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**THE FOOD SECURITY AND NUTRITION IMPACTS  
OF NON-TRADITIONAL AGRICULTURAL  
EXPORTS IN LATIN AMERICA**

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**July 1993**

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IN LATIN AMERICA<sup>1</sup>**

Prepared for the  
Health and Nutrition Sustainability Project  
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## **EXECUTIVE SUMMARY**

The promotion of non-traditional exports (NTX) has become a cornerstone of current economic strategies in many Latin American countries. After several decades of policies promoting import substitution and a virtual neglect of agriculture and a decade of economic decline and debt crisis many Latin American countries are adopting economic strategies emphasizing the production of non-traditional exports (NTX), including agricultural products, as a means of revitalizing their economies and generating foreign exchange. The U.S. Agency for International Development, among other donors, has been strongly promoting the development of export driven economic change in general, and non-traditional agricultural exports in particular (NTAE). However several recent reviews have noted that the long-term distributional effects, including the potential effects of NTAE promotion on the food security and nutritional status of population at risk for malnutrition, have not been adequately considered.

The objectives of this report are:

1. To review the currently available information on the food security, food consumption, and nutrition effects of policies promoting NTAEs in Latin America;
2. To suggest the policy implications of NTAE promotion by A.I.D. based on currently available information;
3. To clarify the research issues involved in the development of a better information base to adequately evaluate the impacts of NTAEs on food security and nutrition of populations at nutritional risk in Latin America;
4. To suggest a research strategy to evaluate these effects.

The information currently available for evaluating the impact of non-traditional agricultural export production on nutritional status in Latin America and the Caribbean is sketchy and inadequate. The most well investigated case, the Western Highlands of Guatemala, may represent an unusual situation in which there is more potential for positive benefit for vulnerable populations. Even in this case it is not clear that increasing income has had a dramatic effect on nutritional status of target household members.

Furthermore, the evidence of the impact of NTAE production on factors thought to contribute to food security (or insecurity) is not conclusive. For example, the effects of NTAE production on food production are unclear. It appears that the two production strategies are not fundamentally incompatible. It is more likely that agricultural policies that privilege export production and support a cheap food policy, in general, discourage staple food production. In addition, the allocation of resources such as agricultural credit, crop insurance, input subsidies, and extension services to NTAE production under circumstances of limited resources may reduce the availability of these for the production of food crops. The cumulative result is likely to be increasing dependency on imported food. While several analysts suggest that there is increased dependency on imports, it is not clear that this has resulted in increased food prices for poor

consumers. At the household level, smallholders who are engaged, at least partially in subsistence production, appear willing to pay a premium for the enhanced food security that consumption of food from their own production affords. They act to protect their own food supply.

While there may be no inherent economies of scale for the production of many NTAE crops, other factors such as control of the markets, problems with pests, and access to credit seem to favor larger producers. Several analysts argue that NTAE production has contributed to the ongoing process of land accumulation and displacement of marginal rural populations in Latin America, especially in Central America.

Where successful NTAE production does appear to increase household income of small producers (at least in Guatemala) when problems of risk in marketing are controlled. Few studies, however, have looked the impact of risk and the potential for increased risk for NTAE production. At the same time, available research on the intrahousehold effects suggests that these are similar to those of other cash crops. Income benefits for producers appear to accrue more to men than to women. This shift has been cited to account for the lower than expected impact of increases in income on food consumption and nutritional status.

NTAE production, and agricultural commercialization in general, have less of an impact on consumption of food and health care services than might be expected. It is not clear if the "leakage" of income from household food security is the result of an inherent characteristic of the crops being grown. None of the carefully done studies addresses the question of how lumpy the income from winter vegetable is and what the competing expenditures are. No one has assessed the impact on "social costs" that might be associated with NTAE production in the form of ritual payments of gifts in order to maintain an available pool of labor, etc. No one has carefully investigated the decision making process with respect to the allocation of household income among competing goods, including food and health. It is not clear if small holders see a need to purchase more food or invest in health care with increased income. The Cuatro Pinos cooperative includes some access to health care and health and nutrition education. It is not clear if these account for the greater impact of NTAE production on nutritional status in this program compared with smallholders in other communities producing NTAEs but without access to the cooperative. While there is some evidence that a portion of the increased income is allocated to health, it is unclear how much of the increased income is being allocated among other goods.

NTAE production appears to create employment. The actual number of jobs created is difficult to determine, so the total impact is not fully known. However, the jobs created tend to pay more than other jobs in agriculture, and in some cases are more stable and less seasonal. For jobs in processing and in greenhouse work, women may be favored. Anecdotal evidence suggests that this may be because employers see women, especially younger unmarried women, as presenting fewer labor problems. It may also be that the wage structure is so low or the

nature of employment so sporadic, especially in processing, that these jobs are more acceptable to women, who have fewer employment opportunities than men.

For small farmers involved in NTAE production in Guatemala, there is some indication that women's time allocation may shift away from food security and child care tasks. The preference of employers in NTAE production and processing (outside the small farm sector) for younger unmarried women means that these women often do not have child care or other household responsibilities.

One of the areas of highest concern, with little data with which to analyze the problem, is the extent of exposure to hazardous chemicals in NTAE production and processing. It is assumed that the potential for exposure is high in some crops, such as flowers and ornamental plants, but there has been little research on the health risks involved.

There is little information on the impact of NTAE production on water and sanitation. The shrimp industry in Honduras represents a positive example. The industry became concerned about potential of contamination of the shrimp ponds with cholera and promoted the construction of latrines in communities surrounding the ponds (Vergne et al. 1993). Increased income from employment or profits from NTAE production may be expected to lead to increased expenditure on health and sanitation, but the extent to which this has occurred has not been determined.

Similar to the general conclusions that can be reached through reviewing the literature on the commercialization of agriculture, it appears that the income, food security and nutrition impacts of NTAE promotion are strongly related to the wider policy climate within countries and regions. For small producers, crop choice (even with increased risk), may be less important for the nutritional status of family members than the access of small producers to credit, information and markets. We must conclude that each case must be examined in light of the special circumstances in which producers and consumers find themselves.

In general, there is surprisingly little information on the distributional effects of NTAE promotion. What is available suggests that there is no inherent reason why smallholders and the rural labor force could not benefit from NTAE promotion. On the other hand, increasingly it appears that current NTAE promotion favors the elite and marginalizes vulnerable rural populations.

## **GENERAL POLICY IMPLICATIONS**

NTAE production has the potential to improve incomes for small holders and create employment for both rural and peri-urban workers. Without adequate targeting for small producers and institutions to improve access to markets and reduce risk for small producers, this sector is likely to be left behind. While commercialization and the promotion of NTAEs has

not created dualistic economies in Latin America, without careful planning, the policies promoting NTAE production may exacerbate the process.

For workers, promotion of NTAEs will be most beneficial if it creates employment opportunities that are more stable, permanent, and more well paid than other employment generated in the agricultural sector. It is difficult to identify the specific policy instruments that would have to be created in order to attain the maximum benefit for the nutritionally marginal and food insecure populations in Latin America. Existing information, however, suggests that the following key considerations should be incorporated into policy decisions.

1. In order for the small farm sector to successfully participate in NTAE production, policies and structures enhancing the access of small holders to information, technology and markets must be made available. These would include:
  - a. Increased availability of credit, insurance, seeds and extension for NTAE production to small holders.
  - b. Promotion of institutions such as marketing cooperatives that facilitate the marketing of NTAEs by small producers.
  - c. Development of information systems that provide timely information to small holders concerning NTAE markets and technology.
  - c. Development of systems for monitoring the impact of NTAE production on land tenure and access to land for small producers.
  - d. Establishment of criteria for success that are appropriate for small producers and resource-poor farmers who may show a smaller return on investment, especially in the short run.
2. Protection of subsistence food production by small holders engaged in NTAE production will enhance food security NTAE producing households and also enhance food availability at the local and regional levels. Policies that protect subsistence production for household consumption and marketing should be adopted, including:
  - a. Promotion of program objectives that set the compatibility of crops and technology selection with subsistence production as a priority for small holders.
  - b. Development of technology based on mixed farming systems that enhance the production of food/subsistence crops.
  - c. Provision of technical assistance to small holders that addresses the whole farming system, including subsistence production.

- d. Understanding and incorporating the goals of farmers and farm households in program planning and evaluation.
3. To protect workers in NTAE production and processing, fair labor practices should be monitored, and employment opportunities should be enhanced for women with children, especially women who are household heads. Alberti (1991) suggests a series of policies that would enhance health, safety and quality of life of workers in NTAE, especially women. Many of these would be likely to also enhance food security and nutrition.
  - a. Provision of basic health and nutrition services in to workplace.
  - b. Provision of assistance in developing basic accounting skills and budgeting in order to assist workers to calculate wages due and keep accounts of wage payments.
  - c. Assistance in the development of small scale credit unions for workers, especially women.
  - d. Promoting the development of child care alternatives for women employed in field work and processing.
4. Set priorities for the kinds of crops to be promoted in terms of the potential impact on employment.
  - a. Promote products with a higher ratio of post harvest/value added processing.
  - b. Promote crops or processing activities that promote a more even pattern of demand for labor throughout the annual cycle.
5. Provide culturally appropriate and well grounded nutrition and health education to producers and workers to enhance the impact of increased income on food consumption and intrahousehold distribution of food.
6. Provide technical assistance to women farmers and provide more opportunities for women to participate in NTAE production and processing.
7. Assess the health and safety issues involved in NTAE production and processing, develop and enforce occupational health and safety guidelines for work in NTAE production and processing.

## QUESTIONS FOR RESEARCH

Existing information on the impacts of NTAE promotion leave a number of questions unanswered. The future research agenda needs to address several points:

1. The long- and short-term distributional effects of NTAE promotion should be more carefully examined. In the long and short terms, who benefits and who loses? What roles do markets (land, labor, agricultural inputs and credit) play in producing different outcomes for various population groups? What are the short- and long-term (including intergenerational) effects on food security, health and nutrition?
2. There is a need to more fully understand the conditions under which small holders can be successfully integrated into NTAE production and the impact of integration on food security and nutrition. This implies several lines of research:
  - a. An analysis of existing small holder participation in NTAE production within a wider variety of ecological, economic, and policy contexts. This implies the development of a series of comparable case studies in regions in which different crops have an advantage (melons, citrus, vegetables, other crops such as quinoa), with differing opportunities for value added processing, under differing conditions of production (eg. cooperative vs. non cooperative; contract farming), under differing conditions of land tenure (land reform, tenancy and share cropping arrangements, etc.) and in with differing access of small holders to credit, seeds, other inputs and technical assistance.
  - b. Quasi-experimental designs in which comparisons are made between producers participating in specific programs with differing access to program benefits, with those who do not have access.
  - c. Investigation into ways to evaluate farmer access to, and use of information in order to develop more effective ways to adjust programs to incorporate existing farmers' knowledge an increase access to new information.
  - d. Investigation of farmers' and farm households' goals for and perceptions of the nature of improvements in the quality of life, values for health and nutrition, decision making concerning allocation of resources among competing goods.
3. There is a need to better understand policy and program alternatives that can enhance the compatibility of NTAE and subsistence production, both at the household and national levels.

4. There is a need for macro-level policy analysis to examine the impact of NTAE promotion policies on food production, food availability and food prices in Latin American and Caribbean countries.
5. The employment effects of NTAE production and processing need to be evaluated. There is conflicting information available regarding the amount of employment generated either in production or processing, and the segment of the labor force that benefits. This implies more careful studies that compare the amount of employment generated in production and value added processing for both men and women, the steadiness of employment and the compatibility of employment with the other roles of women.
6. There is a need to evaluate the impact of integrating the incorporation of complementary social investments into programs to promote NTAE production, and in the workplace in order to enhance the impact of increasing income on food security and health for both producers and workers.
7. The long-term environmental impact of NTAE production should be reviewed and carefully evaluated.

## **METHODOLOGICAL CONSIDERATIONS**

Further research examining the impacts of NTAE production in Latin America need to go beyond some of the methodological constraints that characterize currently available research.

1. There is a need to promote longitudinal and longer term research. All of the research currently available has been carried out on a short-term basis, and much of it is based on cross-sectional data that compares NTAE producers with non-producers. It is clear that early adopters of new crops and technologies are likely to be different from later adopters and non-adopters from the outset. In some instances larger farmers may be early adopters, but smaller farmers may enter into production later, or small farmers may enter into production, but then leave for various reasons. Some groups may seem to benefit in the short run but may be excluded from benefits at a later time. Policy impacts and market conditions are not stable over time, and economic conditions and social outcomes at the household level may shift (these may be quite different in the pre-boom, boom and post-boom periods). Cross-sectional designs are especially problematic, and short-term longitudinal studies may not capture enough of the cycle of adoption to provide information on the full impact of a policy.

Longitudinal research should not only continuously monitor at least a sample of households over a long period of time, but should also monitor policy and environmental conditions, changes in infrastructure, etc. Some of these factors may actually be related to point estimates of impact in a lagged fashion. In cases in which a prospective, quasi-experimental design is possible, which are admittedly likely to be rare, the opportunity should not be missed.

Some retrospective research such as the work by Barham et al. (1992b) that incorporates historical narratives to assess the differences among early and later adopters may be appropriate as well.

2. In order to develop a better understanding of the distributional effects of NTAE production, study designs should go beyond the study of impacts on adopters and non-adopters and include the measurement of impacts on players in local output and factor markets, and those who are excluded from those markets as well. Study designs should also consider that the adoption process is reversible and include producers or workers who have partially or completely left the NTAE sector.

3. Study designs should maximize the complementarity of qualitative (ethnographic and participatory) and quantitative (survey, econometric) research designs. Existing information is limited by the lack of research that documents relationships between production employment, expenditures, nutritional status, etc. and also incorporates an understanding of values, perceptions and decision making. In some cases rapid assessment methodologies may be a useful complement to quantitative studies. In other cases, life histories and the development of historical narratives from a panel of informants may be more appropriate to expand the available data.

