PN-ABD-459
63079

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Reprinted from
World Development
Vol. 16, No. 9, 1988

INTERNATIONAL
FOOD
POLICY
RESEARCH
INSTITUTE

1776 Massachusetts Avenue, N.W.
Washington, D.C. 20036-1993 U.S.A.

Reprint No. 155

World Development, Vol. 16, No. 9, pp. 997–1011, 1988.
Printed in Great Britain.

0305-750X/88 $3.00 + 0.00
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Global Food Balances and Food Security

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Summary — The major structural imbalance in the current global food scene — surpluses in developed countries and deficits in developing countries — offers opportunity for substantial progress in assuring food security in both the long and the short run. To avail of this opportunity requires an understanding of the close connection between food supplies and purchasing power to purchase food.

Massive investment in rural infrastructure is a major component of long-term food security. Since infrastructure is efficiently produced by labor-intensive processes, food as a wage good is an important input, and the global economy would appear to be under-using it from an efficiency point of view. In the short run, food-for-work offers opportunity for immediate increase in food security, as do food subsidy programs. It is essential that a large complex of institutions be developed if the current global scene is to result in increased food security. It will take time to develop those structures, even though food is available now.

1. INTRODUCTION

The current world food situation is dramatically different from that of a decade ago. In the mid-1970s the world was beset by acute food shortages; in the mid-1980s it appeared to be awash in food. Only a decade and a half ago it would have seemed naive to analyze food security as purely a distributional problem; the physical inadequacy of global food supplies was too readily apparent. However, in the late 1980s it had become reasonable to focus on food insecurity as the inability of poor countries, poor families and poor individuals to purchase sufficient quantities of food from existing supplies. Yet, that formulation is also an oversimplification.

Today's global food situation is one of acute structural imbalances. In the developed countries, supply is growing far more rapidly than demand, but in many developing countries the situation is the reverse. Such imbalances are likely to continue, thereby presenting a major opportunity for advancing food security. As always, these imbalances will be punctuated by misleading short periods of weather-induced extreme surplus and scarcity.

The present food security situation is more complicated than scarcity amidst plenty. In most of Asia and Africa, and even much of Latin America, improving food security requires both increasing the purchasing power of the poor and boosting overall food production. This is true because of the importance of food prices in determining the purchasing power of most low-income people, and because of the dominant role of agricultural production as a source of employment for the poor.

These factors suggest the following two-pronged strategy to promote food security. In the long run, efforts must be made to increase the purchasing power of the poor by raising the overall level of food production in the Third World. Increased food supplies and purchasing power must be inextricably linked elements of any long-term food security effort. And in the short run, redistributing food supplies from the developed to the developing world is likely to be the best way to meet the more immediate food security needs of the poor.

In the developing world, agricultural production must be stimulated through cost-decreasing technological change. The small farm, food production sector must be at the center of this effort. Food transfers from the structurally food-surplus nations to the structurally food-deficit nations must be achieved through mechanisms which both boost the purchasing power of

*I appreciate the assistance of my colleagues at the International Food Policy Research Institute, particularly Raisuddin Ahmed, Gunvant Desai, Hannan Ezekiel, Leonardo Paulino, J. S. Sarma, and Joachim von Braun. Thanks also to Luz Dullin for providing data, and Richard H. Adams, Jr. and Frank Riely for providing assistance with the text.

the poor, while also increasing the incentives to raise agricultural and food production over the long run. The gross instability of food availability and purchasing power of the poor must be also reduced. This must be done without prejudicing the long-run efforts to increase the supply of food and the necessary purchasing power.

To comprehend the policy needs and potentials, one must understand the underlying nature of current global food imbalances. To achieve the policy objectives of food security will require complex, time-consuming development of national and international institutions. While food security cannot be achieved overnight, it can be achieved soon.

2. THE STRUCTURAL BASIS OF THE CURRENT GLOBAL FOOD IMBALANCES

The world does seem awash in food. Global cereal stocks in the mid-1980s were almost twice as large as in the mid-1970s. And, in 1985, real world cereal prices were down 30% from 1981, compared to an almost twofold increase between 1972 and 1974. Net exports of cereals from developed to developing countries were 80% larger in the mid-1980s compared to the mid-1970s.[1]

Review of regional production and consumption trends provides somewhat less sense of the current food surplus than price and stock data. On a global basis, between the early 1960s and 1980s, major food crops production grew at a 2.4% annual rate, only half a percent faster than population (Table 1). That margin has been declining in recent years — largely because of a deceleration of production in the developed countries. In the 1960s, food production grew 1.1% faster than population growth, while in the 1970s, production was marginally slower than the rate of population growth (Table 2). From 1971/73 to 1981/83, food production grew more than twice as fast in the developing countries as in the developed countries. Of course, production has grown much faster than consumption in developed countries and conversely in the developing countries.

