PN-ABC-580
61177

INTERNATIONAL FOOD POLICY RESEARCH INSTITUTE

COMMERCIALIZATION OF SUBSISTENCE AGRICULTURE: INCOME AND NUTRITIONAL EFFECTS IN DEVELOPING COUNTRIES

JOACHIM VON BRAUN AND EILEEN KENNEDY

WORKING PAPERS ON COMMERCIALIZATION OF AGRICULTURE AND NUTRITION

NUMBER 1

COMMERCIALIZATION OF SUBSISTENCE AGRICULTURE: INCOME AND NUTRITIONAL EFFECTS IN DEVELOPING COUNTRIES

by

Joachim von Braun

and

Eileen Kennedy

International Food Policy Research Institute
Washington, D.C.

April 1986

CONTENTS

Foreword vii

1. Summary 1

2. Introduction 5

3. Commercialization of Semisubsistence Agriculture and Food Availability 7

4. The Importance and Dynamics of Cash and Export Cropping in Developing-Country Agriculture 11

5. Relationships Between Cash Cropping and Nutritional Status in Households 44

6. Conclusions for Policymaking and Research Needs 63

Bibliography 71

TABLES

1. Classification of cash crops and basic food staples 12

2. Area planted in cash crops as a share of total crop area, by region, country, and income group, 1982 14

3. Shares of total cash and export crops in total cropland, by region and income group, 1982 16

4. Land used for cash and export crops compared with land used for basic staple food production, 1982 17

5. Changes in the share of cash cropland in total cropland, 1968-82 18

6. Changes in the importance of cash cropping in land use in developing countries, by income and region, 1968-82 21

7. Importance of cash cropping in food production and trade in developing countries 28

8. Changes in production of cash crops compared with changes in production of basic food staples, by income group, 1968-82 . . . 30

9. Changes in production of cash crops compared with changes in production of basic food staples, by region, 1968-82 31

10. Correlation results for cash cropping and staple food production of 78 developing countries 33

11. Correlation of cash cropping with staple food production and per capita income in developing countries, 1968-82 34

12. Growth in cash crop and basic staple food production in selected developing countries, 1968-82 35

13. World feed utilization in 1981 and its annual growth rate from 1972-74 to 1981 39

14. Consumption of concentrated feeds in the world and in selected developing countries, 1981 40

15. Total cereal feed use in the world and in selected developing countries, 1972-81 41

16. Summary of studies on income and nutritional effects of cash crop production 47

17. Relationship between monthly household per capita income and prevalence of preschooler malnutrition, Panama, 1980 54

18. Division of labor and income from food and cash crops, by sex, Western Kenya, 1984 57

19. Checklist to test for potential adverse effects of cash cropping on food consumption and nutrition 67

FIGURE

1. Some linkages between cash crop production and nutritional status at household and intrahousehold levels 45

ACKNOWLEDGMENTS

This paper was prepared as part of a series of ongoing IFPRI research projects on the effects of increased commercialization of semisubsistence agriculture on income, food consumption, and nutrition. This study was supported by a grant from the Federal Republic of Germany through the German Agency for Technical Cooperation (GTZ). Our colleagues' background work and our discussions with them were helpful. We also gratefully acknowledge the careful review of an earlier draft by John W. Mellor, Per Pinstrup-Andersen, Ulrich Koester, R. Adelhelm, and U. Hoesle.

Joachim von Braun
Eileen Kennedy

FOREWORD

Increased commercialization of semisubsistence agriculture is an important element of efforts to increase incomes and improve living standards in rural areas of many developing countries. However, the effects on incomes, food consumption, and the nutritional status of the rural poor depend on how the increased commercialization is brought about--that is, the design and implementation of projects and policies and the response by the rural poor to changes in incomes, prices, labor demand, and other relevant factors. Poorly designed projects and lack of appropriate policies may result in deterioration of nutritional status or smaller improvement.

The International Food Policy Research Institute is undertaking research to assess the effects on income and nutrition of the transition from semisubsistence to cash cropping in several countries and to generate new knowledge useful for those designing and implementing policies and projects, thus helping to avoid negative and to enhance positive nutrition and income effects.

Some of the results from this research will be published as IFPRI research reports. This working paper series was initiated to meet requests for additional information on commercialization of semisubsistence agriculture in various countries. These working papers complement IFPRI's research reports by providing detailed but primarily descriptive analyses.

In this working paper, Joachim von Braun and Eileen Kennedy take a global look at the importance of cash cropping in developing countries and review the available literature regarding the effects of cash cropping on incomes, food consumption, and nutrition. Based on this review, they identify knowledge gaps and research needs and propose a checklist for the design of policies and programs to avoid adverse nutritional and income effects.

Per Pinstrup-Andersen

1. SUMMARY

This paper evaluates the competition between cash crop and food crop production and its effects on income and nutrition in developing countries. Aggregate country data are used for a rough assessment of the scope and development of that competition. Available research is reviewed within a conceptual framework of the potential effects of increased cash cropping on nutrition.

A cash crop is one that is produced for sale. It is the commercial orientation of the crop, be it a food or nonfood crop, that identifies it as a cash crop. An export crop is a particular type of cash crop: one that is ultimately exported from a country.

Cash crop production may influence food availability at the national, rural community, or household level. Whether national food availability is actually affected by export crop production depends on the degree of competition for scarce resources--cash crops do not always compete with subsistence food crops--and on the use of foreign exchange earned from export crops. Increased foreign exchange may offer the potential to increase national food availability. Whether this potential for nutritional improvement is actually realized, however, depends on national policies and the underlying preferences of policymakers for foreign exchange allocation. It is certainly not assured that increased foreign exchange will actually be used for food imports or for accelerated food production to maintain or increase food availability.

Cash cropping maintains an important position in many developing countries' agriculture. Of the 78 developing countries analyzed here, only 16 devote less than 10 percent of their cultivated area to major cash crops (excluding basic staple foods). Twenty-eight countries have more than 30 percent of their cropped areas devoted to cash crops. It should be noted that this represents an underestimation of cash cropping because for statistical reasons cash crops are identified by types of crops: sugar; oil seeds; fiber and tobacco; vegetables; coffee, tea, and cacao; and other tree crops, such as fruit trees, oil palms, and rubber. In practice, however, staple foods are often sold for cash, too.

The ratios of cash crop area to basic food crop area reveal that 32 of the 78 countries allocate an area to cash crops that corresponds to more than 50 percent of the staple food crop area. The staple food crops included are cereals, pulses, and roots and tubers. Of the 35 African countries, 20 are producing cash crops in an area equal to more than 30 percent of their area for basic food staples. In many

developing countries, 20 to 40 percent of the basic staple food produced is also marketed.

The agricultural production patterns in developing countries for cash crops change over time. Whereas about a quarter of the 78 countries show considerable increases in land used for cash cropping during the period 1968-82, another quarter show a considerable decrease (about a 15 percent change in the area share during the period). The position of cash cropping in agricultural production is much more stable in middle-income than in low-income countries. In addition, there are more countries in the low-income group that show decreased production of cash crops. Most of the countries that are moving away from cash cropping are in Africa, whereas a majority of Asian and Latin American countries show stable or increased shares of land used for cash crops. The share of land used for traditional non-food crops that are usually also export crops (cotton, other fibers, tobacco, coffee, tea, and cacao) decreased rapidly in 24 countries, mostly low-income countries in Africa, and increased rapidly in 12 countries.

It is frequently assumed that expansion of cash cropping is at the cost of staple food production. This, however, does not appear to be a generalizable effect. Static comparison across countries seems to support the point that countries with higher shares of cash cropping in land use produce less food per capita. But this situation tells nothing about the effects of increased cash cropping on food availability, which is largely determined by trade policies. It is more revealing to look into the dynamic changes of cash cropping and the accompanying changes in food production. Not only is the growth in area allocated to cash crops positively correlated with growth in staple food production, but even the growth in share of cropland allocated to cash crops is generally positively associated with per capita staple food production.

A longitudinal assessment of the relationship between basic food production and cash cropping provides additional insights: most of the countries either manage a combination of growth in both cash cropping and food production or fail to manage either. In both cases the statistical outcome is a positive association of increased or decreased cash cropping with staple food production. Obviously, successful development in the staple food sector, through technological change and appropriate sectoral policies, and growth in the typical cash crop sector are not mutually exclusive. Appropriate policies for input supply, output marketing, and rural infrastructures benefit both sectors and are crucial for that growth.

Because about 600 million metric tons of cereals, or 40 percent of the world cereal harvest, is fed to animals, there is certainly competition for grains between food and feed use at the global level. Out of these 600 million metric tons, about 130 million metric tons are used for feed in developing countries. About two-thirds of this is used in Latin America and China, and only about 3 percent in Africa. The 130 million metric tons correspond to about 15 percent of

total staple food consumption in developing countries (in grain equivalents).

The current pattern of feed use versus food use is hardly an issue of concern. It should be stressed, however, that the nutrition problem in developing countries is largely a poverty problem, and it is affected only marginally by world availability of staple foods. Continuation of recent tendencies in feed use, however, might well be disadvantageous to the poor in developing countries. Cereal feed use in developing countries increased by about 8 percent per year during the last decade. This growth was dominated by the growth in feed use in middle-income and newly industrialized countries in Asia and Latin America. It is important to realize that this growth in demand for grain may induce real prices of foodgrains to rise or pressure for food imports in those countries to increase. The poor tend to respond more rapidly to higher food prices than the rest of the population, which leaves them with the major burden of the adjustment.

Debate about increased food-feed competition in the grain markets and its potentially adverse effects on food consumption of the poor must not be confused with other issues of livestock policies. For many of the rural poor in developing countries and for those severely affected by the famine situation in Africa in the early 1980s, livestock production is an indispensable source of income with considerable developmental opportunities.

A detailed review of the research on the effect of cash cropping on household food consumption and nutrition shows mixed results. This is not surprising, given the great variety of cash crops and production conditions in general. A major problem of many of the studies reviewed is their design. Cross-sectional comparisons frequently ignore conditions in households before cash cropping was initiated. For example, in comparing the nutritional status of family members in coffee-growing households with those in maize-growing households, researchers may conclude that maize growers are better nourished without determining whether the nutritional status of the coffee growers has changed since they adopted cash cropping.

On the basis of the existing research, however, it is evident that critical relationships that determine food consumption and nutrition are affected by increased cash cropping. These effects may be positive or negative, and the actual outcome depends on factors such as the actual increase in real income from cash cropping and its distribution, income composition, change in who controls income (men or women), effects on the allocation of time of household individuals (especially mothers), nutritional knowledge, and health and sanitary factors. At this point, no clear ranking of factors is possible on the basis of existing research. A number of studies show, however, that the positive effect of increased cash income on calorie consumption may be quite small, even among the poor. This may be a result of changes in income composition and income control within the household. That women's roles are not adversely affected by increased commercialization of semisubsistence agriculture is of crucial importance

for nutrition in many societies (especially in Africa). If improved nutrition is a concern, such factors must be considered along with the average income effects of a project or program.

A crucial question for policy and program design remains: whether potential adverse effects of increased cash cropping on nutrition are of a short- or a long-term nature. This is not to say that short-term effects for, say, one-to-two years should not be an issue of concern. But appropriate and efficient policy measures to balance potential adverse effects are dependent on the time frame of the problem. Whereas short-term problems may be dealt with mainly by adjusting the timing of project implementation and a combination of measures such as temporary income support, price subsidies, and nutrition education, long-term adverse effects require very different policy instruments. These must have the potential to improve and stabilize living conditions for the losers in the commercialization process. Employment generation in rural areas would be a major element of those policies.

A checklist is presented at the end of this paper to serve as a basis for problem identification and for selection of policy measures to exclude or balance possible adverse short- and long-term effects on nutrition. It is based on the idea that increased market integration will be beneficial for the semisubsistence farm households themselves, at least in the long run, as well as for the landless rural poor. Nevertheless, certain policies for increased cash cropping might hurt the poor. To preclude this by identification of appropriate policy instruments, including criteria for rejection of potentially harmful programs and projects, remains one of the tasks for further research.

2. INTRODUCTION

An increasing number of low-income countries, especially in Africa, are facing crucial strategic decisions on how to cope with short- and long-run food security problems. At the core of these strategic decisions is the appropriate choice of policies to promote production of export crops and cash crops for the domestic market (food and nonfood), on the one hand, and subsistence crops, on the other hand.

Many developing countries are encouraging the increased production of export crops as a way to generate foreign exchange earnings and fiscal revenues, to increase the income of small landholders, and to provide employment for the rural landless poor. However, critics of policies advocating cash crop production argue that the potential benefits have never materialized and, more importantly, in areas where cash crop production has increased, food consumption and the nutritional status of the poorest households have deteriorated. The purpose of this paper is to review what is known about the income and nutritional consequences of cash crop production in order to identify those factors that enhance positive effects and those that contribute to negative ones.

Increased market integration of semisubsistence agriculture in low-income countries appears unavoidable in the future. Rapid urbanization in developing countries, growth of the rural nonagricultural sector, and technological change in agricultural production are the major driving forces of this commercialization process. Urbanization without increased rural-urban market integration would lead to volatile dualistic structures and import dependence. Growth of the rural nonagricultural sector would require increased availability of food as a major wage good in rural markets. This growth absorbs a significant proportion of the rural labor force dependent on purchased food. This expansion of the rural nonagricultural sector is closely linked to the growth in food production.[1] Increased market integration may occur without technological change in agriculture, but technological change without increased market integration seems unlikely because increased use of purchased inputs and specialization are inherent elements of most technological innovations in both food and nonfood agricultural production.

After developing a conceptual framework for analyzing the linkages between cash crop production and household income, food consump-

---

[1]John W. Mellor and Bruce F. Johnston, "The World Food Equation: Interrelations Among Development, Employment, and Food Consumption," Journal of Economic Literature 22 (June 1984): 531-574.

tion, and nutritional status, statistical information on cash cropping in developing countries is presented. Detailed information by country is provided to enable analysts working on specific countries to identify trends in cash cropping in their study countries. Then relevant empirical research on the effects of cash crop production on the income and nutrition of households is reviewed. Finally, the issues that should be considered in designing policies and programs to increase commercial agriculture while avoiding adverse nutritional effects are considered.

3. COMMERCIALIZATION OF SEMISUBSISTENCE AGRICULTURE AND FOOD AVAILABILITY

In much of the available literature, the terms "cash crop" and "export crop" are used synonymously. A cash crop, however, is one that is produced for sale: it may be sold at home or abroad and it may be either a food or nonfood commodity. An export crop is a cash crop that is ultimately exported from the country where it was produced.

There is no inherent reason why the effects of cash crop production on income and nutritional status should be positive or negative. Insecurity about the cash crop question affects the decisions on agricultural development strategies of the governments of developing countries. The old question of export promotion versus import substitution or optimal mixes of the two is not answered with respect to their nutritional effects in a particular situation.

Theoretically, agricultural specialization and increased cash crops (perhaps for export) have no adverse effects as long as product and factor markets function perfectly. If markets are imperfect--as is frequently the case, at least in the short-run--negative nutritional effects are still of no concern as long as the losers are protected from falling below minimum levels of poverty and nutritional adequacy. But these conditions are seldom fulfilled in the real world; markets do not always function properly and compensation mechanisms are often inadequate.

There are a variety of mechanisms through which cash crop production can affect consumption and nutritional status. A conceptual framework developed by Pinstrup-Andersen specifies that cash crop production may affect national and local food availability, the ability and desire of households to obtain food, intrahousehold distribution of food, and health and sanitary factors.[2] This conceptual framework provides the basis for organizing this paper.

Aggregate national or regional food availability may be a poor indicator of nutritional status because food may be plentiful but the low incomes of the poor may limit access to these supplies. Nevertheless, food availability determines food prices, and prices have important nutritional implications. Income and food prices are two main determinants of food consumption of the poor. High or

---

[2]This chapter draws heavily on Per Pinstrup-Andersen, Export Crop Production and Malnutrition, Occasional Paper Series, Vol. 2, No. 10 (Chapel Hill, N.C.: University of North Carolina, 1983), reprinted by the International Food Policy Research Institute.

increasing food prices generally have more severe effects on the poor and malnourished than on better-off consumers because the poor need to spend a larger portion of their total incomes on food to meet minimum requirements. Thus, to the extent that cash cropping reduces total food availability, the resulting increases in food prices will affect nutrition.

NATIONAL FOOD AVAILABILITY

Cash crop production may influence food availability at the national, the rural community, and the producer household levels. The effects on national food availability may be particularly important where increased commercialization signals an increase in export crops. Whether national food availability is affected by export production of agricultural commodities (food and nonfood) depends upon: the actual competition over resources between export crops and domestically consumed crops; whether potential increases in foreign exchange earned from exports are used for development of the nonexport segments of the food sector; and how much of the foreign exchange earned from additional exports is used for additional food imports. These are complex empirical issues. To address them satisfactorily for a given country requires an assessment of the country's agricultural resource base, as well as evaluation of government policies toward domestic agriculture and consumers in urban and rural areas.

FOOD AVAILABILITY AT THE COMMUNITY LEVEL

Expanded cash crop production is likely to influence local food availability in two ways. First, to the extent that land and other resources are shifted from growing food for local consumption to cash crops, the food supplies in local markets from local production would decrease. Second, if farmers, agricultural laborers, and other rural people earn higher incomes from cash crop production, a part of these higher incomes would be spent on food. Thus local or community food supplies would decrease while food demand increases. The result would be upward pressure on local food prices, having two effects: first, higher prices would lead to an increase in input intensity on the remaining food production area, and second, an effective food marketing system would provide increased food supplies to the community, either from other regions or from additional food imports. Evidence from cases where cash crop production was introduced or expanded indicates, however, that a sufficient inflow of food to avoid significant increases in local food prices frequently does not occur.[3] Potential benefits to farmers and other rural population groups from shifts to export crop production were at least partially offset by increasing local food prices. If increased cash cropping transforms a region from a net exporting to a net importing one,

---

[3]See Kathryn G. Dewey, "Commentary - Agricultural Development, Diet and Nutrition," Ecology of Food and Nutrition 8 (1979): 265-273; and Patrick Fleuret and Anne Fleuret, "Nutrition, Consumption and Agricultural Change," Human Organization 39 (March 1980): 250.

increased prices would be a logical consequence. The difference between f.o.b. and c.i.f. prices may be considerable when a country's internal infrastructure is poorly developed, as is the case in much of Sub-Saharan Africa. The nutrition of the rural poor who do not share in the benefits from cash crops but purchase food in the same markets may suffer as the result of these food price increases. However, the effects on the poor could be favorable if the cash crop is an increasingly commercialized staple food also consumed locally.

Higher food prices induced by increased nonfood cash cropping may stem from deficient rural transportation systems or other physical marketing deficiencies. The transportation and marketing systems for nonfood cash crops rarely provide positive externalities for the marketing of staple foods in the affected regions. In other cases, existing regulations, enforced by costly networks of checkpoints (roadblocks), hamper or prohibit the movement of food from one region to another. This practice is common in many developing countries, including Egypt and Kenya, and for many years, India.

In Kenya, the law specifies that all maize moving across district boundaries in commerical quantities (more than 60 pounds) must be sold to the National Cereals and Produce Board. The board then decides how maize supplies are to be distributed. In Brazil, the price of the staple, black beans, on the local market increased substantially when cash cropping of soybeans displaced black beans.[4] If food prices increase enough to offset any gains in income, the net purchasing power of the poor who spend a high proportion of income on food may remain constant or decrease as a result of cash cropping. Farmers who continue to allocate a portion of their land to food crops will be less affected. Clearly, households that produce their own food rely less on the marketplace for food. But families who must purchase most of their food from local markets may have a lower quality diet.[5]

HOUSEHOLD FOOD AVAILABILITY

A considerable proportion of existing malnutrition is found among households that produce most or all of the food they consume--the semisubsistence farm households. For those households, changes in cropping systems that influence both the amounts and kinds of food produced and the degree of fluctuation in food availability during the year are likely to have important nutritional implications.

Although the virtues of traditional cropping systems can easily be overemphasized, they have nevertheless been developed, modified,

---

[4]Fernando Homen de Melo, "Technological Change and Income Distribution: The Case of a Semi-Open Less-Developed Economy," in Growth and Equity in Agricultural Development, ed. A. Maunder and K. Ohkawa (Hampshire, England: Gower, 1983), pp. 241-251.

[5]See Kathryn G. Dewey, "The Impact of Agricultural Development on Child Nutrition in Tabasco, Mexico," Medical Anthropology 2 (1980): 21; and Kathryn G. Dewey, "Nutritional Consequences of the Transformation from Subsistence to Commercial Agriculture in Tabasco, Mexico," Human Ecology 9 (No. 2, 1981): 151.

and adapted over a long period of time to best meet farmers' goals, including nutritional goals, within existing ecological conditions and other constraints external to the farm. Projects and policies aimed at changing traditional farming systems must be preceded by efforts to fully understand why farmers use existing systems and what repercussions could follow if systems were changed.

A shift from growing mixed crops to one crop may reduce the variety of food available from a household's own production and may increase the risk of crop failure. Projects and policies promoting a shift from semisubsistence mixed cropping systems to monocropping should be carefully watched for possible negative nutritional effects. This is not to argue that the nutritional effects of such projects usually or always are negative. The additional income generated within the farm household and the associated expansion of food purchases may fully compensate for the loss in consumption of own production, while simultaneously providing additional income, which may be spent for nutritional improvements or nonfood consumption goods. However, why this outcome cannot simply be assumed is explained later.

4. THE IMPORTANCE AND DYNAMICS OF CASH AND EXPORT CROPPING IN DEVELOPING-COUNTRY AGRICULTURE

A comprehensive economic assessment of the importance of cash crops for developing countries must focus on their role in resource use, their contribution to national income, and their effects on food availability. This statistical overview mainly concentrates on the importance of major cash and export crops in land use. The review of literature and existing research that follows goes beyond this narrow approach.

LAND USED FOR CASH CROPS

In order to identify the importance of cash cropping for all of the developing countries studied, cash crops are grouped into those that require substantial off-farm processing, such as sugarcane, fiber crops, and oilseeds; those that are usually exported such as coffee and tea; and those that are usually domestically marketed, such as vegetables. According to these considerations, the crops in Table 1 may be classified as cash crops. However, the sum of these cash crops and their share of land use often reflects an underestimation of cash cropping because domestic production of basic staples (grains, pulses, and roots and tubers) are also often marketed.