4. Research should focus on dietary quality as well as energy when assessing food consumption and dietary adequacy. Recent data from the studies included in the Nutrition Collaborative Research Support Project (NCRSP) suggest that food consumption and nutrition studies need to refocus on dietary quality as well as energy consumption (Calloway et al. 1989). NCRSP studies suggest that the percentage of energy from animal products is an important predictor of growth, health, and cognitive development. Furthermore, in some of the studies, the percentage of energy from animal products in the diet of pregnant and lactating mothers was a strong predictor of growth in exclusively breastfed infants under six months of age. NCRSP investigators argue that the percentage of energy from animal products is an indicator of the bio-availability of several key micronutrients in diets. Several of the key studies to date on the nutritional impacts of commercialization of agriculture have focused exclusively on energy or energy and protein intake as indicators of dietary adequacy. Other studies (Dewey 1981; K.M. DeWalt 1983) suggest that changes in dietary quality may be a key outcome of shifts from reliance on household production to the market that often accompanies the commercialization of production. These findings suggest that dietary quality as well as total energy intake must be examined in assessing the nutritional impact of diets and must be included in study designs.

5. The assessment of the nutritional status of adults, especially women of child bearing age, should be included as outcome measures. The nutritional status of young children is usually chosen as the primary indicator of nutritional wellbeing. NCRSP and other data, however, suggest that the nutritional status of women of childbearing age may be an important indicator of household nutritional well being. First, women, rather than young children, may be under

the greatest nutritional stress, especially during seasonal or other food shortfalls (eg. Leonard 1989). Second, the nutritional status, and subsequent energy expenditure of women, may be an important factor in the quality of child care. Malnourished women may not have the energy to adequately care for children and promote household sanitation. Finally, growth failure in exclusively breastfed children under six months of age may be the result of poor availability of micronutrients in breast milk as a result of poor dietary quality for mothers. In addition, weight loss in adults may be useful as an indicator of short term or seasonal stress.

6. Finally, a greater effort should be made to develop an inventory of existing data sets that can be drawn upon to analyze some of the current research questions. Such data sets may not have been designed to directly examine the impact of NTAE production and processing on employment, income, food security, nutrition and health, but may be suitable to address some of the questions. In addition, analysis of existing data would provide information at a comparatively low cost.

## I. INTRODUCTION

The promotion of non-traditional exports (NTX) has become a cornerstone of current economic strategies in many Latin American countries. After several decades of policies promoting import substitution, a neglect of agriculture, and a decade of economic decline and debt crisis many Latin American countries are adopting economic strategies emphasizing the production of non-traditional exports (NTX), including agricultural products, as a means of revitalizing their economies and generating foreign exchange (Barham et al. 1992a). The U.S. Agency for International Development, among other donors, has been strongly promoting the development of export driven economic change in general, and non-traditional agricultural exports (NTAE) in particular (Thrupp and Waters 1993). As several recent reviews have noted (Barham et al. 1992a; 1992b; Thrupp and Waters 1993), however, the long-term distributional effects, including the potential effects of NTAE promotion on the food security and nutritional status of populations at risk for malnutrition, have not been adequately investigated.

### A. SCOPE AND CONTENT OF THIS REVIEW

The objectives of this report are the following:

1. To review the currently available information on the food security, food consumption, and nutrition effects of policies promoting NTAEs in Latin America;
2. To suggest the policy implications of NTAE promotion by A.I.D. based on currently available information;
3. To clarify the research issues involved in the development of a better information base to adequately evaluate the impacts of NTAEs on food security and nutrition of populations at nutritional risk in Latin America;
4. To suggest a research strategy to evaluate these effects.

The review has been carried out drawing on existing information in the published literature and other information available in unpublished reports and data bases. As will be evident below, information that directly addresses the impact of NTAE production and processing on food security and nutrition in Latin America is scarce. For this reason,

information from other regions of the world where parallel processes are underway has been drawn upon for this review. In addition, available information on the impact of agricultural commercialization, in general, has been reviewed and incorporated where it is appropriate for determining the probable impacts of NTAEs. Finally, as will be noted below, understanding the distributional effects of shifts in agricultural and economic policies is key for predicting probable food security and nutrition impacts. Available information on the distributional effects of past booms in agricultural exports and current NTAEs in Latin America has been examined and incorporated where appropriate. The author would like to make special note of the work of Barham, Carter et al. (1992a, 1992b) who have conducted thorough reviews of the general situation in Latin America with respect to NTAEs.

## **II. BACKGROUND**

### **A. CHARACTERISTICS OF NON-TRADITIONAL AGRICULTURAL EXPORTS**

Barham et al. (1992a) suggest that the term non-traditional agricultural exports encompasses at least three different kinds of phenomena. A non-traditional agricultural export may denote a product that has not been produced in a country before, such as snow peas in Guatemala or cut flowers in Ecuador; a product that was traditionally grown for an internal market but is now being produced for an export market, such as tropical fruits; or the development of a new market for a traditional product, such as exporting bananas to the former Soviet Union. The development of NTAEs has been the result of a constellation of policies in Latin American countries that promote liberalization of trade and an emphasis on national comparative advantage in the production of agricultural exports. Barham et al. also include natural resource-based non-traditional exports in this definition. This broader definition would include mariculture and fisheries and some timber and wood products and forest products, such as Brazil nuts.

For Latin America the range of products that can be considered NTAEs includes such diverse crops as cut flowers, ornamental plants, vegetables (asparagus, broccoli, snow peas,

cauliflower, etc.), tropical fruits, and melons. For the purposes of this review, the production and export of shrimp will also be included. While not an agricultural product strictly speaking, shrimp production and processing share many characteristics with the other products mentioned in terms of the creation of employment and the potential displacement of small farmers and fishermen.

The general literature concerning the impact of the commercialization of agriculture on food security and nutrition (eg. Bouis et al. 1984; von Braun and Kennedy 1986; Maxwell and Fernando 1989; DeWalt 1993) suggests that the nature of the specific cash crop produced is important in understanding the relationships between commercialization and nutrition. Important characteristics of specific crops include:

- 1) inherent economies of scale in the production and marketing of crops, hence, the potential for adoption of production by small farmers;
- 2) the capital investment needed to initiate production, which also poses a barrier for resource-poor farmers;
- 3) the magnitude of demands on household labor and competition for labor with other crops;
- 4) the potential for the cash crop to act as a subsistence crop;
- 5) the lag time between planting and economically viable yields for perennial or semi-perennial crops, and finally for the generation of employment;
- 6) the effects on employment opportunities, both seasonal and permanent, especially employment for women; (Bouis et al. 1984, van Braun and Kennedy 1986; Dewey 1989).

In the following discussion, the impacts of crops with specific characteristics will be identified when appropriate and feasible.

## **B. WHERE ARE THE NUTRITIONALLY VULNERABLE IN LATIN AMERICA?**

While the prevalence of protein-calorie malnutrition is, on the average, lower in the Latin American and Caribbean (LAC) region compared with other geographic regions of the world, stunting (low height/age) and global malnutrition (low weight/age) continue to be major health

issues (Sanghvi and Mora 1991). Furthermore, while the prevalence of malnutrition in the LAC region decreased dramatically in the 1960s and 70s, the economic crises of the 1980s were associated with a slowing or stalling of improvement in nutritional status, and in some instances the situation may have worsened during the last decade. Cereal food aid increased from about 160,000 MT in 1974/75 to as much as 1,840,000 MT in 1987/88. Despite the increase in food aid and other cereal imports, per capita food supplies declined in the region over the same interval (Sanghvi and Mora 1991; World Bank 1990). The International Food Policy Research Institute estimates that food energy deficits currently affect 23 percent of the population in Central America and 26 percent in South America (Broca and Oram 1991, cited in von Braun et al. 1992).

Shifts in agricultural production are most likely to have the strongest impact (either positive or negative) on food consumption, food security and nutritional status of populations already at risk or marginally nourished. In Latin America the bulk of nutritional risk is found in the rural sector, specifically among small farmers and landless laborers, and the urban underclass (Harrell et al. 1986; Sanghvi and Mora 1991; Freire 1988). In order to have a positive impact in the rural sector, shifts in production must benefit small farm households and the households of landless workers. To benefit poor rural and urban consumers, shifts in production must either increase employment and/or stabilize or reduce the price of food. Policies that do not benefit small farmers and rural laborers or that lower the availability or raise the price of basic foods are likely to have a detrimental impact on the nutritional status of populations at risk.

### **C. PROMOTION OF NON-TRADITIONAL AGRICULTURAL EXPORTS IN LATIN AMERICA**

As Thrupp and Waters (1993) point out, export led growth has been a key economic process in Latin America since colonial times. The growth of exports through agricultural diversification has been a specific component of development strategies in Latin American and a hallmark of strategies in Central America throughout the post-second World War period. The

Alliance for Progress, initiated in 1961, was founded on export diversification and the expansion of the exports of cotton, sugar and beef. The strategies appeared successful as Latin American countries experienced economic growth through the 1960s and 70s. A heavy dependence on traditional exports in a climate of declining commodity prices, increased competition, and global trade protectionism contributed to the economic crisis in Latin American and the Caribbean in the late 1970s and 80s. Economic diversification of countries into non-traditional exports is seen as a strategy that can move countries toward increased growth (Paus 1988).

A.I.D., as well as several other international aid agencies, has invested heavily in assisting in the promotion of NTX. Thrupp and Waters (1993) have reviewed NTAE promotion activities in Ecuador, where A.I.D. donated \$2.76 million to develop the Program for the Export of Non-traditional Agriculture (PROEXANT). In addition, A.I.D. provided a total of \$7.5 million to banks for NTAE credit. At the same time, the Ecuadorian government has pursued policies that promote NTAE production. The government has reduced policy barriers to export, reduced subsidies for production for local and national markets, and has given the export sector higher priority for credit, reducing availability for credit for local production and markets. Monetary policy has devalued exchange rates, making them more favorable for exports. State agencies have established export promotion activities, including credit support and technical assistance for NTAE producers through the Corporación Financiera Nacional (CFN). CFN helps to formulate export laws and has financed and founded several NTAE companies. The Ministry of Industry and Commerce has an NTAE promotion program, which coordinates with the Ministry of Agriculture and the US APHIS.

As a result of similar policies, the production of NTAEs in a number of Latin American and Caribbean countries has grown dramatically. By 1985, non-traditional agricultural accounted for from 14 percent of exports for Honduras to a high of 61% of exports for Belize (Paus 1988, Stonich 1991). In Ecuador, the total value of NTAEs was \$35.9 million in 1991. This represents a 349.3 percent growth rate since 1985 (Thrupp and Waters 1993). For flowers there was a 1500 percent increase in volume and a 3000 percent increase in the value of the crop between 1985 and 1991 (Thrupp and Waters 1993).

Table I shows the total growth in non-traditional exports for Costa Rica, Chile and Guatemala from 1984 through 1989. In this time period, growth in NTX exceeded 200 percent for Costa Rica and Chile and 78 percent in Guatemala. For all three countries, the annual percentage growth in NTX was greater than growth in the gross domestic product as a whole.

Stonich (1991) has reviewed the growth of NTAEs in Central America from 1983-1987 (Table II). During this time there was growth in production and the value of NTAEs for all countries of Central America, with the growth in production of pineapple (Costa Rica), winter vegetables (Guatemala), and melons (Honduras) the most dramatic.

From 1965 to 1985, the relative importance of horticultural products in world agricultural trade increased (Islam 1990). This was especially true for developing countries as compared with developed countries. For developing countries, the average annual growth rate for the years 1975 - 85 was 8.26 percent, while agricultural exports as a whole rose by only 5.17 percent (Islam 1990). The share of developing countries in world horticultural exports increase, while their share in overall exports declined from 1961 to 1985.

For Latin America and the Caribbean, horticultural exports increased by approximately 4.9 percent per year in real terms. The largest increases in exports were achieved by Brazil, Chile, Colombia and Cuba (Islam 1990). Half of the increase in Latin American horticultural exports can be attributed to import growth. Latin American exports also, however, enjoyed an increase in market share in all markets except Japan.

A review of NTAEs for Honduras in the mid-1980s (Hefferman 1986) lists the most important NTAEs as pineapple, palm oil, and fruit conserves. For Belize, tropical fruits, especially the production of citrus for the frozen juice market (Moberg 1992; and see Table II above), has become a NTAE crop for small producers. For Ecuador, the largest areas of growth have been in cut flowers, shrimp, and vegetables for the individually quick frozen market (IQF), especially in Europe (Thrupp and Waters 1993; Interview with Lena Ronquillo, 1992).

For several countries, especially Honduras and Ecuador, the mariculture of shrimp in artificial ponds along the Pacific coast has become an important source of export earnings. The growth in the value of all shellfish exports in Honduras rose from 47,405 million lempiras in 1980 to 106,015 million lempiras in 1987 and was projected to rise another 7 percent between

1987 and 1993 (Stonich 1991). Between 1978 and 1988 the total production of cultivated shrimp grew from 130 MT to 2225 MT, or by 1,611 percent (Stonich 1991). The area under production grew from 1450 hectares to 5500 hectares from 1986 to 1989 (Stonich 1991).

In general, Barham et al. (1992a) and Thrupp and Waters (1993) conclude that the growth in NTX in general, and in NTAEs in particular, has not been well evaluated for its sustainability and potential for long-term economic growth, nor for its impacts on the environment, income distribution within participating countries, real wages and labor demand, land tenure systems, household organization, household consumption and intrahousehold access to resources.

#### **D. A CONCEPTUAL FRAMEWORK FOR THE LINKAGES BETWEEN PROMOTION OF NTAE AND NUTRITION OF VULNERABLE POPULATIONS**

Existing literature examining the linkages between agricultural policy, agricultural production, and household food security and nutrition of vulnerable populations has identified a series of factors that appear to shape the type and magnitude of the impact of shifts in policy and production practices at the household level. One of the more comprehensive models of these relationships is a schematic overview developed by Kennedy and Pinstrup-Andersen (1983; Kennedy et al. 1991), subsequently modified by them and others. The Kennedy and Pinstrup-Andersen schematic identifies a chain of the principal determinants of the nutritional status of individuals and the factors influencing them (Figure 1). Five distinct levels of influencing factors that flow down to the nutritional status of the individual are identified. These include: 1) food availability at the national, local, and regional levels; 2) ability of households and individuals to obtain available food; 3) desire of households and individuals to obtain available food; 4) utilization of obtained foods by households and individuals; and 5) the health of the individual. Ecological, economic, social, and cultural factors can influence various links along this food security chain. The model suggests several potential points of interface between changes in agriculture policy and production and the nutritional status of vulnerable individuals. The availability and price of food at the national, regional or local levels may be affected; the

ability of households to access the resources necessary to obtain available food, such as access to employment, income, land, etc. may be affected; the desire of households to obtain available food in comparison to consumption of alternative non-food goods and services may shift; and there may be effects on the ways in which household resources, including income and food, are distributed among household members.