Despite the positive margin of production growth over population growth, there is little

Table 1. *Average annual growth* of population, production, and consumption† of major food crops‡, 1961/63 to 1981/83* (percent)

Country group	Population	Production	Consumption
World	1.9	2.4	2.4
Developed countries	0.9	2.2	1.9
Eastern Europe	0.9	1.8	2.5
Western Europe	0.6	2.1	1.4
North America/ Japan/Others	1.2	2.6	1.7
Developing countries (minus China)§	2.5	2.7	3.0
Asia (minus China)	2.3	2.8	2.8
(India)	(2.2)	(2.4)	(2.2)
North Africa/Middle East	2.7	2.3	3.7
Sub-Saharan Africa	2.9	1.7	2.4
Latin America	2.6	3.2	3.5

Source: FAO, Agricultural Supply Utilization Tapes (various years); Production Yearbook Data Tapes (various years).

*Compound growth rates based on mid-points of indicated periods.

†Consumption is total domestic use of major food crops, including food, feed, seeds, allowances for waste, and other non-food uses.

‡Major food crops include cereals, roots and tubers, pulses, groundnuts, and bananas and plantains, rice is in husked form, non-cereal components are in cereal equivalents.

§China is excluded because major disruptions occasioned by the Great Leap Forward in the early 1960s and the subsequent slow recovery created serious biases in the data between 1961 and 1977.

Table 2. *Difference in rates of growth of population, production, and consumption of major food crops*, 1961/63 *to* 1971/73 *and* 1971/73 *to* 1981/83 (percent)

Country group	Population		Production		Consumption	
	61/63–71/73	71/73–81/83	61/63–71/73	71/73–81/83	61/63–71/73	71/73–81/83
World	1.9	1.9	3.0	1.8	3.0	1.8
Developed countries	1.0	0.8	3.3	1.2	3.0	0.9
Eastern Europe	1.6	0.8	3.8	−0.2	3.9	1.1
Western Europe	0.7	0.4	2.8	1.3	2.1	0.8
North America/ Japan/Others	1.3	1.2	3.0	2.3	2.6	0.7
Developing countries (minus China)	2.5	2.4	2.5	2.8	2.9	3.1
Asia (minus China)	2.4	2.2	2.4	3.3	2.7	2.9
(India)	(2.3)	(2.1)	(2.3)	(2.6)	(2.1)	(2.4)
North Africa/Middle East	2.7	2.7	2.1	2.4	3.0	4.5
Sub-Saharan Africa	2.7	3.1	1.5	1.8	2.3	2.5
Latin America	2.7	2.4	3.7	2.7	4.0	3.0

Source: FAO, Agricultural Supply Utilization Tapes (various years); Production Yearbook Data Tapes (various years).

evidence of a decline in the numbers of malnourished and undernourished people in developing countries. The Food and Agriculture Organization (FAO) of the United Nations estimates adequate caloric standards for people. By those standards it is estimated that somewhere between 340 million and 730 million people have inadequate diets.[2] Sukhatme and others suggest that the human body has capacity to adjust to caloric intakes lower than the FAO standards, leading to a reduced estimate of people with in adequate calorie intake.[3] Whatever the estimate, it is clear that levels of food intake below the FAO standards are closely associated with abject poverty.

In countries with very low average incomes and massive poverty, such as India, special programs for ensuring food supplies to the poor may well have reduced the number of people in abject poverty.[4] However, it is notable that in India, which includes some one-third of the malnourished people in the world, there was no measurable trend in the proportion of rural people living below the poverty line. From 1956/67 to 1977/78, the proportion of rural people in India below the poverty line has fluctuated between 40 and 60%.[5] However, during these years the absolute number of people living in poverty increased.

Thus, we can see that the apparent global abundance of food is the product of very different tendencies in the developed compared to the developing countries, and that the differences in consumption growth are far larger than the differences in production growth. What is the source of these structural differences and how likely are they to continue? The answers to such questions have a profound influence on the choice of policies for ensuring food security to the poor of the world.

In developed countries, the processes of technological change in agriculture have been institutionalized. As a result, the productivity of agricultural resources is continually increasing. Concurrently, because population growth is slight and demand is highly inelastic, consumption of food grows little or not at all. Consequently, in developed countries, the benefits of technological change in agriculture are realized largely through the continuous transfer of resources out of agriculture, rather than from increased consumption of food. Frictions to those adjustments are met by a combination of declining agricultural prices, increased stocks of food, or increased exports. Production growth may be retarded either by accelerating the flow of resources out of agriculture, or by reducing the flow of public resources for stimulating technological change. In general, though, while the outflow of resources from the agriculture of developed countries continues to be rapid, it is not as rapid as the pace of productivity increase.[6]

The problem of surplus agricultural production in developed countries is so intractable because technological change is a dynamic process. The measures necessary to transfer resources out of agriculture require not once-and-for-all policy changes, but continuous adjustments. Reduced public expenditure on research in agriculture is one means to confront the problem, but the resulting reduction in competitiveness threatens farmer interests, especially if such policies are undertaken unilaterally. In any case, with the increasing shift of research to the private sector and continuation of competitive forces, it may be difficult for public action to reduce the flow of new technology. Thus, continued rapid growth in exportable food surplus seems inevitable. That surplus provides the basis for establishing food security programs which can do much to eliminate food insecurity in Third World countries.