For example, 34 percent of all foodgrains produced in Egypt were marketed in 1981/82.[6] Thailand's farmers sold, on the average, 39 percent of their rice in 1975/76,[7] whereas Bangladesh's farmers sold 22 percent of theirs in 1977/78.[8] Finally, Kumar reports that farmers in the Eastern Province of Zambia sold 23 percent of their maize production in 1981.[9] The usual pattern of marketable surplus of basic staples is for small farms to market only a small share of gross production, whereas larger farms market a larger share. In Egypt, farms with less than 1.0 acre sell about 15 percent of their

---

[6]Harold Alderman and Joachim von Braun, The Effects of the Egyptian Food Ration and Subsidy System on Income Distribution and Consumption, Research Report 45 (Washington, D.C.: International Food Policy Research Institute, 1984), p. 59.

[7]Prasarn Trairatvorakul, The Effects on Income Distribution and Nutrition of Alternative Rice Price Policies in Thailand, Research Report 46 (Washington, D.C.: International Food Policy Research Institute, 1984), p. 26.

[8]Raisuddin Ahmed, Agricultural Price Policies Under Complex Socioeconomic and Natural Constraints: The Case of Bangladesh. Research Report 27 (Washington, D.C.: International Food Policy Research Institute, 1981) p. 41.

[9]Shubh K. C. Kumar, "Nutrition Problems in Sub-Saharan Africa," paper presented at International Food Policy Research Institute/University of Zimbabwe conference on Accelerating Agricultural Growth in Sub-Saharan Africa, Victoria Falls, Zimbabwe, August 29-September 1, 1983 (mimeographed).

Table 1--Classification of cash crops and basic staple foods

Crop Type	Subgroup
Cash crops	
Sugar crops	Sugarcane, sugarbeet
Oil seeds	Castor beans, groundnuts, rapeseed, safflower seed, soybeans, sunflower seed
Fiber crops and tobacco	Cotton, flax, hemp fiber, jute and jute type fibers, linen, sisal, tobacco
Vegetables	Artichoke, cabbage, cantaloupe, cauliflower, chili, cucumber, eggplant, garlic, gourds, melon, onion, pepper (green), pumpkin, squash, tomato, watermelon, others
Coffee, cacao, tea	
Others	Other tree crops including fruit trees, oil palms, and rubber trees
Basic staple foods	
Cereals	
Pulses	
Roots and tubers	

grain, while those with more than 5.0 acres sell about 48 percent.[10] In Thailand, farms between 2 and 9 rai (about 0.3-1.5 hectares)[11] sell about 12 percent of their rice, whereas those with more than 100 rai (about 15 hectares) sell about 67 percent.[12] Although the very small farmers are net purchasers of grain over a year's cycle, they also participate as sellers in the market for basic food staples, usually after the harvest.

Because a crop-by-crop classification of cash crops is a crude approach, in the following discussion relative changes rather than absolute numbers are emphasized. For countries such as Thailand, with

[10]Alderman and von Braun, Effects of Egyptian Food Ration and Subsidy System.

[11]One hectare equals 6.25 rai.

[12]Trairatvorakul, Effects on Income Distribution and Nutrition.

its rice and cassava (tapioca) exports, information on the degree of export cropping is certainly incomplete because exports of food staples are neglected. In other countries, however, significant shares of some food commodities classified as cash crops are also consumed on-farm: groundnuts and vegetables, for example. Basic staple foods are often used as feed for livestock, which in turn are marketed. This issue will be addressed separately.

In Table 2 the area used by each of the cash crops in 78 developing countries is listed as a percentage of the sum of arable land plus land under permanent crops.[13] The sum of the acreage used by the six categories of cash crops identified in Table 1 is referred to as total cash cropland, and the sum of land for cacao, coffee, fiber crops, tea, and tobacco is referred to as nonfood cash cropland in Table 2. These two aggregates are also expressed as a percentage of the basic staple food area. Ideally, information for each country should be available for actual coverage of individual crops in rotation, as well as the extent of double cropping in land use, but this is not possible with the data base used. Therefore, the application of the two denominators--total cropland and gross basic staple food land--serves to express the importance of land use for cash crops from two different angles.

The countries in Table 2 are grouped by region and by income level (GNP) following the World Bank's classification of low-income, lower-middle-income, and upper-middle-income countries.[14]

The large share of cash cropland in total cropland in use compared with land used for staple food crops is striking in many countries. There is also a large degree of variance between countries. Only 16 of the 78 developing countries devote less than 10 percent of their cropped area to cash crops and those are mostly low-income countries in Africa. Twenty-eight countries have more than 30 percent of their cropland allocated to cash crops, and those are mostly middle-income countries, largely in Latin America and the Caribbean (see Table 3). A wide variety of cash crops contribute to the high shares in these countries. The more traditional nonfood cash crops, which are mostly export crops--cacao, coffee, cotton, tea, and tobacco--figure prominently in some countries. Yet these crops hold a share of more than 30 percent of total cropped area in only three countries, and of more than 10 percent in 20 countries.

The ratio of cash crop area to basic food crop area reveals that 32 of the 78 countries allocate an area to cash crops corresponding to half of their basic food crop area (see Table 4). Sixteen countries (20 percent of the countries studied) use an even larger area for cash

---

[13]Definitions of crops and land use may be found in Food and Agriculture Organization of the United Nations, "Explanatory Notes," in Production Yearbook (Rome: FAO, various years).

[14]World Bank, World Development Report (New York: Oxford University Press for the World Bank, 1984).

Table 2—Area planted in cash crops as a share of total crop area, by region, country, and income group, 1982

Region/Country	Sugar	Oilseeds	Fibers	Vegetables	Coffee, Tea, Cacao	Other	Total Cash Crops		Total Nonfood		As a Percent of Basic Food Crops	
							Percent	Area	Percent	Area	Total Cash Crops	Total Nonfood
								(1,000 hectares)		(1,000 hectares)		
Asia												
Low income												
Bangladesh	1.8	2.4	7.3	1.0	0.5	2.0	14.88	1,355	7.8	709	11.6	6.1
Nepal	1.0	0.0	1.5	0.0	0.0	0.6	3.1	73	1.5	35	3.0	1.4
Burma	0.5	0.9	3.2	0.3	0.0	4.5	15.4	1,54[illegible]	3.2	321	27.0	5.6
India	1.9	0.3	0.8	0.3	0.4	2.[illegible]	19.6	33,250	7.1	12,069	26.6	9.6
Sri Lanka	0.3	0.8	0.8	2.6	11.9	39.7	56.0	1,218	12.7	276	132.0	29.9
Pakistan	4.7	2.5	11.5	0.5	0.0	1.7	20.9	4,234	11.5	2,326	33.9	18.6
Afghanistan	0.1	0.0	1.5	0.3	0.0	1.8	3.7	294	1.5	117	8.6	3.4
Kampuchea	0.1	0.2	0.4	0.0	0.0	4.8	5.5	167	0.4	11	9.5	0.7
Laos	0.1	1.9	1.4	2.7	1.2	1.0	8.4	74	2.5	23	9.4	2.9
Vietnam	1.6	3.6	0.8	1.0	1.3	6.4	14.9	912	2.1	129	12.6	1.8
Lower-middle income												
Yemen, Democratic	0.0	0.0	6.1	0.7	0.3	9.4	16.4	34	6.4	13	46.1	18.0
Yemen, Arab Republic	0.1	0.0	0.4	0.0	0.3	1.5	2.3	63	0.7	19	7.0	2.1
Indonesia	1.3	5.5	1.3	1.3	3.2	24.0	35.5	7,158	4.5	880	53.6	6.6
Thailand	3.2	1.3	2.2	0.9	0.2	9.7	17.5	3,313	2.4	449	26.4	3.6
Papua New Guinea	0.5	0.3	0.0	0.0	33.0	61.1	95.0	351	33.0	122	204.6	71.2
Philippines	4.0	0.6	0.6	0.5	1.2	32.7	39.6	4,677	1.8	213	67.3	3.1
Turkey	1.4	2.1	2.9	2.2	0.2	10.4	19.2	5,237	3.1	852	35.7	5.8
Korea, Democratic	0.0	13.7	2.8	3.4	0.0	4.0	23.8	541	2.8	63	19.7	2.3
Lebanon	0.4	0.5	1.1	6.3	0.0	29.5	37.8	113	1.1	3	260.8	7.7
Upper-middle income												
Syria	0.4	0.3	2.8	4.1	0.0	8.8	16.5	953	2.8	162	31.4	5.3
Jordan	0.0	0.0	0.7	7.3	0.0	9.2	17.2	71	0.7	3	41.8	1.7
Malaysia	0.4	0.1	0.3	0.4	2.3	74.2	77.7	3,369	2.6	113	428.7	14.4
Korea, Republic	0.0	10.3	2.2	11.4	0.0	6.0	29.8	649	2.2	48	37.6	2.8
Africa												
Low income												
Chad	0.1	5.4	6.7	0.0	0.0	0.2	12.4	390	6.7	212	26.6	14.5
Ethiopia	0.1	1.2	1.0	0.1	5.2	0.1	7.7	1,072	6.2	864	16.7	13.5
Mali	0.1	9.7	5.1	0.1	0.1	0.1	15.2	312	5.1	105	17.7	5.9
Zaire	0.2	8.2	3.0	0.3	4.2	4.5	20.3	1,297	7.2	459	35.8	12.7
Malawi	0.6	11.0	4.7	0.4	1.0	0.0	17.7	413	5.7	132	23.3	7.4
Upper Volta	0.2	5.6	2.7	0.0	0.0	0.5	9.0	236	2.7	70	8.9	2.6
Uganda	1.0	2.3	7.8	0.2	3.4	25.0	39.6	2,315	11.2	654	115.5	32.6
Rwanda	0.1	2.4	0.2	1.2	3.8	23.8	31.4	324	4.0	41	45.1	5.7
Burundi	0.0	1.0	0.6	0.0	3.0	12.0	16.6	217	3.6	47	25.8	5.6
Tanzania	0.9	3.7	0.7	0.4	2.1	18.3	34.1	1,771	10.8	562	40.4	12.8
Somalia	0.8	0.3	1.1	0.0	0.0	1.4	3.6	40	1.1	12	6.2	1.9
Benin	0.0	3.7	1.5	0.9	0.3	24.6	30.9	557	1.8	32	69.0	4.0
Central African Republic	0.0	5.9	4.4	0.1	2.5	1.6	14.5	283	7.0	137	48.9	23.5
Guinea	0.3	5.3	0.2	0.0	3.8	0.9	13.4	211	4.0	63	32.4	9.7
Niger	0.1	5.2	0.1	0.1	0.0	0.0	5.5	201	0.1	3	3.5	0.1

(continued)

Table 2—Continued

Region/Country	Sugar	Oilseeds	Fibers	Vegetables	Coffee, Tea, Cacao	Other	Total Cash Crops		Total Nonfood		As a Percent of Basic Food Crops	
							Percent	Area	Percent	Area	Total Cash Crops	Total Nonfood
								(1,000 hectares)		(1,000 hectares)		
Africa												
Low income												
Niger	0.1	5.2	0.1	0.1	0.0	0.0	5.5	201	0.1	3	3.5	0.1
Madagascar	1.5	1.4	1.1	0.1	7.5	8.8	20.4	613	8.6	258	35.0	14.8
Togo	0.0	2.6	1.9	0.4	4.6	0.1	9.7	138	6.6	43	28.7	19.4
Ghana	0.1	3.6	0.4	2.7	40.1	20.2	67.1	1,858	40.5	1,122	140.6	84.9
Kenya	1.3	1.6	6.9	0.3	8.2	12.2	30.5	725	15.2	362	31.1	15.4
Sierra Leone	0.0	0.8	0.0	0.1	4.0	4.3	9.2	163	4.0	71	30.8	13.4
Mozambique	1.3	6.7	6.0	0.1	0.7	6.8	21.6	664	6.7	206	39.4	12.2
Sudan	0.2	7.7	2.9	0.2	0.0	0.5	11.6	1,439	2.9	363	29.0	7.3
Lower-middle income												
Mauritania	0.0	1.0	0.0	0.4	0.0	1.4	2.8	6	0.0	0	2.6	0.0
Liberia	2.7	2.6	0.0	0.0	13.5	52.6	71.3	265	13.5	50	85.8	16.2
Senegal	0.1	21.8	0.8	0.1	0.0	0.1	22.9	1,196	0.8	42	99.1	3.5
Zambia	0.2	1.3	0.5	0.1	0.0	0.2	2.2	114	0.5	27	19.6	4.6
Egypt	4.6	3.2	20.2	12.7	0.0	6.6	47.2	1,165	20.2	498	51.5	22.0
Zimbabwe	1.1	9.5	5.6	0.1	0.3	2.6	19.2	535	5.9	164	26.5	8.1
Nigeria	0.1	2.6	1.5	0.4	2.3	6.0	12.9	3,929	3.8	1,165	18.6	5.5
Morocco	0.8	0.7	0.2	0.8	0.0	5.8	8.3	694	0.2	19	15.0	0.4
Cameroon	0.4	5.0	0.9	0.2	11.7	3.3	21.5	1,496	12.5	871	71.8	41.8
Ivory Coast	0.7	1.5	3.0	0.2	37.2	0.0	42.5	1,416	40.2	1,784	89.7	84.6
Congo	1.8	3.0	0.2	0.2	1.2	1.5	7.8	53	1.4	10	41.0	7.4
Tunisia	0.0	0.1	0.2	1.4	0.0	30.2	31.9	1,592	0.2	8	118.7	0.6
Angola	0.4	2.0	2.7	0.1	5.2	10.5	20.8	728	7.9	276	74.3	28.2
Latin America, Caribbean												
Lower-middle income												
Haiti	9.0	5.9	3.5	0.3	4.0	34.6	57.3	514	7.5	68	67.6	8.9
Bolivia	2.0	1.9	0.3	0.4	0.9	2.9	8.3	280	1.2	39	34.9	4.9
Honduras	5.4	0.0	0.9	0.5	6.8	4.5	18.0	318	7.6	135	62.7	26.6
El Salvador	4.3	0.2	7.5	0.8	21.7	3.2	37.6	260	29.1	217	65.6	50.8
Nicaragua	3.5	0.4	7.5	0.7	7.4	6.3	25.8	324	15.0	187	100.0	57.8
Guatemala	4.4	0.0	4.0	1.1	14.8	12.3	36.5	653	18.8	335	74.8	38.4
Peru	1.4	0.2	2.6	0.8	4.4	4.5	14.0	491	7.1	248	40.8	20.7
Dominican Republic	13.0	2.0	3.0	0.8	20.3	3.8	42.8	621	23.3	338	275.0	150.0
Jamaica	16.5	0.7	0.6	2.2	3.4	19.2	42.6	113	4.0	11	399.4	37.7
Ecuador	3.5	1.2	0.7	0.8	22.9	10.1	39.3	1,030	23.6	619	187.0	112.4
Costa Rica	8.0	0.0	1.5	0.7	15.3	40.2	65.6	416	16.7	106	217.9	55.6
Colombia	5.4	0.9	1.4	0.8	20.4	8.3	37.2	2,111	21.8	1,238	103.2	60.6
Paraguay	1.9	23.6	17.3	1.5	1.2	14.2	59.7	1,157	18.5	359	147.3	45.7
Cuba	39.8	0.5	2.6	2.0	1.6	19.4	66.0	2,119	4.2	135	507.9	32.4
Panama	8.7	0.0	0.2	0.4	5.2	15.5	30.0	174	5.3	31	100.7	18.0
Brazil	4.1	12.0	6.0	0.3	3.2	12.4	38.0	28,314	9.1	6,764	93.2	22.3
Mexico	2.2	3.0	1.1	0.9	2.6	4.1	13.8	3,223	3.6	848	31.0	6.2
Uruguay	1.6	6.5	1.3	1.4	0.0	3.2	14.0	203	1.3	19	35.1	3.3
Venezuela	2.1	0.5	0.8	0.6	8.7	9.3	21.9	823	9.5	355	94.0	40.5
Trinidad Tobago	15.8	0.0	0.0	1.0	19.3	36.4	72.5	115	19.3	31	760.5	202.7

Source: Food and Agriculture Organization of the United Nations, Production Yearbook, 1982 (Rome: FAO, 1983).

Table 3--Shares of total cash and export crops in total cropland, by region and income group, 1982

Share of Cash Cropland in Total Cropland	Income			Region			
	Low	Lower-Middle	Upper-Middle	Asia, Pacific	Africa	Latin America, Caribbean	Total
	(number of countries)						
Total cash crops							
Less than 10 percent	10	6	0	5	10	1	16[a]
10 - 30 percent	15	12	7	12	15	7	34[b]
More than 30 percent	8	16	4	6	10	12	28[c]
Total	33	34	11	23	35	20	78
Nonfood cash crops (export crops)							
Less than 10 percent	27	21	10	20	27	11	58
10 - 30 percent	5	11	1	2	6	9	17
More than 30 percent	1	2	0	1	2	0	3
Total	33	34	11	23	35	20	78

Source: Compiled from Table 2.

Notes: Income classification follows the World Bank, World Development Report, 1984 (New York: Oxford University Press, 1984). Cash crops are defined in Table 1. Nonfood cash crops include fiber crops, tobacco, coffee, tea, and cacao.

[a]Countries with less than 10 percent of cropland in cash crops are: Afghanistan, Bolivia, the Congo, Ethiopia, Kampuchea, Laos, Mauritania, Morocco, Nepal, Niger, Sierra Leone, Somalia, Togo, Upper Volta, Yemen Arab Republic, and Zambia.

[b]Countries with 10 to 30 percent of cropland in cash crops include: Angola, Bangladesh, Burma, Burundi, Cameroon, Central African Republic, Chad, Democratic Korea, Democratic Yemen, Guinea, Honduras, India, Jordan, Madagascar, Malawi, Mali, Mexico, Mozambique, Nicaragua, Nigeria, Pakistan, Panama, Peru, Republic of Korea, Senegal, Sudan, Syria, Thailand, Turkey, Uruguay, Venezuela, Vietnam, Zaire, and Zimbabwe.

[c]Countries with more than 30 percent of cropland in cash crops include: Benin, Brazil, Colombia, Costa Rica, Cuba, Dominican Republic, Ecuador, Egypt, El Salvador, Ghana, Guatemala, Haiti, Indonesia, the Ivory Coast, Jamaica, Kenya, Lebanon, Liberia, Malaysia, Papua New Guinea, Paraguay, the Philippines, Rwanda, Sri Lanka, Tanzania, Trinidad Tobago, Tunisia, and Uganda.

crops than for basic food crops. Most of these are middle-income countries. Of the 35 African countries, however, 20 produce cash crops in an area equal to more than 30 percent of their area for basic staples (see Table 4). To repeat, marketed surplus of basic staples tends to range between 20 and 40 percent of gross production in low-income countries.[15] Thus a corresponding share of the basic crop area should be viewed as a cash crop area, which further increases the ratio of cash crop area to basic food crop area actually used for subsistence. This was not included in the accounting.

[15]See the figures for Bangladesh, Egypt, Thailand, and Zambia quoted earlier.

Table 4--Land used for cash and export crops compared with land used for basic staple food production, 1982

Land in Cash Crops in Proportion to Land in Basic Staple Foods	Income			Region			
	Low	Lower-Middle	Upper-Middle	Asia, Pacific	Africa	Latin America, Caribbean	Total
	(number of countries)						
Total cash crops							
Less than 10 percent	7	2	0	5	4	0	9[a]
10 - 30 percent	11	6	0	6	11	0	17[b]
30 - 50 percent	10	5	5	6	10	4	20[c]
50 - 100 percent	2	12	2	2	7	7	16[d]
More than 100 percent	3	9	4	4	3	9	16[e]
Total	33	34	11	23	35	20	78
Nonfood cash crops (export crops)							
Less than 10 percent	19	16	5	18	18	4	40
10 - 30 percent	12	6	3	4	13	4	21
30 - 50 percent	1	4	2	0	2	5	7
50 - 100 percent	1	6	0	1	2	4	7
More than 100 percent	0	2	1	0	0	3	3
Total	33	34	11	23	35	20	78

Source: Compiled from Table 2.

Notes: Basic staple foods included are grains, pulses, and roots and tubers. Income classification follows the World Bank World Development Report, 1984 (New York: Oxford University Press, 1984). Cash crops are defined in Table 1. Nonfood cash crops include fiber crops, tobacco, coffee, tea, and cacao.

[a]Countries with less than 10 percent of cropland in cash crops are: Afghanistan, Kampuchea, Laos, Mauritania, Nepal, Niger, Somalia, Upper Volta, Yemen Arab Republic..

[b]Countries with 10 to 30 percent cropland in cash crops include: Bangladesh, Burma, Burundi, Chad, Democratic Korea, Ethiopia, India, Malawi, Mali, Morocco, Nigeria, Sudan, Thailand, Togo, Vietnam, Zambia, and Zimbabwe.

[c]Countries with 30 - 50 percent of cropland in cash crops include: Bolivia, Central African Republic, the Congo, Democratic Yemen, Guinea, Jordan, Kenya, Madagascar, Mexico, Mozambique, Pakistan, Peru, Republic of Korea, Rwanda, Sierra Leone, Syria, Tanzania, Turkey, Uruguay, and Zaire.

[d]Countries with 50 - 100 percent of cropland in cash crops are: Angola, Benin, Brazil, Cameroon, Egypt, El Salvador, Guatemala, Haiti, Honduras, Indonesia, the Ivory Coast, Liberia, Nicaragua, the Philippines, Senegal, and Venezuela.

[e]Countries with more than 100 percent of cropland in cash crops include: Colombia, Costa Rica, Cuba, Dominican Republic, Ecuador, Ghana, Jamaica, Lebanon, Malaysia, Uganda, Panama, Papua New Guinea, Paraguay, Sri Lanka, Trinidad Tobago, and Tunisia.

