing insecurity -- in which irrigated, surplus wheat areas, for example, have raised output (and income) per person and stability, while coarse grain (and perhaps unirrigated rice) areas have reduced both -- is the need to provide the poorer, at-risk groups in the latter areas with priority in the allocation of primary health care; of micro-irrigation (where economic); of improved on-farm facilities for storage (and perhaps other post-harvest processing) on a scale sufficiently small to enable marginal and deficient farmers to retain their crop; of right-to-work programs; of non-farm, labor-intensive activities producing outputs reliably saleable, when crops are bad, for cash "exchange entitlements" for food from other areas; and of research into improved crop robustness and water control. The "Drought-prone Areas Programme" could focus some of these strategies on some of the areas where large proportions of people are at risk.

V. INTERACTIONS AND POLICY RESPONSES

At the level of micro inputs and outputs, Indian food security, even for the poorest, looks much less vulnerable to external shocks than might be expected a priori. This paper has made only a very modest start at statistical proof of this. However, I have little doubt that it is more or less statistically provable that internal downward fluctuations in access to food by poverty groups are a much more serious threat to the survival and health of poor Indians than are external downward fluctuations in aggregate food availability.

Against this (more or less) hard fact must be set a soft hunch. It is that the aggregate responses of Indian policy-makers to world recession and to energy shortages and risks do involve major threats to the food security of at-risk groups, in a way that input-output and other micro relationships, more or less demonstrably, do not. The importance of an effect is in no way related logically to the "hardness" (for example, the quantifiability) of the proof of that effect. It is greatly to be hoped that statistically oriented organizations will accept that the soft wood may matter more than the hard trees. There are three ways in which the government's aggregate adjustments to external recession, fluctuation, and uncertainty might threaten the food security of at-risk groups.

The first is the government's response to sudden resource scarcity, or the threat of it. What do Indian policy-makers do if access to foreign exchange is, or seems likely to be, sharply curtailed, most plausibly by inflation of prices of imports (especially oil or food); by protection against, or recession in markets for, exports; or by declining aid? The historical evidence, both in the retreats to a core Second Plan in the late 1950s and from the abandonment of the minimum income program in the early 1970s, is that it is agricultural and anti-poverty programs -- and especially the intersection of these two sets -- that suffer most when resources are scarce. Moreover, the inflationary experiences of the 1970s, although modest and well-controlled by most standards, have led India to contractionist gut-reactions -- involving drastic cuts in public expenditures rather than attempts to raise more resources or develop incomes policies -- more similar to those recently familiar in several OECD countries than to most other Third World situations. In a sense, the Government of India is its own IMF.

The second danger, especially if usable food stocks shrink rapidly, is that the government will concentrate its energies within agriculture even more upon secure sources of food surplus production. Even from the standpoint of those at greatest food risk, there would be a strong case for such a response, if

- income distribution were fairly equal;
- food movements were rapid, efficient, and cheap per ton-mile;

- markets or policies effectively induced workers to move from, and/or nonfarm capital to move to, areas unfavorable for secure food production.

These conditions are on the whole absent in India. They are unlikely to be created in the wake of external shocks -- recessionary or cost-inflationary -- because such shocks will reduce available resources and intensify conflicts over their use: conflicts in which those with much income and power have natural advantages. More mundanely, more expensive energy means more costly food transport to points of need.

The third danger concerns the balance between export promotion and import substitution as a policy goal. The government has in the past 5-10 years done much to rectify the tilt, typical of its earlier economic policies, towards import-substitution that was often randomly structured and that almost always turned the terms of trade and the incentives to allocate resources against agriculture. Modest measures of trade-freeing in OECD -- notably the EEC's list for the generalized scheme of preferences, which compensated in part for the protectionist impact vis-a-vis India, of the Community's Common External Tariff and of its special trading arrangements with its African and Caribbean Associates, with the European Free Trade Area, and with the Council for Mutual Economic Assistance (CMEA or Comecon) -- have helped India to expand important manufacturing-export sectors, often non-traditional. So have joint engineering ventures with OECD firms in West Asia, the softer terms of capital inflows, and good harvests. All these -- but above all reasonable export growth -- have given the government confidence in moves, however gradual, away from restrictionist and anti-agricultural trade policies. If India's export prospects are retarded due to recession and protection in the OECD, then the forces calling for reversion to the older, import-substituting postures will be greatly strengthened. In practice, this reversion would almost certainly damage the relative short-run prospects for food production and for the poorest groups, whatever its virtues as a long-run development strategy may be. India's tentative entry into the Eurodollar markets in late 1980 marks a further attempt to secure the cash base for renewed expansion without renewed protectionism; if a world debt crisis were to curtail such options, or even worse, lead to cumulative contraction of credit, then India could swiftly be driven back to the defensive postures of 1956-65.