The importance of structural demand forces as a dynamic determinant of supply-demand balances is underlined by the record of Eastern Europe. In the 1970s and 1980s, Eastern Europe has been a major source of demand growth for exports from developed countries. From 1961/63 to 1981/83, the rate of food production growth in Eastern Europe was only slightly worse than in Western Europe (Table 1). However, within Eastern Europe food consumption has grown at a rate 80% faster than that for Western Europe. That growth has brought about an explosive rise in the demand for imported cereals, especially cereals for livestock feed. Eventually, however, that rate of growth in demand will level off, and Eastern Europe will cease to be a major cereal importer.

Developing countries are still in the early stages of institutionalizing the processes of technological change in agriculture. Rates of growth in agricultural output are, therefore, relatively slow. Because low-income countries start in a technologically backward situation, they may have short-term surges of very high growth rates, as they catch up with technological advances. During such periods food production growth rates may exceed long-term rates of growth of demand. Although not universally applicable, both Indonesia in the late 1970s and China in the early 1980s experienced such non-sustainable rates of production growth.[7]

In developing countries, demand can grow rapidly — fueled by high population growth rates, income elasticities of demand close to unity even for the basic food staples, and mod-

erately rapid income growth. Since in developing countries, income elasticities of demand are sharply different across income groups, overall growth in demand for food is particularly affected by changes in the incomes of the lower income groups.[8]

In many developing countries, the ever-increasing demand for food exceeds local production capabilities. In recent years, this has led many Third World countries to import a rising share of their food requirements. Between the early 1960s and the early 1980s, developing countries' share of world cereal imports increased from 36% to 46%.[9] Most striking, the 24 developing countries with the fastest growth rates in basic food staple production from 1961/65 to 1979/83 increased their net imports of food staples by 419%.[10] In fact, the developing countries are the major growth market for basic food staples. Given continued growth of employment and incomes, net imports of basic food staples are projected to increase by at least 40 million tons over the next 20 years.[11] High employment policies, including accelerated growth in the livestock sector with its large direct demand for feed and its employment driven indirect demand for food, could easily expand incremental imports by three times that amount.[12] These latter projections emphasize the impact high-employment policies have in determining food security as well as trade potentials.

But there is an important point in the food import record of those developing countries that have done well in food production growth. It is well known that the comparative advantage of low-income countries lies in their ability to mobilize large, low productivity labor supplies for increased production. Yet less fully recognized is the fact that labor supply is itself the product of two interacting markets — the labor market *per se* and the food market.[13] The high marginal propensity of the poor to spend on food requires more food to back up more employment. As Kumar (1988) demonstrates later in this issue, additional supplies of food are necessary for improved labor productivity and increased demand for labor by small farmers. Her study also indicates that adequate supplies of food, by relieving the labor constraint, indirectly influence the decisions of small farmers to adopt modern technology. Thus, not just food security as a welfare objective, but food supplies as a productive input call attention to the present food imbalances between developed and developing countries.

It follows that for developing countries, optimal growth will be associated with high rates of growth of employment; and, therefore, requires greater supplies of food. The capacity of developed country surpluses to insure those food supplies acts as a very positive force for economic growth, equity and food security in the Third World. The important fact, here, is not the concessional terms of such food supplies, but their elastic supply. In most cases, abundant supplies of food aid can do much to accelerate employment growth.

3. AGRICULTURAL GROWTH AND ACCESS TO FOOD

In countries in which a high proportion of employment and income is generated in the rural sector, an agriculture-based growth strategy provides the only possibility of broad-based participation by the poor.[14] Many people in the Third World work in agriculture. Raising the incomes of these people generates a demand for labor-intensive goods and services which are typically produced in the countryside.[15] For example, smallholder farmers in Bangladesh and Malaysia spend 35 and 40%, respectively, of their increments to income on locally-produced non-agricultural goods and services. Reardon *et al.* (1988), in this volume, emphasize the importance of non-agricultural employment in improving food security in the rural areas of Burkina Faso. In addition, small farmers in Nigeria spend as much as 20% of their increments to income on locally-produced agricultural goods, such as vegetables and livestock, creating additional employment opportunities in the agricultural sector.[16]

Such incremental expenditure by the peasantry provides a structure of demand that facilitates capital widening to a far greater extent than alternative techniques of production. This places a special emphasis on smallholder agricultural production. If there is a high concentration of landholding among wealthy farmers, increased profits will go largely to imports or highly capital-intensive goods, and will not induce the necessary multipliers and linkages from agriculture to promote employment in other sectors. Fortunately, the bulk of Asia and Africa have peasant farmer dominated rural sectors.

This kind of rural-based growth — which provides increased income and employment opportunities to the poor — has two essential components. First, it is technologically based. Agricultural output is stimulated by applying new technology that increases output per unit of input. This is important because agriculture is a sector particularly subject to Ricardian diminishing returns. As attempts are made to stimulate

production, the inelastic supply of land causes the productivity of other inputs to decline gradually. It is the rapid growth in real incomes of the farming classes that provides the effective demand for the labor of the poor, partly working to produce the enhanced agricultural output, but far more to produce consumer goods. Note that virtually all programs to increase productivity of the rural poor involve goods for which income elasticities are quite high.[17]

Throughout the Third World, the poor spend between 50 and 80% of their increments to income on food.[18] Thus, any increase in food prices has a deleterious impact upon their incomes. The vulnerability of the poor in Asia to rising food prices is well known. It is now clear that the poor in Africa are also generally net purchasers of food and hence are also vulnerable to rising food prices.[19] Since increasing food production by incentives such as higher prices hurts the poor, there is a special need for technological change which provides incentives to farmers -- incentives which are both potentially greater than those provided by higher prices and which have no negative impact on the poor.[20] Von Braun (1988), later in this issue, analyzes the specific mechanisms through which cost-reducing technological change can be pro-poor, pro-food security.