DYNAMIC CHANGES IN CASH CROPPING, 1968-82

The production patterns for cash crops in developing countries are not stable over time. This is clear from Table 5, which presents the relative change in percent per year of the share of cash crop areas in total cropped areas of the same countries during 1968-82. The annual rates of change of land devoted to cash crops in total cropland use are computed from trend lines estimated for the period. Thus the relative position of cash cropping in land use remains stable

Table 5—Changes in the share of cash cropland in total cropland, 1968-82

Region/Country	Sugar	Oilseeds	Fibers	Vegetables	Coffee, Tea, Cacao	Other	Total Cash Crops	Total Nonfood	As Percent of Basic Food Crops: Total Cash Crops	As Percent of Basic Food Crops: Total Nonfood
	(percent/year)									
Asia										
Low income										
Bangladesh	-0.5	-0.8	-2.7	-0.0	-0.1	0.6	-1.6	-2.6	-2.2	-3.2
Nepal	3.4	0.0	-3.8	0.0	0.0	0.1	-1.7	-3.8	-1.2	-3.3
Burma	0.5	-0.5	1.6	1.3	0.2	0.1	0.2	1.0	-0.1	1.3
India	1.5	1.0	0.2	1.9	1.4	-1.1	0.5	0.2	0.4	0.1
Sri Lanka	4.3	7.7	0.7	1.7	-0.7	-0.4	-0.3	-0.7	-1.7	-2.1
Pakistan	3.3	-1.5	0.9	5.1	0.0	5.8	1.4	0.9	0.9	0.4
Afghanistan	0.1	5.3	1.1	9.5	0.0	0.3	1.2	1.1	0.9	0.8
Kampuchea	-5.6	-11.7	-7.7	0.0	-6.2	0.0	-2.0	-7.7	0.8	-5.1
Laos	-0.4	9.3	-0.5	2.9	3.2	5.0	3.6	1.0	3.2	0.6
Vietnam	20.1	2.7	3.9	1.5	4.9	-1.1	1.6	4.5	0.2	3.0
Lower-middle income										
Yemen, Democratic	0.0	0.0	-0.9	5.7	-1.8	-1.3	-1.1	-1.0	-2.4	-2.3
Yemen, Arab Republic	-0.2	0.0	1.1	0.0	3.8	1.9	1.7	1.9	5.4	5.6
Indonesia	9.6	0.6	0.4	2.5	3.3	-0.7	0.1	2.4	0.5	2.9
Thailand	13.2	-0.3	-4.5	-2.0	121.9	-1.3	-0.5	-3.9	-1.5	-4.8
Papua New Guinea	6.0	-8.8	0.0	5.0	3.8	-1.6	-0.1	3.8	-1.4	2.4
Philippines	0.2	5.2	-4.1	-1.0	4.2	2.8	2.4	0.2	2.3	0.1
Turkey	8.8	3.6	-1.7	2.0	6.8	1.1	1.2	-1.4	1.1	-1.5
Korea, Democratic	0.0	-0.2	-0.3	2.9	0.0	2.4	0.6	-0.3	-0.8	-1.7
Lebanon	-2.7	-10.0	-4.8	0.1	0.0	1.6	0.6	-4.8	6.5	0.8
Upper-middle income										
Syria	9.3	4.3	-4.5	6.5	0.0	5.8	2.9	-4.5	-0.4	-7.6
Jordan	0.0	-5.6	-4.6	-1.9	0.0	1.4	-0.4	-4.6	4.3	-0.0
Malaysia	19.1	3.7	11.9	6.8	15.3	-0.2	0.1	14.7	1.4	16.2
Korea, Republic of	0.0	-2.7	-1.2	4.8	1.8	-0.1	0.1	-1.2	2.3	0.9
Africa										
Low income										
Chad	19.5	0.6	-4.5	1.7	0.0	4.1	-2.4	-4.5	-3.3	-5.4
Ethiopia	0.5	-0.9	-3.1	2.0	1.0	-13.7	-0.7	0.4	0.4	1.4
Mali	8.0	-3.2	1.9	0.0	63.6	-2.4	-1.7	1.9	-3.0	0.6
Zaire	1.5	2.2	-3.1	1.7	1.5	0.2	0.8	-0.3	-0.8	-1.8
Malawi	15.5	-0.0	0.7	2.1	1.8	-13.2	0.5	0.8	0.5	0.9
Upper Volta	119.6	-1.4	-1.8	9.3	0.0	-0.3	-1.3	-1.8	-0.4	-0.9
Uganda	0.7	-7.4	-11.6	3.0	-4.6	2.9	-2.6	-9.3	-0.0	-6.9
Rwanda	11.8	5.0	-1.1	0.0	0.6	1.0	1.2	0.5	1.6	1.0
Burundi	0.0	2.2	-3.0	0.0	1.0	0.4	0.5	0.1	0.6	0.1
Tanzania	0.8	5.3	-2.7	2.4	-0.0	0.5	-0.2	-2.2	-2.7	-4.7
Somalia	5.8	-12.6	0.4	0.0	0.0	1.4	-0.6	0.4	-2.3	-1.3
Benin	0.0	-1.8	-6.4	3.2	-13.8	-1.0	-1.4	-6.5	-0.7	-5.8
Central African Republic	0.0	0.4	-5.1	1.6	4.3	-1.7	-1.3	-2.7	-2.9	-4.2
Guinea	129.1	1.0	0.6	0.0	0.9	-1.6	0.9	0.9	2.0	1.9
Niger	6.3	-9.4	-15.0	3.4	0.0	-2.9	-9.3	-15.0	-9.4	-15.1

(continued)

Table 5--Continued

Region/Country	Sugar	Oilseeds	Fibers	Vegetables	Coffee, Tea, Cacao	Other	Total Cash Crops	Total Nonfood	As Percent of Basic Food Crops: Total Cash Crops	As Percent of Basic Food Crops: Total Nonfood
					(percent/year)					
Africa										
Low income										
Madagascar	3.4	-3.0	-3.0	2.0	-0.5	5.6	1.5	-0.9	2.1	-0.3
Togo	0.0	-0.3	-3.9	2.8	-0.3	14.7	-1.4	-1.7	-0.2	-0.4
Ghana	-4.8	0.9	13.2	2.5	-2.2	7.8	-0.6	-2.1	-0.1	-1.6
Kenya	1.2	4.5	1.8	2.2	3.8	-2.2	0.4	2.8	1.4	3.8
Sierra Leone	0.0	-3.8	82.4	2.5	-1.7	-0.5	-1.3	-1.6	-1.7	-2.0
Mozambique	-0.7	-1.8	-7.8	0.1	0.4	-0.2	-3.5	-7.3	-5.2	-8.9
Sudan	6.4	6.8	-2.6	2.1	0.0	4.1	2.9	-2.6	-2.1	-7.4
Lower-middle income										
Mauritania	0.0	0.8	0.0	22.4	0.0	2.7	2.9	2.7	4.6	4.5
Liberia	8.1	2.7	0.0	32.8	6.3	-0.9	0.4	6.3	-1.7	4.1
Senegal	102.1	-0.4	10.1	6.6	0.0	4.0	-0.1	10.1	0.9	11.2
Zambia	12.6	-1.4	8.0	2.4	47.8	1.7	1.3	8.1	7.3	14.5
Egypt	5.2	11.8	-0.8	3.8	0.0	4.0	1.7	-0.8	-0.2	-2.7
Zimbabwe	4.3	1.5	2.1	0.0	0.2	3.2	2.1	2.3	1.8	1.9
Nigeria	3.1	-8.1	2.5	2.8	0.4	-0.0	-2.1	1.2	-3.1	0.2
Morocco	5.2	7.4	-3.5	2.6	0.0	0.1	0.9	-3.5	2.1	-2.3
Cameroon	10.6	2.4	-5.9	0.6	1.6	3.5	1.6	0.8	-0.9	-1.7
Ivory Coast	152.1	-2.1	3.8	-1.0	-0.0	0.0	0.2	0.2	0.3	0.3
Congo	-9.6	-0.6	-1.3	4.0	-0.8	4.5	2.3	-0.9	-1.3	0.1
Tunisia	0.0	112.8	2.0	3.5	0.0	1.1	1.2	2.0	0.7	1.5
Angola	0.0	0.6	-4.6	-0.1	-9.6	22.4	-0.8	-8.2	-1.1	-8.5
Latin America, Caribbean										
Lower-middle income										
Haiti	-0.5	21.4	-3.0	2.9	-1.2	0.4	0.7	-2.1	1.8	-1.1
Bolivia	2.4	15.1	0.2	-5.3	0.6	-1.9	0.6	0.2	2.2	1.7
Honduras	4.1	22.4	3.6	7.3	0.3	1.8	1.9	0.7	0.7	-0.5
El Salvador	-0.6	8.7	1.0	-0.3	1.5	-8.7	-0.1	1.4	-0.6	0.9
Nicaragua	2.4	25.6	-2.0	2.4	0.2	-0.2	-0.0	-0.8	1.6	0.9
Guatemala	6.1	1.1	0.8	0.7	-0.2	-1.0	0.3	0.1	1.1	1.0
Peru	-3.2	3.8	-4.2	-3.6	0.1	-0.8	-1.8	-2.1	1.2	1.0
Dominican Republic	0.7	-7.9	3.0	1.8	-0.9	-1.6	-1.0	-0.5	-0.5	-0.0
Jamaica	-3.0	8.6	-1.4	3.7	-2.5	1.3	-0.8	-2.3	-2.1	-3.6
Ecuador	0.5	1.1	2.2	2.3	2.5	-3.2	0.3	2.5	4.5	6.9
Costa Rica	1.0	0.0	9.7	1.7	-3.6	7.4	2.2	-3.0	2.6	-2.6
Colombia	0.6	-0.5	-4.2	2.4	1.7	-3.6	-0.4	0.8	-1.3	-0.1
Paraguay	-4.0	13.4	9.1	-4.0	-3.7	0.8	5.6	8.0	6.1	8.5
Upper-middle income										
Cuba	-1.6	-2.3	-1.3	3.6	-2.4	5.2	-0.0	-1.7	1.8	0.1
Panama	8.9	0.0	3.9	-1.1	1.0	-0.5	1.6	1.1	4.0	3.4
Brazil	1.7	11.0	-3.5	-3.7	-3.3	2.2	1.9	-3.4	2.3	-3.0
Mexico	0.3	6.4	-4.7	1.7	1.9	-0.1	0.8	-1.3	1.0	-1.1
Uruguay	2.4	0.5	-4.6	2.4	0.0	-0.9	-0.6	-4.6	1.8	-2.3
Venezuela	1.7	10.5	-4.8	4.4	-1.4	0.6	-0.3	-1.8	-0.1	-1.6
Trinidad Tobago	-2.9	0.0	-13.0	2.7	-1.3	-0.0	-1.1	-1.3	-5.4	-5.6

Source: Food and Agriculture Organization of the United Nations, Production Yearbook, 1982 (Rome: FAO, 1983).

if the expansion or reduction of cash cropping occurs at the same rate as total cropland expansion or reduction. In order to avoid a distorted picture, the growth of cash cropland is not analyzed, but the share of cash cropland in total cropland in use is examined to determine if the role of cash crops in land resource use has changed. Total area harvested expanded at different growth rates in different regions of the developing world during the period of observation. During 1971-80 area harvested expanded by 1.0 percent per year in Asia (excluding China) and in North Africa/Middle East.[16] In Sub-Saharan Africa, growth in area harvested was 1.1 percent, whereas it was 0.6 percent in Latin America. In both these regions area expansion was sharply reduced in the 1970s compared to the 1960s, when area expanded by 2.5 percent per year in Sub-Saharan Africa and by 2.7 percent in Latin America.[17]

In Table 6 the results from Table 5 are aggregated by income and by region. In about half of the countries (38) the share of cash cropping in land use remained quite stable. The share grew or shrank less than 1 percent per year. The other half of the countries were divided into two groups of roughly equal size: 23 where the share of cash cropping expanded and 17 where their share was reduced. For example, a rate of increase of 2 percent means that in a country with an initial area share of 30 percent for cash crops, this share grew to 40 percent between 1968 and 1982.

It is evident from Table 6 that the position of cash cropping in agricultural production is much more stable in middle- than in low-income countries. One might expect that the low-income countries would move more rapidly into market-integrated agriculture with relatively more cash cropping. However, this is not supported by the evidence: there are more countries in the low-income group that show decreased rather than increased cash cropping. Most of the countries that tend to reduce relative land used for cash cropping--as defined for these tabulations--are in Africa (12), whereas a majority of Asian and Latin American countries show stable or increased shares of land used for cash crops (see Table 6). The decrease in the share of the traditional nonfood cash crops--cacao, coffee, fiber crops, tea, and tobacco--is particularly striking. Twenty-four countries, mostly low-income countries in Africa, show a rapid decrease, while only 12 countries show a rapid increase in the share of land for nonfood cash crops. Changes are also marked in agricultural export volume. Lele points out that agricultural export volumes stagnated or declined in most of Sub-Saharan Africa during the period 1970-82 with only a few exceptions, such as the Ivory Coast and Malawi.[18] The upper-middle-

---

[16]Mellor and Johnston, "The World Food Equation," p. 536.

[17]Ibid.

[18]Uma Lele, "Terms of Trade, Agricultural Growth, and Rural Poverty in Africa," in Agricultural Change and Rural Poverty - Variations on a Theme by Dharm Narain, ed. John W. Mellor and Gunvant M. Desai (Baltimore: Johns Hopkins University Press for the International Food Policy Research Institute, 1985), pp. 161-180.

Table 6--Changes in the importance of cash cropping in land use in developing countries, by income and region, 1968-82

Average Percentage Change Per Year of the Cash Cropping Share in Land Use	Income			Region			
	Low	Lower-Middle	Upper-Middle	Asia, Pacific	Africa	Latin America, Caribbean	Total
				(number of countries)			
Major cash crops							
Stable share (+/-1 percent)	13	18	7	11	14	13	38
Moderate increase (1 to 2 percent)	5	7	2	5	6	3	14
Rapid increase (more than 2 percent)	2[a]	6[b]	1[c]	3	4	2	9
Moderate decrease (-1 to -2 percent)	9	2	1	4	6	2	12
Rapid decrease (less than -2 percent)	4[d]	1[e]	0	0	5	0	5
Total	33	34	11	23	35	20	78
Nonfood cash cropping (export crops)							
Stable share (+/-1 percent)	12	13	-	7	12	6	25
Moderate increase (1 to 2 percent)	3	4	1	3	3	2	8
Rapid increase (more than 2 percent)	2[f]	9[g]	1[h]	4	6	2	12
Moderate decrease (-1 to -2 percent)	3	1	5	2	3	4	9
Rapid decrease (less than -2 percent)	12[i]	8[j]	4[k]	7	11	6	24
Total	32	35	11	23	35	20	78

Source: Compiled from Table 5.

Notes: Total land use refers to the sum of arable land and land under permanent crops. Income classification follows the World Bank World Development Report, 1984 (New York: Oxford University Press, 1984). Cash crops are defined in Table 1.
Nonfood cash crops include fiber crops, tobacco, coffee, tea, and cacao.

[a] Laos and Sudan.
[b] The Congo, Costa Rica, Mauritania, Paraguay, the Philippines, and Zimbabwe.
[c] Syria.
[d] Chad, Mozambique, Niger, and Uganda.
[e] Nigeria.
[f] Kenya and Vietnam.
[g] Ecuador, Indonesia, Liberia, Mauritania, Papua New Guinea, Paraguay, Senegal, Zambia, and Zimbabwe.
[h] Malaysia.
[i] Bangladesh, Benin, Central African Republic, Chad, Ghana, Kampuchea, Mozambique, Nepal, Niger, Sudan, Tanzania, and Uganda.
[j] Angola, Costa Rica, Haiti, Jamaica, Lebanon, Morocco, Peru, and Thailand.
[k] Brazil, Jordan, Syria, and Uruguay.

income countries also moved away from traditional nonfood cash crops. Nine out of the 11 countries of that group reduced their shares significantly. Nonfood cash crops changed more than cash cropping in general.

The shift of cash crop production between groups of countries seems to follow a pattern of reductions in the low- and

upper-middle-income countries and increases in the lower-middle-income countries (see Table 6). It is likely, however, that different factors drive low-income countries out of nonfood cash cropping than those that influence the upper-middle-income countries. Upper-middle-income countries tended to switch from one cash crop to another, whereas low-income countries relatively reduced cash cropping in general. Thus low-income countries seem to have moved toward more production of basic staple foods.

In summary, cash cropping maintains an important position in many developing countries' agriculture. In 28 of the 78 developing countries, more than 30 percent of cropland is allocated to cash crops. The relative importance of cash crops has changed quite rapidly over time in a number of countries. While the share of cropland devoted to cash crops has remained quite stable in half of the countries, the other half can be divided into two groups--one with significant increases and the other with significant decreases in cash cropping. The decreases occurred mainly in the low-income African countries.

Concern about the potential socioeconomic and nutritional effects of these changes may be more relevant than concern about high but possibly stable levels of commercial agriculture. This is because of the potentially demanding adjustments of the rural population and market institutions to such changes. Short- to medium-term changes may also lead to misallocation of resources--capital, for example--because much of the capital invested for cash crop production and processing is "semifixed" in the sense that its value in use exceeds its opportunity cost outside the sector but is less than the cost of acquisition of another unit. The move into cash cropping is not a one-way street, despite the problem of semifixed capital. More countries have reduced the amount of traditional nonfood cash crops grown than have expanded the area for those crops.

COMPETITION BETWEEN BASIC STAPLE FOOD CROPS AND CASH CROPS

Cash crops and subsistence crops compete for scarce farm resources--labor, land, water, and capital (including, for example, transportation facilities). Farmers select the crop mix that provides for their own food security and for the maximum return on scarce resources. Crop-specific risks (production and price risks) are important variables that farmers must consider in making production decisions. Cash crops and export crops in particular are frequently risky for farmers as they depend on a proper functioning of input supply and output marketing systems. Reducing this institutional risk--for example, the risk that an irrigation scheme may collapse due to mismanagement or lack of foreign exchange to run the pumps--is usually beyond the control of small farmers. In virtually all developing countries food and nonfood cash crops are important to generate income for even the smallest farmers. But cash crops do not always compete for all resources with subsistence crops. They may be grown in a different season or in locations with soils or altitudes

inappropriate for subsistence food crops. Thus cash crops and subsistence crops may be complementary for some resources, land and labor use, for example, but they may compete with each other for some other scarce resources, such as capital. However, competition in production does not imply that expanding cash cropping necessarily reduces food availability.

Comparative Advantage and Import Dependence

Expanding export crop production may not reduce overall food availability in the exporting country at all. If agricultural exports conform to existing comparative advantages, the foreign exchange generated could enable the country to import more food than could have been produced if the resources used had been directed to basic food crops. Foreign exchange generated from export crops could also be spent to improve the productivity of domestically consumed food crops, thus inducing more balanced growth in agriculture.

The theory of comparative advantage, however, has both normative and positive aspects--that is, it suggests what products a country should specialize in to maximize welfare, and it shows how production and trade patterns would look under welfare-maximizing resource allocation (free trade). According to Ricardo, national and global welfare is maximized if a country specializes in producing those goods it produces at relatively low cost and exports them in exchange for imports of goods that other countries produce at relatively low cost. It is the relative costs--the comparative advantage--that determine the theoretically optimal production and trade pattern. Some of the limitations of the theory relevant to this paper are taken up later.[19]

Whereas production patterns under comparative advantage are determined by the countries' production possibilities and the relevant price ratios (terms of trade) on the international market, adjusted for applicable transportation costs, the pattern of a country's imports and exports, say, in food and nonfood agricultural commodities is also determined by its preferences: whether it prefers to consume domestically produced commodities or to use foreign exchange from export production to purchase food. Because the three key variables--production possibilities, terms of trade, and preferences--change over time, trade patterns under comparative advantages also change. Thompson and Abbot argue for dynamic concepts of comparative advantage (short run versus long run) and stress that "present low income countries' production possibilities often reflect investment decisions made by the metropolitan powers in their colonial periods. Comparative advantage in the short run, and possibly to a

[19]For a brief critique, see Th. Dams, "Der Kampf Gegen den Hunger in der Welt, Anmerkungen zum Zusammenhang 'Agrarexporte und Selbstversorgung mit Nahrungsmitteln in Entwicklungslaendern,'" der Ueberblick (1983): 12-18.

lesser extent in the long run, may be a product of those decisions."[20] This seems particularly important for agriculture, given the importance of research and development investments for comparative advantage of specific crops. Investment in some export crops in developing countries has been disproportionately high until recently, and it has influenced at least the short-run comparative advantages of domestically consumed food products versus export commodities.[21]

Much research has been devoted to the supply-side determinants of comparative advantage--production possibilities and terms of trade. Less attention has been paid to the demand-side consequences of making use of comparative advantage (preference structures) and its determinants. This is particularly relevant to the effects of export production on income distribution and nutrition. A key issue at the national level is what is actually done with the foreign exchange generated from agricultural exports. The extent to which foreign exchange, whether generated by agricultural exports or not, is actually used for food imports depends on a number of factors, including food demand, the development strategy, relevant government policies, and the demand for foreign exchange from other sources.[22]

In many low-income countries the government strongly influences the import of food staples, and in some cases it completely controls imports. In some countries food availability and price levels are important factors in maintaining political stability, which suggests that increased foreign exchange from export crops might lead to increased food imports. The internal distribution of these countries, however, may be targeted only toward the social groups relevant for political stability, which are usually not the poor and malnourished--at least not the rural poor. The extent to which scarce foreign exchange is allocated to food imports is a political question, which at least in the short run may not be dictated by economic considerations. The malnourished frequently exercise little political power. As a consequence, the nutrition effects of foreign trade policies may be of little concern to the policymaker. This tends to be particularly pronounced in countries where malnutrition is found primarily in rural areas, because the rural poor generally possess less political power than the urban poor. The effects on nutrition of an

---

[20] R. L. Thompson and Philip C. Abbot, "On the Dynamics of Agricultural Comparative Advantage," paper presented at U.S. Department of Agriculture - Universities International Agricultural Trade Research Consortium meeting, Bridgeton, Missouri, June 1982 (mimeographed), p. 7.

[21] See Pater Oram and Vishva Bindlish, Resource Allocations to National Agricultural Research: Trends in the 1970s (The Hague and Washington, D.C.: International Service for National Agricultural Research and the International Food Policy Research Institute, November 1981); and Per Pinstrup-Andesen, Agricultural Research and Technology in Economic Development (New York: Longman, 1982).

[22] Pinstrup-Andersen, Export Crop Production and Malnutrition, p. 3.

adverse political environment should not be interpreted as a negative effect of export crop production per se. Confusing the causes of the problem is likely to lead to inappropriate and economically inefficient solutions.

The relationships between fiscal policy and cash cropping can induce some peculiar effects, especially when fiscal resources are particularly scarce. There is considerable evidence in several developing countries that export crop producers are heavily taxed, mainly through marketing boards and overvalued exchange rates. When farmers attempt to shift away from export crops under the direction of the incentive structure, governments frequently force them to continue to grow export crops in order to maintain a taxation source. Attempts to enforce cash or export cropping are probably increasing, considering the severity of the fiscal and foreign exchange problems in many developing countries at this time. Area allocation restrictions and fines for not adhering to them are standard measures of enforcement.