Existing information on the impact of agricultural change in general, and on the commercialization of agriculture in particular, suggests a number of specific linkages between changes in agricultural production and food consumption and nutritional status of individuals in farm households (DeWalt 1983; Bouis et al. 1985; Frankenberger 1985; von Braun and Kennedy 1986; Dewey 1989; Kennedy 1991; DeWalt 1993.). Several of the linkages identified in earlier research are likely to be crucial in understanding the potential impact of increased production of NTAEs on the food consumption and nutrition of vulnerable populations in Latin America and the Caribbean with special emphasis on the rural poor.

### **1. Food Availability and Prices**

The potential effect of increases in NTAE production on food prices is closely related to the issue of displacement of food production, especially at the national and regional levels. Pinstrup-Andersen (1981) and Bouis et al. (1985) note that, in some cases, the displacement of food production by cash crops has had the effect of raising food prices and thus limiting the impact of rising cash income on real income. While it seems evident that the market availability of food and prices of basic foods are key to access to food by urban households and the households of rural laborers, we must also consider that most small producers are also net food consumers (Pinstrup-Andersen 1989). Even in a heavily subsistence based food system in the Ecuadorian Andes we found that, on average, approximately 50% of energy in small farm households, came from purchased foods (Uquillas et al. 1990).

## 2. Income

In general, increasing income is associated with increased energy intake for poorer consumers, and improved dietary quality (Alderman 1989). Agricultural projects and policies aimed at the nutritionally vulnerable rural population would generally expect to improve food consumption and nutritional status directly through improving the income of farm and laborer households. It must be kept in mind, however, that especially within the small farm sector, the relationships between household income and food consumption are not straightforward. Reviews of the impact of commercialization of agriculture on income and food security of rural households point to several intervening factors (DeWalt 1983; Bouis et al. 1985; von Braun and Kennedy 1986; Dewey 1989; Kennedy 1991; DeWalt 1993; von Braun and Pandya-Lorch 1991; von Braun et al. 1992).

Improvements in yield as a result of new agricultural technology or improved cultural practices may not result in improved net income if the cost, in cash or labor, is greater than the value of the output. A major problem identified for the commercialization of agriculture is that while cash income may rise, real income may not rise or may even decline if the cost of purchased food of a quality similar to food produced by households is greater than the imputed value of food previously produced for home consumption (Dewey 1989). This is of particular concern with respect to production of export crops that might displace subsistence crops at the level of individual farm or at regional and national levels. The result may be that the purchased diet is of poorer nutritional quality than the subsistence based diet (Neitchmann 1973; Dewey 1989). It is hypothetically possible that reductions in food production might occasion a rise in the price of food (Bouis et al. 1985), although this is more likely under conditions of poor markets and infrastructure. Binswanger and von Braun (1990) argue that there are no clear case studies in which this has happened.

The effect of increased income on food consumption is a function of the form of income, the lumpiness of income, and the source of income (Bouis et al. 1985). Income in kind (ie. in the form of food) is more likely to have a positive impact on food consumption than its equivalent in cash. The regularity in the flow of income tends to be more important than the

amount of income (Pines 1983, USAID 1984). Lumpy income is more likely to be spent on non-food items than income that flows in a regular fashion. Finally, men and women may spend income differently. Income earned and controlled by women may be more likely to contribute to household food availability than income earned and controlled by men (Holmboe-Ottesen et al. 1989; Leslie 1988, 1989; Blumberg 1988a, 1988b). It is likely, however, that the impact of women's control over income is dependent on social and cultural factors influencing the way in which income is pooled within families. The strongest demonstrations of the impact of income under women's control on food expenditures come from research in Africa and South Asia (Blumberg 1988a, 1988b; Holmboe-Ottesen et al. 1989). There is evidence that the same processes operate in Latin America (eg. Roldan 1987), but the issue has been thoroughly investigated. It is likely, however, that increasing women's access to income will have a beneficial impact on the food intake and nutrition of vulnerable household members, while displacing women's income or access to productive resources is likely to have a detrimental effect.

In sum, shifts in production that even out the flow of income, produce income in kind (improve food production) and differentially improve women's income are most likely to have a positive effect on food security. Conversely, shifts that reduce direct income to women may have a negative effect on food security.

### **3. Women's Work and Time Allocation**

While increasing the control of income by women may have a positive impact on children's nutritional status, an increase in the time allocated to economic tasks that are poorly rewarded may shift women's time away from household food and child care related tasks and result in poorer child outcomes. Several recent reviews of research on this issue (Leslie 1988, 1989; Engle nd.) note that the data from different studies are contradictory with respect to the impact of maternal employment on child health and nutrition. They conclude that the relationship between maternal employment and child nutrition is quite complex and influenced by a number

of factors in the social context, and is somewhat dependent on the outcome variable being examined.

There seems to be relatively little relationship between infant feeding patterns -- breastfeeding as compared with bottle feeding or early introduction of supplementary feeding -- and mother's work (Leslie 1989). When child nutrition is examined, the age of the child at the time the mother enters or returns to the work force is an important factor. Entrance or return of women to the labor force before the third month of life is associated with poorer child outcomes. Older children, 2-3 years of age, appear to benefit from maternal employment, except for the children of unskilled workers (Engle 1991; Engle and Pederson 1989). In addition, women who work in their own homes appear to spend less time attending to their children's needs than women who work outside the home, and subsequently have children with poorer health outcomes, even when income is held constant (Leslie 1988, 1989). Leslie (1989), however, notes that the data from different studies are contradictory, with some finding negative impacts of women's employment on child nutrition and others finding positive impacts. One factor that seems to clearly emerge as important is the age and experience of the alternate caretaker. When the alternate caretaker is an adult, child health outcomes are better than when the caretaker is a child (Leslie 1988, 1989).

Few studies have actually addressed the impact on child welfare of increased demands on women's labor as a result of shifts in production in farm households. Women are usually heavily engaged in production and commercialization activities in Latin America, and are also the primary child caretakers and manage household food resources. Commercialization of agricultural production may place increased demands on household labor, primarily the labor of women and children. Bouis and Haddad (1990) argue that the nutrition impact of gains in income and increases in the food availability to households in a sugar scheme in the Philippines may have been offset by an increase in illness among children as a result of a shift in time allocation of women from child care to agricultural production. A crucial factor may be whether increased demand for women's labor is adequately compensated.

NTAE production is likely to shift labor demands within producing households, resulting in increased demand for women's labor, and may provide more wage labor opportunities for

women, both in production and processing. From the literature on maternal employment, we can conclude that the effects of increased labor time by women on child nutrition should be included in an evaluation of the nutrition impact of NTAE promotion, and that the availability of appropriate child care arrangements may be a key factor in supporting the welfare of children.

#### **4. Maintenance of Subsistence Production and Availability of Food**

We often conceptualize the commercialization of agriculture as the substitution of subsistence, or more likely semi- subsistence, agriculture with cash cropping. On a national level this may not actually be so. Von Braun and Kennedy (1986) reviewed national level statistics for 78 countries and found that, when examined cross-sectionally, countries with higher shares of land in cash crops do produce less food per capita than those with less land devoted to cash crops. However, when the share of land in cash crops is compared longitudinally for 1968 and 1982, those countries with an increase in area devoted to cash crops also tend to have improved per capita staple food production over the same time period. And, perhaps more importantly, the converse is true, especially in Sub-Saharan Africa. Those countries with a decline in the production of cash cropping have also experienced a decline in the per capita production of staple crops from 1968 to 1982.

Associations at the national level do not necessarily mean the same thing at the household and community level. With fixed amounts of land it would seem that, in general, individual farmers will need to replace land in subsistence crops with land planted in cash crops, or shift staple crop production from subsistence use to market. However, the Cuatro Pinos study (von Braun et al. 1989, discussed in detail below) demonstrates that farmers may increase subsistence crop production at the same time as they increase cash crop production, especially if they can increase productivity per unit of land by exploiting fertilizers and other inputs used in cash crop production for the production of subsistence crops. Reviews of the literature on the commercialization of agriculture (discussed below) suggest that when subsistence production is protected and maintained, the introduction of cash cropping is more likely to result in improved food consumption and nutritional status than when subsistence production is discouraged or

ignored (DeWalt 1993). The potential impact of increasing production of NTAE on food availability at the national regional and household levels is not clear.

### **5. Crop Mix and Minor Crops**

While most research regarding the displacement of subsistence crops with commercial crops focuses on the loss of production of staple food crops, there is an equally important question concerning the effect of shifts to NTAE production by small farmers on the production and availability of minor crops, and uncultivated crops.

In addition to the significant shifts that result from the commercialization of agriculture, the application of some agricultural technology and cultural practices to subsistence agriculture may have a negative effect on the availability of food. Dedication of land to commercial crops and the use of monocropping techniques and herbicides may eliminate or reduce the cultivation of minor crops (Dewey 1989). Wild food plants often grow as weeds in the disturbed soils in cultivated fields. In Central Mexico these "weeds" are called carne de la milpa (meat from the field) and constitute a crucial hungry season food (DeWalt 1983). While minor crops and wild foods do not provide the bulk of energy and protein that staple grain and tuber crops supply, they may be the major sources of micronutrients in local diets.

### **6. Crop Labor Requirements**

In addition to the food consumption effects associated with increases in labor demands of women, other effects associated with new crop labor requirements may also be important. Increases in labor demand and energy expenditure may not be offset by increases in income or food production. One result may be shifts in the intra-household distribution of resources and a diversion of food from less productive members of the household (children) to more economically crucial members (Fleuret and Fleuret 1980, Gross and Underwood 1971, Bouis et al. 1985).

## **7. Land Tenure and Access to Resources**

Access to land is one of the most consistent correlates of nutritional status for rural households (von Braun et al. 1992; Bouis and Haddad 1990). However, the distributional effects of changes in agricultural production and policies in terms of impact on land tenure and access to resources is one of the least investigated areas of concern. In a review of the impact of the "Green Revolution" on poor people, Lipton and Longhurst (1990) suggest that the introduction of new varieties and the technological packages that accompanied them resulted in early adoption by larger farmers and displacement of marginal producers. Bouis and Haddad (1990) also note that one of the results of the promotion of sugar production in the Philippines was land accumulation by larger producers and displacement of small producers. The development of cotton and beef production in Central America (see below) also resulted in the displacement of tenant farmers and sharecroppers from the land of large land holders (Williams 1986; B.R. DeWalt 1983). The issues of land accumulation or displacement are rarely addressed in studies of food security and nutrition. This is the result of the use of methodologies for the assessment of nutritional impact that focus on short-term changes rather than on long-term monitoring of trends.

Finally, it is possible that the dedication of land to NTAE crops may have an impact on resources held in common such as wood lots, common grazing land and hunting and fishing grounds. In previous decades, cotton and beef production had an impact on access to common resources in Central America. Shrimp production on the Gulf of Fonseca may have also had an effect on access to common resources of importance to the diet of marginal populations.

## **8. Targeting**

The targeting of the benefits of commercialization to those at greatest nutritional risk is crucial. As Lunven (1982) noted in a review of several World Bank projects, the greatest failure of projects to improve nutritional status was a result of a failure to target benefits to those at greatest risk. Economies of scale in some crops make it less likely that the smallest, most

vulnerable farmers will participate (Thrupp and Waters 1993). Agricultural credit is often unavailable to small farmers, especially in cases in which larger farmers are perceived as having higher net returns to investment. In a study of four *ejidos* in Mexico it was argued that when the *ejido* sector receives the same access to credit, subsidized water and other inputs as the large farmer sector, productivity is high and the impact on household nutrition is positive (DeWalt et al. 1987). The availability of agricultural credit, extension services and information and inputs are important components to targeting to the smallest farmers.

## 9. Questions to be Addressed

Existing models of the relationships between agricultural and economic policies and food consumption and the review of a number of specific linkages between agricultural production and food consumption and nutrition suggest a number of questions that must be addressed in order to adequately understand the impact of promotion of NTAE production on the food security and nutrition of vulnerable populations in Latin America. These are outlined below, organized in terms of the level of the Kennedy/Pinstrup-Andersen model they represent.

### I. Food Availability

- A. What are the effects of NTAE production on the availability (through production or importation) of basic foods at the national, regional and local levels, especially those that serve as basic staples for nutritionally vulnerable groups?
  1. What are the effects of policies promoting NTAE production on availability of the factors of production for food crops (eg. land, labor, capital, credit, chemical inputs) especially for small farmers?
  2. What are the effects of NTAE production on the ability of countries to import basic foods?
- B. What are the effects of shifts in availability of basic foods on food prices at the national, regional and local levels?

**II. Ability to Obtain Food****A. Household Production**

1. What are the impacts of NTAE production on land tenure and availability of land for subsistence crops at the local level?
2. What are the impacts on NTAE production on availability of household and hired labor for subsistence crop production?
3. What are the impacts of NTAE production on the availability of other inputs for subsistence crop production (credit, chemicals, technical assistance)?
4. What is the impact of NTAE production on availability of wild foods?
5. If purchased foods are substituted for subsistence production, how does the nutrient content of substituted foods compare with subsistence crops?

**B. Income**

1. Is there an increase in the income of NTAE producing households?
2. How much and what types of employment are generated in the production and processing of NTAEs?

**III. Desire to Obtain Available Food**

- A. How steady is the flow of income from NTAE production within NTAE producing households?
- B. How steady is the employment from NTAE production and processing?
- C. Who controls income from NTAE production and processing? How likely is it that women will control income?
- D. How is cash income allocated among competing goods?
- E. Are increases in income for small farm households sufficient to support lifestyle security as well as food security?

**IV. Utilization of Foods**

- A. How is energy expenditure by different household members affected by NTAE production?
- B. How are child care and household food processing and preparation affected by labor needs of NTAE production or increased employment by women?

- C. What are the effects of shifts in labor patterns within households as a result of NTAE production and processing on the allocation of food and medical care in those households?
- V. Health of the Individual
  - A. What are the effects of NTAE production on the safety of the food and water supplies?
  - B. Does NTAE production and processing expose workers and their families to hazardous materials?
  - C. What is the impact of NTAE production and processing on the nutrient requirements of producers and workers?
  - D. To what extent is increased income allocated to improved sanitation and health care.