Second, an agriculture-based development strategy that enhances food security for the rural poor requires massive investment in rural infrastructure. It is increasingly clear that reliable all-weather transport is essential to achieving a high level of intensity of farming, labor input per hectare, wage rates, and rate of growth in non-farm employment. In Bangladesh, Ahmed and Hossain show that good infrastructure compared to poor infrastructure is associated with 92% more fertilizer use per hectare, 4% more labor per hectare in farming, 30% more non-farm employment, and a 12% higher wage rate.[21] Typically, one-third or more of the agricultural area of developing countries is so ill-served with infrastructure as to be left out of these processes.[22]

The size of the requisite investment in rural infrastructure is quite large if agriculture is to become the centerpiece for any development strategy. Unfortunately, the investment norm in many developing countries is to neglect the countryside, and to concentrate the bulk of resources in a few major urban centers and in highly capital-intensive industries. This inevitably leads to a very small proportion of the labor force working at high productivity and wage rates, with the bulk of the labor force contributing precious little to the development process. Such suboptimal strategies of development are characterized by the import substitution strategies endemic in Latin America; the heavy industry strategy of India and China; and the capital-intensive consumer goods strategy of the Philippines.

Export-led growth typical of South Korea, if fed by massive capital inflows, can bring the mass of people to income levels that provide food security and may eventually pull the rural sector along. But the countries which have done well from the beginning in providing food security are the ones with broad-based agricultural strategies, e.g. Taiwan, Thailand, Malaysia, Kenya, and the Ivory Coast.[23] Such agricultural growth strategies exploit low-income countries' comparative advantage, providing agricultural exports to pay for commercial imports of food as well as capital-intensive intermediate products. The strategy indicated here varies sharply from a pure export-led strategy because, in the present context, demand is initially generated domestically, rather than overseas.

This point can be illustrated by contrasting the recent experiences of Kenya and Tanzania. In the 1980s, Kenya's agricultural sector grew at an average annual rate of nearly 3%, and was the primary force behind a slightly more rapid growth in GDP. Tanzania, on the other hand, was unable to sustain a rate of growth above 1% for either its agricultural sector or in GDP. Growth in the incomes of Kenya's poor was so rapid as to require large imports of food to sustain per capita consumption. Food imports grew at 6.5% per year in Keyna, compared to only 3.0% in Tanzania from 1970 to 1985. Kenya has been able to provide better food security to its people by promoting more rapid and more equitable growth through an emphasis on its agricultural sector.[24]

If food were more scarce in the world, as in the mid-1970s, an exposition on food security through growth would have given greater emphasis to the need for increased domestic production of food as a wage good. Yet in a world genuinely awash with food, such wage goods can be imported without substantially raising prices, and it therefore becomes important to emphasize agriculture for its broad-based employment and income-generating potentials. The current global structural imbalances have the potential to reduce the risks of a high employment growth, rural-based agricultural growth strategy.

4. REDISTRIBUTION OF FOOD

In a world with large food surpluses in wealthy

nations, we should not shy from redistribution of food as a short-run ameliorative to food security. Marginal redistribution of income towards low-income people will not in itself achieve food security. A redistributive approach to short-run food security requires distribution of food not just finances. Such redistribution efforts, however, face a myriad of problems.

To take a simple case within a developing country, say India, if one rupee of purchasing power is taken away from a person in the top 5% of the income distribution that will cause a reduction, in constant prices, of 0.03 rupee in foodgrain consumption.[25] That same rupee provided to a person in the bottom 20% of the income distribution will provide increased demand for 0.58 rupee of foodgrains. The one-to-one equality of financial transfers is matched by a 19-to-one inequality in material transfers. Thus, a marginal redistribution of income is profoundly inflationary in driving up food prices. In this case, what the left hand of society gives to the poor, the right hand of the market takes away.

Of course, the more prosperous do reduce their consumption by the amount of the lost rupee. Most of this reduced consumption will be for labor-intensive goods and services, including vegetables and livestock. This produces reduced employment opportunities — and income — for the poor. The poor lose if the physical supply of food is not increased, either by lower incomes from reduced employment or from higher prices.

The same principles apply to transfers across nations. Financial transfers to the poor of poor nations will only serve to drive up the domestic price of food, unless these transfers are used to import food. Keep in mind that the short-run supply response of food production to price is slow and the long-run response is related more to complex institutional development.