Some countries would not be able to feed themselves even if all agricultural resources were used for food, whereas others, including many low-income countries, could adequately feed their populations with only a fraction of their agricultural resources. Thus there is no reason why net export earnings generated by agriculture should equal import spending on food. Efforts by food-deficit countries to gain a higher level of food self-sufficiency may, but need not, conflict with efficient resource utilization. Even when such conflict is present, however, a strong desire to reduce dependence on other countries for the supply of basic food staples may result in government intervention. A large share of grain exports is concentrated in five exporting countries--Argentina, Australia, Canada, France, and the United States--which accounted for 80-88 percent of all wheat exports during 1970-78.[23] In coarse grains, the United States alone accounted for 37-60 percent of exports during the same period, while the export share of the four principal exporters was 62-78 percent. Although past attempts to use grain embargoes as retaliation against specific countries have failed, the high concentration of grain exporters and periodic reference by some of these exporters to the desirability of using food as a diplomatic weapon may raise doubts in the minds of policymakers in food-deficit countries about the reliability of foreign suppliers.[24]

Although exporting countries have been unable or unwilling to discriminate significantly against any individual importing country in commercial grain trade, such discrimination is not uncommon in food aid. Use of food aid for diplomatic and political purposes has been widespread, and dependence on such aid to meet a large part of domestic food demands could greatly constrain the political freedom of the recipient countries. The amount of food aid available is highly

---

[23]Andrew Schmitz et al., Grain Export Cartels (Cambridge, Mass.: Ballinger, 1981).

[24]Pinstrup-Andersen, Export Crop Production and Malnutrition, pp. 3-4.

unstable and thus is an insecure source of supply. Aid tends to decrease when world market prices increase, as exemplified by the period 1970-76. Low-income, food-deficit countries are faced with reduced food aid when they need it most: when the cost of commercial imports are high. Many countries that have received large amounts of food aid for some time have suddenly faced a "blackout" of food aid. Between 1965 and 1978, 27 countries were confronted with this situation at least once. Domestic and foreign policy events are frequently causes of the interruption of the food aid flow.[25] Thus without long-term contractual arrangements with donors, dependence on food aid for a major portion of total domestic food demand is risky. Cutbacks in food aid are usually not fully replaced by commercial imports in developing countries, as an analysis of the 32 major food aid recipients suggests.[26]

Dependence on imports or food aid to meet a large share of staple food requirements may result in changes in consumption patterns. Wheat and rice are the principal staple foods available on the international market. Because of their natural environments, many low-income, food-importing countries, especially in Africa, are unable to produce these commodities at a reasonable cost. Thus urban consumption patterns often depend heavily on imported wheat and rice, whereas domestically produced maize, millet, sorghum, and roots and tubers provide a large proportion of total calorie intake among rural consumers. Such a dual consumption pattern is frequently promoted by export crop production and reinforced by domestic price policies. Improved trade relationships between developing countries of the same region might help to reduce these tendencies, especially in Sub-Saharan Africa, but so far this option has hardly been explored.[27] Urban consumption patterns that depend heavily on imported food commodities, the domestic production of which is not economically viable, are vulnerable to changes in world market prices and the availability of foreign food aid.[28] Furthermore, such consumption patterns reduce long-run urban demand for domestically produced food, which is likely to hamper future efforts to save foreign exchange and promote agricultural development through expanded domestic food production.[29]

---

[25]Joachim von Braun and Barbara Huddleston, "Implications of Food Aid for Price Policy in Recipient Countries," paper presented at International Food Policy Research Institute Workshop on Food and Agricultural Price Policy, Elkridge, Md., April 29-May 2, 1984 (mimeographed).

[26]Ibid.

[27]Ulrich Koester, "Regional Cooperation in the Food Sector Among Developing Countries to Improve Food Security," paper presented at the 19th International Conference of Agricultural Economists, Malaga, August 26-September 4, 1985.

[28]Christopher L. Delgado and Cornelia P. Miller, "Changing Food Patterns in West Africa: Implications for Policy Research," Food Policy 10 (No. 1, 1985): 57-62; reprinted by the International Food Policy Research Institute.

[29]Pinstrup-Andersen, Export Crop Production and Malnutrition.

To actually make efficient use of existing comparative advantages requires highly flexible responses in trade in view of unstable international markets. There may be managerial constraints for developing countries that handle most of their food trade through parastatals. Inclusion of basic food in the risky business of international export trade would cause numerous problems in countries whose parastatals lack managerial skills in the export business and where basic information on domestic supply and demand is also lacking. Excessive time lags occur where export and import clearances require high-level government decisions. The experience of Kenya in trading maize is quite telling in this respect:

> Following a large maize surplus in 1977/78, a decision was reached to export maize in early 1979, and 198,000 tons were exported from February to September 1979. By November, there was an acute domestic shortage, and it became clear that there had been some misjudgment about the size of the new crop and about the availability of stocks in the country....It took 6 to 12 months before sufficient imports--some purchased commercially and some provided by donors--arrived and were distributed.[30]

Schluter notes that since this happened, Kenya has been reluctant to authorize food exports for any commodity with significant domestic demand. Also, administrative delays in arranging rapid import and distribution of maize in what amounted to a national emergency undermined the confidence of policymakers that they could rely on food imports to alleviate domestic shortages. Political risks in liberalizing food exports also arise from the probability that consumer prices will increase. Not only the poor, but also politically important groups such as high- and middle-income urban consumers may suffer, as well as rural consumers in regions that have a deficit in the exported product.

Growth in Staple Food Production and Cash Cropping

From this general discussion, it is evident that increased cash cropping may have positive, negative, or neutral effects on national food availability. The outcome depends, first, on whether government policies are directed toward improving productivity in subsistence foods, as well as toward promoting cash crops. Second, it depends on the trade policies of the countries themselves, and third, on the external food aid policies that affect them.

The analyses here demonstrate that a rapid growth in cash cropping does not automatically exclude growth in per capita food production. In fact, the majority of countries with positive growth in

---

[30] Michael Schluter, Constraints on Kenya's Food and Beverage Exports, Research Report 44 (Washington, D.C.: International Food Policy Research Institute, 1984), p. 101.

per capita production of basic staples have simultaneously expanded their area devoted to cash crops (see Tables 7 and 8). Unfortunately, the opposite is true in low-income countries and in Africa: constant or shrinking per capita food production is combined with constant or shrinking allocation of land shares to cash crops (see Tables 8 and 9). If there is a general message in these cross-tabulations, it is probably that an appropriate agricultural policy permits joint growth in both cash crops and staple food crops and that failure of agricultural policy affects both.

Table 7--Importance of cash cropping in food production and food trade in developing countries

Region/ Country	Cash Cropping: Share of Total Cropland Use, 1982	Cash Cropping: Growth of Share, 1968-82	Growth in Per Capita Food Production Per Year, 1968-82	Share of Total Agricultural Exports: Basic Food Imports (1979-82 Averages)	Share of Total Agricultural Exports: Basic Food Exports (1979-82 Averages)
		(percent/year)			
Asia					
Low income					
Bangladesh	14.8	-1.6	-0.4	1.5	0.0
Nepal	3.1	-1.7	-1.9	0.2	0.4
Burma	15.4	0.2	2.0	0.0	1.0
India	19.6	0.5	0.0	0.3	0.1
Sri Lanka	56.0	-0.3	2.0	0.3	0.0
Pakistan	20.9	1.4	0.8	0.4	0.5
Afghanistan	3.7	1.2	-1.0	0.1	0.0
Kampuchea	5.5	-2.0	-6.2	23.7	0.0
Laos	8.4	3.6	-0.7	23.1	0.0
Vietnam	14.9	1.6	0.6	1.8	0.2
Lower-middle income					
Yemen, Democratic	16.4	-1.1	0.1	5.4	0.0
Yemen, Arab Republic	2.3	1.7	-3.3	16.6	0.0
Indonesia	36.5	0.1	2.1	0.3	0.0
Thailand	17.5	-0.5	1.1	0.0	0.4
Papua New Guinea	94.8	-0.1	-0.7	0.2	0.1
Philippines	39.6	2.4	1.9	0.1	0.3
Turkey	19.2	1.2	1.4	0.1	0.2
Korea, Democratic	23.8	0.6	2.4	0.8	0.8
Lebanon	37.8	0.6	-2.7	0.8	0.1
Upper-middle income					
Syria	16.5	2.9	3.3	0.6	0.2
Jordan	17.2	-0.4	-9.1	0.8	0.1
Malaysia	77.7	0.1	-1.3	0.1	0.1
Korea, Republic	29.8	0.1	-0.7	2.1	0.0
Africa					
Low income					
Chad	12.4	-2.4	-2.6	0.1	0.0
Ethiopia	7.7	-0.7	0.6	0.1	0.0
Mali	15.2	-1.7	-1.7	0.2	0.0
Zaire	20.3	0.8	-0.2	0.5	0.0
Malawi	17.7	0.5	-1.4	0.0	0.0
Upper Volta	9.0	-1.3	-0.8	0.4	0.0
Uganda	39.6	-2.6	-3.2	0.0	0.0
Rwanda	31.4	1.2	1.0	0.1	0.0
Burundi	16.6	0.5	-0.5	0.1	0.0

(continued)

Table 7--Continued

Region/ Country	Cash Cropping: Share of Total Cropland Use, 1982	Cash Cropping: Growth of Share, 1968-82	Growth in Per Capita Food Production Per Year, 1968-82	Share of Total Agricultural Exports: Basic Food Imports (1979-82 Averages)	Share of Total Agricultural Exports: Basic Food Exports (1979-82 Averages)
		(percent/year)			
Africa					
Low income					
Tanzania	34.1	-0.2	3.2	0.2	0.0
Somalia	3.6	-0.6	-1.9	0.6	0.0
Benin	30.9	-1.4	-0.8	0.6	0.2
Central African Republic	14.5	-1.3	-0.7	0.1	0.0
Guinea	13.4	0.9	-3.1	1.4	0.0
Niger	5.5	-9.3	1.4	0.5	0.2
Madagascar	20.4	1.5	-1.6	0.3	0.0
Togo	9.7	-1.4	-2.1	0.2	0.0
Ghana	67.1	-0.6	-4.2	0.1	0.0
Kenya	30.5	0.4	-3.7	0.1	0.0
Sierra Leone	9.2	-1.3	-0.8	0.9	0.0
Mozambique	21.6	-3.5	-3.8	0.6	0.0
Sudan	11.6	2.9	2.2	0.1	0.2
Lower-middle income					
Mauritania	2.8	2.9	-4.5	0.9	0.0
Liberia	71.3	0.4	-0.6	0.4	0.0
Senegal	22.9	-0.1	-1.0	1.2	0.5
Zambia	2.2	1.3	-2.2	7.0	0.0
Egypt	47.2	1.7	-1.5	2.3	0.0
Zimbabwe	19.2	2.1	-0.6	0.0	0.1
Nigeria	12.9	-2.1	-0.9	1.8	0.1
Morocco	8.3	0.9	-5.3	1.0	0.1
Cameroon	21.5	1.6	0.2	0.1	0.0
Ivory Coast	42.5	0.2	-0.9	0.1	0.0
Congo	7.8	-2.3	-0.7	1.4	0.0
Tunisia	31.9	1.2	1.3	1.2	0.5
Angola	20.8	-0.8	-4.0	0.7	0.0
Latin America, Caribbean					
Lower-middle income					
Haiti	57.3	0.7	-3.9	1.0	0.0
Bolivia	8.3	0.6	0.1	0.9	0.0
Honduras	18.0	2.0	-0.9	0.0	0.0
El Salvador	37.6	-0.1	0.0	0.1	0.0
Nicaragua	25.8	0.0	-2.3	0.1	0.0
Guatemala	36.6	0.3	-0.3	0.1	0.0
Peru	14.0	-1.8	-2.1	1.1	0.0
Dominican Republic	42.8	-1.0	1.3	0.2	0.0
Jamaica	42.6	-0.8	2.6	0.7	0.0
Ecuador	39.3	0.3	-2.7	0.2	0.0
Costa Rica	65.6	2.2	2.1	0.1	0.0
Colombia	37.2	-0.4	3.0	0.1	0.0
Paraguay	59.7	5.6	3.2	0.0	0.0
Upper-middle income					
Cuba	66.0	0.0	3.6	0.1	0.0
Panama	30.0	1.6	-1.6	0.2	0.0
Brazil	38.0	1.9	-0.2	0.2	0.1
Mexico	13.8	0.8	0.2	0.6	0.0
Uruguay	14.0	-0.6	1.5	0.1	0.2
Venezuela	21.9	-0.3	1.2	7.6	0.0
Trinidad Tobago	72.5	-1.1	5.4	1.1	0.0

Source: Food and Agriculture Organization of the United Nations, Production Yearbook, 1982 (Rome: FAO, 1983).

Table 8--Changes in production of cash crops compared with changes in production of basic food staples, by income group, 1968-82

Growth in Share of Cash Crop Area In Total Land Use	Growth in Per Capita Food Production per Year			
	Less than -1 Percent	+/- 1 Percent	More than +1 Percent	Total
	(number of countries)			
Low income				
Less than -1 percent	7	5	1	13
+/- 1 percent	5	4	3	13
More than +1 percent	1	5	1	7
Total	13	14	5	32
Lower-middle income				
Less than -1 percent	1	3	0	4
+/- 1 percent	6	7	6	18
More than +1 percent	4	3	5	12
Total	11	13	11	35
Upper-middle income				
Less than -1 percent	0	0	1	1
+/- 1 percent	2	2	3	7
More than +1 percent	1	1	1	3
Total	3	3	5	11
All countries				
Less than -1 percent	8[a]	8[b]	2[c]	18
+/- 1 percent	13[d]	13[e]	12[f]	38
More than +1 percent	6[g]	9[h]	7[i]	22
Total	27	30	21	78

Source: Compiled from Table 7.

Notes: The rates of change are annual changes in estimated trend lines. Grains, pulses, root and tubers (in grain equivalents) are included.

[a] Chad, Kampuchea, Mali, Mozambique, Nepal, Peru, Togo, and Uganda.
[b] Bangladesh, Benin, Central African Republic, Congo, Democratic Yemen, Nigeria, Upper Volta, and Sierra Leone.
[c] Nigeria and Trinidad.
[d] Angola, Ecuador, Ghana, Guinea, Haiti, Jordan, Kenya, Lebanon, Malawi, Malaysia, Morocco, Nicaragua, and Somalia.
[e] Bolivia, Burundi, El Salvador, Ethiopia, Guatemala, India, the Ivory Coast, Liberia, Mexico, Papua New Guinea, Republic of Korea, Senegal, and Zaire.
[f] Burma, Colombia, Cuba, Democratic Korea, Dominican Republic, Indonesia, Jamaica, Sri Lanka, Tanzania, Thailand, Uruguay, and Venezuela.
[g] Egypt, Madagascar, Mauritania, Panama, Yemen Arab Republic, and Zambia.
[h] Afghanistan, Brazil, Cameroon, Honduras, Laos, Pakistan, Rwanda, Vietnam, and Zimbabwe.
[i] Costa Rica, Paraguay, Philippines, Sudan, Syria, Tunisia, and Turkey.

Table 9--Changes in production of cash crops compared with changes in production of basic food staples, by region, 1968-82

Growth in Share of Cash Crop Area In Total Land Use	Growth in Per Capita Food Production per Year			
	Less than -1 percent	+/- 1 percent	More than + 1 percent	Total
	(number of countries)			
Asia and Pacific				
Less than -1 percent	1	2	1	4
+/- 1 percent	3	3	5	11
More than +1 percent	1	4	3	8
Total	5	9	9	23
Africa				
Less than -1 percent	5[a]	6[b]	1[c]	12
+/- 1 percent	7[d]	6[e]	1[f]	14
More than +1 percent	4[g]	3[h]	2[i]	9
Total	16	15	4	35
Latin America and Caribbean				
Less than -1 percent	1	0	1	2
+/- 1 percent	3	4	6	13
More than +1 percent	1	2	2	5
Total	5	6	9	20
All countries				
Less than 1 percent	8	8	2	18
1 percent	13	12	13	38
More than 1 percent	6	9	7	22
Total	26	30	22	78

Source: Compiled from Table 7.
Notes: The rates of change are annual changes in estimated trend lines. Grains, pulses, root and tubers (in grain equivalents) are included.

[a] Chad, Mali, Mozambique, Togo, and Uganda.
[b] Benin, Central African Republic, Congo, Nigeria, Sierra Leone, and Upper Volta.
[c] Niger.
[d] Angola, Ghana, Guinea, Kenya, Malawi, Morocco, and Somalia.
[e] Burundi, Ethiopia, the Ivory Coast, Liberia, Senegal, and Zaire.
[f] Tanzania.
[g] Egypt, Madagascar, Mauritania, and Zambia.
[h] Cameroon, Rwanda, and Zimbabwe.
[i] Sudan and Tunisia.

The data base compiled for the developing countries' cash crop production permits further statistical evaluation. Correlation analysis is applied for this purpose. It should be noted that no rigorous testing of hypotheses is done here or causal relationships traced, but instead statistical associations (correlations) are detected. Two types of correlation analyses are done with variables indicating patterns and changes in cash cropping, on the one hand, and country-specific indicators of levels and growth of food production, per capita income, and the agricultural trade balance, on the other hand. The first is a cross-sectional analysis for the 78 developing countries in the early 1980s, and the second is a longitudinal analysis within the 78 developing countries for the time period 1968-82.[31]

The major findings of the correlation analysis are as follows. Growth in the area allocated to cash crops is positively correlated with growth in staple food production (correlation 1, Table 10). This result reinforces the evidence from the cross-tabulations that growth in cash crops and in staple foods tend to move together, whether in a positive or a negative direction.

In general, even the growth in share of cropland allocated to cash crops is positively associated with increased staple food production per capita (correlation 2, Table 10). This means that even if relatively more land is devoted to cash crops out of total cropland available, per capita food production tends to keep growing. This correlation, however, is not significant at the 95 percent level.

In correlation 3 in Table 10, levels of cash cropping and of staple food production per capita in 1982 are related, as opposed to their changes over time, with which correlations 1 and 2 deal. A higher share of cash crops in land use in a country tends to be combined with a lower level of staple food production per capita in that country: the two variables are negatively correlated. It is this static comparison across countries, rather than the dynamics of cash cropping (correlations 1 and 2), that hints of competition in production of cash crops and staple food crops as they are defined here. Yet the result must be cautiously interpreted with respect to its implications for food availability. Actually the negative correlation between the two variables does not indicate anything about national food availability, as this depends upon trade policies, such as the amount of foreign exchange allocated to food imports.

If countries make efficient use of comparative advantage, a correlation of the proportion of food import expenditures to agricultural export revenues should be negatively correlated with the share of export crops in land use. Correlation 5 in Table 10 yields this result. With an increase in land for export cropping, the export revenues should increase more than enough to make up for additional

---

[31]The definition of cash cropping is the simplified one of crop type stated in Table 1.

Table 10--Correlation results for cash cropping and staple food production of 78 developing countries

Variables A	Variables B	Correlation Coefficient	Level of Significance
			(percent)
1. Growth of cash crop area, 1968-82	Growth in staple food production, 1968-82 (grain equivalent)	0.32	99.7
2. Growth in the share of cash crop area, 1968-82	Growth in per capita staple food production, 1968-82 (grain equivalent)	0.13	86.9
3. Share of cash crop area in total crop area, 1982	Staple food production per capita, 1982 (grain equivalent)	-0.27	99.0
4. Share of cash crop area in total crop area, 1982	Income per capita, 1982 (GNP)	0.33	99.8
5. Share of export crop area in total crop area, 1982[a]	Share of food imports in agricultural export (1979-82 average)	-0.21	96.1
6. Growth in the share of cash crop area, 1968-82	Growth in per capita income (GNP) 1968-82	0.26	98.6

Source: Calculated from Tables 2, 5, and 7.
Notes: The A variables indicate patterns and changes in cash cropping, and the B variables include country-specific basic data.

a "Export crops" here include only cacao, coffee, fiber crops, tea, and tobacco.

demand in food imports. Yet the issues discussed above--whether foreign exchange is appropriately allocated to food imports and agricultural development--cannot, of course, be sufficiently discussed on the basis of such simple correlations. More in-depth food policy studies for individual countries representing typical cases appear to be the appropriate research direction in view of the importance of actual policymaking for the outcome of cash cropping's effects on food availability.

The relationship between cash cropping and per capita staple food production within a country observed over time reinforces the findings from the cross-sectional analyses above (see correlation 1, Table 10, and correlations 1 and 2, Table 11). Many developing countries manage growth in cash cropping and food production both or, conversely, fail to manage either. In both cases the outcome is the positive statistical association of the change in cash cropping and staple food production.

Table 11--Correlation of cash cropping with staple food production and per capita income in developing countries, 1968-82

Variables A[a]	Variables B[a]	Correlations[b] Positive	Negative	Not Significant
		(number of countries)		
1. Area under cash crops	Basic staple food production	44	4	30
2. Share of cash-cropland in cropland used	Per capita basic staple food production	24	15	39
3. Share of cash-cropland in cropland used	Per capita GNP	2	22	54

[a] The A variables indicate patterns and changes in cash cropping and the B variables include country-specific basic data.

[b] Correlation coefficients significant at the 90 percent level are used for the grouping into the "positive" or "negative" group.

Cash crops' share in land use is higher in countries with higher GNP per capita (correlations 4 and 6, Table 10). This should be expected, as the degree of specialization and market integration increases in the process of economic development. Despite this general tendency in the cross-sectional analysis, however, in the longitudinal analysis increased cash cropping was negatively associated with economic growth during the period of observation, 1968-82, for a large number of countries (correlation 3, Table 11). Many of the 22 countries that show negative correlation are countries with deteriorating growth but relatively stable allocation of land to cash crops.

A number of factors may contribute to the mostly negative association between increased cash cropping and GNP per capita. Perhaps countries that counted on a high proportion of export cropping in land use in the 1960s may have been adversely affected by deteriorating terms of trade in the 1970s and become increasingly impoverished as a result. Or perhaps countries with high population growth and reduced per capita GNP may have attempted to maintain or expand their cash (export) cropping in order to maintain their ability to import staple foods. In many developing countries, particularly in Africa, the need for food imports expanded drastically in the late 1970s and early 1980s.

Table 12--Growth in cash crop and basic staple food production in selected developing countries, 1968-82

Country	Share of Cash Crop Area in Total Cropland, 1982 (1)	Growth In: Share of Cash Crop Area in Total Cropland (2)	Growth In: Staple Food Production Per Capita (3)	Correlation Between Growth in Cash Crop and Basic Staple Food Production (4)
	(percent)	(percent per year)		
Bangladesh	15	-1.6	-0.4	0.42
Indonesia	37	0.1	2.1	0.62[a]
Philippines	40	2.4	1.9	0.78[a]
Kenya	30	0.4	-3.7	-0.62[a]
Mali	15	-1.7	-1.7	0.06
Nigeria	13	-2.1	-1.0	0.68[a]
Rwanda	32	1.2	1.0	0.69[a]
Senegal	23	-0.1	-1.0	0.11
Brazil	38	1.9	-0.2	-0.21
Guatemala	37	0.3	-0.3	-0.37
Peru	14	-1.8	-2.1	0.50[b]

Sources: Compiled from Tables 2, 5, and 7 and analyses on Food and Agriculture Organization of the United Nations, Production Yearbook, 1982 (Rome: FAO, 1983).