#### **E. THE IMPACT OF AGRICULTURAL COMMERCIALIZATION ON THE FOOD SECURITY AND NUTRITION OF RURAL HOUSEHOLDS**

In the last decade there have been several reviews of the impacts of agricultural commercialization, in general, on the food security and nutritional status of rural households (Pinstrup-Andersen 1983; von Braun and Kennedy 1986; Maxwell 1988; Maxwell and Fernando 1989; Dewey 1989; von Braun et al. 1990, 1992; DeWalt 1993). These reviews reach several conclusions concerning the impacts of the commercialization of agriculture on food security and nutrition. In this section the results of some key studies of commercialization will be reviewed and the conclusions reached by the authors of the several reviews cited above will be summarized.

The literature suggests that the results of agricultural commercialization are mixed. Empirical research provides examples of both positive and negative impacts on food security and nutritional status (von Braun and Kennedy 1986; DeWalt 1993). It appears that the impacts are closely tied to specific cultural social and policy contexts, and to the nature of the commercial crops being produced. There are, however, several generalizations that can be drawn.

## 1. Income

The literature examining commercialization of agriculture reinforces the conclusion that the relationship of income generation to food security of small farm households is complex and relies on the profitability of the crop, and the intrahousehold distribution of income. In studies in Guatemala (von Braun et al. 1989; Immink and Alarcon 1991), Kenya (Kennedy and Cogill 1987), The Gambia (von Braun 1988; Rubin and Webb 1988), New Guinea (Shack et al. 1990), Malawi (Kurth 1989), Philippines (Bouis and Haddad 1990), Sri Lanka (Eide et al. 1986; Holmboe-Ottesen et al. 1988), and Rwanda (von Braun et al. 1991), increases in income, in general, are translated into increased household food consumption. Studies that disaggregate the impact of increases in income by income groups note that in the poorest households this reflects an increase in consumption of energy, and often an increase in dietary quality (reflecting greater income elasticities for animal products) across the range (DeWalt 1983; Alderman 1986; von Braun et al. 1992). While some of these studies also demonstrate improvement in child nutritional status (Eide et al. 1986; Holmboe-Ottesen et al. 1988; Shack et al. 1990; von Braun 1988; Rubin and Webb 1988; von Braun et al. 1989), others show mixed results with some classes of households benefitting and others not (Immink and Alarcon 1991), and some show no differences (Bouis and Haddad 1990; Kennedy and Cogill 1987; Kurth 1989). Others studies of commercialization show poorer nutritional status among participants (Niemeijer et al. 1988; Huss-Ashmore and Curry 1989; Haaga et al. 1986; Fleuret and Fleuret 1991, Peters 1990).

Increasing income may have differential effects for several reasons. In some cases there may be an increase in cash income but not in total income, or a rise in prices might offset an increase in income. Furthermore, many shifts to cash cropping result in a shift in income control from women to men (Nieves 1987; von Braun 1988; von Braun et al 1989; Kennedy 1991; Blumberg 1990). The extent to which increases in family income offset losses of income to women is unclear. Von Braun (1988) argues that in a rice production scheme in the Gambia, increases in family income were able to offset the possible negative impact of loss of income to women. Barham et al.(1992b), van Braun et al. (1989), and Nieves (1987) argue that shifts in

income from women to men in the process of commercialization in Highland Guatemala may have offset the benefits of increased household income for small child nutrition.

In addition, the marginal propensity to spend incremental income from cash crops on food, as compared with income from other sources, may be lower than expected (Immink and Alarcon 1991). Kaiser and Dewey (1991a) show that, in a Mexican community, income from subsistence crops, sale of cash crops, and remittances from migrant workers are spent in different ways. Income from cash cropping does not have a significant impact on food consumption, while the percentage of income in remittances is negatively correlated with food consumption, and a score of subsistence production positively predicts the percentage of income allocated to food, even when total income is held constant.

Finally, the health status of vulnerable household members may be a significant confounding variable, which is discussed below.

## **2. Protecting Food Crop Production**

The protection of subsistence production at the household level in the process of commercialization appears to be one of the most important factors in producing a positive impact on food security and nutrition of small farm families. In a review of a series of studies on the nutrition impact of commercialization carried out since 1986 (DeWalt 1993), it is clear that those projects that specifically included the goal of protecting subsistence production while promoting adoption of cash crops generally resulted in improvements in food consumption and/or nutritional status, while projects that discouraged subsistence production resulted in negative impacts. The nature of the crop as a food crop or a non-food or non-nutritive crop is an important element in this. Several studies of rice production, for example, show that this crop generates cash income, but at the same time stabilizes subsistence production and household food security as well (Eide et al. 1986; Ottesen et al. 1986; von Braun 1988). The availability of food from gardens in a rubber scheme in Papua New Guinea (Schack et al. 1990) provides the same stability for food consumption with a subsequent added benefit for households producing cash income. Those households that were able to maintain household food production in an

irrigated rice scheme in West Kenya (Niemeijer et al. 1988) benefitted from cash cropping, while those that did not had the poorest nutritional status. Fleuret and Fleuret (1991), in a study of commercialization in the Taita Hills of Kenya, suggest that the prohibition against intercropping food crops with coffee accounts, in part, for a negative association between coffee production and nutritional status in one of the communities they studied. Haaga et al. (1986) suggest that the major factor accounting for poorer nutritional status for children in households adopting new crops in another region of Kenya is the loss of drought tolerant food crops in a region prone to periodic drought.

Von Braun et al. (1989, 1990,) conclude from a review of a series of studies carried out by IFPRI in several countries that smallholder farmers make a conscious effort to maintain food production even when they have to pay a premium for own produced foods.

At the national level it appears that promotion of commercial or export crops is also not necessarily at odds with food production. As noted above, von Braun and Kennedy (1986) related food production to cash crop production in 78 developing countries and demonstrated that there is a positive correlation between cash crop production and food production. It appears that agricultural and economic policies that benefit agriculture benefit both cash crop and food crop production.

Dewey (1989) argues that one of the impacts of commercialization and the replacement of subsistence foods with purchased foods is a decrease in the quality of diets. In the restudy of Plan Chontalpa (Dewey 1981), Dewey reports a purchased diet that appear to be of poorer quality than the home produced diet consumed previously.

### **3. Land Tenure**

The impact of commercialization on land tenure in many cases has been to promote the concentration of land (Dewey 1989; Bouis and Haddad 1989; Barham et al. 1992b). This is sometimes the result of increasing accumulation of land by larger landowners, or, in many cases, the displacement of tenant farmers and share croppers. The displacement of tenant farmers is one of the important effects of the cotton and beef booms in Central America in previous

decades (Williams 1986; BR DeWalt et al. nd.). Dewey (1989) argues that land concentration and displacement of marginal farmers is one of the primary mechanisms by which commercialization of agriculture promotes a deterioration in nutritional status.

Bouis and Haddad (1990) find that one of the earliest results of the introduction of a sugar mill in Bukidnon Province, Philippines was land concentration and displacement of small holders. They compare the process they observed as akin to land reform -- in reverse.

Barham et al. (1992b), discussed below in more detail, note that the effects of the adoption of winter vegetable production in the Western Highlands of Guatemala resulted in some land concentration, but only by the smallest land holders. Because of diseconomies of scale inherent in winter vegetable production, smaller landholders were able to increase their land holding to closer to the optimal level, while there was no incentive for larger farmers to accumulate land holdings. In this case, changes in land tenure appear to benefit the most vulnerable land owners and can be seen as reversing a trend towards increasing fragmentation of land holdings. Under circumstances in which land tenure policy discourages land concentration, commercialization may not have an effect. In a study of shifts from the subsistence production of maize to the commercial production of sorghum in four communities in Mexico, it was found that the existence of the *ejido* system mitigated against any tendency towards land accumulation (DeWalt et al. 1990).

#### 4. Health

A failure to improve basic health conditions is likely to offset some or all of the benefit of improved food consumption, especially in children. The IFPRI studies (von Braun et al. 1990) show that increasing income did not result in health improvements in most cases. This is perhaps the most clear in the study of cash cropping in Rwanda (von Braun et al. 1991). We must keep in mind that food consumption is only part of the nutrition equation. While it is possible that increasing income from commercialization could be translated into improved sanitation and use of health care, this seems to be less common than impacts on food consumption. Finally, as Bouis and Haddad (1990) point out, increasing demands on the time

of women may result in poorer child care and increased child morbidity. Consequently, the effect of improvements in food availability and consumption on child nutritional status may have been offset by continued high morbidity rates.

#### **F. EXPORT BOOMS IN COTTON AND BEEF IN CENTRAL AMERICA**

One of the limitations of the literature on commercialization is that research rarely has enough time depth to adequately evaluate the long-term distributional impacts of agricultural and economic policies. For this reason it may be useful to review some of the long-term impacts of previous periods of promotion of export crops in Latin America. It could be argued that cotton and beef were the NTAEs of the 1960s and 1970s. Several writers have reviewed the long term impacts of the cotton and beef booms in Central America. Williams (1986) argues that the cotton and beef booms were far more beneficial to larger land holders and growers than to small, marginal farmers in rural areas. Cotton requires access to large amounts of capital or credit in order to purchase inputs and pay labor costs, and was adopted first by larger producers.

According to Williams, cotton and beef production also had the effect of attracting and then displacing marginal farmers. In both systems, forest land was converted to cotton crop land or pasture by renting or share-cropping land at low rates for two or three years, with the proviso that the tenants would leave either pasture or crop land ready to plant. B.R. DeWalt (1983) documents this process in the 1970s and 1980s in Honduras during a time that sharecroppers and renters were being displaced by land owners eager to move to beef cattle production. In the short run it appeared that small holders had cheap access to tenancy and sharecropping arrangements. In the long run small farmers were displaced as land was cleared and converted to pasture. In addition, lands held as national trusts or through communal title by indigenous communities were occupied and eventually controlled by private producers.

Cotton production also took land that was formerly in maize production in much of Central America as large landholders displaced tenant farmers who were sharecropping and rehired them as wage laborers in cotton. When world prices for cotton fell in the 1970s, many of these large producers moved to cattle and beef production. In addition, beef production was

possible on poorer quality land. Williams argues that the beef boom further extended large landholdings into land that was formerly uninteresting to large producers because of its poor quality. Barham et al. conclude that the beef export boom in Central America "...displaced tens of thousands of peasant farmers from land that they had previously farmed either without official title or with usufruct rights. This displacement effectively created unemployed labor due to the low labor requirements of cattle ranching" (1992a:53). Williams attributes the revolutionary movements in much of Central America in the 1970s to the peasant unrest as a result of increasing marginalization and displacement of rural the rural poor.

Several studies of Plan Chontalpa (Hernandez et al. 1974, Dewey 1981; Dewey 1989) document the nutrition impact of shifts from semi-subsistence production to cash crop production, including cattle production. Dewey (1981; 1989) studied the dietary and nutrition effects of shifts to cattle production among *ejidatarios* in Tabasco, Mexico. Cattle production increased in this area in part as a result of Plan Chontalpa. There were farmers who adopted cattle production in addition to subsistence crop production. While these families had a greater cash income, dietary quality and child nutrition were not significantly different from households that did not raise cattle.

The introduction of cotton and cattle production are in contrast with booms in cacao and coffee in South America. Here the nature of crops, diseconomies of scale and land tenure resulted in benefits to small holders engaged in production of these crops while world market prices were high.

### III. NTAE PRODUCTION, FOOD SECURITY AND NUTRITION IN LATIN AMERICA

Drawing on the information from more general studies of the impact of agricultural production strategies and policies, especially those promoting cash and export crops, on food security, food consumption and nutrition it is likely that the impact of NTAE production will be mediated through the following paths:

- 1) income effects for smallholders;

- 2) employment effects for poor rural and urban workers;
- 3) effects on control of income by women;
- 4) effects on access to land and other resources for marginal farmers, fishermen;
- 5) effects on food prices and availability of subsistence crops; and
- 6) health effects.

#### **A. TARGETING: WHO BENEFITS FROM NTAE PRODUCTION?**

The adoption of new crops and technology is a complicated issue. Barham et al. (1992a) have reviewed information on adoption and conclude that the potential for the adoption of NTAE crops by smallholders is, in part, dependent on the crop. However, even in crops that could be adopted by smallholders, this is rarely the case in Latin America. Earlier booms in cotton and cattle clearly benefitted larger landholders. The capital investments necessary to produce cotton were not feasible for smallholders, who were displaced and became a wage labor force for large holders. When the cotton boom ended the agricultural labor force was displaced again. Cattle production occupies large extensions of land and requires little labor.

Islam (1990) has reviewed the available information on the economies of scale for the production and marketing of horticultural products. He argues that there are few significant inherent economies of scale in the production of horticultural crops. While the production of horticultural products for export was initially based on the larger farms, in a few countries production spread to the smaller farms. For example, the bulk of production of fruits and vegetables for the export market in Kenya and Cote D'Ivoire is carried out on small farms. In Guatemala, production of non-traditional vegetables by small farmers was promoted by international development assistance agencies (von Braun, Hotchkiss and Immink 1989).

Even in horticultural crops, however, the minimum efficient farm size may vary from crop to crop. Shapiro and Wainana (1987, cited in Islam 1990) conclude that in Kenya cashew nuts, pineapples, macadamia nuts, and citrus fruits required more land than other horticultural products for efficient production, while vegetable production is more labor-intensive than fruits and nuts, and thus requires less land.

In crops that need closer control over the supervision of the production practices in order to insure standardized quality, large producers have an advantage over smaller producers. The production of pineapples in Costa Rica appears to be an example of a crop that is not suitable to production by small farmers even under conditions of contract farming.

Thrupp and Waters (1993) review the capital investment needed to enter into flower production in Ecuador. They estimate an initial investment of \$200,000 per hectare with a substantial additional investment each year. The mean size of a flower plantation in Ecuador is less than 7 hectares. However, with the capital investment needed, flower producers are not small farmers. Larger producers may also be better able to respond efficiently to changing market conditions and adopt new crops and processes.