All of this means that direct transfer of food to the poor represents a feasible and potentially efficient means of achieving food security by redistributing across international boundaries.[26] But it is important that such food transfers actually reach the poor, or else prices will be depressed. Price decreases, of course, benefit the poor, but there is always the danger that such decreases will retard the process of technological change in agriculture.[27]

The very elastic demand for food of the poor in developing countries offers an opportunity for price discrimination that is advantageous to both food producers and poor consumers. By selling at a lower price in the low-income market, increased consumption occurs that reduces supply in the high-income market where demand is inelastic, resulting in a higher average price.[28] It should be noted that given the supply schedule it is advantageous to all producers, not just those in food aid providing developed countries. That is the theoretical basis for food aid from the point of view of exporters and producers.

Seeing the relationship between food, purchasing power and food security allows us to understand the place of food security in the current spate of structural adjustment programs, such as those advocated by the World Bank.[29] These adjustment programs are, of course, reactions to unsustainable deficits in government budgets and large trade imbalances. Reducing transfer payments, such as food subsidies, and food imports helps deal with both problems. If subsidies to the poor are reduced, but the supply of food is maintained, then a significant part of the loss from reducing subsidies will be returned through lower prices. There will, of course, be a net loss to the poor, but not in full proportion to the subsidy reduction. The major damage occurs, if both the purchasing power of the poor and the supply of food is reduced. Then the reduction in subsidy will not be offset by lower market prices. The precise extent of the net loss of the poor depends on the incidence of the subsidy savings. The major damage to the poor occurs, if both the purchasing power of the poor and the supply of food is reduced. Then the reduction in subsidy will not be offset by lower market prices.

Food subsidies and accompanying food imports are likely to represent a substantial part of the budget of those developing countries which have poor agricultural growth records. This is because of the importance of cheap food in maintaining political stability in the face of little income growth. Since the subsidies will tend to drive up prices if imports are not increased, there tends to be a commensurate increase in imports.

Because of the close interaction between incomes of the poor and purchase of food, the structural adjustment process may show itself in many guises, but with the same effect in each case. Policies of reduced government expenditure or tighter monetary policy are both likely to reduce the employment and purchasing power of the poor. This will reduce upward pressures on food prices and thus facilitate reduced imports, thereby closing the circle on the food consumption of the poor. Note the government budget imbalances and trade deficits tend to go hand in hand in the context of food security.

Structural adjustment programs are likely to create another food security problem for the poor. The very purpose of those programs is to accelerate growth. Such growth is likely to raise the incomes and purchasing power of laboring

class people in the third through the sixth deciles of the income distribution, who have more human capital, in terms of family nutrition, health, and education. As long as the economy is essentially in labor surplus, these people will earn more and will put upward pressure on the price of food. If the bottom two deciles remain unemployed and underemployed, they will have their real incomes reduced by the higher prices.

That seems to be precisely what has happened with structural adjustment in Sri Lanka. The top 75% in the income distribution experienced increased incomes and food consumption, despite a drastic reduction in food subsidies; but the bottom 20% suffered a lower level of food consumption.[30] Structural adjustment has all the appearances of working, but with a deleterious effect on the very poor, at least in the short run.

Lele argues that similar problems have plagued the process of structural adjustment in Malawi.[31] She makes the further point that the pace of market liberalization in the structural adjustment process has often outpaced the capacity to build institutions and to remove constraints for increasing the employment of the poor. In such circumstances, special efforts are needed to ensure the food security of the poor.

In many cases, food aid from the developed countries can be effectively used to mitigate the unfavorable effects of structural adjustment on the poor. The key, here, is targeting such food aid to low-income people. Efficient targeting will maximize the extent of market expansion in response to food aid, gratifying producer groups in both developed and developing countries. Thus, the vital questions for food aid in support of structural adjustment are: (1) How can it be targeted to the poor? and (2) How can it also contribute positively to the process of broad-based growth?

The two principal means of targeting food aid to the poor are food-for-work and food subsidies. Food-for-work is usually highly effective at reaching the most poor, because the work is onerous and the pay is low. While food-for-work sometimes misses certain classes of the poor (such as women and the infirm), it is attractive because it helps create the physical infrastructure needed for broad-based growth. In that regard, it is especially attractive in rural areas where, in general, infrastructure is sorely lacking. In much of Africa, for example, the veritable lack of paved roads, and complementary institutions presents one of the largest impediments to rural development.

In considering the use of food aid to support the creation of such public works, it is well to remember that developing countries are currently using food as a factor of production (as a wage good to back up increased employment) at a grossly sub-optimal level. Thus, earmarking foreign assistance in the form of food aid is biasing expenditures and development allocations in a direction which is initially sub-optimal. That may not be the theoretically most efficient way to improve the allocation of resources, but it is effective and correct.

If food-for-work is to make an effective contribution to growth it must be complemented by other resources — e.g., materials for road surfacing and culverts. Ezekiel estimates that in Africa food comprises some 15 to 40% of the cost of public works.[32] Ahmed and Hossain show that without the complement of other resources, food aid is of little productive value. In Bangladesh, rural roads without a hard surface are of little value; but paved roads enjoy a high rate of return.[34]

How to find financing to complement food aid in rural public works or other labor-intensive projects is a matter of institutional convenience. One solution is to provide some additional food aid for monetization, that is for sale in the market. Such sales must not, however, reduce prices below reasonable levels. Those counterpart funds from sales of food aid would then be allocated to food aid projects to cover non-food costs.[34] A second solution would be to develop institutional ties between food aid to developing countries and the institutions which provide financial resources. This should be feasible between such multilateral organizations as the World Food Program and the World Bank.