Notes: For definitions of variables, see Table 1 and the text.

[a] These correlation coefficients are significant at the 95 percent level.
[b] These correlation coefficients are significant at the 90 percent level.

The information presented for groups of countries is given for 11 selected individual countries in Table 12. For several of these countries, detailed studies on the nutritional effects of increased commercialization of semisubsistence agriculture are currently under way or in the planning stage.[32] Three of these countries--Brazil, Guatemala, and Kenya--represent cases where the change in cash cropping is negatively associated with per capita food production (see Table 12). In these countries, cash crops (as defined in Table 1) cover between 30 and 38 percent of the cropland, and this share increased during the years 1968-82. In countries as diverse as Bangladesh, Mali, Nigeria, Peru, and Senegal, the share of land devoted to cash crops declined but per capita staple food production diminished as well, which yields the positive correlations between the two variables in these cases. The opposite movement can be observed in Indonesia, the Philippines, and Rwanda, where cash cropping increased along with growth in per capita staple food produc-

[32]The International Food Policy Research Institute, in collaboration with national institutions, is conducting specific studies in the Gambia, Guatemala, Kenya, the Philippines, and Rwanda.

tion. A reduced share of area in cash cropping is not associated with increased per capita staple food production in any of these selected countries. This, again, supports the finding that countries tend to either manage growth in both subsectors--cash crops and staple food crops--or fail to achieve growth in either. Only Brazil, Guatemala, and Kenya represent exceptions to this tendency among the 11 countries selected here.

The agricultural subsectors of subsistence food production and export crop production do not coexist independently of each other. Lele notes that the result of adverse developments in export volumes and terms of trade in much of Africa has been a general decline in the capacity to import. To the extent that reduced foreign exchange availability has reduced imports of agricultural inputs, spare parts, or consumer goods, the rural sector has probably been adversely affected and the rate of technological change that could augment food production may have slowed down.[33]

Although the discussion up to this point has focused on national food availability, export crop production also affects global food availability to the extent that such production consists of nonfoods, such as cotton and rubber, or food commodities with little or no nutritional value, such as coffee and tea. These commodities account for a large share of agricultural exports of the poorest developing countries but a small share of global agricultural exports. Whereas it has been important to some countries, the impact of shifts from food to nonfood crops on global food availability has been rather limited. The demand for livestock feed affects the availability of staple foods for direct consumption more seriously.

Of particular interest in the global competition between food and nonfood agricultural production is the potential impact of energy cropping--the production of agricultural commodities for manufacturing liquid fuel--on future food supplies. At this time, energy cropping is not economically sound for farmers without government subsidies.[34] However, if oil prices increase faster than the costs to agriculture of producing ethanol, such subsidies may not be needed in locations best adapted to energy cropping. Furthermore, if the rate of increase in oil prices exceeds that of food prices and if a low-priced energy source is available for the ethanol production process, energy cropping may become more profitable than food production in some countries and regions. The current downward pressure on oil prices makes such a development unlikely in the near future.

The price elasticity of demand for most nonfood agricultural export crops tends to be low, implying that production expansion would

---

[33]Lele, "Terms of Trade, Agricultural Growth, and Rural Poverty in Africa."

[34]Per Pinstrup-Andersen, "Energy Cropping," Mazingira 5 (No. 1, 1981): 60-69; reprinted by the International Food Policy Research Institute.

cause relatively large price reductions and thus would discourage further production expansion. This is not likely to be the case for energy cropping. Because ethanol will fill only a small fraction of a country's total consumption of liquid fuel, even if energy cropping becomes widespread, no significant price-depressing effect is likely to occur for oil as a result of expanded ethanol production. Thus if relative prices should favor energy production in the future, its impact on food supplies could be significant.[35]

On a per hectare basis, many traditional export crops tend to yield significantly higher foreign exchange values than staple goods in developing countries. Yet this does not necessarily provide a basis for recommending further promotion of export cropping. Lewis argues that the tropical countries, as a whole, cannot benefit much from productivity increases in export crops because of generally inelastic demand for these crops.[36] As this is not the case with basic staples, increased productivity in staple food production provides the potential for agricultural growth in developing countries. Mellor and Johnston emphasize that improvements in nutrition require a set of interacting forces: accelerated growth in agriculture; wage goods production; a strategy of development that structures demand toward goods and services with high employment content; and increased employment and thus increased effective demand for food on the part of the poor.[37]

FOOD VERSUS LIVESTOCK FEED

In 1981, about 600 million tons of cereal, which represent almost 40 percent of the world cereal harvest, were fed to animals.[38] This implies that at the global level there is competition between food and feed use of cereals, which affects prices on cereal markets. Some interest groups advocate an enforced or voluntary reduction in the consumption of meat and poultry products, especially in high-income countries. They expect that the derived demand for feedgrains would effectively be reduced, resulting in a major depression of cereal prices and increased availability of cereals to the poor. The potential price-depressing effect of any restrictions on feed use (through a meat or feed tax, for example) would probably be largely offset by a consequent reduction in overall grain production. Nevertheless, this concept has led some interest groups to support reduced consumption of livestock products.[39] But whether expen-

---

[35]Pinstrup-Andersen, Export Crop Production and Malnutrition, p. 6.

[36]W. Arthur Lewis, "Development Strategy in a Limping World Economy," in Rural Change, ed. G. Johnson and A. Maunder (Hampshire, England: Gower, 1981), pp. 12-27.

[37]Mellor and Johnston, "The World Food Equation."

[38]Food and Agriculture Organization of the United Nations, Changing Patterns and Trends in Feed Utilization, Economic and Social Development Paper 37 (Rome: FAO, 1983).

[39]This view is reflected in the slogan, "I was hungry and you have fed my food to your animals," (Brot fuer die Welt) in der Ueberblick, January 1983, p. 7.

ditures on livestock products and the use of calories for feed do in fact adversely affect nutrition of the poor in developing countries are complex and unresolved empirical issues. Again, the nature of the nutrition problem in developing countries is largely a poverty problem, which is only marginally affected by world supplies of staple foods.

The competition between food and feed is quite complex, however, and it is not as significant as it might appear for the developing countries, from the quantities of feed used worldwide. In 1981, about 73 percent of total world feed utilization (in grain equivalents) was from roughages, of which only a minor share competed for resources that could also have been used for production of basic staple foods. Of the remaining 27 percent of feed, about one-third was comprised of milling by-products, such as oil meals. The share of cereals in global feed use was about 17 percent (600 million tons). Of the approximately 600 million tons of cereals fed to livestock, about 22 percent (or 130 million tons) were actually used in developing countries. These 130 million tons corresponded to about 15 percent of the developing countries' total staple food consumption (in grain equivalents), and they were distributed: Africa, 2.8 percent; China, 39.8 percent; Far East, 10.2 percent; Latin America, 33.0 percent; and Near East, 14.2 percent.[40]

Although the current patterns of food versus feed competition in developing countries do not appear dramatic, the recent changes in the structure of feedgrain consumption in developing countries do. The use of cereal for feed in developing countries increased by about 8 percent per year during the 1970s but by only 1 percent per year in developed countries (see Table 13). This increase was dominated by growth in feed utilization in middle-income and newly industrialized countries in Asia and Latin America, as well as in the oil-exporting countries (see Tables 14 and 15).[41] The rapid growth in poultry industries is a main factor behind the increased feed demand in these countries.[42]

There are indications that the income elasticities of total demand for cereals tend to fall and then rise as per capita incomes rise and livestock consumption increases. Moreover, the component values of the food and derived feed elasticities are such that the weighted income elasticity of demand for cereals may well rise to a value larger than the initial value of the elasticity for food use alone. Mellor and Johnston argue that this shifts the rate of growth

---

[40]This information is compiled from data presented in Food and Agriculture Organization of the United Nations, Changing Patterns and Trends in Feed Utilization.

[41]J. S. Sarma, "An Analysis of Cereals Feed in the Third World: Past Trends and Projections to 1990 and 2000," preliminary draft, International Food Policy Research Institute, Washington, D.C., 1984 (mimeographed).

[42]Sarma, "An Analysis of Cereals Feed in the Third World."

Table 13--World feed utilization in 1981 and its annual growth rate from 1972-74 to 1981

Type of Feed	Developed Countries		Developing Countries		World	
	1981	Growth rate, 1972-74 to 1981	1981	Growth rate, 1972-74 to 1981	1981	Growth rate, 1972-74 to 1981
	(million metric tons)	(percent/year)	(million metric tons)	(percent/year)	(million metric tons)	(percent/year)
Concentrates						
Cereals	470	1.1	130	8.0	600	2.3
Milling by-products	35	...	60	3.7	95	2.2
Oilmeals	65	4.7	25	6.6	90	5.2
Other concentrates	120	5.2	40	...	160	3.7
Total concentrates	690	2.0	255	5.2	945	2.8
Roughages						
Temporary and permanent pasture	660	-0.2	...	...	...	...
Harvested roughages	250	2.2	...	...	...	...
Other roughages	55	4.1	...	...	...	...
Total roughages	965	0.6	1590	1.3	2555	1.0
Total feed	1,655	1.2	1,845	1.8	3,500	1.5

Source: Food and Agriculture Organization of the United Nations, Changing Patterns and Trends in Feed Utilization, Economic and Social Development Paper 37 (Rome: FAO, 1983), p. 2.

Notes: Feed use is given in grain equivalent. Other concentrates include cassava, grass meals, meat meals, milk, molasses, and pulses.

Table 14--Consumption of concentrate feedstuffs in the world and in selected developing countries, 1981

Region/Country	Grain Equivalent			
	Cereals	Cereal-Milling By-Products	Oilmeals	Total
	(million metric tons)			
World	599.8	93.3	90.5	783.6
Developing countries	131.5	57.9	24.6	214.0
Africa	3.7	3.7	1.6	9.0
Morocco	0.6	0.4	-	1.0
Nigeria	0.4	0.4	0.2	1.0
Others	2.7	2.9	1.4	7.0
Latin America	43.4	5.8	6.3	55.5
Argentina	6.3	0.3	0.4	7.0
Brazil	17.5	2.2	1.9	21.6
Mexico	11.3	1.5	2.0	12.1
Others	8.3	1.8	2.0	12.1
Near East	18.7	4.3	2.3	25.3
Egypt	2.0	1.0	0.5	3.5
Iran	1.9	0.9	0.4	3.2
Saudi Arabia	2.6	0.1	0.1	2.8
Turkey	8.2	0.9	0.6	9.7
Others	4.0	1.4	0.7	6.1
Far East	10.8	17.0	6.9	34.7
India	1.4	7.6	3.7	12.7
Korea, Republic of	3.3	0.8	0.5	4.6
Thailand	2.1	1.1	0.3	3.5
Others	4.0	7.5	2.4	13.9
Asian centrally planned economies	54.9	27.1	7.5	89.5
China	52.3	25.4	7.4	85.1

Source: Food and Agriculture Organization of the United Nations, Changing Patterns and Trends in Feed Utilization, Economic and Social Development Paper 37 (Rome: FAO, 1983), p. 43.

Table 15--Total cereal feed use in the world and in selected developing countries, 1972-81

Region/Country	1972-74 Average	1974-76 Average	1977	1978	1979	1980	1981	Growth Rates 1972-74 to 1981
	(million metric tons)[a]							(percent/ year)
World	486.6	484.4	532.3	575.5	572.6	559.1	578.5	2.2
Developed countries	417.0	400.3	435.7	473.7	463.4	440.3	451.5	1.0
Developing countries	69.6	84.1	96.6	101.8	109.2	118.8	127.0	7.8
Africa	2.3	2.7	2.9	2.9	3.2	3.3	3.6	5.8
Algeria	0.1	0.2	0.3	0.4	0.4	0.4	0.7	27.5
Morocco	0.8	1.0	1.0	1.0	0.9	1.0	0.6	-3.7
Nigeria	0.2	0.2	0.2	0.3	0.3	0.4	0.4	9.1
Tunisia	0.2	0.2	0.3	0.3	0.4	0.4	0.6	14.7
Latin America	25.6	27.6	31.6	29.4	31.9	38.0	41.7	6.3
Argentina	6.5	6.2	6.0	6.2	5.8	4.8	6.1	-0.8
Brazil	10.5	11.2	13.2	10.5	13.1	16.7	16.5	5.8
Mexico	4.9	5.9	6.9	7.0	7.2	9.4	11.2	10.9
Near East	9.1	10.8	13.0	14.0	14.7	15.7	18.3	9.1
Egypt	1.0	1.3	1.4	1.7	1.8	2.0	2.0	9.2
Iran	1.0	1.4	2.2	2.2	1.7	1.9	1.9	8.3
Saudi Arabia	...	...	0.2	0.4	1.0	1.8	2.5	49.5
Turkey	5.3	6.1	7.2	7.3	7.5	7.0	8.1	5.4
Far East	4.0	4.5	6.6	7.9	9.5	9.3	10.4	12.7
India	1.2	1.3	1.3	1.4	1.3	1.3	1.4	1.9
Korea, Republic of	0.6	0.8	1.4	2.0	2.9	2.5	3.2	23.3
Philippines	0.2	0.3	0.8	1.2	1.6	1.8	1.9	32.5
Thailand	0.7	0.8	1.5	1.8	1.8	1.9	2.0	14.0
Asian centrally planned economies	28.6	38.5	42.5	47.5	49.9	52.4	52.9	8.0
China	26.9	36.8	40.7	45.6	47.8	50.0	50.4	8.2

Source: Food and Agriculture Organization of the United Nations, Changing Patterns and Trends in Feed Utilization, Economic and Social Development Paper 37 (Rome: FAO, 1983), Annex Table 7.

[a] Note that these figures are product weights, not grain equivalents, as in Table 14.

in demand for cereals above even the production growth rates achieved by countries successful in accelerating food production.[43] Net imports may then have a period of explosive growth, and "given the diminishing returns to limited land area, plus the great difficulty and lack of experience with increasing the yield per unit of land by more than two percent per year, we can expect this phase to be one of rising real prices or rising imports of food."[44]

[43] Mellor and Johnston, "The World Food Equation."

[44] Ibid.

During this process, competition between food and feed utilization of basic staples may at times adversely affect food consumption of the poor, especially in countries where the growth path is combined with skewed income distribution.[45] This may be so because the derived income elasticity for feed may be higher in the middle- and high-income groups than the income elasticity for direct cereal consumption among the poor. Rising incomes and unchanged income distribution could result in upward pressure on cereal prices, depending on each country's trade response and the local market infrastructure. These higher prices would largely affect the poor, who tend to be more responsive to prices in their demand for basic food.

It may be argued that an expanded livestock sector dependent on feedgrains at the margin may function as a buffer to reduce price fluctuations in grains for direct human consumption, as grain use for cattle could shrink more rapidly when prices rise than grain consumption by the poor. Although government intervention may enforce such an effect--for instance, by rationing--market forces do not necessarily suggest such an outcome. Average price elasticities for meat in developing countries are frequently the same or even lower than the price elasticities of coarse grains in the poorest deciles of the population.[46] With such a structure of price elasticities and the prevailing technology in meat production, where feed represents only a fraction of the marginal cost of meat production, a rapid increase in cereal prices may lead to curtailment of food consumption among the poor before it significantly affects the use of feed for livestock production. Thus the poor may go hungry before the animals, if no policy interventions are applied. Comprehensive empirical analysis of these potential relationships has not been conducted, but it is certainly desirable. Increased purchasing power in the hands of the poor is the best assurance that the poor will win over animals in the competition for basic staples.

Sarma provides some insights into the development of average income elasticities of demand for food and feed in 12 selected developing countries, using the income elasticity of meat as a proxy for feed.[47] Projections of the combined elasticities for grains for the 1980-2000 period indicate that in five of the countries (Brazil, Indonesia, Kenya, Korea, and Malaysia) the combined elasticity declines, whereas in three countries (Egypt, Nigeria, and Turkey), it increases during the period. In the remaining four countries included

---

[45]Pan Yotopoulos, "Middle-Income Classes and Food Crises: The 'New' Food-Feed Competition," Economic Development and Cultural Change (April 1985): 463-483.

[46]Elasticities from numerous studies are reported in Harold Alderman, "The Effect of Income and Food Price Changes on the Acquisition of Food by Low-Income Households," report prepared for U.S. Agency for International Development, International Food Policy Research Institute, Washington, D.C., October 1984.

[47]Sarma, "An Analysis of Cereal Feed in the Third World."

in Sarma's analysis (India, Mexico, the Philippines, and Thailand), the combined elasticity is practically unchanged.[48]

The argument about increased food-feed competition on cereal markets and its potential adverse effects for food consumption of the poor must not be confused with other issues of livestock policy. For many of the rural poor in developing countries and for those severely affected by the famine in Africa in the early 1980s, livestock production based on natural rangeland is an indispensable source of income. In general, improved production efficiency and stabilization of feed supply with the ecologically appropriate development of livestock production remains a promising task for development. Further stabilization of the fodder base of vulnerable livestock production systems would result in stabilization of the real income of the rural population in those regions. This in turn would have favorable effects on food consumption. It is obvious that traditional livestock production systems should also be highly integrated into the exchange economy. Exports of livestock products from regions or countries with severe staple food supply and nutrition problems make perfect sense, as it permits the exchange of more expensive calories for cheaper ones, say, from cereals. The complex variety of livestock production systems, the existing demand patterns for animal products, and the actual response to changed economic conditions, such as prices, in both production and consumption preclude generalizations about the effects of food-feed competition on food consumption and nutrition in developing countries. In many cases, policy interferences that aim to shift the balance of the competition to the food side--for example, by discriminating against the livestock sector through taxation--may also adversely affect the poor and malnourished segments of the population.

[48]Ibid.

5. RELATIONSHIP BETWEEN CASH CROPPING AND NUTRITIONAL STATUS IN HOUSEHOLDS

Although important variables for the effects of increased cash cropping on nutrition are determined nationally and locally, their actual outcome largely depends on the relationships between agricultural production, income generation, and food consumption and nutrition among and within households.

Figure 1 examines in detail the process through which cash cropping may affect family consumption and nutritional status. Figure 1 is based on the assumption that households have already made the decision to begin cash crop production. The factors that influence this decision may be, for example, a change in the farm's incentive structure, which favors increased cash cropping, or a change in household preferences, which increase the demand for cash income versus in-kind (food) income. Growing of a cash crop may also be enforced by the government because of perceived benefits to the economy through fiscal or foreign exchange effects. Such reasons for growing cash crops are not depicted in Figure 1, however.

In examining the major ways in which cash crop production affects consumption and nutritional status, Figure 1 emphasizes identification of the mechanisms through which commercial agriculture may influence preschooler health. It also serves as the basis of the review of the literature.

A number of studies have been conducted to assess the effects of cash crop production on income, family food consumption, and nutritional status. None of the existing studies has looked at all of the potential linkages between cash crop production and family health and welfare. The following review of the literature discusses the available studies. Then the ways in which commercialization of agriculture influences the health and welfare of households are examined.

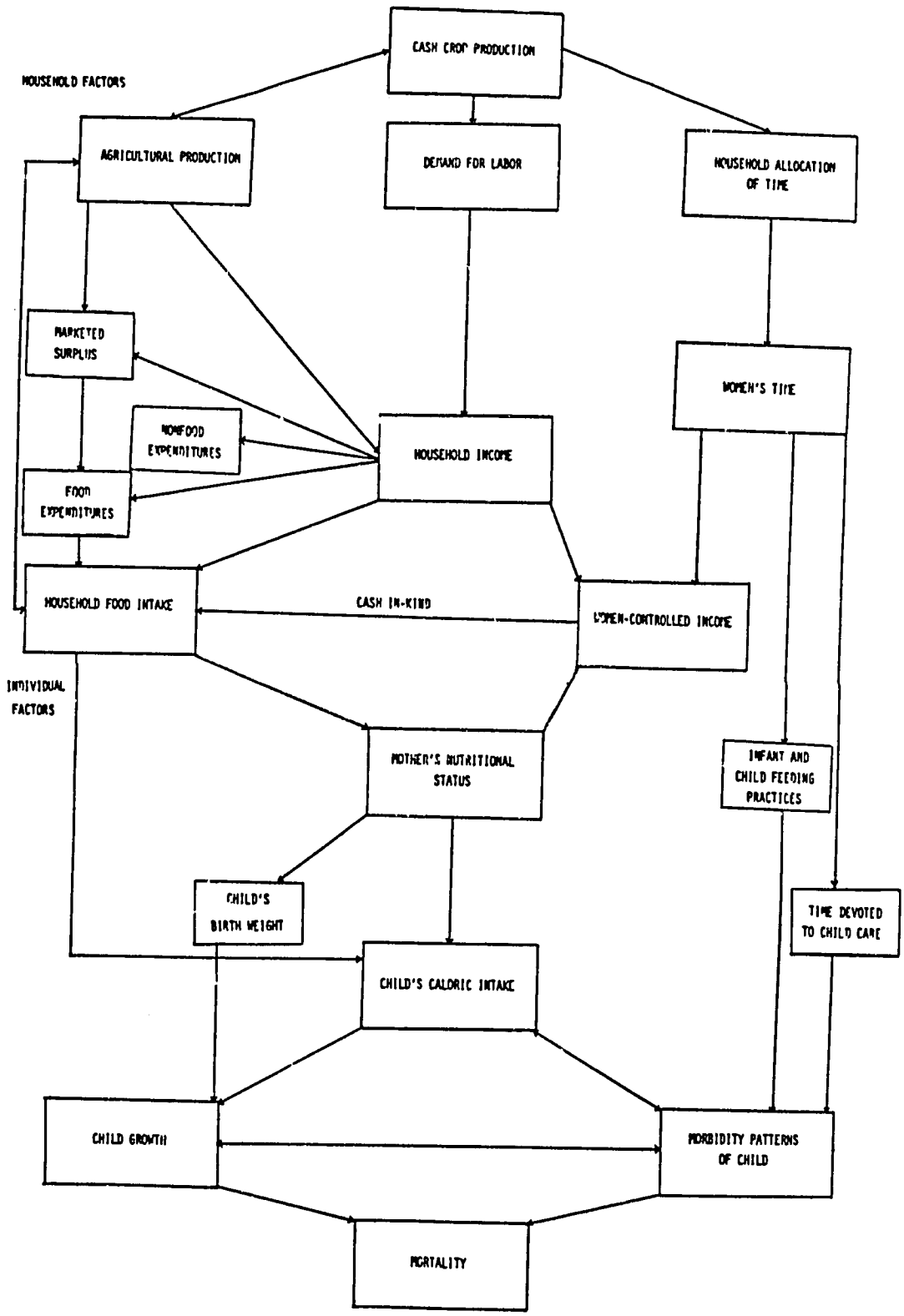
REVIEW OF RESEARCH FINDINGS

Several recent accounts have suggested that the introduction or expansion of cash crop production may adversely affect nutritional status.[49] However, the studies that have looked specifically at the

---

[49]Patrick Fleuret and Anne Fleuret, "Nutrition, Consumption and Agricultural Change," Human Organization 39 (March 1980): 250; and Kathryn G. Dewey, "Commentary -- Agricultural Development, Diet and Nutrition," Ecology of Food and Nutrition 8 (1979): 265.