Finally, with increasing pest problems as a result of the monocropping of annual crops in tropical settings (Murray and Hoppin 1990; Rosset 1991; Stonich 1991, B.R. DeWalt et al. nd), larger farmers may have an advantages in the timely and knowledgeable use of pesticides as well as acquiring the necessary working capital. Large farmers do enjoy an advantage under certain circumstances. Several researchers carrying out studies in Southern Honduras (Murray, cited in Stonich 1991; Stonich 1991; B. R. DeWalt et al. nd.) argue that while smallholders were among the early adopters of melon production in Southern Honduras, smallholders abandoned production as pest problems, specifically white fly, increased. Murray and Hoppin (1990) document increasing control by the contractors of contract farming operation in the Dominican Republic as pest problems become more important. Furthermore, the development of resistant strains of pests threaten other production options of small farmers.

Reviewing the adoption of shrimp mariculture in Honduras, Stonich (1991) notes

Although development reports written up to the mid-1980s stressed the need to incorporate poor households in the development process primarily through the formation and support of co-operative (USAID 1985), more recent reports conclude that only the larger (i.e. more than 300 hectares) intensive operations are profitable (USAID/FEDPROEXAAH 1989). Shrimp farming is technology and capital intensive, feed costs are high, and producers must meet increasingly strict standards for US and other markets. In the late 1980s yields by small producers averaged 134-147 lb of shrimp per hectare per harvest (approximately

US\$3,000) while intensive production by large firms yielded approximately 850 lb per hectare per harvest (US\$11,350) (SECPLAN/USAID 1989) (p.738-739).

B.R. DeWalt et al. (1993) have recently evaluated the social impact of shrimp mariculture on the Gulf of Fonseca. They note that almost all of the small producers who entered into shrimp mariculture in the 1980s have left production.

Moberg (1992) documents the adoption of citrus production for the frozen juice market among smallholders in two communities in Belize. He notes that while citrus growers were initially the largest landholders, smallholders moved to citrus production as a result of disadvantageous pricing policies making staple food crops increasingly unproductive for farmers. However, the substantial investment in the establishment of a citrus grove, which may take five years before any returns are seen, has meant that the adoption of citrus production was possible for only the larger of the small holders. In the early 1980s some smallholders in one of the communities studied by Moberg formed a cooperative of smallholders who adopted citrus production. Despite the increased risk involved in citrus production, those farmers who have adopted citrus production appear to have much higher household incomes. In addition, Moberg presents some data to suggest that citrus producers have higher expenditures for purchased foods with little difference in the consumption of home produced foods.

Where there are no economies of scale in production, there may be economies of scale in the marketing of many NTAEs. Fresh fruits and vegetables require special conditions for handling and shipping. Processed fruit and vegetable products such as frozen vegetables and juice concentrates are often processed under conditions of monopsony. The economies of scale are such that the production of specific regions or even whole countries is not sufficient to support more than one processing plant.

Rosset (1991) discusses a case study of ayote squash production by small holders in Costa Rica. Smallholders were recruited into a crop diversification project that promoted the adoption of cacao, tubers and *ayote* squash for export to North American markets. In the first year ayote producers earned up to 40 times more per hectare than subsistence maize producers. However in the second year losses from disease as a result of poor quality seed, combined with a drop in prices as a result of increased competition and a flooding of the market, resulted in heavy

losses. Rosset argues that economies of scale in marketing and management of inputs resulted in large losses for small producers. This was exacerbated by a lack of certified seed and technical assistance for small producers after the first year of the project. Rosset suggests, following Conroy, that in general NTAEs tend to have shallow, rapidly saturated markets and unstable prices.

Thrupp and Waters (1993) note that in Ecuador there are no small farmers involved in the production of NTAEs (principally flowers, vegetables, fruit juices). The only exception is a few small producers exporting quinoa to the health food market in Europe. They argue that the nature of the market for many NTAEs makes it difficult, if not impossible, for small farmers to enter this sector under most conditions. The need to fit into "niche markets", maintain standard size and quality, and deal with well developed marketing channels may be especially difficult for small producers with inadequate access to information and inputs. Partially for this reason, where small producers enter into NTAE production, exporters can exert a good deal of control over small producers under these conditions. Murray and Hoppin (1990) also argue that the transition from small producer control to exporter control has taken place in melon production in Guatemala. In part, small producers were forced into tight contractual arrangements as exporters dumped poorer quality melons on the local market and undercut producers prices, and then refused to buy melons for export from small producers.

The Western Highlands of Guatemala appear to be one of the few areas in which small farmers have successfully entered directly into the export market as producers. In large part this is the result of extensive technical assistance in the formation of a cooperative structure to manage marketing. The Cuatro Pinos cooperative markets much of its produce directly. However, there are some analysts who speculate that in the long term small producers will be pushed out of production there as well (Rosset 1991; Murray and Hoppin 1990).

In many more instances the development of NTAEs has been a phenomenon of agribusiness further exacerbating the dualistic nature of the agricultural economies in which agro-industrial producers enter into the export market, while small (peasant) producers continue to produce basic grains for household, regional and national domestic consumption. In some ways the nature of the current entry of Latin American countries into NTAEs is more like the

cotton and cattle booms of Central America of the 1960s than it is like the coffee and cacao booms in Ecuador where small farmers predominated.

## **B. EFFECT ON EMPLOYMENT**

The employment effects of NTAE production appear to be dependent on the specific crops produced. As noted above, the cattle boom in Central America resulted in the displacement and marginalization of the rural labor force, (Barham et al. 1992a) and increased migration into urban areas (B.R. DeWalt, et al. nd). In contrast, the adoption of winter vegetable production in Highland Guatemala resulted in a dramatic increase in demand for both household and contracted labor, with a rise in employment in the local area (von Braun et al. 1989; Barham et al. 1992b; Immink and Alarcon 1991).

Alberti (1991) surveyed men and women workers in NTAE processing plants in Guatemala, Honduras, and Costa Rica. She interviewed workers and managers in industries surrounding several different crops. These included melons and ornamental plants in each country and specialty products in each country (highland vegetables in Guatemala, winter squash in Honduras and processed tropical fruits in Costa Rica). Her results suggest that the effect of NTAE production and processing has been beneficial to both men and women in Central American countries. While men are more likely to hold permanent jobs and have greater upward mobility in employment, Alberti found that women make up a substantial proportion of labor force in production and processing of these crops. Participation of women is lowest in Honduras where women make up only 33 percent of the total work force in NTAE production and processing, and highest in Costa Rica where women make up 54 percent of the work force. Women are less likely to be found doing field work and more likely to be employed in greenhouse production. Women who work in the field tend to have lower education, come from households that are landless, be among the youngest (under 15 years) or oldest (over 45 years) workers, and have more children if they are partnered. Women who work in non-field activities tend to be between 15 and 25 year of age and to have few children. Overall, about one half of the women interviewed had family responsibilities (children and/or partner) and about one half

lived with parents and contributed to the parental family. Unpartnered female household heads and partnered women with children predominate in the longer term full time employment. Therefore these women earn a greater share of the income accruing to women in NTAE production and processing in the industries surveyed. In addition, jobs were generated for women whose socioeconomic status ranged from very poor to fairly well off.

Alberti concludes that NTAE production and processing has created employment for men and women, and that the NTAE jobs are more likely to be permanent than employment in TAE or other crop production, although men are more likely than women to have the permanent positions. The best jobs, with higher wages and more job security, are more likely to go to better educated workers. Workers in lower paid, more seasonal field work jobs are more likely to be unskilled and to have fewer alternative employment opportunities.

PROEXANT (1992, cited in Thrupp and Waters 1993) estimates that NTAE production employs 12,485 rural people on 9,483 ha. of production land in Ecuador. About 61 percent of this total are women. In the Ecuadorian case, it is not clear whether these jobs are "new" or whether these workers were previously employed and shifted from other jobs. However, Alberti's (1991) analysis of employment in Central America and studies by Allen (1990), Siguenza (1990), and Ferin (1990) in Ecuador suggest that for women, NTAE production and processing has provided new opportunities for employment. Furthermore, because export companies, especially transnational corporations, are more likely to comply with legislation dealing with working conditions and minimum wage laws, the employment created in NTAE production and processing is often "better" than existing employment opportunities from the point of view of the workers (Alberti 1991). (Problems with exposure to occupational hazards are discussed below).

In contrast, Thrupp and Waters (1993) conclude that in Ecuador there are important labor problems in NTAE production and processing. They argue that:

The jobs in the NTAE sector tend to be insecure, irregular, and unpredictable in many cases, due mainly to the prevalence of temporary and seasonal work (eg. for harvest and post harvest activities) (p. 26).

The creation of rural employment was one of the benefits that was touted for the development of mariculture shrimp production in Honduras. However, a 1987 study of the labor force employed by 29 shrimp farms found that these shrimp farms had created a total of 1,130 jobs of which only 31 percent were permanent (Gonzalez 1987; Stonich 1991). This is a total of 0.79 jobs per hectare. Ninety-three percent of the jobs created were unskilled. The shrimp industry's estimate of the potential job creation is 1.5 jobs/has. At the same time, shrimp mariculture may have displaced a number of marginal producers and artisanal fishermen from this area. Stonich (1991) argues that "job creation is inadequate in a region where 125,000 household are landless or land poor and in which the estimated unemployment rate is more than 60 percent (p. 743)". Stonich also notes that due to peasant unrest in the region, processors tend to bring in young unmarried women from other regions of the country to process shrimp, rather than hire local labor.

Vergne et al. (1993) have recently reviewed the environmental and social impact of shrimp mariculture along the Gulf of Fonseca and have a somewhat more positive view of the impact on employment. Their qualitative study suggests that the availability of employment in the shrimp industry has increased employment, especially for women, and that wages are attractive enough to have created a local labor shortage in some sectors. At the same time they also describe a number of labor practices followed by processing plants to keep workers in a temporary status to circumvent Honduran labor laws and avoid benefits that would accrue to permanent workers. Also, movement of workers into the region has resulted in land disputes, as squatter settlements have grown up near processing plants.

For shrimp mariculture in Ecuador there may be other, indirect impacts that are poorly accounted for. In the case of cassava production for the shrimp industry, the development of a number of small cooperatives in the Manabí, one of the poorer provinces of Ecuador, to process cassava to meet the demand for flour and starch has increased household employment for association members and has created employment for non-association members in the region (Susan Poats, personal communication, Blumberg and Colyer 1990; Maura Mack, personal communication). In recent years cassava processors have been able to diversify to other

markets, including the glue industry that supports the production of plywood and card-board boxes for export.

In sum, there are a number of important questions left unanswered. We do not have clear idea of the total number of jobs generated through NTAE production and processing in these countries. Also it is not clear how many small, marginal producers have been displaced by NTAE production. As noted above, there is some indication that this has happened for some crops and shrimp mariculture. It is not clear to what extent the generation of employment has offset this displacement. The existing studies tend to be qualitative or derived from secondary sources and highly interpretive.

In general, it appears that the production and processing of NTAEs can and has had a positive impact on rural employment, especially on the employment of women. Because of the relatively small land requirements for some of these crops, the displacement of labor from other crops may not be an issue in many cases. In addition, where there is good supervision of employers the jobs created are more likely to be in compliance with minimum wage laws. However, the work generated tends to be seasonal, and irregular, and women with children appear to be discriminated against as employees.

### **C. EFFECT OF NTAE PRODUCTION AND PROCESSING ON WOMEN'S CONTROL OF INCOME**

There have been few studies of the impact of NTAE production on the income, employment opportunities, or access to productive resources of women in Latin America. Only a small number of reports have addressed this issue. In general, they suggest that women find employment in both field work (especially harvesting) and processing of NTAEs (Alberti 1991).

Observations of the labor force involved in the harvest and processing of flowers in Ecuador (Thrupp and Waters 1993; Blumberg 1992; Lena Ronquillo, personal communication) suggests that women are differentially hired for these tasks. While the explanation for differential employment for women is that women have better fine motor skills and more patience than men,

women also accept lower wages than men and are more available for short term and seasonal labor (Blumberg 1992).

Several of ten case studies of women's participation in new economic opportunities in different ecological zones of Ecuador documented employment opportunities for women generated through the development of NTAEs (Hess 1990). Ferrin (1990) found that in the cantón of Jipijapa in Coastal province of Manabí, where women's employment opportunities have been restricted primarily to coffee harvesting, some women had begun to find seasonal employment in the harvesting of shrimp larvae for the shrimp industry. Harvesting of larvae occupies only a few weeks per year, however. In a study of cassava processing in Manabí (Maura Mack, personal communication) cassava starch processing (for a variety of products with export potential including shrimp and glue for the plywood industry) has the potential of increasing incomes and the status of women relative to men. Women involved in the San Vicente cooperative, in this area, increased their earnings proportionately more than men. Ferrin (1990) and Blumberg and Colyer (1989), in complementary studies of the same cooperatives, found that women retained control of income they generated through cassava starch production, and that it was spent primarily on food and child health.

Siguenza (1990) studied the women employees of one of a number of rose plantations and processing enterprises near the city of Cuenca, Ecuador. The plantation studied by Siguenza began in 1984 with a labor force of eight young women and now employs between 35 and 45 women. Workers are paid the government minimum wage, which is quite high by local standards. However, the plantation demands that all employees be available seven days per week and requires long irregular hours, which probably explains why most of the employees are single and only two women had children. Single women were found to be contributing to the household income of their parents, and even purchasing food for their families, thus having an impact on the food security of these households. However, a labor policy that made it more feasible for women with children to earn incomes could be expected to have a more beneficial impact on the nutritional status of children. It was also observed that women working on the plantation appeared to be delaying their own marriage and child bearing well beyond the usual

age for girls in this area as a result of their employment. Delaying of marriage may have the effect of reducing the birth rate.

In work in the town of Guano in the province of Chimborazo in the Ecuadorian highlands, Allen (1991) found a similar situation with respect to women working in a plant processing vegetable crops for export (eg. asparagus, snow peas). The processing plant had a policy of employing only single women. The same policy has been reported in another major vegetable processing plant near the capital of Quito (Blumberg 1992).

In a companion study in indigenous communities in Chimborazo, formed as a result of the Ecuadorian land reform program, Allen (1991) found that policies subsidizing irrigation and agricultural inputs had resulted in an increase in the production of horticultural crops. While these crops were destined for the domestic rather than export market, the shift to commercial production had the result of moving some control of land and productive activities from women to men. While Allen did not detect a negative impact on women's status, there does exist the potential for a negative impact on household food security.

In general, Alberti concludes that NTAE production and processing has created more, higher quality jobs for women. In this respect it is more effective in providing field work jobs for women than traditional export agriculture has been. In addition, because of the fragile nature of the products, more value adding labor is needed in the producing country, and this labor is more likely to be provided by women. Finally, the jobs usually pay at least the national minimum wage, which is a higher wage than is usually available to agricultural workers in these countries. At the same time, however, it must be kept in mind that much of the work is seasonal or only part time.