It has (I think) been shown that external shocks do not represent a major threat to the food security of India's at-risk groups and that internally induced, local disturbances around a precarious mean normally do. It has been suggested -- not shown -- that government adjustments to international setbacks may also involve such a threat. What of the reverse effect: the effect of the government's adjustments to internal threats to food security upon its vulnerability to external shocks?

Four possible government policies might be pursued to reduce food insecurity. The first is the safety net, making available relief (with public-works programs, via health insurance, by remission of land revenue, etc.) to an at-risk group, either after or as a prior guarantee against a decline in either its food availability or its earning power. The second is "betting on the safe" -- concentrating efforts to improve output

(varietal research, price-incentives, fertilizers) of crops and areas of small variability and in particular of assured water supply. The third is "strengthening the unsafe": raising their average intake of food, so as to reduce the suffering implicit in an X percent (or in a Y kcal.) decline in their daily food intake per consumer-unit. The fourth is "making the unsafe safe": reducing the variability of their access to food.

The government's "New Strategy" for agriculture since 1965 has explicitly centered on betting on the safe, especially growers of irrigated wheat. That strategy has succeeded in keeping food output growth ahead of population growth and in building up a substantial safety margin of grain stocks. However, as we have seen, instability of food output has not decreased. Moreover, further attempts to raise the share of output in "safe" areas -- apart from their reliance on uncertain transfer mechanisms when the poorest people in the "unsafe" areas go short of food -- are bound to run into diminishing marginal returns. A final factor is the high and rising energy intensity of further output in the Punjab and Haryana. Our arguments above, that food production is not comparatively energy-intensive and especially not oil-intensive, apply rather less forcibly to marginal wheat and rice production in safe areas -- often tractorized (and diesel-fueled), and increasingly watered by tubewells with diesel or non-hydro-electric pumps. With oil and its derivatives costing India 70 percent of export earnings as of late 1980, such factors must militate against further emphasis on "betting on the safe." So must interregional food transport costs. The strategy has yielded substantial results, but it is vulnerable to external "oil shocks" as well as being, as a route to food security in an unequal society, itself worryingly insecure.

If more "betting on the safe" increases external vulnerability, more "strengthening the unsafe" appears very attractive and tends to reduce vulnerability. This is because marginal coarse grain output in the West, and much marginal monsoon rice in the Northeast, is both input-extensive and unlikely to be diverted from poor beneficiaries in response to world movements in oil or grain prices, or in demand for Indian exports. The poor eat the outputs themselves, and/or work to produce them. The trouble with strengthening the unsafe is that, in the existing state of knowledge, it may well not be at all cost-effective. Research outputs, permitting dramatic yield gains that significantly increase net farm income, are just not yet available in most monsoon rice or rainfed bajra, ragi and jowar areas. Much of the ICRISAT (International Crops Research Institute for the Semi-arid Tropics) and AICMIP (All-India Co-ordinated Millet Improvement Program) work, and some IRRI (International Rice Research Institute) and AICRIP (All-India Co-ordinated Rice Improvement Program) work, is extremely promising of such outputs, however. At least since the mid-1970s, such work has been explicitly directed toward robustness, especially under moisture stress, even at the expense of very high yields. The agro-economic work on farm systems, involving watershed management in sloping but rainfed areas, is exciting. So is the work to retain high-yielding qualities and pest-resistance for several years in millets, via composites. But strengthing the unsafe, for all its moral appeal and economic promise, requires a major rise in outputs from -- and probably in input to -- research for the affected crops and areas

(above all, perhaps, for rainfed rice in the Northeast and for minor millets), if it is to work. When it does, it will improve the immunity of food security from external shocks.