Figure 1--Some linkages between cash crop production and nutritional status at household and intrahousehold levels



income and nutritional results of cash crop production provide mixed results. As shown in Table 16, there is no apparent trend. Some studies show that cash cropping has a positive effect on family food consumption,[50] while others indicate that cash cropping has a negative effect.[51] Even in a country such as Kenya, there is no consistent positive or negative effect observed across the different crops.[52] This partly reflects the heterogeneity of cash cropping situations and the different methodological approaches used in the studies, and it partly reflects different underlying assumptions. Each of these will be briefly discussed.

Several of the studies referred to in Table 16 use the approach of comparing one time period to another. For example, Hernandez et al. report the effects of cash cropping in one area of Mexico.[53] A community was studied in 1958 prior to the introduction of Plan Chontalpa, a new agricultural scheme involving cash crops, and in 1971, 13 years after the program had been implemented. The authors report that there was no significant decrease in second- and third-degree preschooler malnutrition as measured by weight/age between 1958 and 1971 and, therefore, they conclude that the economic gains in the area did not translate into nutritional benefits. However, the findings are inconsistent. For example, although second- and third-degree malnutrition did not decrease, the infant and child mortality rates declined significantly between the two time periods. It is quite plausible that malnourished children who ordinarily would have died are now being kept alive and are therefore contributing to the unchanged rates of second- and third-degree malnutrition.

An approach similar to that used in Mexico was used by Lambert, who conducted a small survey in a coffee-growing area in Papua New Guinea.[54] Weighed food intake data were collected in 1975 from 13 households representing 78 individuals. Data from this 1975 survey were compared to dietary intake data collected in 1956, when coffee production was first introduced into the area. The results indicate

---

[50]Larry Lev, The Effect of Cash Cropping on Food Consumption Adequacy Among the Meru of Northern Tanzania, Working Paper 21 (East Lansing, Mich.: Michigan State University, 1981); Philip Harvey and Peter Heywood, Nutrition and Growth in Simbu, vol. 4 (Papua New Guinea: Simbu Provisional Government, Office of Environment and Conservation, 1983).

[51]D. R. Gross and B. A. Underwood, "Technological Change and Calorie Costs: Sisal Agriculture in Northeastern Brazil," American Anthropologist 73 (March 1971): 725; J. N. Lambert, "Does Cash Cropping Cause Malnutrition?" National Planning Office, Port Moresby, Papua New Guinea, 1978 (mimeographed); and Mercedes Hernandez et al., "Effect of Economic Growth on Nutrition in a Typical Community," Ecology of Food and Nutrition 4 (March 1974): 283-291.

[52]Jon Hitchings, "Agricultural Determinants of Nutritional Status Among Kenyan Children with Model of Anthropometric and Growth Indicators" (Ph.D. dissertation, Stanford University, 1982).

[53]Hernandez et al., "Effect of Economic Growth on Nutrition."

[54]Lambert, "Does Cash Cropping Cause Malnutrition?"

Table 16--Summary of studies on income and nutritional effects of cash crop production

Study	Country	Crop	Effects on Family Consumption	Effects on Nutritional Status
Lev, 1981	Tanzania	Coffee/ Bananas	Positive	n.a.
Hitchings, 1982	Kenya	Tea Coffee Cotton Pyrethrum Sugarcane	n.a.	Positive Positive Neutral Neutral Negative
Rabeneck, 1982	Kenya	Coffee/ Staples	n.a.	Positive
Fleuret and Fleuret, 1983	Kenya	Coffee/ Vegetables	n.a.	Positive
Gross and Underwood, 1971	Brazil	Sisal	Negative	n.a.
Dewey, 1979	Mexico	Cocoa, Sugarcane	n.a.	Negative
Hernandez et al., 1974	Mexico	Cocoa, Sugarcane	n.a.	Negative
Lambert, 1978	Papua New Guinea	Coffee	Negative	
Harvey and Heywood, 1983	Papua New Guinea	Coffee	Positive	Positive

Sources: See the bibliography for complete references.

Notes: n.a. indicates that this issue was not addressed.
The Lev study also shows a positive effect on household income.

that there was a 33 percent decline in food intake between the two time periods and that in 1975 the diet was even more heavily dependent on one crop, sweet potatoes.

The study by Harvey and Heywood was also conducted in Papua New Guinea.[55] Dietary data for 1956 (the baseline period for the Lambert study) and for 1980/81 were compared. The authors conclude that the dietary intakes of the area had improved. They attribute much of this improvement to the better economic conditions in the area as a result of cash crop production; this cause and effect relationship was surmised and not analyzed directly.

The Hernandez and Lambert studies implicitly assume that no changes other than the introduction of commercial agriculture occurred during the two time periods investigated. Clearly the health and nutritional status of the communities could have been affected by a variety of nonagricultural factors. Without accounting for other potential exogenous factors, it is difficult to interpret the data as presented.

Several other studies use a cross-sectional approach.[56] Households that had already begun cash crop production are compared to noncash cropping households. This type of ex-post analyses using a cross-sectional design is popular in the evaluation literature primarily because it can be implemented in a fairly short period of time. However, as with most cross-sectional studies, there is no clear indication that the baseline nutritional and health status of participating and nonparticipating households was similar prior to the introduction of the cash cropping scheme. There is evidence from other studies that participants and nonparticipants often differ in ways that could affect the observed results. In one study of farmers shifting from maize to sugarcane production in Kenya results indicate that households that were early participants in the sugarcane outgrowers' scheme had larger landholdings than those families that chose not to join the program.[57] Similarly, in India early adopters of high-yielding varieties of rice tended to be wealthier than the nonadopters.[58]

---

[55]Harvey and Heywood, Nutrition and Growth in Simbu.

[56]See Sonya Rabeneck, "The Determinants of Protein-Energy Malnutrition Among Preschool Children in Kenya with Respect to Cash Cropping and Self-Sufficiency in Staple Food Production," (Ph.D. dissertation, Cornell University, 1982); Hitchings, "Agricultural Determinants of Nutritional Status"; and Kathryn G. Dewey, "Nutritional Consequences of the Transformation from Subsistence to Commercial Agriculture in Tabasco, Mexico," Human Ecology 2 (September 1981): 151.

[57]Eileen Kennedy and Bruce Cogill, "Effects of the Commercialization of Agriculture on Women's Decisionmaking and Time Allocation," paper presented at Association of Women in Development Annual Meeting, Washington, D.C., April 26, 1985 (mimeographed).

[58]International Food Policy Research Institute, "Nutritional Effects of Technological Change in Agriculture and Related Public Policies and Projects: Selected Case Studies," Second Progress Report submitted to the International Fund for Agricultural Development, Washington, D.C., January 1984 (mimeographed).

The most important limitation in these studies is that they have not been conducted in a way that explains why the reported outcomes are observed. Thus there are clear discrepancies in the results. The same crop appears to be associated with positive effects in some countries and with negative effects in other countries;[59] even within the same country, a crop may be shown to have both positive and adverse effects.[60] In Kenya, some commercial crops--coffee and tea--appear to have favorable effects on nutritional status; others--cotton and pyrethrum--have no impact; and another--sugarcane--has a negative influence.[61] Given these disparate findings, it is not surprising that there is confusion in the minds of policymakers about the relative merits of commercial agriculture for improving food consumption and nutritional status.

EFFECTS OF CASH CROP PRODUCTION ON FOOD DISTRIBUTION

As already indicated, most of the studies that evaluate cash cropping have concentrated solely on specific outcome measures. There are some additional studies that are not explicitly designed to assess cash cropping but do provide some clues on how commercial agriculture might affect health and nutritional status.

Income Effects

In societies where farmers are free to make their own production decisions, increased commercialization will occur only if the farmer does not perceive that another production option would more effectively achieve his goals within the constraints he faces. Thus, although higher income is only one of a set of possible goals, it is highly unlikely that a farmer would produce export crops unless he or she expects it to yield higher economic gains than any other realistic production option.

There is some evidence to indicate that cash crop production has resulted in significant gains in nominal income. In Kenya, the cash income of farmers participating in the sugar outgrowers' scheme were approximately twice those of nonscheme farmers.[62] Additional data from Kenya indicate that income of farmers producing tea also increased.[63]

---

[59]See Rabeneck, "The Determinants of Protein-Energy Malnutrition"; Hitchings, "Agricultural Determinants of Nutritional Status"; and Lambert, "Does Cash Cropping Cause Malnutrition?".

[60]The studies on coffee production in Papua New Guinea are one example. See Lambert, "Does Cash Cropping Cause Malnutrition?"; and Harvey and Haywood, Nutrition and Growth in Simbu.

[61]Hitchings, "Agricultural Determinants of Nutritional Status."

[62]Kennedy and Cogill, "Effects of the Commercialization of Agriculture on Women's Decisionmaking."

[63]Food and Agriculture Organization of the United Nations, Integrating Nutrition into Agricultural and Rural Development Projects - Six Case Studies (Rome: FAO, 1984).

What is less apparent from the literature is what is happening to real income. The gains in nominal income could be entirely offset by increases in the price of food and nonfood items. If a nonfood cash crop is displacing production of food crops, food supply and in turn local food prices could be affected. This need not happen if local markets are functioning effectively. If food supplies can move freely throughout a country, cash crop production will not affect local food prices beyond the effect of marketing costs. However, if markets cannot respond to decreased food supplies, then real income may not increase and in extreme cases may decline as a result of an increase in commercial agriculture in a given area.

Up to this point it has been assumed that the expected income gains (either nominal or real) from increased commercialization actually materialize, but they may not. Pinstrup-Andersen describes a number of scenarios in which export crop production could negatively affect income.[64] Farmgate prices of export crops may be lower than expected due to unforeseen export taxes, falling world market prices, or exploitation of local monopsony power. Furthermore, input prices may increase or the productivity of export crops in the long run may be lower than expected. Where short-season crops are grown, farmers can move out of export crop production, and any negative nutrition effects would be temporary. But many export crops traditionally produced by low-income countries, such as cacao, coffee, rubber, and tea, are perennial and do not produce until a number of years after they have been planted. Thus by the time these crops begin to produce, a considerable investment has been made, which includes the opportunity cost of land planted. This investment is lost if production is discontinued. Therefore farmers are likely to continue production of these crops even though the fixed costs associated with the initial investment are not covered. Consequently, under such conditions farmers who switch to cash crop production may be economically and nutritionally worse off than those who choose not to switch. The problem will be particularly pronounced if the initial investments depend on long-term loans with land as collateral.

Whether a new cash crop is actually advantageous for farmers' earnings at a particular location at a particular period of time largely depends on its returns to the scarce resource. This may be land but, especially for much of Sub-Saharan Africa, can also be labor during selected seasons of the year. Simply comparing gross margins per unit of land, in which cash crops frequently appear to be more competitive than subsistence crops, may in fact be misleading. The returns to seasonal labor, as well as the potential bottleneck in financing input acquisition in situations of seasonally constrained liquidity and borrowing capacity, are of major importance for the small farmer. The risk of growing a particular crop must also be taken into account. The variance of returns to the scarce resource may be higher for a cash crop than for a subsistence crop. It is

---

[64]Pinstrup-Andersen, Export Crop Production and Malnutrition.

often such overlooked factors that lead the semisubsistence farmer not to adopt a new cash crop, to the surprise of goverment planners. Swanberg and Hogan point out with a detailed example from Tanzania that the simple comparison of gross margins on a per hectare basis not accounting for risk would lead to misleading conclusions about competitiveness and income generation of cash crops.[65] A simplistic comparative analysis of costs and returns seems to show that Tanzania's export crops (coffee, tea, tobacco, sisal, cotton, and cashews) outperform all other crops. They give an average return to labor of 10 shillings per day compared to 6 shillings for the others, and their gross margin per hectare is more than twice that of any of the other crops (coarse grains, pulses, and cassava). However, when risk is taken into account the picture changes because there are higher risks attached to crops like cotton, tobacco, and pyrethrum. The standard deviation of their gross margin was even bigger than the mean value of the gross margin itself, which suggests a high expected value of the loss function. This suggests that for many small farmers cash crops lead to large income fluctuations and occasional losses, although in the long term and on the average they may be advantageous.

Nutritional Effects

What are the nutritional consequences of cash crop production? The answer depends in part on what indicator is used to assess the nutritional effects. Household food expenditures, family caloric and nutrient consumption, individual dietary intake, growth, morbidity, and mortality all can potentially be influenced by the entry of households into commercial agriculture. The inconsistency of findings related to the nutritional benefits of cash crop production is related partially to differences in the indicators used to evaluate outcomes.

As mentioned earlier, it has usually been assumed that a switch from semisubsistence to commercial agriculture would enhance the household's ability to obtain food by increasing family income. Some evidence suggests that cash crop production is frequently associated with increased nominal income.[66] However, even if real income increases, there may not necessarily be a nutritional benefit.

Income is one of the major determinants of family food consumption. In general, as income increases, at least a part of the incremental earnings are spent on food.[67] Alderman reviewed data from 15

---

[65]Kenneth Swanberg and Ed Hogan, Implications of the Drought Syndrome for Agricultural Planning in East Africa: The Case of Tanzania, Development Discussion Paper No. 120 (Cambridge, Mass.: Harvard Institute for International Development, Harvard University, 1981, pp. 15-25.

[66]See Food and Agriculture Organization of the United Nations, Integrating Nutrition into Agricultural and Rural Development Projects; and Lev, Effect of Cash Cropping on Food Consumption Adequacy.

[67]See John W. Mellor, "Food Price Policy and Income Distribution in Low-Income Countries," Economic Development and Cultural Change 27 (January 1978): 1; and Shlomo Reutlinger and Marcelo Selowsky, Malnutrition and Poverty: Magnitude and Policy Options, World Bank Occasional Paper 23 (Baltimore: Johns Hopkins University Press, 1976).

countries and found that food expenditures for families who consume 1,750-2,000 calories per capita per day increase by 8.2 percent with a 10 percent increase in income.[68] However, the impact of additional income on caloric intake is less robust. Alderman found that caloric intake increases by only 4.8 percent with a 10 percent increase in income. Pinstrup-Andersen notes that the marginal propensity to consume calories from additional income varies.[69]

Therefore, although the marginal propensity to spend on food may be significant, the propensity to consume calories out of additional income may be quite low and may vary widely among households with similar caloric deficits. For example, in one maize-producing village in Tanzania, total income was related to food expenditures but had no effect on caloric adequacy.[70] It appears that even at fairly low income levels, families will devote a portion of an increase in income to obtaining more variety in the diet rather than simply augmenting the caloric intake of the household. Studies among low-income households in Nicaragua and Colombia show that the income/calorie relationships were only weakly significant.[71] In the Colombia study, a program was implemented to increase maize production in small-farm households by introducing high-yielding varieties of maize. Farmers in the project had significantly higher incomes than nonparticipating families. However, the marginal propensity to spend on calories out of additional income was only 0.1.[72] Data from northern Nigeria show that a 10 percent increase in household income increased calorie consumption by approximately 5 to 6 percent.[73]

Clearly, the positive relationship between income and household caloric consumption, however weak, exists. What is more perplexing is why increments in income do not necessarily result in improvements in the diets of all individual family members. There has been a tendency to assume that if household income increases, all household members will share in the nutritional benefits. This may not always happen.

Improvements in a household's food intake do not necessarily result in an increase in each family member's food consumption. A

---

[68]Alderman, "The Effect of Income and Food Price Changes."

[69]Pinstrup-Andersen, Export Crop Production and Malnutrition.

[70]Lalitha Seshamani, "Food Consumption and Nutritional Adequacy in Iringa: A Case Study of Four Villages," University of Dar-es-Salaam, Tanzania, 1980 (mimeographed).

[71]Jere Behrman and Barbara L. Wolfe, "More Evidence on Nutrition Demand; Income Seems Overrated and Women's Schooling Underemphasized," Journal of Development Economics 14 (1984): 105; and Richard H. Goldman and Catherine A. Overholt, Nutrition Intervention in Developing Countries: Study VI, Agricultural Production, Technical Change, and Nutritional Goals (Cambridge, Mass.: Oegleschlager, Gunn and Hain, 1981).

[72]Goldman and Overholt, Nutrition Intervention in Developing Countries.

[73]International Food Policy Research Institute, "Nutritional Effects of Technological Change in Agriculture and Related Public Policies and Projects: Selected Case Studies," Final report submitted to the International Fund for Agricultural Development, International Food Policy Research Institute, Washington, D.C., 1985 (mimeographed).

number of recent studies suggest that the distribution of food among household members is not equal. In one study in the Philippines, boys were favored over girls in the intrahousehold distribution of calories.[74] Results from several other studies in Asia also suggest that girls are disadvantaged in comparison to boys.[75] Lipton, however, takes an alternative point of view and asserts that children are generally not disfavored.[76] Similarly, Rogers concludes that in Africa girls may not be discriminated against because of the bride price they ultimately command.[77] The extent of sex bias in the allocation of food may therefore differ between Asia and Africa.

Improvements in household food intake may but need not improve the food intake of all household members. However, the pattern of intrahousehold distribution of food needs to be considered in predicting the effects of the commercialization of agriculture on individual family member's nutrient intake. The picture is complicated further when one tries to establish a link between changes in income and household food consumption and more concrete measures of nutritional status, such as child growth. For example, in three villages in Senegal, Josserand observed that the total quantity of food ingested by the household was positively correlated to income, but no significant relationship was noted between family income and preschooler growth.[78] In the southern highlands of Tanzania, study results show a negative relationship between economic growth in monetary terms and children's growth.[79]

Table 17 shows that the two categories of households having the highest prevalence of preschooler malnutrition in a study in Panama were not in the lowest income group.[80] The authors note that for the

---

[74]Benjamin Senauer, Marito Garcia, and Elizabeth Jacinto, "Determinants of the Intrahousehold Allocation of Food in Developing Countries," International Food Policy Research Institute, Washington, D.C., 1986 (mimeographed).

[75]Lincoln Chen, Emdadul Huq, and Stan D'Souza, "Sex Bias in the Family Allocation of Food and Health Care in Rural Bangladesh," Population and Development Review 7 (March 1981): 55; Alice S. Carloni, "Sex Disparities in the Distribution of Food Within Rural Households," Food and Nutrition 7 (1981): 3-12; and Robert E. Evenson, Barry M. Popkin, and Elizabeth K. Quizon, "Nutrition, Work and Demographic Behavior in Rural Philippine Households," in Rural Household Studies in Asia, ed. Hans P. Binswanger, Robert E. Evenson, Cecilia A. Florencio, and Benjamin White (Singapore: Singapore University Press, 1980).

[76]Michael Lipton, Poverty, Undernutrition and Hunger, World Bank Staff Working Paper 597 (Washington, D.C.: World Bank, 1983).

[77]Beatrice Rogers, The Internal Dynamics of Households: A Critical Factor in Development Policy (Washington, D.C.: U.S. Agency for International Development, 1983).

[78]Henri P. Josserand, "Farmers' Consumption of an Imported Cereal and the Cash/Food Crop Decision: An Example from Senegal," Food Policy (February 1984): 27-34.

[79]Oddvar Jakobsen, Economic and Geographical Factors Influencing Child Malnutrition: A Study from the Southern Highlands, Tanzania, Research Paper 52 (Dar-es-Salaam, Tanzania: University of Dar-es-Salaam, 1978).

[80]David L. Franklin, MarieLouise W. Harrell, and Cutberto Parillon, "Nutritional Functional Classification Study of Panama," Food Policy (February 1985): 63-74.

Table 17--Relationship between monthly household per capita income and prevalence of preschooler malnutrition, Panama, 1980

Functional Group	Monthly Per Capita Income	Acute or Chronically Malnourished Preschoolers	
		Number in Sample	Percent
	(B/mo.)		
Diversified small farms	127.00	213	29.7
Horticulturalists	87.00	157	25.1
Maize and rice producers	56.47	84	25.0
Solely rice producers	66.10	38	24.2
Farmers with employees	112.84	40	23.5
Agricultural workers	114.45	154	21.4
Unskilled workers	95.75	92	20.7
Solely maize producers	78.00	26	19.7
Cassava producers	60.00	16	19.1
Skilled workers	149.65	81	15.7
Salaried urban workers	150.48	42	15.5
Self-employed workers	80.06	35	13.4
Government employees	122.00	10	12.8
Commercial, transport workers	288.00	46	11.3
Professionals and office workers	198.00	45	11.2
National average	122.19	1,079	20.3

Source: David Franklin, MarieLouise Harrell, and Cutberto Parillon, "Nutritional Functional Classification Study of Panama, Food Policy (1985): 63-74.

Notes: 1 balboa = US$1.

Acute malnutrition is defined as more than two standard deviations below the World Health Organization reference value for weight-for-height; chronic malnutrition is defined as more than two standard deviations below the WHO reference value for height-for-age.

country as a whole, income is significantly associated with food consumption and nutritional status (growth), but the degree of this relationship varies by group, and factors other than income influence consumption. However, as noted in the data presented in Table 16, other studies have found a positive association between cash crop production and income and preschooler growth.[81]

Why are the findings inconsistent? A certain absolute level of income may be a necessary but not sufficient condition for nutritional improvement. Factors such as source of payment (lump sum or continual), type of income (cash versus in-kind), and control of income, may be as important as or more important than total income in understanding the nutritional consequences of cash crop production.

Other Income-Related Factors Influencing Nutrition

If household income declines, a decrease in caloric consumption or nutritional status is not surprising. But why would increased income be associated with a deterioration in nutritional status? Part of the explanation may relate to the form in which the income is received. Income in the form of lump sum payments appears to be used differently than a smaller, more continuous flow of income. Lev found this in Tanzania: lump sums of income, such as remittances or payment from the coffee crop, influenced wealth (housing and land ownership, for example) but had little effect on the adequacy of the household diet.[82] In the Mwea irrigation scheme in Kenya, a higher percentage of income in the form of lump sum payment was spent by participating households on items such as bicycles and children's schooling than was spent by farmers not involved in the plan.[83] As a result, there was virtually no difference in the food consumption patterns of farm families participating in the scheme and those not, even though the income of participating farmers had increased.

Lump sum income appears to be associated more with the purchase of consumer durables, whereas continual forms of income are more likely to be spent on food. There is nothing inherent in lump sums of income to account for this. Presumably a portion of these large payments could be saved for purchase of food and other basic items at a later time. However, part of the explanation as to why lump sum payments are typically used differently from more periodic forms of income may lie in who controls the income.