The commercialization literature as a whole suggests that for small producers entrance of the household into NTAE production tends to shift control of income from women to men. Blumberg (1985) and Nieves (1987) have both suggested that this was one of the effects of the shift to NTAE in the Western Highlands of Guatemala. Barham et al. (1992a) speculate that this shift is responsible for the relative lack of impact of rising household incomes on child nutrition in the Cuatro Pinos study. Katz (1993, see below) demonstrates that the contribution of men to food expenses in NTAE producing households is lower and less responsive to increases in

household income than in non-NTAE households in Guatemala. She speculates that women are absorbing a larger share of the burden of food expenditures in these household. The impact of these shifts under circumstances in which total household income increases is still unclear.

The information on the impact of NTAEs on women's access to employment, income and other resources is sketchy, but several tentative conclusions can be drawn. It appears that NTAEs create comparatively well paying employment opportunities for some women. However, it is difficult to assess the total number of jobs created through this route. In addition, some studies suggest that the jobs generated are most accessible to young unmarried women with few or no children.

#### **D. IMPACT OF NTAE PRODUCTION ON FOOD AVAILABILITY AND PRICES**

A series of studies carried out by the Nutrition Economics Group at USDA over the last 15 years on the consumption effects of agricultural policies has not addressed the impact of policies promoting NTAE production on the availability of food and food prices. Von Braun et al. have argued that increased production of cash crops does not necessarily result in a decrease in food production either at the national or household level (von Braun and Kennedy 1986; von Braun et al. 1989). However, McAfee (1991) argues that among the impacts of the Caribbean Basin Initiative, which has included an emphasis on NTAEs (mangos, papayas, vegetables, aloe vera, avocados, pepper sauce and flowers), is a decrease in the food self sufficiency of a number of Caribbean Basin countries. She argues that food production has declined because there is more credit available for export crops than for food crops; agricultural extension is directed towards export rather than food crops; available packages of fertilizers and pesticides are developed for export crops; drop producers of food crops must compete with export crop producers for transport to markets. Rosset (1991) posits a similar argument for Costa Rica and other Central American countries. At the same time, the balance of trade deficit for these countries has continued to grow as a result of declining prices and markets for exports and increased dependency on imported food.

Examination of the production of food in Latin American countries that have promoted NTAE production suggests that food production has been declining (Stonich 1991; Rosset 1991; Moberg 1992), however, in many instances food production was already in decline as a result of pricing policies that disadvantaged food producers. It is unclear what the effects on local or national food prices have been as a result of the promotion of NTAEs. No evidence was found that NTAE production is contributing in any particular way to declining food production, or that there is any adverse impact on food prices.

#### **E. IMPACT OF NTAE PRODUCTION ON THE ENVIRONMENT AND ACCESS TO WILD FOODS**

One of the most worrisome aspects of NTAE production is its potential impact on the environment in general, and on exposure of individuals to toxic chemicals. As noted above, Murray and Hoppin (1990) document the impact of increasing pest problems as a result of overuse of pesticides, arguing that this is contributing to the movement of small producers from the production of many of these crops. In addition, there is very little known about the health effects of pesticide exposure of producers and workers in production and processing activities. This appears to be a problem in many crops, but the cut flower industry is especially problematic. As flowers are not a food crop, there are no restrictions on the levels of pesticide residues for exportation. Therefore, harvesters, who are primarily women, may be exposed to much higher levels of pesticides than workers in other crops (Blumberg 1992).

The impact of shrimp mariculture on the mangrove swamps of the Pacific coast of Central and South America is well known. By the year 1995 Honduras will have lost over one half of the mangrove forest (Stonich 1991). One of the consequences documented by Stonich is the decreasing access of economically marginal populations along Pacific coast of Honduras to the wild food resources afforded by the mangrove swamps. Communities along The Gulf of Fonseca in Honduras have traditionally exploited the swamps for aquatic and terrestrial wildlife. Stonich attributes the development of grassroots environmental groups to their concern about access to this common resource.

#### **IV. STUDIES OF FOOD SECURITY AND NUTRITION IN THE WESTERN HIGHLANDS OF GUATEMALA**

There are relatively few studies that have directly addressed the impact of NTAE production on food security and nutrition of vulnerable populations. Among those that do are several studies in the Western Highlands of Guatemala that have been carried out by The Institute for Nutrition for Central America and Panama (INCAP), in collaboration with several other institutions (International Food Policy Research Institute, University of Wisconsin) (Nieves 1987; van Braun et al. 1989; Immink and Alarcon 1991; Barham et al. 1992b; Csete et al. 1993). These studies represent the only empirical research directly addressing the impact of NTAEs on food security and nutrition that was available.

##### **A. THE CUATRO PINOS COOPERATIVE**

The Cuatro Pinos cooperative on the western highlands of Guatemala has been the site of a detailed investigation into the nutritional effects of shifts to the production of winter vegetables among small farmers who were members of the cooperative carried out collaboratively by INCAP and IFPRI (von Braun et al. 1989). Production strategies, labor allocation, employment, income, food consumption, and nutritional status of children were compared for households participating in the Cuatro Pinos cooperative and non-participating households at two points in time (1983, 1985). The results are summarized here.

The effects on food consumption and nutrition of shifts to NTAE production by small farmers in the Western Highland of Guatemala are complex. NTAE production increases the income of the smaller farms relative to larger farms and has the effect of equalizing income distribution among the poor. It appears that NTAE production has a more dramatic impact on the income of farmers with smaller land holdings.

Cooperative members spend more on food and have about 7 percent more food energy available than non-members. Increased income is translated into increased availability of energy to households. However, holding income constant, member households increase their energy

consumption less with increasing income than nonmember households, reducing the positive gross-income effect for calorie acquisition from an expected increase of 7.2 percent to an overall net effect of 1.9 percent in a typical cooperative farm household.

In the study communities, there is an overall positive but weak relationship between income and child nutritional status (CNS), and the effects vary by income level. CNS in the middle and upper terciles of the income distribution show a slight improvement in global nutritional status (weight/age Z-scores) between 1983 and 1985, though, children in the lowest tercile show a slight decline. The prevalence of long-term undernutrition (stunting: low height/age), increased in children from the bottom and middle income terciles and improved in children from the highest tercile. The decline in some groups may reflect the worsening economic conditions across Guatemala in the early 1980s and also suggests that benefits from NTAE production may not be evenly distributed among classes of households.

A regression model predicting children's nutritional status shows that level of income is highly significant for the weight/age, height/age and weight/height indicators for poorer households, and less so for children in higher income groups. Short-term measures of nutritional status show a stronger relationship with income than longer term measures such as height/age. A higher percentage of income from off-farm non-agricultural sources for men and women is linked to improved CNS. For weight/age women's income always has a greater impact on CNS than men's income. In the height/age model (long term effects), the difference between the effects of male and female controlled income is less. A higher share of income from NTAE crops has a small positive effect on nutrition after controlling for income in the weight/age and height/age models, but is not significant in the weight/height model.

Von Braun, Hotchkiss and Immink conclude that income from new cash crops has a positive effect on the nutritional status of children. In their model they find no support for hypotheses that suggest that the loss of control of income by women or the use of export crop derived income for non-food items would have a detrimental impact on the nutritional status of children.

Finally, when a model is constructed that includes household availability of energy as an indicator of the impact of income on food consumption, household level food availability was found to have a strong positive effect on short-term CNS (low weight/height). The authors

conclude that to the extent to which income generation through the sale of NTAE products by poor farmers, and the creation of employment for the landless poor, is translated into increased availability of food, and food security, the nutritional status of the poor is improved via the production of non-traditional agricultural exports.

In this instance, the introduction of NTAE production appears to have had a positive effect on food consumption of the poorest households in the study area. In addition, the authors conclude that short-term effects have been to differentially benefit the smallest farmers and poorest participating households, and to have contributed to improving income distribution, at least within the small farm sector in this region.

## **B. NTAE PRODUCTION, LAND ACCUMULATION AND WEALTH**

Barham, Carter and Sigelko (1992b) have further analyzed the impact of adoption of NTAE production in the Western Highlands on accumulation of land and wealth. A stratified random sample of 318 households in five Cakchiquel villages participated in a three wave survey in Fall 1990 and Spring and Summer of 1991. In addition to information on current conditions, household heads were asked to reconstruct the history of their farm with respect to land accumulation and NTAE production from the time of household formation through 1990.

From data on farm size and adoption of NTAE production, Barham et al. conclude that larger farmers are more likely to adopt production of NTAEs, but smaller farmers adopting NTAE production tend to adopt it more intensively with a greater proportion of land devoted to NTAE production.

For farms up to 28 *cuerdas*, increasing farm size is related to adoption. Beyond this point farm size is negatively related to adoption. This supports the finding of the INCAP-IFPRI study that there is a diseconomy of scale for snow pea production. Also, households with older heads are less likely to adopt NTAE production. The authors suggest that older farmers are less willing to adopt new technologies, or that they head households that have reached the stage of land deaccumulation. Education of the household head and size of the household had no significant effect on adoption.

The more important finding in this study has to do with the effect of NTAE adoption on land accumulation. From the data on the natural history of the farm and farm household constructed from the agrarian history panel, the authors conclude that NTAE adoption is positively related to land accumulation, but that greater land accumulation takes place in households that had less land to begin with. The net effect on differences in land holding is relatively small, however. They also find that NTAE adoption is higher among the farms with more initial land. They see this as further evidence that initial land endowments are important in the decision to adopt NTAE production.

From a series of regression analyses, Barham et al. conclude that the positive accumulation of land as a result of NTAE adoption was strongest in those households that initiated adoption later and began with less land. In all time periods, smaller and larger initial land holdings predict accumulation, while households with initial holdings in the middle range accumulated less. NTAE adoption appears to have a positive and significant effect on land accumulation patterns of adopting households since 1987. Furthermore the accumulation result is strongest for the smaller households. Households appear to use land rental as a stepping stone to land ownership.

In conclusion, the authors view the potential for the adoption of NTAE production in Guatemala as a possible counter force to the increasing fragmentation of land holdings by small farmers. They see this as a positive process that can have long-term benefits for smaller farmers in these regions. However, the question must be asked, about where the land must be coming from. Reliance on data from existing farmers makes it difficult to tell if some land accumulation has taken place through the displacement of the smallest, least productive farmers from land ownership.

### **C. NUTRITION, FOOD CONSUMPTION AND NTAE PRODUCTION IN COMMUNITIES NOT ASSOCIATED WITH THE CUATRO PINOS COOPERATIVE**

Researchers from the University of Wisconsin have recently completed a second study of adoption of NTAE/winter vegetable production by small holders in five communities in the departments of Sololá and Chimaltenango not included in the Cuatro Pinos Cooperative (Katz 1993; Csete et al. nd.). A random, stratified sample of 274 households were surveyed four times over a one year period. Data on income for each economically active household member, expenditures, food consumption and anthropometric data were collected for all households.

Children's age, years of involvement in NTAE production, and residence in the village with the lower income were negatively associated with children's height/age. Time involved in NTAE production was also negatively related to weight/age and weight/height. The number of hours the mother spent in remunerated work, and the presence of daughters between the ages of 11 and 15 were positively associated with height/age. NTAE participation, used as a dichotomous variable, was also found to be negatively associated with height/age and with weight/age (Csete et al. nd.).

Katz (1993) has examined models predicting food expenditures for the same sample of households. In this analysis she was able to disaggregate the share of food expenses provided by men and women, and the share from household production for both NTAE producing and non-producing households. Katz uses Heckman's two-step procedure to control, at least in part, for the self selection of NTAE adopters and non-adopters and the potential that the factors that influence the decision to adopt NTAE production may also influence food choice and food expenditures.

Katz demonstrates that NTAE production was more likely to be adopted by farmers who were younger and had more and higher quality land. However, holding these factors constant, NTAE adoption resulted in higher incomes at all levels. Katz estimates that every additional *cuerda* of land planted to NTAE resulted in a \$110 increase in income. This is mean of 12.5 percent. Katz also finds that households with larger amounts of land planted to NTAE also

produce more subsistence crops. Also, even though NTAE production draws on women's time for household labor, the extent of adoption of NTAE production was not found to be negatively associated with women's ability to generate independent income. Katz suggests that women in NTAE producing households may be absorbing increased demand for labor without sacrificing other economic activities, but potentially decreasing time in other activities for which they do not receive remuneration (possibly leisure time and child care).

Katz examines the factors that affect the food allowance that men transfer to their wives (wives also contribute to the total food expenditures). The mean elasticity of the weekly food allowance with respect to household income is .32, and with respect to women's income it is -.03. Increasing household income has a small positive effect on the allowance, increasing income by women has a very small negative effect on the allowance. Perhaps more importantly, non-adopters (on average poorer than adopters) provide their wives with slightly higher mean weekly allowances, and increases in total income for non-adopters are transferred to the food allowance at a higher rate than for adopters. At the same time increases in income of women lower the amount of money provided by husbands to a greater extent in non-adopting households. Increases in the value of subsistence production lower the food allowance in non-adopting households and raise it in adopting households. In NTAE producing households the food allowance provided to women by men is "less responsive to changes in both household and female income, making women's earnings potentially more important overall determinant of food expenditure levels (Katz 1993)."

When total weekly food expenditures are examined, the mean elasticity of food expenditures with respect to total household income is small but positive in non-NTAE households, and small but negative in NTAE households. Neither is statistically significant. For female income, there is stronger relationship between increasing income and total food expenditures in NTAE households as compared with non-NTAE households and this is statistically significant.

Katz suggests that women in NTAE producing households are also absorbing "declining proportional male transfers by sacrificing other sorts of female expenditures, such as domestic technology, in order to maintain a desired level of food availability -- which may also increase

with higher incomes (Katz 1993)". The willingness of women to absorb both extra labor demands and economic demands, the increase in production of subsistence crops, and the sizable profits from NTAE production appear to offset the potentially adverse intra-household and food substitution impacts of the new crops.

However, examining both the data on CNS and the data on intra-household transfers and food expenditures suggests that the potential positive impact of increased income on CNS is more than offset by trade-offs in the intra-household allocation of resources, among which may be the time available to women for tasks associated with household food security and child care. Unfortunately, time allocation data, which could test this hypothesis is not yet available.