Making the unsafe safer, however - reducing the downward fluctuations about low means, above all in yearly food output in the Northeast and West, but also in yearly and in seasonal access to earnings (command over food) by the urban and rural poorest in many parts of India - may have all the appeal and security against international fluctuation of strengthening the safe, and a lot more policy practicability even without major new research. All over India, tail-enders could gain security in bad years (and slack seasons) from improved system management by irrigation maintenance officials -- now, without waiting for new research. And these are among the poorest and most-at-risk groups, second only to farmers in semi-arid unirrigated areas in exposure to water uncertainty. For farmers in semi-arid areas, much could be done toward a similar goal. Work to discover where small-scale irrigation is effective, by establishing the precise location, depth, recovery costs and benefits, and amount of groundwater, followed by credit for private or co-operative well-building, could give very large numbers of micro-farmers the confidence to invest. In Northeast India improvements in drainage and in water-weed control could similarly reduce insecurity. These are not exciting or new proposals. However, they could, by a timely reversion to traditional "security" functions of irrigation (away from the much more recent concern with growth), give many small farmers the confidence to invest, to employ more of the landless, and, paradoxically, by shifting to security -- to lay the basis for renewed growth.

NOTES TO PART 4

1. Being prepared by the Agriculture and Rural Development Department of the World Bank under the direction of Dr. G. Donaldson.

2. Net foodgrain output, per head of Indian population, rose from 161.4 kg in 1967-68 to 172.1 kg in 1970-71; fell in three of the next four years to 145.4 kg in 1974-75 (over halfway back to the 1965-66 disaster level of 128.3 kg); but then rose to a peak of 206.7 kg in 1978-79. F. Sanderson and S. Roy, Food Trends and Prospects in India, Brookings, 1979, p.78; Agriculture Situation in India, Jan. 1980, p. 765.

3. D. Antiporta and R. Barker, "Food production and demand," Supplementary Papers: vol. 1, p.5, to Rural Asia: Challenge and Opportunity, Asian Development Bank, Manila, 1978; C.H. Hanumantha Rao, Technological Change and Distribution of Gains in Indian Agriculture, Macmillan (Delhi), 1975, p. 8.

4. For evidence that any improvement was indeed slight, see D. Tyagi, "Farm prices and class bias in India," Economic and Political Weekly, XIV, 39, 29 Sept. 1979, esp. pp. A-121-A-122.

5. FAO, State of Food and Agriculture 1978, Five Year Plan 1978-83: Final Report (Rome); Planning Commission, Delhi, 1980; P. Streeten and M. Lipton (eds.), The Crisis of Indian Planning, Oxford, 1968, p.86. Figures are for agriculture, irrigation, forestry, and fisheries.

6. In 1979 the SFDA (catering to farmers with 1-2 ha) and the Marginal Farmers' and Landless Laborers' Association or MFAL (catering to farmers with below 1 ha) were merged.

7. N. Reynolds and P. Sundear, "Maharashtra's employment guarantee scheme - a programme to emulate?," Economic and Political Weekly, XII, 29, 16 July 1977; K. Dandekar and M. Sathe, "Employment guarantee scheme and food for work programme," Economic and Political Weekly, XV, 5, 12 April 1980.

8 V.S. Vyas, "Some aspects of structural change in Indian agriculture," Indian Journal of Agricultural Economics, XXIV, 1, Jan-Mar. 1979, esp. p.4.

9. P. Visaria, Living Standards, Employment and Education in Western India, 1972-3, Working Paper no.1, joint ESCAP-IBRD project or evaluation of Asian data income distribution, Washington, Rev. 1977, tables 17-20. For example, 11.1% of person-days were "unemployed" in rural Guyarat in 1972-73 among the bottom decile of households marked by income-per-person -- but only 3.8% among the top two deciles, (table 17)

10. Some evidence suggests that in Latin America as many as 57 percent of infant and child deaths are "associated with malnutrition" (R.H. Cassen, India: Population, Economy, Society, Macmillan, 1978, p.107). See, however, O. Koksal, "Effects of nutrition on infant and maternal mortality in specific developing areas," Turkish Journal of Paediatrics, 18, 3/4, 1976, pp.72-9.

11. P.V. Sukhatma, Malnutrition and Poverty, Ninth L.B. Shastri Memorial Lecture, Indian Society of Agricultural Economics, Delhi, 1977.