The concept of a household being one homogeneous decisionmaking unit, maximizing one utility function, and pooling income, may be

---

[81] See Rabeneck, "Determinants of Protein-Energy Malnutrition"; Harvey and Heywood, Nutrition and Growth in Simbu; and Patrick Fleuret and Anne Fleuret, "Socio-Economic Determinants of Child Nutrition in Taita, Kenya: A Call for Discussion," Readers Forum (1983): 8.

[82] Lev, Effect of Cash Cropping on Food Consumption Adequacy.

[83] Rolf Korte, "Chapter 1: Health and Nutrition," in Mwea Irrigation Scheme (Washington, D.C.: World Bank, 1981).

inappropriate in many developing countries. In many cultures men control cash income and women control food income. This is especially true in Africa where cash crops are often viewed as men's income; this is clearly illustrated by data from a sugarcane-growing area of Kenya (see Table 18). The responsibility for sugar, the cash crop, as well as income received from it is overwhelmingly seen as falling under male control.

After reviewing a number of projects introducing technological change into rural areas, Tinker concludes, "A recurring theme in all these studies of new technology for cash crops is that while cash incomes may have increased, nutritional levels tend to fall. The primary reason for this seemingly contradictory phenomenon is the fact that this income belongs to the men. Men use this money for improving homes, throwing 'prestige' feasts, buying transistor radios."[84]

Guyer points out that men and women in West Africa have different spheres of economic activity; not only do they control different types of income, but they also have different expenditure responsibilities within households.[85] The daily level of nutrition and standard of living depend more on the women, who earn small, steady incomes that they tend to spend on small, regular purchases like food.

Tripp found similar results in Ghana.86 Women's income from trading, although lower than men's income, affected the nutrition of children more. Findings in Nigeria, India, and Nepal were similar; the nutritional status of children was influenced more by women's income.[87]

The way in which cash cropping affects control of income may have important welfare implications. Resources controlled by women are more likely to be allocated to increasing the family's food intake, including the diets of children. Women's income need not decrease as a result of cash cropping; a study in Cameroon illustrates that women

---

[84]Irene Tinker, New Technologies for Food Chain Activities: The Imperative of Equity for Women, (Washington, D.C.: U.S. Agency for International Development, Office of Women In Development, 1979).

[85]Jane Guyer, Household Budget and Women's Income, African Studies Center Working Paper 28 (Boston: Boston University, 1980).

[86]Robert Tripp, Cash Cropping, Nutrition and Choice of Technology in Rural Development (Mexico: Centro Internacional de Mejoramiento de Maiz y Trigo, 1982).

[87]Bruno Gans, "Some Socio-Economic and Cultural Factors in West African Pediatrics," Archives of Disease in Childhood 38 (1963): 1-12; Shubh Kumar, Role of the Household Economy in Determining Child Nutrition at Low Income Levels: A Case Study in Kerala, Department of Agricultural Economics Occasional Paper 95 (Ithaca, N.Y.: Cornell University, 1977); and Meena Acharya and Lynn Bennett, Women and the Subsistence Sector, Economic Participation and Household Decision Making in Nepal, World Bank Staff Working Paper 526 (Washington, D.C.: World Bank, 1983).

Table 18--Division of labor and income from food and cash crops by sex, Western Kenya, 1984

Person Responsible	Maize	Sorghum	Sugar
		(percent)	
Responsibility for growing crop			
Men	41.1	33.9	87.1
Women	34.3	42.3	4.5
Men and women	23.8	22.9	5.4
Other	0.8	0.8	2.9
Received revenue from crop			
Men	27.8	21.4	88.8
Women	59.3	67.3	5.4
Men and women	11.2	10.5	3.3
Other	1.6	0.8	2.5

Sources: Preliminary results of a survey conducted at the Sony Sugar Factory, 1984; Eileen Kennedy and Bruce Cogill, "Effects of the Commercialization of Agriculture on Women's Decision-making and Time Allocation," paper presented at the annual meeting of the Association of Women in Development, Washington, D.C., April 26, 1985.

Note: Maize and sorghum are food crops, whereas sugar is a cash crop in this region.

may be better off financially.[88] But to the extent that women's income decreases as a result of cash crop production, family consumption and nutrition may be adversely affected.

The form in which income is received is another factor that can affect consumption and nutritional status. There is evidence from India that in-kind income is more likely to be used for family consumption than cash income; income from home gardens and home production may be more likely to increase household food intake than an

[88]See Christine W. Jones, "The Impact of the SEMRY I Irrigated Rice Project on the Organization of Production and Consumption at the Intrahousehold Level," paper presented for PPC, USAID (Washington, D.C.: U.S. Agency for International Development, 1983); and Christine W. Jones, "Bargaining Processes Among Members of Agricultural Production Units in N. Cameroon," paper presented at Tufts University School of Nutrition, Medford, Mass., October 1984 (mimeographed).

equivalent amount of cash income.[89] In Sri Lanka, the marginal propensity for households to consume calories from agricultural income is higher than from other types of income.[90]

Food consumption in Kenya is positively associated with farm income and negatively associated with off-farm income. Greer and Thorbecke emphasize that this finding is important because it suggests that increased agricultural productivity may be a more effective measure for improving household food consumption and, in turn, child health than simply increasing total family income.[91]

A number of recent studies suggest that the nutritional status of preschool children is better on farms where agricultural production includes a mix of subsistence and cash crops than on farms where most of the land has been turned over to cash crop production. Data from Kenya indicate that children from coffee-growing households that also grew food staples had greater mean percent height-for-age than children from noncash cropping households.[92] In this same study, however, the nutritional status of children from households that grew only coffee was poorer than that of children living in semisubsistence (noncash cropping) households. Other studies also suggest that a mix of subsistence and cash crops may be important in optimizing positive nutritional effects.[93]

In addition to the two explanations already given--the difference in the way in-kind or agricultural income and cash income are perceived and the difference in male and female control of income--another explanation may relate to the short-term effects of cash crops that take a long time to mature. The Fleurets introduced the concept of transitional malnutrition associated with export crops.[94] Cash crops that require a long lead time between initial planting and harvest, such as coffee, sugarcane, and tea, may cause temporary food shortages within the household. In Malawi, farmers who planted only coffee and had no other source of income experienced temporary food shortages prior to harvest.[95]

---

[89]Kumar, Role of the Household Economy in Determining Child Nutrition.

[90]David E. Sahn and Harold Alderman, "Testing for Differences in the Marginal Propensities to Consume from Income Earned by Women and Men," International Food Policy Research Institute, Washington, D.C., 1984 (mimeographed).

[91]Joel Greer and Erik Thorbecke, "Pattern of Food Consumption and Poverty in Kenya and Effects of Food Prices," Cornell University, Ithaca, N.Y., 1983 (mimeographed).

[92]Rabeneck, "The Determinants of Protein-Energy Malnutrition."

[93]Fleuret and Fleuret, "Socio-Economic Determinants of Child Nutrition."

[94]Fleuret and Fleuret, "Nutrition, Consumption and Agricultural Change."

[95]F. Ogbu, "Seasonal Hunger in Tropical Africa as a Cultural Phenomenon," Africa 46 (1973): 317-332.

This not only helps to explain why farm households whose income is generated from a mixture of cash and food crops tend to have adequate food consumption, it also explains some of Hitchings' findings in Kenya.[96] Using a long-term measure of preschooler nutritional status--height-for-age--he found a neutral association between cash crop production and nutritional status for most cash crops. The adverse effects of cash cropping may therefore be only a short-term phenomenon; in the longer term, gains in income generated from cash cropping may rectify adverse nutritional effects. More work is needed in this area, especially to determine appropriate programs for alleviating adverse short-term effects from cash cropping.

Effects of Cash Crop Production on Nonagricultural Households

The discussion thus far has concentrated on the effects of commercial agriculture on farm households. However, the commercialization of agriculture may have a substantial effect on the demand for labor in a given area. If the production of cash crops increases, the need for hired labor and incomes of laborers, particularly landless laborers, may increase. However, if the cash crop is less labor-intensive than the food crop it replaces, then the demand for hired labor will decrease and the incomes of this group will decline. Ahmed examined this issue and found that jute production was twice as labor-intensive as traditional rice production in Bangladesh.[97] Increased production of labor-intensive crops is an attractive way of reaching the landless poor who are often not reached by other development activities. There is little doubt that cash crop production generates rural income and employment and thus contributes greatly to human nutrition in many of the poorest countries.[98]

One criticism of many commercial crops is that the income workers receive is not enough to compensate them for the increased energy required to plant and harvest the crop. An often-quoted study by Gross and Underwood looked indirectly at whether the income generated from sisal production in Brazil was sufficient compensation for the additional caloric costs of production.[99] For a one-week period the activities of a sisal disfiberer, his food intake, and that of his wife and children were monitored. The authors concluded that the sisal producer could not supply enough income to provide for his energy needs as well as the caloric needs of his family. Without verification from additional studies, however, it is premature to conclude that cash crops are more or less energy-intensive than other types of crops.

[96]Hitchings, "Agricultural Determinants of Nutritional Status."

[97]Ahmed, Agricultural Price Policies.

[98]Pinstrup-Andersen, Export Crop Production and Malnutrition.

[99]Gross and Underwood, "Technological Change and Caloric Costs."

Intrahousehold and Health-Related Factors

The discussion thus far has centered on income-mediated pathways, such as agricultural production and demand for labor, that cash crop production take in influencing consumption and nutritional status. However, cash crop production can also affect nutrition significantly by altering the internal dynamics within the household: time and other resources could be reallocated, food shares could be redistributed among the family, and the health and sanitation environment could be changed.

Time Constraints of Women. Commercialization of agriculture may affect not only women's income but also the allocation of women's time. In many cultures, particularly in Africa, men and women have different responsibilities for crops, labor, and support obligations of the household.[100] Men are frequently responsible for land preparation and women for the other aspects of crop cultivation. The manner in which commercial agriculture is implemented may affect this intrafamilial distribution of labor. For example, the introduction of mechanical technology for swamp rice production in Sierra Leone slightly decreased the mean hours worked by men, while the amount of time required for female labor increased by 50 percent.[101] In this case the demand for men's time decreased because less time was needed for land cultivation; the demand for women's time increased dramatically because there was now additional land that could be cultivated, and thus more female labor was required for planting and harvesting. Not all types of technological change work to the disadvantage of women, however. The introduction of biochemical technology for inland swamp rice increased the demand for men's time by 80 percent because of increased land development, but female input remained about the same.[102]

The effect of commercial agriculture on reallocation of women's time is of concern because of its potential effect on women's household activities, such as food preparation, child care, and other nurturing activities. One study conducted in the rural Philippines suggests, however, that the amount of time devoted to child care is unaffected by whether the mother works.[103] Instead, the leisure time of working mothers in this study decreased an average of four

---

[100] Elsie B. Garfield, The Impact of Technical Change on the Rural Kenyan Household: Evidence from the Integrated Agricultural Development Program: A Research Proposal and Literature Review, Institute for Development Studies Working Paper 358 (Nairobi: University of Nairobi, 1979).

[101] Dunstan Spencer and Derek Byerlee, "Technical Change, Labor Use, and Small Farmer Development: Evidence from Sierra Leone," American Journal of Agricultural Economics (December 1976): 874-880.

[102] Ibid.

[103] Barry M. Popkin, "Rural Women, Work, and Child Welfare in the Philippines," in Women and Poverty in the Third World, ed. Mayra Buvinic, Margaret Lycette, and William P. McGreevey (Baltimore: Johns Hopkins University Press, 1983) pp. 157-176.

hours a day; the caloric intake of preschoolers of working mothers increased by 145 calories per day, however.

In one review of how women allocate their time in the Eastern District of Kenya, half of women's time spent on agricultural work, on average, was devoted to men's export crops.[104] O'Dea speculates that this may mean less time available for child care, but no empirical evidence was available to support this point. Other evidence from Kenya indicated that women spent virtually no time on the men's sugarcane crop.[105]

Much more research is needed to explain how agricultural strategies, including cash crop production, affect the demand for women's time, including time available for child care. The contention that the commercialization of agriculture in general decreases the time women have available at home is based more on speculation than empirical evidence.

Health and Sanitary Factors. Finally, the health and sanitation implications of cash cropping schemes have rarely been considered in most project evaluations. Yet this may be the mechanism through which rural development strategies, including the commercialization of agriculture, may have the greatest effect on nutrition. A positive relationship between demand for health services and income should be expected in general. To the extent that increased cash cropping increases real income, a positive effect via the demand for health services may occur.

It is well established that nutrition and infection are synergistic. Poorly nourished individuals are more susceptible to disease, and conversely, infections adversely affect nutritional status. Weanling diarrhea is one of the major causes of moderate and severe malnutrition in children under three in developing countries. Diarrhea is twice as prevalent in the malnourished and takes longer to cure. Any effort to improve the income and in turn the diet of the household may have a limited effect on the health of household members without simultaneous hygienic improvements.

The quantity of water is a prime influence on nutritional status. An insufficient supply can precipitate intestinal, skin, or eye infections because people are unable to wash their food and utensils or to bathe. In addition the quality of the water is important; infections can be spread through a water supply that is polluted with fecal material. Hitchings found that none of the children from households that used water from small dams or rain vats had a weight-for-height

---

[104] J. O'Dea, "An Examination of the Impact of Cash Crop Agriculture on Nutritional Status with Reference to Kenya," (M.S. thesis, University of London, 1982).

[105] Kennedy and Cogill, "Effects of the Commercialization of Agriculture on Women's Decisionmaking."

less than 80 percent; the same study also found that preschooler wasting (weight-for-height less than 80 percent of normal weight-for-height) was more prevalent in households with no facilities for fecal disposal when compared to households with pit latrines.[106]

The relationships between disease, nutrition, and health are important. They highlight the fact that water and sanitation cannot be overlooked in anticipating the potential effects of cash cropping schemes on nutritional status. Agricultural projects and health projects should not be seen as separate entities but, where possible, should be integrated into a single community development strategy.

In summary, not all of the linkages depicted in Figure 1 are equally important in understanding the process through which cash crop production influences nutritional status. The relative importance of each of these factors may be mediated by the sociocultural environment. For example, the issue of budget control appears to be more critical in Africa than in Asia. Conversely, sex disparities in allocation of food and other resources may be more important in Asia than in Africa. However, because none of the studies to date has analyzed each of these key linkages, it is difficult to draw inferences about how cash crop production influences consumption and nutrition in a given setting. It is clear that broad generalizations about the nutritional consequences of cash crop production are meaningless.

[106]Hitchings, "Agricultural Determinants of Nutritional Status."

6. CONCLUSIONS FOR POLICYMAKING AND RESEARCH NEEDS

The assessment of the status of commercialization of agriculture in developing countries in Chapter 3 suggests that most agricultural sectors are already highly integrated in the exchange economy. Nationally this is indicated by the production of major cash crops and internationally by export crop production.

Cash cropping is a reality in developing countries and a part of agricultural development strategies. Some donor countries directly or indirectly promote increased cash cropping and market integration of subsistence agriculture in developing countries. Developed countries' trade arrangements sometimes provide preferential entry to their markets for developing-country products, although fixed quotas are also frequently used. The European Economic Community's agreement with Asian, Caribbean, and Pacific countries' sugar producers is a notable case in point. At the program level, numerous donor-sponsored projects attempt to increase market integration of food crops and to promote cash crops for both domestic use and exports.

SHOULD DEVELOPING COUNTRIES DISSOCIATE THEIR AGRICULTURE FROM THE EXCHANGE ECONOMY?

In view of the potential problems of increased cash and export cropping, which include dependence on unstable world markets for food supply and negative effects on income distribution and nutrition of the poor, a radical dissociation of developing countries' agriculture from the exchange economy has sometimes been advocated.[107] Apart from the long-run economic losses from prohibiting the use of comparative advantage of such a policy, short-term problems should not be overlooked. At this time, any strategies involving the withdrawal of countries from the international exchange economy would result in substantial domestic short-term adjustment problems, which could adversely affect the rural and urban poor whose employment is linked to cash cropping. It is also evident that similar effects could occur if a rapid move into export cropping were prescribed for countries with a mainly subsistence-oriented farming community. Thus policymakers should seek an approach to the long-term development that is appropriate for a country's resource base, its comparative advantage, and consumer needs (including those of the farm population), but they

---

[107] Dieter Senghaas, "Abkoppelung als Entwicklung - politische Devise," der Ueberblick (March 1983): 24-26; Barbara Dinham and Colin Hines, Agribusiness in Africa (Trenton, N.J.: Institute of Food and Development, 1984).

should also consider that short-term effects may vary. This is important for strategies promoting increased cash cropping as well as for strategies that attempt to move away from cash crops. National policies--price policies, for example--that aim for food security cannot be separated from program planning or from plans for implementing policies to avoid potential adverse effects of cash cropping in the short run.

Diversification of agricultural production patterns appears to be a desirable component of increased national food security. However, emphasizing subsistence food crops can, paradoxically, also have an adverse effect on national food security: instability in domestic food production may be higher in some countries than instability in potential foreign exchange earnings from export crops and thus, in turn, instability in food import capacities. The risk of not having enough food available may be higher with a "food-first" strategy.

A high degree of food self-sufficiency is not a necessary condition for the achievement of the goal of food security, where this is understood to be the ability of all households in a region or nation to acquire enough food for adequate nutrition over time. In particular, small countries cannot neglect the chance of gains from trade in food and nonfood agricultural commodities. This trade, however, should not necessarily take place on the world market or include long-distance South-North trade. For many of the landlocked African countries, for example, the import parity price of basic staples is two or more times the world market price because of inland transportation costs. The equivalent export parity prices in such cases are close to zero or even negative. The obvious conclusion for these countries might be a strategy of self-sufficiency in basic staples. However, as Koester argues for countries in East Africa, interregional food trade between these countries could be quite beneficial to the group.[108] Nationally, increased specialization of regions with differing resource endowments also could provide a chance for employment and growth in the rural sector. Efficiency of the rural infrastructure is crucial in order to tap these potentials.

KNOWLEDGE NEEDED TO FORMULATE APPROPRIATE STRATEGIES

When considering a country-specific strategy for balanced promotion of subsistence food crops and cash crops that takes nutritional effects into account, it is not appropriate to ask these questions alone: "Is there a national food gap?" and "Are there malnourished people in rural areas?" One must ask instead, "Who are the malnourished? How are they affected by alternative production policies such as increased cash cropping? How can their nutritional situation be effectively improved along with economically viable policies for agricultural development?"

[108]Koester, "Regional Cooperation in the Food Sector."

Agricultural policies in developing countries aimed at nutritional improvement are frequently based on too-general questions, such as the first two. National food supply is a poor indicator of the nutritional situation of a population, and without a clear understanding of the nature and causes of rural malnutrition and hunger, the choice of food crop or cash crop promotion may be inappropriate in the light of objectives for nutritional improvement. Understanding the relationship between food and nonfood agricultural production and consumption and nutrition is therefore a precondition to finding appropriate and efficient solutions for existing nutrition problems and preventing future problems. In this respect research plays a substantial role.

Food and agricultural price policy is a key instrument for guiding both food crop and nonfood cash crop production. Taxation, subsidies, and trade regulations are the major tools of this instrument. It is not the task of this report to develop comprehensive guidelines for cash-crop-related price policies in developing countries. It should be stressed, however, that focusing on prices for single commodities, on staple foods, for example, in policy dialogues is neither adequate nor helpful for decisionmaking. Efficient price policies must consider both price levels and price ratios--between export crops and domestically consumed products--as well as consumer and producer responses to changes and instability in the two. The costs of price distortions are largely determined by the degree of responsiveness to price changes. There are still major deficiencies in empirical knowledge in this area, especially with regard to supply response. Further household level research is required to overcome this gap. Exerting pressure to increase food prices in order to provide producer incentives may ignore the complexities involved and may result in disappointing production increases while making the poor, especially the rural poor, considerably worse off, at least in the short run.[109]

Food deficits may be reduced following domestic food price increases, but adjustments may occur mainly on the consumption side, especially among the price-responsive poor. Producer price policies are only one of the policy instruments that need to be considered under the rubric of policies for improved agricultural development aimed at solving the food supply problem. In more broad-based approaches, cost-saving technological changes in food production can play an important role because they facilitate expanded food supplies at equal or lower prices and create employment in rural areas. The appropriate role of cash and export crops in such multifaceted approaches must be defined according to the situations in each country. To begin such approaches by excluding or neglecting the potential of cash crops would be as inappropriate as rigorously pro-

---

[109]Pinstrup-Andersen, "Food Prices and the Poor in Developing Countries," pp. 77-106.

moting them while blatantly disregarding potential risks associated with them: the risk of increased malnutrition as the result of price instability in international markets for export crops, the risk of crop failure, and ecological risks. However, these risks vary from crop to crop and cannot be generalized for cash crops as such.

Further research on the relationships between cash cropping and nutrition should focus on developing a pragmatic classification of cash crops according to their individual characteristics, including criteria such as requirements for labor, economies of scale, capital investment, and the time frame for investment (the length of the gestation period of projects). This information could help to identify those cash cropping schemes that are riskier from a nutritional perspective.

There has been a tendency to look at cash cropping as either "good" or "bad." Research is not likely to alter biased views. Research should be geared to enhance the potential positive effects on nutrition of cash cropping and to effectively preclude the negative ones.

From the review of micro studies in Chapter 5, it is apparent that the commercialization of agriculture can have a positive effect on the income and nutritional status of small-farm households. The extent to which this occurs depends on the effects on real income, sources and control of income, agricultural production strategies, expenditure patterns, household decisionmaking, demand for labor, and allocation of food and other resources within the household. The importance of each of these factors may vary according to the sociocultural environment.

The ambiguity of findings from previous studies largely arises because the process leading to the observed outcomes has never been clearly defined. Most studies were focused on agricultural production and, to a lesser degree, on labor demand. Virtually no information is available on the impact of cash crop production on household allocation of time or other resources; yet these linkages may be equally important in explaining the effect of cash crop production on an individual's nutritional status.

An indication of what is happening to individual members of a household is also noticeably absent from most studies. As a consequence, the usefulness of findings from past studies is rather limited for designing cash crop projects and related policies with explicitly stated nutrition goals.[110]

---

[110] To fill this gap, the International Food Policy Research Institute, in conjunction with national institutions, has embarked on a series of studies focusing on the short- and medium-term effects of cash cropping. These studies are being conducted in the Gambia on rice and groundnuts; Guatemala, vegetables; India, dairy development; Kenya, sugarcane; the Philippines, sugarcane; and Rwanda, tea and potatoes.