#### **D. CROP DIVERSIFICATION AND NUTRITION**

Immink and Alarcon (1991) analyzed data from two surveys carried out with a total of 786 farm households in the Western Highlands of Guatemala in 1987 and 1988. The sample was drawn from 24 communities, of which of 12 were involved in the crop diversification project and 12 communities were not involved with the project. Households were classified *ex post* into four groups based on household cropping patterns: 1) traditional or "maize farmers" (maize and beans); 2) "potato farmers" (maize and/or beans and potatoes); 3) "wheat farmers" (maize and/or beans and/or potatoes and wheat); and 4) "vegetable growers" (maize and/or beans and/or potatoes and vegetables). Vegetable growers included farmers that grow traditional vegetables and non-traditional vegetables for export. Of the four categories, maize farmers made up the largest, with 40 percent of the cases. The other 60 percent of households produced some other cash crop, with about 21 percent producing vegetables. Farmers producing traditional or new cash crops also continued to produce traditional subsistence crops, and maize farmers commercialized part of their production. In all, 97 percent of the households produced maize, 33.4 percent produced beans, and 37 percent grew potatoes. Among the households producing vegetable 27 percent produced cabbage, 18.4 percent carrots, 14.1 percent cauliflower, 13 percent red beets and 9.2 percent broccoli.

In this analysis, the larger of these small farms were more likely to be involved in a diversified cropping pattern, and heads of wheat producing households were more likely to have some education and to be literate, while male and female head of potato farms were less likely to have formal education. Vegetable producing households tended to be larger in size. Potato and vegetable producing households were more likely to have received formal credit and/or agricultural extension services than maize and wheat farmers.

Households growing wheat or vegetables have higher per capita income levels than households producing maize or potatoes. For all farmers, those producing cash crops in addition to maize had higher incomes, with wheat and vegetable producers showing the greatest income gain. However, when incomes are considered by amount of cropland under cultivation, those farmers with less than .5 ha. under cultivation producing potatoes were at a disadvantage, while vegetable producers showed a higher average income. For larger farmers (>.5 ha.) the percentage difference in incomes was reduced.

Food budget shares for all groups were similar. When food consumed from own production is added, food budget shares still remain, on average, below 50 percent of total income in each group. In general, consumption of own produced staple crops (maize and beans) was reduced in households producing vegetables. This was more apparent in the households with the smallest amounts of land, in which the consumption of own produced maize was about half of consumption in wheat households and about 65 percent of maize farmers in the same land holding class. Overall consumption of subsistence crops was higher in the households with greater amounts of land under cultivation, but there was some drop in consumption of subsistence crops in potato and vegetable producing households. Households that produced carrots and beets, traditional vegetable crops in this area, tended to consume significant amounts of these foods as well.

Household energy and protein intakes are lowest for potato producing households when compared to households with other cropping patterns. The intakes of preschoolers are less likely to be adequate than the availability of nutrients at the household level would suggest for all cropping patterns. However, children in potato producing households are at the greatest risk, with only 13 percent showing adequate intakes of energy and 52 percent showing adequate

intakes of protein. A probit model shows that the main factors predicting adequacy of intake for preschoolers were income and household size. The latter suggests that larger households may have also captured an income effect, or that there is more household labor and adequate child care available in larger households.

Preschool children had a greater probability of having inadequate food intake if they were in potato producing households. Finally, Immink and Alarcon investigated the effect of cropping pattern on child growth for both preschool and school-aged children. Again, preschool children in households with smaller farm sizes producing potatoes are at greatest risk for both stunting and low weight/age. For the largest farms, the prevalence of stunting is similar for all cropping patterns, except for wheat farmers, who have children that do better than other households. In households with the smallest and largest farms, growing vegetables appears to confer an advantage on preschool children in terms of height, and appears to be a disadvantage in middle size farms. For weight, children in wheat and vegetable producing households with larger and middle sized farms are at an advantage.

A probit model with height/age as the dependent variable identifies income (top tercile), mother's literacy, and adequate protein intake, and belonging to a wheat producing household as predictors of better growth, while belonging to a potato producing household is a predictor of poorer growth. For adults, the best predictor for a higher body mass index (BMI) was residence in a vegetable growing household. The authors conclude that this cropping strategy requires less household and more hired labor and may result in lower energy expenditures for adults.

In this study the best predictor of improved nutritional status among vulnerable preschoolers is income. For these communities, the greatest income gains were observed for households with the smallest farm size who followed wheat or vegetable production patterns. Households with small farms were at a disadvantage compared to maize producers if they pursued potato production. Potato production appears to place households at a disadvantage, while, in some income levels, vegetable production appears to confer an advantage.

One of the more interesting findings of this research is that the adoption of different cash crops appears to have different impacts on CNS. Unfortunately, as an *ex post* analysis, this

study is limited in its ability to determine the intermediate variables that might account for the differential impact of potato production compared with maize, vegetable and wheat production.

## **E. CONCLUSIONS TO BE DRAWN FROM THESE STUDIES**

The four studies of the Western Highlands suggest several common themes in the evaluation of food security and nutrition impacts of NTAE production in this region. At least in the short run, adoption of NTAE production by small farmers appears to improve income and food security of participating households, with special benefit to households with the smallest amount of cropland. NTAE adoption by small farmers appears to lead to land accumulation and reversal of patterns of land fragmentation in the area. For NTAE producers in some communities, increased production of NTAEs was accompanied by increases in the availability of staple foods from own consumption, further enhancing food security. Gains in nutritional status of children in participating households are less dramatic and appear to be related to both the crops produced and in the social and economic context in which the process of NTAE adoption takes place. Adoption of NTAE production within the framework of the Cuatro Pinos Cooperative appears to have a positive, but modest impact on CNS. In those communities investigated by Csete et al. and Katz, in which there is no cooperative structure, the impact on CNS appears to be negative. Csete et al. suggest this may, in part, be due to the better education status of cooperative members, compared with NTAE members in the communities they worked in, or the cooperative structure may provide other crucial supports necessary to more successful entrance into NTAE production. Two of these studies suggest that there are shifts in the intrahousehold allocation of resources with NTAE production that offset the impact of increased income.

Barham et al. (1992) point out several important characteristics of the process of NTAE adoption in the Western Highlands of Guatemala that must be taken into consideration in interpreting the generalizability of the results of all of these studies for NTAE adoption in Latin America. The promotion of winter fruits and vegetable in the Western Highlands of Guatemala probably presents the best case scenario for adoption of NTAEs. The crops promoted have

built-in diseconomies of scale, which advantage small producers over large producers. Furthermore, this is an exceptionally labor-intensive crop that creates a large demand for labor, both in production and processing. Partially because the farmers were able to remain independent producers, they were able to choose to continue production of subsistence crops and the production of the basic staple maize was even enhanced for farmers choosing NTAE production. The enhancement of subsistence crops production may have offset, at least in part, the potential risk to food security posed by the adoption of a riskier cropping pattern. The climatic conditions most suitable for the production of these crops are found to be precisely in the region of the country in which the population most at risk for nutritional deficit lives.

Finally, the cooperative was able to operate as an independent marketing agent, exporting directly to the U.S. and Europe. The existence of the cooperative relieved, somewhat, the potential impact of economies of scale in marketing that might be faced by small independent producers. Partially by serendipity, the nature of the NTAE crops produced made them most appropriate in the geographical region of the country in which small farmers predominated. Because of geography and climate, NTAE production was targeted towards the rural sector at greater nutritional risk.

As noted above, in other areas the expansion of NTAE production has been concentrated on large farms, often controlled by multinational corporations (e.g. pineapple production in Costa Rica). In some instances, crops that could be grown by small farmers have suffered from an increase in pest problems, which the small farmer lacks the capital to manage, eventually creating an economy of scale that favors larger producers (e.g. melon production in Honduras). Other crops, especially perennial crops such as nuts, involve substantial capital outlays and a long latent period before production is economically viable, conditions which also may favor larger producers.

## V. CONCLUSIONS AND QUESTIONS FOR RESEARCH

The information currently available for evaluating the impact of policies promoting non-traditional agricultural export production on nutritional status in Latin America and the

Caribbean is sketchy and inadequate. Much of the available information is based on qualitative information, and some of this is largely anecdotal. Qualitative data are rarely linked with quantitative research, so that we have economic studies in which a relationship is established between NTAE production and food consumption and nutrition outcomes, but there is little information on the intervening processes. Data on employment effects have not taken a broad enough view in order to be able to estimate total employment generated and the extent to which this represents new employment. For the impact of NTAE production on for the small holder sector, the most well investigated case, the Western Highlands of Guatemala may be unusual in that there is more potential for positive benefit for vulnerable populations. Even in this case it is not clear that increasing income has had a dramatic effect on nutritional status of target household members. In the following section the information that was reviewed will be summarized. There is enough information, to reach some conclusions concerning policies that would enhance the food security and nutrition benefits of the promotion of NTAE production. In the final section a series of research questions will be suggested that would enhance our ability to evaluate the impact of NTAEs on food security and nutrition.

## **A. SUMMARY OF FINDINGS**

Returning to the questions that would need to be addressed in examining the impact of NTAE production at several levels, we can summarize current information available to answer them.

### **1. Food Availability**

Food production has been declining and food imports increasing in Latin America and the Caribbean during the same time that NTAE production has been increasing. However, it is not likely that there is a direct relationship between these two phenomena. On a global level, agricultural commercialization does not appear to be incompatible with food production. It is more likely that agricultural policies that privilege export production and support a cheap food

policy, in general, discourage staple food production. In addition, the allocation of resources such as agricultural credit, crop insurance, input subsidies, and extension services to NTAE production under circumstances of limited resources may reduce the availability of these for the production of food crops. The cumulative result is likely to be increasing dependency on imported food. While several analysts suggest that there is increased dependency, it is not clear that this has resulted in increased food prices for poor consumers.

Adoption of NTAE production by small farmers does not appear to be incompatible with continued, and even enhanced subsistence production. At the household level, smallholders who are engaged at least partially in subsistence production appear willing to pay a premium for the enhanced food security that consumption of food from their own production affords. They act to protect their own food supply.

In some countries the allocation of credit, fertilizer, technical assistance and perhaps labor to NTAE production has diverted these factors of production from the food sector and from the small farm sector. A careful evaluation of the potential impact of these policies on the production of food crops for domestic consumption is not available.

No evidence was found that promotion of NTAE production has had an effect on food prices at the national, regional or local levels.

As Pellett (1991) has recently noted, deterioration of the environment is tied to global and household food security issues. In a more local sense, increases in resistant pests threaten food production as well as sustainable NTAE production; destruction of food and other resources in common areas, such as the mangrove swamps of the Pacific coast of Central and South America, limit the access of the poor to wild foods; and exposure of workers and producers to toxic chemicals has direct effects on health and potential indirect effects on nutritional status.

## 2. Ability to Obtain Food

### a. Household Production

Some analysts argue that the long term impact of policies for NTAE production will be towards land accumulation. Under some circumstances the more general process of commercialization has had this effect. Where production of very labor-intensive crops, such as winter vegetable production, has been adopted by small farmers, there does seem to be a tendency towards land accumulation, even among smaller farmers. In Guatemala this process appears to have differentially benefitted the smallest landholders, and to have slowed the process of land fragmentation. Because this research was carried out with farmers, it is not clear if the most marginal farmers have lost land. On the whole, however, where the crops produced have diseconomies of scale, this process can be seen as beneficial. Flower production also has diseconomies of scale in production with respect to land, and in Ecuador, for example, the size of flower plantations are small. It is unlikely that the growth in the flower industry will have much of an impact on land tenure. Where contract farming is more common, the potential for displacement of small holders is more likely and would need to be monitored. Several analysts argue that this process is taking place in Latin America, especially in Central America. While NTAE production did not create this process, it continues to extend it. There is some evidence that shrimp mariculture has reduced access of economically marginal people to formerly common resources in the mangrove swamps and to fishing grounds. The impacts on NTAE promotion on land tenure appear to be closely tied to the crops involved, capital needed to adopt production, the nature of production and marketing relationships and, perhaps more importantly, to broader land tenure policies.

NTAE production may compete for labor with food crop production in some regions. There is some evidence that women's labor is diverted from household maintenance tasks to NTAE production in Guatemala. Agrarian reform communities in Southern Honduras report a labor shortage due to increasing employment in the shrimp industry. As the value of other crops is low, increases in the wage structure cannot be absorbed. At the same time, the jobs available

in NTAE production and processing are competitive because they do pay better. Studies in Central America and Ecuador show that even small holders seek off farm employment in the NTAE sector.

**b. Income**

NTAE production does appear to increase household income of small producers (at least in Guatemala) when problems of risk in marketing are controlled, although few studies have looked the impact of risk and the potential for increased risk for NTAE production. NTAE production also appears to create employment. The actual number of jobs created is not certain so the total impact is not fully known. However, the jobs created tend to pay more than other jobs in agriculture, and in some cases are more stable and less seasonal.

**3. Desire to Obtain Available Food**

The steadiness of the flow of income from NTAE production has not been addressed in the studies that have looked at income generation. Employment in NTAE appears to be somewhat less seasonal and more steady than in TAE and food crops. There are a number of anecdotal data that suggest that companies frequently use questionable labor practices to exclude certain kinds of workers (eg. married women with children) and to keep workers in a temporary category to avoid paying benefits.

Available research on the intrahousehold effects suggests that these are similar to those of other cash crops. Income benefits appear to tend to accrue more to men than to women for producers. This shift has been cited to account for the lower than expected impact of increases in income on food consumption and nutritional status. For those employed in the labor force involved in production and in the processing industry, women may be favored. Anecdotal evidence suggests that this may be because employers see women, especially younger unmarried women, as presenting fewer labor problems. It may also be that the wage structure is so low or

the nature of employment so sporadic, especially in processing, that these jobs are more acceptable to women, who have fewer employment opportunities, than they are to men.

NTAE production, and agricultural commercialization in general, has less of an impact on consumption of food and health care services than might be expected. It is not clear if the "leakage" of income from household food security is the result of an inherent characteristic of the crops being grown. None of the carefully done studies address the question of how lumpy the income from winter vegetable is and what the competing expenditures are. No one has assessed the impact on "social costs" that might be associated with NTAE production in the form of ritual payments of gifts in order to maintain an available pool of labor, etc. No one has carefully investigated the decision making process with respect to the allocation of household income among competing goods, including food and health. It is not clear if small holders see a need to purchase more food or invest in health care with increased income. The Cuatro Pinos cooperative includes some access to health care and health and nutrition education, which may account for the greater impact of NTAE production on nutritional status in this program compared with smallholders in other communities producing NTAEs but without access to the cooperative. While there is some evidence that some of the increased income is allocated to health, it is unclear how much of the increased income is being allocated among other goods.