Food subsidies are another means of targeting food towards the poor. They also have a production effect in that they should lead to a somewhat more stable and lower-priced labor force. Food subsidies have the effect of distorting consumption patterns towards food — more food is consumed at a given income level when income comes from food subsidies than when it comes in other forms.[35] Such distortions may or may not be desirable from the point of view of the poor, but are considered attractive by most donors.

Broad subsidy schemes, the most extreme of which exist in Egypt, have immense costs and an immense impact on food security. In recent years, Egypt has spent up to 9% of its national income and 17% of its national budget on food subsidies. These subsidies have accounted for about 16% of the total incomes of the poorest quartile of the population.[36] The level of caloric intake of Egypt's poor is high in relation to international norms at that level of income.

Food subsidies may be targeted to the poor by very general measures, such as choosing lower quality foods, or very specifically, by giving the poor food stamps or inviting them to field

kitchens. Efforts at narrow targeting are more expensive in poor countries and those with fewer educated people to serve as administrators. It is all too easy for narrow targeting to become less efficient in delivering a given proportion of food to poor people than more generalized subsidies.

A good example of narrow targeting is the pilot scheme in the Philippines, which designated low-income areas and then focused subsidy programs in these areas.[37] Yet in cases like the Philippines, as targeting efforts narrow, they exclude more and more of both the wealthy and the poor. In a sense, efficiency may rise, but deprivation is likely to increase as well.

Bangladesh is a good example of a country using food aid to back both food-for-work and food subsidies. In the mid-1980s, the average value of food aid in Bangladesh equaled 26% of annual development expenditure. That provided a substantial quantity of food and the financial means for the government to transfer purchasing power to the poor. It should be emphasized that governments cannot quickly turn income and food redistribution programs on and off. Once programs are introduced even with foreign aid, governments will do their best to maintain them — even at very high costs to long-term development. For example, an econometric analysis of public development expenditures in Bangladesh indicates that during the period 1976 to 1985, every dollar reduction in the supply of food aid was followed by a reduction in public expenditures on development of as much as 18 cents.[38] Similar analysis for Egypt provides even more striking evidence of the extent to which governments will cut other expenditures in order to maintain food subsidies when foreign aid is reduced.

5. INSTABILITY

Commitment of a Third World government to food security has profound political implications. Such commitment requires a substantial reallocation of resources to rural infrastructure and the technical institutions of agriculture. Growth will no doubt be faster, but with larger, weather-induced fluctuations. Similarly, a more employment-oriented strategy provides political goods to a larger populace, but it is also subject to the vagaries of national weather and international prices.

During the past few decades fluctuations in both food production and international prices have increased markedly. Policies of developed countries are at least partly responsible for these increased price fluctuations.[39] The increased production fluctuations in developing countries may be partially due to volatility in the important input policies associated with the improved food production technology.[40] Whatever the cause, it is important to devise policies that reduce the burden of such fluctuations of both Third World governments and the poor.

Lele and Chandler draw attention to immense fluctuations in the demand on public food distribution systems in Africa.[41] The predominance of rain-fed agriculture and the marginal nature of much of African agriculture results in large fluctuations in food production. These fluctuations affect the ability of poor rural people to co-produce food and obtain employment. Thus, security of food consumption cannot be separated from production stability problems.

In theory, bilateral foreign assistance programs could play a very useful stabilizing role. But bilateral assistance — and especially food aid — is itself inherently unstable.[42] Thus, a food security orientation can benefit greatly from stabilization efforts by international institutions.

The most important and obvious international device for stabilizing food supplies is the International Monetary Fund's cereal import facility. Although conceptually a good idea, this facility has been little used since it was instituted in 1981. The lack of use is ostensibly because of the absence of poor weather and other forces driving up food prices. Ezekiel, however, shows that a substantial number of countries have faced fluctuations in their food import costs and should therefore have been eligible to draw on the fund.[43] They could not do so because of various constraints imposed on drawings under the scheme, including those arising from integration with the Compensatory Financing Facility dealing with export fluctuations.

If developing countries are to be encouraged to make commitments to agriculture and food security, they need a facility that treats food as a special commodity, one that is separated from other foreign exchange needs. This calls for significant modification of the present IMF cereal import facility. Such modifications must take into account circumstances in which a country's food aid is suddenly reduced and that country needs to use hard currencies for importing food. A vigorous cereal facility could encourage countries to take up more agriculture-oriented and more food security-oriented development strategies.

Beyond the cereal import facility, there is scope for the international financial institutions, such as the World Bank and the major regional banks, to provide some stabilizing effects. These actors should recognize the commitments that developing countries are making to long-term

agricultural development, and attempt to provide stability in the face of the shifting national emphases of the bilateral donors. This may require structural adjustment lending in the face of poor crop years and high international prices of food. It may also require attention to imports of fertilizer which are so vital to technological change in agriculture, but which probably cannot be stabilized by an IMF-type facility.