A CHECKLIST TO AVOID ADVERSE EFFECTS OF CASH CROPPING

As long as research results are lacking that could provide a basis for generalization, a checklist for program design is desirable. The checklist given in Table 19 helps to identify the risks of cash crop promotion in a particular situation, and it also indicates potential remedies. It draws upon the conceptual relationships pointed out in Figure 1 and the related research findings. It is divided into national and regional issues (issues for policy dialogue), and into program and household issues (issues for program design and implementation).

Table 19--Checklist to test for potential adverse effects of cash cropping on food consumption and nutrition

Effects To Be Checked	Actions to be Considered
National and regional level issues for policy dialogue	
1. Are resources (land, labor, and so forth) for cash crop production drawn from those of subsistence food production?	•Action required only if Question 2 is positive
2. Is the national or regional food supply from domestic production reduced because of cash crops?	•Increase in food imports or temporary food aid •Promotion of food flows within countries •Promotion of subsistence food production as well as cash crops
3. Are food prices inflating locally as cash crop production increases?	•Improvement of rural infrastructure for transport and marketing of food crops •Actions under Question 2
4. Are seasonal and irregular fluctuations of food supply, prices, and income increased?	•Interventions to stabilize markets •Interventions to stabilize incomes of the poor
5. Is labor demand for landless laborers reduced by increased cash cropping?	•Employment generation in rural areas

(continued)

Table 19--Continued

6. Is land and control over other resources such as water becoming more concentrated?	•Land tenure policies •Regulations for access to resources
7. Are local markets for food becoming monopolized by increased cash cropping?	•Improvement in competition on food markets •Establishment of controlled, public food outlets •Establishment of consumer cooperatives
8. Are public companies (parastatals) that handle cash crop marketing and processing acquiring an undue share of cash crop returns without transfers back to farms via investment in agriculture?	•Improvements in efficiency of public companies •Buildup of cooperatives run by farmers •Expansion of private sector's role in marketing and processing
Program and household level issues for program design and implementation	
9. Have the real incomes of the poor and malnourished temporarily decreased due to increased cash cropping? Or have they decreased for an extended time period?	•Temporary income support schemes, including public works •Slower program implementation •Additional project component for long-term income generation for the poor •Rejection of project if above actions not effective
10. Does the cash crop in question and related production and processing technology adversely affect the resource base (soil fertility, for example) and affect the ecology, thereby negatively affecting the long-term food/agricultural production and income generation capacity of the location?	•Alternative crops or technologies •Rejection of project if above action not effective

(continued)

Table 19--Continued

11. Are the local welfare and food sharing systems dissolved through increased commercialization?	•Reactivation of traditional systems •Introduction of new components such as grain banks or credit and savings facilities
12. Is the income stream in cash more irregular (lumpy) than the earlier flow of subsistence food?	•Same activities as Question 11 •Cash management education •Gradual phasing-in of cash cropping •Periodic payments based on estimated yields
13. Is control over income within households shifted to members less concerned with food and nutritional needs (in Africa, from women to men)?	•Provision of access to cash crop income for women •Promotion of production of subsistence crops to achieve marketable surpluses of women's crops
14. Is the cash crop production increasing demand for women's time, with negative effects for child care and health environment of children?	•Mechanization of production and processing activities •Nutrition education •Nutritional surveillance systems
15. Is increased cash cropping raising demand for child labor in field and household activities?	•Measures to reduce the demand for child labor including mechanization •Incentives for school participation
16. Does increased cash crop production induce or enforce a substantial change in the local food consumption pattern (diet)?	•Nutrition education •Actions under Question 3

The checklist should be considered a guideline for roughly identifying the potential adverse effects on food consumption and nutrition of projects, programs, and policies that attempt to increase market integration of food production and food or nonfood cash crop production. It shows that in many instances potential adverse effects of increased cash cropping on food consumption and nutrition may be

avoided at no cost by appropriately designing policies and projects. Research has an important role to play in this context. In many cases a marginally higher investment in knowledge generation before embarking on a new program of cash crop promotion may avoid hardship to population groups and lead to economically more efficient options with a favorable long-run perspective. Yet activities to balance potential adverse effects of increased cash cropping that require an investment in resources, at least initially, may be called for in some circumstances. The programs and policies that are riskiest for the rural poor are those that may be advantageous from a national policy perspective--those that receive political support from central administrations but are not conducive to local benefits. In conjunction with these programs and policies, the access of the poor to resources such as land and water may become increasingly constrained.

To assure a continuous, stable, and self-sustaining correction of potential adverse effects, the poor must be linked, directly or indirectly, into the real income stream generated from increased cash cropping. In addition, sufficient foreign exchange and fiscal resources must be generated, and political will must exist for actually compensating potential losers in the commercialization process. For instance, there is a risk that compensation activities, such as subsidized rural employment, might be abandoned when an initially available foreign funding source is cut off before the modified rural production and marketing system is self-sustaining. Particular attention should be paid to local pressures on food prices that may result from increased nonfood cash cropping in remote regions with thin and volatile food markets.

Policies of production, taxation, and subsidies on inputs, services, and capital are inherent features of cash crop promotion in their early phases of implementation. In each case, the more cash cropping induces unfavorable distribution of income and bears the potential for adverse nutrition effects for the poor, the more subsidies should be extended to compensate for these effects. But subsidies must lead to productive employment and steady, unsubsidized income for the poor in the long run. The policy measures listed in the checklist basically follow this premise. Given the great variety of potential circumstances, the checklist and related policy measures have to be quite general. Recommendations will always have to be made based on particular situations; the checklist only provides a point of departure for more specific recommendations. As further research on the issue materializes, it is expected that the checklist can be developed further with some issues excluded and others added.

BIBLIOGRAPHY

Acharaya, Meena and Bennett, Lynn. Women and the Subsistence Sector, Economic Participation and Household Decision Making in Nepal. World Bank Staff Working Paper 526. Washington, D.C.: World Bank, 1983.

Ahmed, Raisuddin. Agricultural Price Policies Under Complex Socioeconomic and Natural Constraints: The Case of Bangladesh. Research Report 27. Washington, D.C.: International Food Policy Research Institute, 1981.

Alderman, Harold. "The Effect of Income and Food Price Changes on the Acquisition of Food by Low-Income Households." Report prepared for the U.S. Agency for International Development by the International Food Policy Research Institute, Washington, D.C., 1984 (mimeographed).

Alderman, Harold and Braun, Joachim von. The Effects of the Egyptian Food Ration and Subsidy System on Income Distribution and Consumption. Research Report 45. Washington, D.C.: International Food Policy Research Institute, 1984.

Alvensleben, R. von. "Sind Agrarexporte aus Entwicklungslaendern 'boese'?" der Ueberblick 1 (1983): 6-9.

Behrman, Jere and Wolfe, Barbara L. "More Evidence on Nutrition Demand; Income Seems Overrated and Women's Schooling Underemphasized." Journal of Development Economics 14 (1984): 105.

Bouis, Howarth; Braun, Joachim von; Dewalt, Kathleen; Kennedy, Eileen; Pinstrup-Andersen, Per; and Nieves, Isabel. "A Common Framework for Research on the Income and Nutrition Effects of Increasing Commercialization of Semi-Subsistence Agriculture." International Food Policy Research Institute, Washington, D.C., 1984 (mimeographed).

Braun, Joachim von and Huddleston, Barbara. "Implications of Food Aid for Price Policy in Recipient Countries." Paper prepared for the International Food Policy Research Institute Workshop on Food and Agricultural Price Policy, Elkridge, Md., April 29-May 2, 1984.

Carloni, Alice S. "Sex Disparities in the Distribution of Food Within Rural Households." Food and Nutrition 7 (1981): 3-12.

Chen, L. C.; Huq, E.; and D'Souza, S. "Sex Bias in the Family Allocation of Food and Health Care in Rural Bangladesh." Population and Development Review 7 (No.1, 1981): 55.

Dams, Th. "Der Kampf Gegen den Hunger in der Welt, Anmerkungen zum Zusammenhang 'Agrarexporte und Selbstversorgung mit Nahrungsmitteln in Entwicklungslaendern.'" Der Ueberblick (1983): 12-18.

Delgado, Christopher L. and Miller, Cornelia P. "Changing Food Patterns in West Africa: Implications for Policy Research." Food Policy 10 (January 1985): 57-62. Reprinted by the International Food Policy Research Institute.

Dewey, Kathryn. "Commentary - Agricultural Development, Diet and Nutrition." Ecology of Food and Nutrition 8 (1979): 265-273.

_____. "The Impact of Agricultural Development on Child Nutrition in Tabasco, Mexico." Medical Anthropology 2 (1980): 21.

_____. "Nutritional Consequences of the Transformation from Subsistence to Commercial Agriculture in Tabasco, Mexico." Human Ecology 9 (No. 2, 1981): 151.

Dinham, Barbara and Hines, Colin. Agribusiness in Africa. Trenton, New Jersey: Institute of Food and Development, 1984.

Evenson, Robert E.; Popkin, Barry M.; and Quizon, Elizabeth K. "Nutrition, Work and Demographic Behavior in Rural Philippine Households." In Rural Household Studies in Asia. Edited by Hans P. Binswanger, Robert E. Evenson, Cecilia A. Florencio, and Benjamin White. Singapore: Singapore University Press, 1980.

Fleuret, Patrick and Fleuret, Anne. "Nutrition, Consumption and Agricultural Change." Human Organization 39 (March 1980): 250.

_____. "Socio-Economic Determinants of Child Nutrition in Taita, Kenya: A Call for Discussion." Readers Forum (1983): 8.

Food and Agriculture Organization of the United Nations. Changing Patterns and Trends in Feed Utilization. Economic and Social Development Paper 37. Rome: FAO, 1983.

_____. Integrating Nutrition into Agricultural and Rural Development Projects - Six Case Studies. Rome: FAO, 1984.

_____. Production Yearbook. Rome: FAO, various years.

_____. Trade Yearbook. Rome: FAO, various years.

Franklin, David L.; Harrell, MarieLouise; and Parillon, Cutberto. "Nutritional Functional Classification Study of Panama." Food Policy (February 1985): 63-74.

Gans, Bruno. "Some Socio-Economic and Cultural Factors in West African Pediatrics." Archives of Disease in Childhood 38 (1963): 142.

Garfield, Elsie B. The Impact of Technical Change on the Rural Kenyan Household: Evidence from the Integrated Agricultural Development Program: A Research Proposal and Literature Review. Institute of Development Studies, Working Paper 358. Nairobi: University of Nairobi, 1979.

German Agency for Technical Cooperation-Datenproject. Status 1984. Eschborn, Germany: GTZ, 1984.

Goldman, Richard and Overholt, Catherine A. Nutrition Intervention in Developing Countries: Study VI: Agricultural Production, Technical Change and Nutritional Goals. Cambridge, Mass.: Oeglesch-lager, Gunn and Hain, 1981.

Greer, Joel and Thorbecke, Erik. "Pattern of Food Consumption and Poverty in Kenya and Effects of Food Prices." Cornell University, Ithaca, N.Y., 1983 (mimeographed).

Gross, Daniel and Underwood, Barbara A. "Technological Change and Calorie Costs: Sisal Agriculture in Northeastern Brazil." American Anthropologist 73 (March 1971): 725.

Guyer, Jane. Household Budget and Women's Incomes. African Studies Center, Working Paper 28. Boston: Boston University, 1980.

Harvey, Phillip and Heywood, Peter. Nutrition and Growth in Simbu. Vol. 4. Papua New Guinea: Simbu Provincial Government, Office of Environment and Conservation, 1983.

Hernandez, Mercedes; Hidalgo, C. P.; et al. "Effect of Economic Growth on Nutrition in a Typical Community." Ecology of Food and Nutrition 4 (March 1974): 283-291.

Hillman, Jimmye S. "The Role of Export Cropping in Less Developed Countries." American Journal of Agricultural Economics (1981): 375.

Hitchings, Jon. "Agricultural Determinants of Nutritional Status Among Kenyan Children with Model of Anthropometric and Growth Indicators." Ph.D. dissertation, Stanford University, 1982.

Homen de Melo, Fernando. "Technological Change and Income Distribution: The Case of a Semi-Open Less-Developed Economy." In Growth and Equity in Agricultural Development, pp. 241-251. Edited by A. Maunder and K. Ohkawa. Hampshire, England: Gower, 1983.

International Food Policy Research Institute. "Income and Nutritional Effects of Cash Crop Production--The Case of Gambia and Kenya." First Progress Report submitted to the International Fund for Agricultural Development. Washington, D.C., 1984 (mimeographed).

_____. "Nutritional Effects of Technological Change in Agriculture and Related Public Policies and Projects: Selected Case Studies." Second Progress Report submitted to the International Fund for Agricultural Development, Washington, D.C., January 1984 (mimeographed).

_____. "Nutritional Effects of Technological Change in Agriculture and Related Public Policies and Projects: Selected Case Studies." Final report submitted to the International Fund for Agricultural Development by IFPRI, Washington, D.C., 1985 (mimeographed).

Jakobsen, Oddvar. Economic and Geographical Factors Influencing Child Malnutrition: A Study from the Southern Highlands, Tanzania. Research Paper 52. Dar-es-Salaam, Tanzania: University of Dar-es-Salaam, 1978.

Jones, Christine W. "Bargaining Processes Among Members of Agricultural Production Units in N. Cameroon." Paper presented at Tufts University School of Nutrition, Medford, Mass., October 1984 (mimeographed).

_____. "The Impact of the SEMRY I Irrigated Rice Project on the Organization of Production and Consumption at the Intrahousehold Level." Paper prepared for U.S. Agency for International Development, Washington, D.C., 1983.

Josserand, Henri P. "Farmers' Consumption of an Imported Cereal and the Cash/Food Crop Decision: An Example from Senegal." Food Policy (February 1984): 27-34.

Kennedy, Eileen and Cogill, Bruce. "Effects of the Commercialization of Agriculture on Women's Decisionmaking and Time Allocation." Paper presented at the annual meeting of the Association of Women in Development, Washington, D.C., April 26, 1985 (mimeographed).

Koester, Ulrich. "Regional Cooperation in the Food Sector Among Developing Countries to Improve Food Security." Paper presented at the 19th International Conference of Agricultural Economists, Malaga, August 26-September 4, 1985.

Korte, Rolf. "Chapter 1: Health and Nutrition." In Mwea Irrigation Scheme. Washington, D.C.: World Bank, 1981.

Kumar, Shubh. "Nutrition Problems in Sub-Saharan Africa." Paper prepared for a conference on Accelerating Agricultural Growth in Sub-Saharan Africa, Victoria Falls, Zimbabwe, August 29-September 1, 1983 (mimeographed).

_____. Role of the Household Economy in Determining Child Nutrition at Low Income Levels: A Case Study in Kerala. Department of Agricultural Economics, Occasional Paper 95. Ithaca, N.Y.: Cornell University, 1977.

Lambert, J. N. "Does Cash Cropping Cause Malnutrition?" National Planning Office, Port Moresby, Papua New Guinea, 1978 (mimeographed).

Lappé, Frances M. and Collins, J. Food First: Beyond the Myth of Scarcity. Boston: Houghton Mifflin Company, 1977.

Lele, Uma. "Terms of Trade, Agricultural Growth, and Rural Poverty in Africa." In Agricultural Change and Rural Poverty: Variations on a Theme by Dharm Narain. Edited by John W. Mellor and Gunvant M. Desai. Baltimore: Johns Hopkins University Press for the International Food Policy Research Institute, 1985.

Lev, Larry. The Effect of Cash Cropping on Food Consumption Adequacy Among the Meru of Northern Tanzania. Working Paper 21. East Lansing, Mich.: Michigan State University, 1981.

Lewis, W. Arthur. "Development Strategy in a Limping World Economy." In Rural Change, pp. 12-27. Edited by G. Johnson and A. Maunder. Hampshire, England: Gower, 1981.

Lipton, Michael. Poverty, Undernutrition and Hunger. World Bank Staff Working Paper 597. Washington, D.C.: World Bank, 1983.

Mellor, John W. "Food Price Policy and Income Distribution in Low-Income Countries." Economic Development and Cultural Change 27 (January 1978): 1.

_____. Food Trends and the Research Agenda. Food Policy Statement. Washington, D.C.: International Food Policy Research Institute, 1981.

Mellor, John W. and Johnston, Bruce F. "The World Food Equation: Interrelations Among Development, Employment, and Food Consumption." Journal of Economic Literature 22 (June 1984): 531-574.

Nkamany, K. et al. "The Consequences of the Drought in Bas, Zaire." Disasters 1 (No. 4, 1978): 55.

O'Dea, J. "An Examination of the Impact of Cash Crop Agriculture on Nutritional Status with Reference to Kenya." M.S. thesis, University of London, 1982.

Ogbu, J. "Seasonal Hunger in Tropical Africa as a Cultural Phenomenon." Africa 46 (1973): 317-332.

Oram, Peter and Bindlish, Vishva. Resource Allocations to National Agricultural Research: Trends in the 1970s. The Hague and Washington, D.C.: International Service for National Agricultural Research/International Food Policy Research Institute, 1981.

Pinstrup-Andersen, Per. Agricultural Research and Technology in Economic Development. New York: Longman, 1982.

_____. "Energy Cropping." Mazingira 5 (No. 1, 1981): 60-69. Reprinted by the International Food Policy Research Institute.

_____. Export Crop Production and Malnutrition. Occasional Paper Series, vol. 2, No. 10. Chapel Hill, N.C.: University of North Carolina, 1983. Reprinted by the International Food Policy Research Institute.

_____. "Food Prices and the Poor in Developing Countries." Paper presented at the Fourth European Congress of Agricultural Economists, Kiel, West Germany, September 3-7, 1984.

Popkin, Barry M. "Rural Women, Work and Child Welfare in the Philippines." In Women and Poverty in the Third World. Edited by Mayra Buvinic, Margaret Lycette, and William B. McGreevey. Baltimore: Johns Hopkins University Press, 1983.

_____. "Time Allocation of the Mother and Child Nutrition." Ecology of Food and Nutrition 9 (1980): 1.

Rabeneck, Sonya. "The Determinants of Protein-Energy Malnutrition Among Preschool Children in Kenya with Respect to Cash Cropping and Self-Sufficiency in Staple Food Production." Ph.D. dissertation, Cornell University, 1982.

Republic of Kenya. Economic Survey-1982. Nairobi: Central Bureau of Statistics, 1982.

_____. Economic Survey-1983. Nairobi: Central Bureau of Statistics, 1983.

_____. Situation Analysis of Children and Women in Kenya, Vols. 1-4. Nairobi: Central Bureau of Statistics and Ministry of Finance and Planning, 1984.

Reutlinger, Shlomo and Selowsky, Marcelo. Malnutrition and Poverty: Magnitude and Policy Options. World Bank Occasional Paper 23. Baltimore: Johns Hopkins University Press for the World Bank, 1976.

Rogers, Beatrice. The Internal Dynamics of Households: A Critical Factor in Development Policy. Washington, D.C.: U.S. Agency for International Development, Bureau for Program and Policy Coordination, 1983.

Sahn, David E. and Alderman, Harold. "Testing for Differences in the Marginal Propensities to Consume From Income Earned by Women and Men." International Food Policy Research Institute, Washington, D.C., 1984 (mimeographed).

Sarma, J. S. "An Analysis of Cereals Feed in the Third World: Past Trends and Projections to 1990 and 2000." Preliminary draft, International Food Policy Research Institute, Washington, D.C., 1984 (mimeographed).

Schluter, Michael. Constraints on Kenya's Food and Beverage Exports. Research Report 44. Washington, D.C.: International Food Policy Research Institute, 1984.

Schmitz, Andrew et al. Grain Export Cartels. Cambridge, Mass.: Ballinger Publishing Company, 1981.

Senauer, Benjamin; Garcia, Marito; and Jacinto, Elizabeth. "Determinants of the Intrahousehold Allocation of Food in Developing Countries." International Food Policy Research Institute, Washington, D.C., 1986 (mimeographed).

Senghaas, Dieter. "Abkoppelung als Entwicklungspolitische Devise." der Ueberblick (March 1983): 24-26.

Seshamani, Lalitha. "Food Consumption and Nutritional Adequacy in Iringa: A Case Study of Four Villages." University of Dar-es-Salaam, Dar-es-Salaam, Tanzania, 1980 (mimeographed).

Siamwalla, Ammar and Valdés, Alberto. "Food Insecurity in Developing Countries." Food Policy (1980): 258.

Spencer, Dunstan. African Women in Agricultural Development: A Case Study in Sierra Leone. African Rural Economy Working Paper 11. East Lansing, Mich.: Michigan State University, Department of Agricultural Economics, 1976.

Spencer, Dunstan and Byerlee, Derek. "Technical Change, Labor Use and Small Farmer Development: Evidence from Sierra Leone." American Journal of Agricultural Economics (December 1976): 874-880.

Swanberg, Kenneth and Hogan, Ed. Implications of the Drought Syndrome for Agricultural Planning in East Africa: The Case of Tanzania. Harvard Institute for International Development Discussion Paper 120. Cambridge, Mass.: Harvard University, 1981.

Tangerman, S. "Wer ist Schuld am Hunger in der Dritten Welt?" der Ueberblick 1/83 (1983): 9-12.

Thompson, R. L. and Abbot, Philip C. "On the Dynamics of Agricultural Comparative Advantage." Paper presented at U.S. Department of Agriculture-Universities International Agricultural Trade Research Consortium meeting, Bridgeton, Missouri, June 1982 (mimeographed).

Tinker, Irene. New Technologies for Food Chain Activities: The Imperative of Equity for Women. Washington, D.C.: U.S. Agency for International Development, Office of Women in Development, 1979.

Trairatvorakul, Prasarn. The Effects on Income Distribution and Nutrition of Alternative Rice Price Policies in Thailand. Research Report 46. Washington, D.C.: International Food Policy Research Institute, 1984.

Tripp, Robert. Cash Cropping, Nutrition and Choice of Technology in Rural Development. Mexico: Centro Internacional de Mejoramiento de Maiz y Trigo, 1982.

_____. 'Farmers and Traders: Some Economic Determinants of Nutritional Status in Northern Ghana." Food and Nutrition 8 (January 1982): 3-12.

Williamson-Gray, Cheryl. Food Consumption Parameters for Brazil and Their Application to Food Policy. Research Report 32. Washington, D.C.: International Food Policy Research Institute, 1982.

World Bank. World Development Report. New York: Oxford University Press for the World Bank, 1984.

Yotopoulos, Pan. "Middle-Income Classes and Food Crises: The 'New' Food-Feed Competition." Economic Development and Cultural Change (April 1985): 463-483.

Joachim von Braun, an economist, and Eileen Kennedy, a nutritionist, are research fellows in the Food Consumption and Nutrition Program at the International Food Policy Research Institute.