12. A useful discussion is S.S. Bhalla, Measurement of Poverty - Issues and Methods, World Bank, 29 Jan. 1980, pp.69-96. Internal circulation only.

13. G.S. Bhalla and Y.K. Alagh, Performance of Indian Agriculture: A Districtwise Study, Sterling (New Delhi), 1979, p.67.

14. Bhalla and Alagh, pp. 84, 108, 139. Rice yield fell in Orissa (by 1.4% yearly), Maharashtra (by 1.1%), Rajasthan (0.6%), and Bihar (0.1%) viz. in states containing 35 of India's 189 rice districts; and jowar yield fell in most districts (pp. 76-7, 81,101).

15. Sanderson and Roy, p.38, estimate that in 1970-71 coarse grains (planted on 34% of foodgrain area in 1978, and accounting for 25% of foodgrain output) received 14% of fertilizers used on food-grains.

16. Bhalla, loc. cit.; and M.S. Ahlwahlia, "Rural poverty and agriculture performance in India," Journal of Development Studies, 14,3 April 1978.

17. See, for example, Cassen, p. 95.

18. P.V. Sukhatme, "Assessment of adequacy of diets at different income levels," Economic and Political Weekly, XIII, 31-32, Aug. 1978, esp. pp. 1375-82.

19. P.V. Sukhatme, "Nutrition policy: need for reorientation," Economic and Political Weekly, XV, 26,28 June 1980, p. 1103; cf. Cassen, p.92.

20. C.H. Shah, "Food preferences and nutrition: a perspective on poverty," 39th Conference, Indian Society of Agricultural Economics, Bangalore, 18 Dec. 1979; M.R. Rao, "Nutrition situation in India during 1971-72," Sarvekshana, Jan. 1979. On the sale of ration books by the poor to meet non-food needs, see L. Gulati, "Rationing in a Peri-urban Community: Case Study of a Squatter Habitat," Economic and Political Weekly, Vol. XII, 12, March 1977 p. 506.

21. Since the poor and the poorest, in rural areas, derive most income respectively from own-farm employment and farm-labor self-employment, sharp cuts in food production lead mainly to "failures of exchange entitlements" for the poorest, but to "food availability deficiency" for the poor. A. K. Sen, "Famines," World Development, 8, 9, Sept. 1980.

22. N.S. Jodha, "Effectiveness of farmers' adjustments to risk," Economic and Political Weekly, XII, 25, 25 June, 1978.

23. Forced sale of assets, entry into debt bondage, etc.; cf. Jodha.

24. Bhalla, p.42, summarizes the substantial Indian evidence.

25. Cassen, pp. 58-63.

26. Relative cost, feasibility, and incidence of benefit must of course be known before the suggestions can be turned into a set of policies. For evidence that the cost of preventing each death involving undernutrition is lowest if prenatal care is stressed -- and rises with the child's age at intervention -- see A. Kielmann et al., "The Narangwal nutrition study: a summary review," American Journal of Clinical Nutrition, 31, 11, 1978

27. For evidence that over 80% of alleged anthropometric evidence of inadequate dietary energy concerns low height/age ratios and/or weight/age ratios -- and that these are probably often harmless — see D. Steckler, "Small but healthy," mimeo, Ford Foundation, New Delhi (n.d. but probably 1980).

28. The effect is not in reducing work capacity per unit of body weight (except in extreme cases), but in raising the heat-rate at similar (sub-maximal) work loads. K. Satyanarayanana et al., "Nutritional deprivation in childhood and the body size, activity, and physical work capacity of young boys [aged 14-17 in rural Hyderabad]," American Journal of Clinical Nutrition, 32, 9, 1979; G.B. Spurr et al., "Functional assessment of nutritional status: heartrate response to submaximal work," ibid., 32, 4, 1979.

29. C. Martinez and A. Chavez, "Nutrition and development of children from poor rural areas: 7," Nutrition Reports International, 19,3, 1979.

30. Leading ultimately via marasmus to starvation; but a ratio of 20% or over in women, or 12% or over in men, would presumably be considered safe by most experts.

31. Leading ultimately either via kwashiorkor to starvation, where classic protein-calorie malnutrition (PCM) presents as protein deprivation a rare phenomenon in India except as a by-product of caloric deprivation (Sukhatme (1977)); or via impaired immune response to repeated and/or prolonged infections and death (R.K. Chandra, "Malnutrition and infection", in M. Wallerstein (ed.), Proceedings of 1979 MIT Nutrition Conference, MIT Press, forthcoming).