Hay and Rukuni (1988), in this issue, discuss the evolution of domestic policies in Africa to cope with production and price instability, including the use of domestic storage. Although domestic stocks are expensive to maintain, many countries use them in an attempt to stabilize food supply and consumption. Yet except in situations where transfer costs are extraordinarily high, such as in the landlocked nations of the Sahel and Southern Africa, domestic storage stocks should, in general, only be kept at a level to carry consumption in the face of sharp declines in production up to the time at which imports from abroad can be realized. Pinckney and Valdés (1988) make this point explicitly for the case of Kenya and Pakistan later in this issue. Minimal use of stocks, of course, presumes an efficient international system for ensuring food security — something not yet in place. Of course, given the human and political importance of food security and imperfections in private trade, it is important that government err on the side of somewhat larger stocks rather than on the side of smaller stocks. In addition, where transport costs are high, investment should be made to improve roads and delivery systems, in order to eliminate long-term dependence on domestic storage.[44]

Stocking policy may be influenced not only by efforts to maintain consumption, but also by price-support operations for the agricultural sector. Yet, in cases where new technological breakthroughs combined with good weather bring large increases in production, such stocking efforts may prove extremely expensive. This is the situation India has faced since the mid-1970s. In India, where buffer stocks were targeted at 10 million tons of cereals, total stocks with central and state governments were as much as 22.5 million tons in 1984 and 29.2 million tons in 1985.[45] Such over-stocking provides a high degree of food security for consumers, but at a very high cost. Over the period 1975/76 through 1979/80, the Indian public food distribution system incurred additional costs (received subsidies) ranging from 24.40 and 41.20% of the wholesale issue price of wheat in order to protect consumers from paying a wholesale market price that was only between 0.66 and 5.70% more than that issue price.[46] Under such circumstances, food prices need to be gradually reduced. That, of course, does not reduce farm incomes since they have already been raised by the new technological breakthroughs which reduced cost and produced large production increases.

It is important that the benefits of technological change be passed on to consumers. If those benefits pass on quickly through multiplier effects to other sectors of the economy, those higher incomes will themselves serve to maintain prices only marginally lower than their previous level. To the extent that those processes do not work well or involve lags, it will be necessary for agricultural prices to decline to pass on the benefits more directly. Of course, providing the benefits through employment is the preferred action since that raises national income. Stabilization of domestic prices is often necessary to supplement efforts to create employment, particularly in economies where poverty is widespread and targeting food subsidies is ineffective. The paper by Ahmed (1988) in this volume demonstrates how such a price stabilization program should be established.

6. INSTITUTIONAL NEEDS

The current global food imbalances present an extraordinary opportunity for achieving world food security. To realize that opportunity will require much intelligence, goodwill and time. It will also require a number of concrete steps on the part of both developed and developing countries.

From the standpoint of the developed countries, much is needed. These countries not only have the potentially useful surplus food, but also the disproportionate share of scientific resources needed to expand agricultural production in the Third World. From the developed countries, technical experts of all kinds — plant breeders, agronomists and livestock specialists — are needed to help lay the foundation for accelerated Third World agricultural growth.

The developed countries also must make available the expertise needed to help Third World governments formulate new and improved food and agricultural policies. Just viewing food security issues alone, there is a complex interaction of domestic food price policy, food import policy, and food production policy. Since a rapid move towards global food security implies market interference, policies must be developed that are quite broad. In many developing countries this means that renewed attention must be focused on expanding institu-

tions for agricultural research and extension. In most cases, agricultural research is quite specific to a particular physical environment. While the broad concepts of the new agricultural technology may be borrowed from abroad, Third World countries must have the research ability to adapt these findings to their own situation. Developing countries with the help of developed country experts must build and train their own cadre of agricultural scientists, technicians, and extension agents.

With respect to food aid, developed countries must begin moving far larger quantities of aid than in the past, and with far clearer objectives. This will require increased numbers of trained administrators — in both developed and developing countries — who understand how food aid can be used to relieve food insecurity.

Food aid provides an important link in the needed partnership between developed and developing countries. Food aid in support of rural public works can do much to build an efficient and reliable rural infrastructure. The construction of all-weather roads and new irrigation systems helps set the stage for long-term agricultural growth. Such rural public works also provide much-needed short-term employment and income for the poor. The poor will then use their increased purchasing power to buy the food sent into the system by food aid.

If the food and scientific resources provided by the developed world are to be used effectively, new institutional structures need to be created in the Third World to handle and channel these resources to those in greatest need. In Africa, such institutional structures hardly exist at present and, as a result, the efficiency of relief measures is often quite low. Given the recurrent nature of food security problems, developing countries need to build institutional structures which can be expanded in times of scarcity and contracted in times of abundance. This is a point emphasized by Hay (1988), in this volume, in his analysis of Botswana's drought relief program. Although they take time to build, institutional structures for rural public works often meet this kind of need. For example, the Maharashtra Employment Guarantee Scheme in India provides an excellent example of a rural public works program designed to provide seasonal food security, but which expands easily to deal with the much larger food security problems that arise during famines.[47]

It is tempting in the context of institution building to plead for institutions in the developed world which would ensure stability of food aid. Food aid is notoriously unstable, but it seems unlikely that major bilateral donors will quit making the political decisions that create this instability in the first place. This fact serves to underscore the need for international mechanisms which can provide stability. The cereal import facility at the IMF is a nascent structure which needs to be developed and expanded. And the international organizations of the world — the World Bank and the major regional banks — need to develop other institutional structures for directing resources to meet the food security needs of the Third World.