32. For the relation of these to intra-village inequality, see B. Dasgupta, Village Society and Labour Use, Oxford University Press. (Delhi), 1977, pp. 180-87; cf. S. Epstein, South India: Yesterday, Today and Tomorrow, MacMillan 1973, pp. 46-49, 213, 217.

33. In the late 1960s, urban prices exceeded rural prices by about 15 percent (G.S. Chatterjee and N. Bhattacharya, "Rural-urban differences in consumer prices," Economic and Political Weekly, IV, 20, 17th May 1969, p.850). I would expect an even narrower gap now.

34. M.R. Rao, pp. 111-12.

35. Choice of expensive calories by the urban poorest caused the NSS urban poverty line to set at over twice the rural level (Shah, p.9) despite a price differential of only about 15% (fn. 33 above). See also Rao, p. 113-4.

36. S. Schofield, "Seasonal factors affecting nutrition with special reference to pre-school children," Journal of Development Studies, Oct. 1974.

37. Cassen, p. 243.

38. See Cassen, p.95 for evidence of substantial understatement of caloric intakes in Kerala.

39. Ahluwahlia (1978), p.306.

40. Ibid., p.317.

41. H. Binswanger, The Economics of Tractors in South Asia, Agricultural Development Council, 1978.

42. Ahluwahlia (1978), p.313.

43. A.K.M.A. Chowdhury, S. Huffman, and L.C. Chen "Interaction of Agriculture, dietary practices and infection on seasonal dimensions of energy malnutrition," in A. Pacey, R. Chander, and R. Longhurst (eds.) Seasonal Dimensions to Rural Poverty.

44. R. Chambers, R. Longhurst, D. Bradley, and R. Feachem, Seasonal Dimensions to Rural Poverty: Analysis and Policy Implications, IDS Discussion Paper No. 142, Feb. 1979.

45. R. Boxal, M. Greeley, D.S. Tyagi, M. Lipton, and J. Neelakanta, The Prevention of Farm-level Food Grain Storage Losses in India: A Social Cost-benefit Analysis, IDS Research Report, Brighton, Oct. 1978.

46. R. Longhurst and P. Payne, Seasonal Aspects of Nutrition: Review of Evidence and Policy Implications, IDS Discussion Paper no. 145, Brighton, Nov. 1979; Chambers and Longhurst; R. Chambers, Health, Agriculture and Rural Poverty: Why Seasons Matter, IDS Discussion Paper No. 148, Brighton, Dec. 1979.

47. The World Bank's project in Indonesia and The International Fund for Agricultural Development's (IFAD's) 1979 proposals to the Government of Sri Lanka indicate great potential for home garden development. Any program to purchase urban land for allotments or garden plots, however, would require finance for purchase or compensation.

48. P. Visaria, op. cit.; and his Working Paper no. 3 on the same project, "Size of Land Holding, Living Standards and Employment in Rural Western India 1972-73, Washington, Oct. 1978; also P. Visaria and S. Pal, Poverty and Living Standards in Asia; World Bank, Feb. 1980. (internal circulation only).

49. Work in progress for PPRD by M. Lipton.

50. Cassen, pp. 94-106.

51. P.V. Sukhatme, "Nutrition policy: need for reorientation," Economic and Political Weekly, XV, 26, June 28 1980, p. 1103.

52. Gopalan (1969) found only 32% of his sample of children, but 62% of cases of nutritional deficiency, with birth-rates 4 or higher -- a risk 3.5 times as great (Cassen, p.92). This actually understates the disparity, because a larger proportion of children with higher birth-orders die before reaching any given age of entry to an (age-stratified or random) sample.

53. R. J. Saunders and J.J. Warford, Village Water Supply, World Bank, 1976.

54. Sukhatme (1980), p.1103.

55. W.E. Tyler, Energy Resources and Economic Development in India, Nijhoff, 1978.

56. A.V. Desai, India's Energy Economy: Facts and Their Interpretation, Centre for Monitoring Indian Economy, Bombay, Feb. 1980, pp.35, 80.