From all these, we can see that there is a need for a complex set of interacting national and international institutions in the areas of production, infrastructure building and financing. With a clear sense of such needs, these structures could be built in time to end hunger and food insecurity by the end of the century. Such pious hopes have been dashed in the past because there has not been an underlying sense of strategy and a recognition of the complex set of institutions that are needed.

NOTES

1. Data in preceding paragraph are from, respectively, Mellor (1986) and USDA (1987).

2. World Bank (1986), pp. 1–5. Estimates vary widely according to definition of malnutrition and statistical techniques. Reutlinger and Selowsky (1976) have estimated that as many as 1.1 billion people suffer from calorie deficient diets. In light of such discrepancies, these estimates seem useful primarily in emphasizing that malnutrition continues to be a huge and pervasive problem in developing countries.

3. Sukhatme (1977) and Margen (1978).

4. Mellor and Desai (1985) and Dandekar (1988).

5. Ahluwalia (1985), Table 7.1, p. 60.

6. See Tweeten (1988) for a discussion of technology and structural changes in US agriculture.

7. Recent studies of food production in those countries include Rosegrant *et al.* (1987) for Indonesia and Stone (1987) for China.

8. See, for example, Mellor (1978) and Alderman (1986).

9. Data derived from USDA (1987).

10. The analysis of countries with rapid food pro-

duction growth appears originally in Bachman and Paulino (1979). L. A. Paulino of the International Food Policy Research Institute has provided these updated estimates from unpublished data derived from unpublished FAO data.

11. Paulino (1986), Table 12, p. 42.

12. Paulino (1986), Table 15, p. 62 and unpublished data from J. S. Sarma of the International Food Policy Research Institute.

13. Lele and Mellor (1981).

14. For a detailed discussion of the impact of agricultural growth on the poor, see Mellor (1976).

15. This fact was originally discussed in Mellor and Lele (1973). It was developed further in Mellor (1976), see especially Chapter 7.

16. Data on Bangladesh from Ahmed and Hossain (1987), Chapter 7. Data on Nigeria and Malaysia from Hazell and Roell (1983), Table 6, p. 28.

17. Mellor (1978).

18. Pinstrup-Anderson (1985), Table 1, p. 9.

19. Lele and Myers (1987) and Reardon and Matlon (forthcoming).

20. See Ranade *et al.* (1988).

21. Ahmed and Hossain (1987), Chapters 4 and 5.

22. See, for example, Wanmali (forthcoming).

23. A broad overview of various development strategies can be found in Mellor and Johnston (1984).

24. Data on agricultural and GDP growth from World Bank (1987), Table 2, p. 204. Import data from Lele (1988), p. 40. For a full comparative analysis of Kenya, Tanzania, and Malawi, see Lele and Myers (1987).

25. Derived from Mellor (1978), Tables 1 and 2, pp. 5–7.

26. A number of studies analyze the impact of food aid in developing countries. See, for example, Singer *et al.* (1987), Clay (1985a), Reutlinger (1983), Sen (1983), and Schultz (1980). Maxwell and Singer (1979) review a number of other studies as well.

27. Mellor (1978, 1968).

28. The concept of food aid as a form of price discrimination is discussed in Mellor (1983) and Srinivasan (1987).

29. For further analysis of the relationship between food security and the purchasing power of the poor, see Sen (1981). In that context, Mellor and Gavian (1987) and Clay (1985b) analyze the importance of food production on the incomes of the poor. The following discussion on structural adjustment programs is drawn from Mellor (forthcoming).

30. Edirisinghe (1987), Table 29, p. 48.

31. Lele (1987).

32. Ezekiel (1988).

33. Ahmed and Hossain (1987), Chapter 9.

34. Ezekiel and Gandhi (1987).

35. See, for example, Kumar (1979) and Garcia and Pinstrup-Andersen (1987).

36. National income and budget data from Alderman *et al.* (1982), Table 3, p. 16. Data on subsidies as a percent of per capita income from Alderman and von Braun (1984), p. 41. For additional information on the impact of food subsidies in developing countries, see Ahmed (1979), Gavan and Chandrasekera (1979), George (1979), Gray (1982), Scobie (1983), Trairatvorakul (1984), and von Braun and de Haen (1983).

37. See Garcia and Pinstrup-Andersen (1987)

38. Data in this paragraph derived from Ahmed and Hossain (1987) and Ahmed and Bernard (1987).

39. See, for example, Koester and Valdes (1984).

40. For an analysis of these fluctuations, see Anderson and Hazell (forthcoming).

41. Lele and Chandler (1981).

42. Lele and Agarwal (1987) and Huddleston (1984).

43. Ezekiel (1985). For analysis of the theoretical developments leading up to the creation of the cereal import facility, see Adams (1983).

44. High transport costs can seriously inhibit efforts to achieve food security through food imports. For an analysis in the context of the Sahelian region of Africa, see McIntire (1981).

45. Sarma (1988), p. 263.

46. Ezekiel (1984).

47. Ezekiel (1986).

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