57. Desai, p. 78.

58. Desai, p. 42.

59. J. Adams and W.E. Tyner, "Energy in rural India: national policy from the village perspective," Indian Journal of Agricultural Economics, XXXII, 4, Oct.-Dec. 1977, pp. 79-81. See also World Bank, World Development Report 1981, pp. 40-42.

60. FAO, The State of Food and Agriculture 1976, Rome, 1978, p.97.

61. G.K. Sohbti, "Fertilizer prices: historical perspective," Fertiliser News, 24, 4, April 1979, pp.6-7 and cover.

62. Sanderson and Roy, pp.24-5; Fertiliser News, 24, 7, July 1979, p.54, and 25, 6, June 1980, p.51. The assumption that a steady 70% of all fertilizers go onto foodgrains is somewhat arbitrary, but was known to be about right in 1970/71.

63. Sanderson and Roy, p.22. The following illustrative calculations - the exact initial proportions assumed for mid-1973 have no significance - assume cost-plus pricing and no impact of fossil-fuel prices on the non-feedstock components of urea cost. To remove the latter simplification strengthens the argument; to remove the former complicates but does not in essence change it.

64. K.V. Ramanathan, "Fertilizer demand and supply situation in India," Fertiliser News, 25, 1, Jan. 1980, p.26.

65. Partly due to financing problems, partly because of a policy decision to protect domestic fertilizer producers. It is not clear that, even at present levels, subsidies compensate fertilizer buyers for the price increases caused by protection.

66. Ramanathan, p. 26; "Statistical notes," Fertiliser News, 25, 6, June 1980, p. 51. (Ramanathan shows that the share of P is projected to grow somewhat further and of K substantially further, at the cost of the share of N, until at least 1987-88.) Energy requirements of fertilizers from FAO, State of Food and Agriculture 1976, pp. 97-8.

67. Ramanathan, pp. 26, 28; "Statistical notes," p. 51.

68. Bhalla and Alagh, p. 67.

69. Ramanathan, p. 26.

70. Sanderson and Roy, p. 64. For convincing evidence on size-productivity, see fn. 73.

71. Ibid. p. 38; in 1970-71 coarse grains, planted on 34% of foodgrain area, received only 14% of fertilizer, and - partly for this reason? - contributed only 25% of output.

72. Fertiliser News, 24, 7, July 1979 (special number on fertilizer marketing).

73. R.A. Berry and W.R. Cline, Agrarian Structure and Productivity in Developing Countries, John Hopkins, 1979, esp. the appendix by S.S. Bhalla.

74. R. Righter, Sunday Times, 9 November 1980.

75. "At least" because the greater incidence of undernutrition among the under-fives renders the proportion of affected Indian persons greater than of consumer units.

76. Sanderson and Roy, pp. 157-58.

77. Ibid., p. 156; if an index covering 1976, with its serious drought, and 1980 were available, the variability for the 1970s would probably be close to the 1950s level.

78. M. Lipton, "The technology, the system and the poor: the case of the new cereal varieties," in Institute of Social Studies, Developing Societies: the Next Twenty-five Years, Nijhoff, The Hague, 1979.

79. Bhalla and Alagh, pp. 84, 86, 98-99.

80. Sanderson and Roy, p. 158.

81. R. Wade, "Mobilization of local resources for irrigation: support of changes in water management," paper presented at ADC Seminar Mobilizing Local Resources for Irrigation, 11-15 August 1980, Colombo, Sri Lanka. The alleged "faults" of farmers (top-enders' greed, tail-enders' non-maintenance of field channels) are in fact rational responses to the irrigation managers' failure to provide reliable water. This, in turn, is a rational response to the very unsatisfactory training, information, career structure, incentives, and politicization to which the Irrigation Department is exposed.

82. Sanderson and Roy, pp. 127-28, estimate investment costs per gross hectare (in 1975 prices) of major and medium-size surface-water projects at $450 in 1968-9/1973-4; $900 in 1977-9; and $1,350 by 2000. On groundwater, see pp. 140-41.

83. Raj Krishna, Rural Unemployment - A Survey of Concepts and Estimates for India, World Bank Staff Working Paper No. 234, April 1976, p. 37.

84. A.K. Sen, "Famines as failures of exchange entitlement," Economic and Political Weekly, XI, 31-33, Special Number, August 1976.

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