#### 4. Utilization

There have been no careful studies of the energy costs to individuals of NTAE production as compared with other crops. There is some evidence that women are providing more labor in NTAE producing households and that children are recruited to take over some tasks formerly carried out by women. It has not been determined whether increased energy costs to household members providing field labor, or child labor to replace work previously carried out by adult women offsets the energy value of increased food consumption. For some NTAE crops in Guatemala (Immink and Alarcon 1991) it appears that increases in the amount of contractual labor releases the labor of household members and may result in improved nutritional status for adults within producing households.

For small farmers involved in NTAE production in Guatemala, there is some indication that women's time allocation may shift away from food security and child care tasks. The preference of employers in NTAE production and processing (outside the small farm sector) for younger unmarried women results means that these women often do not have child care or other household responsibilities.

## **5. Health**

One of the areas of highest concern, with little data to address it is the extent of exposure to hazardous chemicals in NTAE production and processing. It is assumed that the potential for exposure is high in some crops, such as flowers and ornamental plants, but there has been little research on the health risks involved.

There is little information on the impact of NTAE production on water and sanitation. The shrimp industry in Honduras became concerned about the potential of contamination of the shrimp ponds with cholera and promoted the construction of latrines in communities surrounding the ponds (Vergne et al. 1993). The extent to which increased income from employment or profits from NTAE production is allocated to health and sanitation is unclear.

## **6. Targeting**

One of the striking observations from reviewing the literature for NTAE production is that while there may be no inherent economies of scale for many NTAE crops, other factors such as control of the markets, problems with pests, and access to credit seem to strongly favor larger, more well capitalized producers. To the extent that policies promoting NTAE are in place in contexts in which there is no protection for smallholders and marginal populations, promotion of NTAE production is likely to contribute to the process of marginalization of the rural poor and increasing concentration of wealth in the hands of the elite. The movement of the rural poor to urban areas is likely to exacerbate the nutritional problems found among the urban poor. Similar to the general conclusions that can be reached through reviewing the

literature on the commercialization of agriculture, it appears that the income, food security and nutrition impacts of NTAE promotion are strongly related to the wider policy climate. As we noted in research in Mexico (DeWalt et al, 1990), for small producers, crop choice (even with increased risk), is less important for the nutritional status of family members, than the access of small producers to credit, information and markets.

In general, there is surprisingly little information on the distributional effects of NTAE promotion. What is available suggests that there is no inherent reason why smallholders and the rural labor force could not benefit from NTAE promotion. On the other hand, increasingly it appears that current NTAE promotion favors the elite and marginalizes vulnerable rural populations.

## **B. GENERAL POLICY IMPLICATIONS**

NTAE production has the potential to improve incomes for small holders and create employment for both rural and peri-urban workers. Without adequate targeting for small producers and institutions to improve access to markets and reduce risk for small producers, this sector is likely to be left behind. While commercialization and the promotion of NTAEs has not created dualistic economies in Latin America, without care the policies promoting NTAE production may exacerbate the process.

For workers, promotion of NTAEs will be most beneficial if it creates employment opportunities that are more stable, permanent, and more well paid than other employment generated in the agricultural sector. I cannot address the specific policy instruments that would need to be created in order to attain the maximum benefit for the nutritionally marginal and food insecure populations in Latin America. However, existing information suggests that the following areas should be addressed.

1. In order for the small farm sector to successfully participate in NTAE production, policies and structures enhancing the access of small holders to information, technology and markets must be made available. These would include:

- a. Increased availability of credit, insurance, seeds and extension for NTAE production to small holders;
  - b. Promotion of institutions such as marketing cooperatives that facilitate the marketing of NTAEs by small producers;
  - c. Development of information systems that provide timely information to small holders concerning NTAE markets and technology;
  - c. Development of systems for monitoring the impact of NTAE production on land tenure and access to land for small producers;
  - d. Development of criteria for success that are appropriate for small producers and resource poor farmers who may show a smaller return on investment, especially in the short run;
2. Protection of subsistence food production by small holders engaged in NTAE production will enhance food security NTAE producing households and also enhance food availability at the local and regional levels. Policies that protect subsistence production for household consumption and marketing should be adopted, including:
- a. Promotion of program objectives that set the compatibility of crops and technology selection with subsistence production as a priority for small holders;
  - b. Development of technology based on mixed farming systems that enhance the production of food/subsistence crops;
  - c. Provision of technical assistance to small holders that addresses the whole farming system, including subsistence production;
  - d. Understand and incorporate the goals of farmers and farm households in program planning and evaluation;
3. To protect workers in NTAE production and processing, fair labor practices should be monitored, and employment opportunities should be enhanced for women with children, especially women who are household heads. Alberti (1991) suggests a series of policies that would enhance health, safety and quality of life of workers in NTAE, especially women. Many of these would be likely to also enhance food security and nutrition.
- a. Provision of basic health and nutrition services in the workplace;

- b. Provision of assistance in developing basic accounting skills and budgeting in order to assist workers to calculate wages due and keep accounts of wage payments;
  - c. Assistance in the development of small scale credit unions for workers, especially women;
  - d. Promotion of the development of child care alternatives for women employed in field work and processing.
4. Set priorities for the kinds of crops to be promoted in terms of the potential impact on employment.
    - a. Promote products with a higher ratio of post harvest/value added processing;
    - b. Promote crops or processing activities that promote a more even pattern of demand for labor throughout the annual cycle.
  5. Provide culturally appropriate and well grounded nutrition and health education to producers and workers to enhance the impact of increased income on food consumption and intrahousehold distribution of food.
  6. Provide technical assistance to women farmers and provide more opportunities for women to participate in NTAE production and processing.
  7. Assess the health and safety issues involved in NTAE production and processing, develop and enforce occupational health and safety guidelines for work in NTAE production and processing.

### **C. QUESTIONS FOR RESEARCH<sup>2</sup>**

Existing information on the impacts of NTAE promotion leave a number of questions unanswered. The future research agenda needs to address several points:

1. The long- and short-term distributional effects of NTAE promotion should be more carefully examined. In the long and short terms, who benefits and who loses? What roles do markets (land, labor, agricultural inputs and credit) play in producing different

- out comes for various population groups? What are the short- and long-term (including intergenerational) effects on food security, health and nutrition?
2. There is a need to more fully understand the conditions under which small holders can be successfully integrated into NTAE production and the impact of integration on food security and nutrition. This implies several lines of research:
    - a. An analysis of existing small holder participation in NTAE production under a wider variety of ecological, economic, and policy contexts. This implies the development of a series of comparable case studies in regions in which different crops have an advantage (melons, citrus, vegetables, other crops such as quinoa), with differing opportunities for value added processing, under differing conditions of production (eg. cooperative vs. noncooperative; contract farming), under differing conditions of land tenure (land reform, tenancy and share cropping arrangements, etc.) and with differing access of small holders to credit, seeds, other inputs and technical assistance.
    - b. Quasi-experimental designs in which comparisons are made between producers participating in specific programs with differing access to program benefits, with those who do not have access.
    - c. Investigation into ways to evaluate farmer access to, and use of information in order to develop more effective ways to adjust programs to incorporate existing farmers' knowledge and increase access to new information.
    - d. Investigation of farmers' and farm households' goals for and perceptions of the nature of improvements in the quality of life, values for health and nutrition, and decisionmaking concerning allocation of resources among competing goods.
  3. There is a need to better understand policy and program alternatives that can enhance the compatibility of NTAE and subsistence production, both at the household and national levels.
  4. There is a need for macro-level policy analysis to examine the impact of NTAE promotion policies on food production, food availability and food prices in Latin American and Caribbean countries.

5. The employment effects of NTAE production and processing need to be evaluated. There is conflicting information available for the amount of employment generated either in production or processing, and the segment of the labor force that benefits. This implies more careful studies that compare the amount of employment generated in production and value added processing for both men and women, the steadiness of employment, and the compatibility of employment with the other roles of women.
6. There is a need to evaluate the impact of integrating the incorporation of complementary social investments into programs to promote NTAE production, and in the workplace in order to enhance the impact of increasing income on food security and health for both producers and workers.
7. The long-term environmental impact of NTAE production should be reviewed and carefully evaluated.

#### **D. METHODOLOGICAL CONSIDERATIONS**

Further research examining the impacts of NTAE production in Latin America need to go beyond some of the methodological constraints that characterize currently available research.

1. There is a need to promote longitudinal and longer-term research. All of the research currently available has been carried out on a short-term basis, much of it is based on cross-sectional data that compares NTAE producers with non-producers. It is clear that early adopters of new crops and technologies are likely to be different from later adopters and non-adopters from the outset. In some instances larger farmers may be early adopters, but smaller farmers may enter into production later, or small farmers may enter into production, but then leave for various reasons. Some groups may seem to benefit in the short run but to be excluded from benefits at a later time. Policy impacts and market conditions are not stable over time, and economic conditions and social outcomes at the household level may shift (these may be quite different in the pre-boom, boom and post-boom periods). Cross-sectional designs are especially problematic, and short-term longitudinal studies may not capture enough of the cycle of adoption to provide information on the full impact of a policy. Longitudinal research should not only

continuously monitor at least a sample of households over a long period of time, but also monitor policy and environmental conditions, changes in infrastructure, etc. Some of these factors may actually be related to point estimates of impact in a lagged fashion. In some cases, likely to be rare, in which a prospective, quasi-experimental design is possible, the opportunity should not be missed. Some retrospective research such as the work by Barham et al. (1992b) that incorporates historical narratives to assess the differences among early and later adopters may be appropriate as well.

2. In order to develop a better understanding of the distributional effects of NTAE production, study designs should go beyond the study of impacts on adopters and non-adopters and include the measurement of impacts on players in local output and factor markets, and those who are excluded from those markets as well. Study designs should also consider that the adoption process is reversible and include producers or workers who have partially or completely left the NTAE sector.

3. Study designs should maximize the complementarity of qualitative (ethnographic and participatory) and quantitative (survey, econometric) research designs. Existing information is limited by the lack of research that documents relationships between production employment, expenditures, nutritional status, etc. and also incorporates an understanding of values, perceptions and decisionmaking. In some cases rapid assessment methodologies may be a useful complement. In other cases life histories and the development of historical narratives from a panel of informants expand the available data.

4. Research should focus on dietary quality as well as energy when assessing food consumption and dietary adequacy. Recent data from the studies included in the Nutrition Collaborative Research Support Project (NCRSP) suggest that food consumption and nutrition studies need to refocus on dietary quality as well as energy consumption (Calloway et al. 1989). NCRSP studies suggest that the percentage of energy from animal products is an important predictor of growth, health, and cognitive development. Furthermore, in some of the studies, the percentage of energy from animal products in the diet of pregnant and lactating mothers was a strong predictor of growth in exclusively breastfed infants under six months of age. NCRSP investigators argue that the percentage of energy from animal products is an indicator of the bio-

availability of several key micronutrients in diets. Several of the key studies to date on the nutritional impacts of commercialization of agriculture have focused exclusively on energy or energy and protein intake as indicators of dietary adequacy. Other studies (Dewey 1981; K.M. DeWalt 1983) suggest that changes in dietary quality may be a key outcome of shifts from reliance on household production to the market that often accompanies the commercialization of production. These findings suggest that dietary quality as well as total energy intake must be examined in assessing the nutritional impact of diets and must be included in study designs.

5. The assessment of the nutritional status of adults, especially women of child bearing age, should be included as outcome measures. The nutritional status of young children is usually chosen as the primary indicator of nutritional wellbeing. NCRSP and other data, however, suggest that the nutritional status of women of childbearing age may be an important indicator of household nutritional well being. First, women, rather than young children, may be under the greatest nutritional stress, especially during seasonal or other food shortfalls (eg. Leonard 1989). Second, the nutritional status, and subsequent energy expenditure of women, may be an important factor in the quality of child care. Malnourished women may not have the energy to adequately care for children and promote household sanitation. Finally, growth failure in exclusively breastfed children under six months of age may be the result of poor availability of micronutrients in breast milk as a result of poor dietary quality for mothers. In addition, weight loss in adults may be useful as an indicator of short term or seasonal stress.

6. Finally, a greater effort should be made to develop an inventory of existing data sets that can be drawn upon to analyze some of the current research questions. Such data sets may not have been designed to directly examine the impact of NTAE production and processing on employment, income, food security, nutrition and health, but may be suitable to address some of the questions. In addition, analysis of existing data would provide information at a comparatively low cost.

**Table I: Growth rates of non-traditional exports (NTX) and gross domestic product (GDP), 1984-1989.**

Country	Six-Year Growth in NTX (%)	NTX/GDP 1989 (%)	Annual NTX Growth (%)	Annual GDP Growth (%)
Costa Rica	348	11	28	4.0
Chile	222	11	17	6.4
Guatemala	78	8	12	2.3

From: Barham et al. 1992a, p. 49.

Table II: Comparison of export crop production for Central American countries, 1983 - 1987

	Amount	US\$ (millions)	Amount	US\$ (millions)
<b>Belize</b>				
Citrus	-	-	323 ml	10.3
Cucumbers	-	-	1231 mt	.7
<b>Costa Rica</b>				
Melons	84 mt	.037	1025	.26
Pineapple	3716 mt	1.1	34,321 mt	13.4
Cut flowers	3.4 mu	.6	14 mu	4.6
Live plants	56 mu	2.7	102 mu	4.6
<b>El Salvador</b>				
Broccoli	-	-	585 mt	.46
Cucumbers	-	-	299 mt	.09
Melons	971 mt	.332	8912 mt	2.6
Okra	1607 mt	-	3690 mt	2.3
<b>Guatemala</b>				
Broccoli	2524 mt	1.8	12,630 mt	8.7
Celery	-	-	3567 mt	.6
Melons	3598 mt	.7	9984 mt	3.6
Preserved fruit	98 mt	.044	1272	1.0
Snow peas	-	-	4900 mt	4.0
Strawberries	4 mt	.005	1555 mt	.5
Cut flowers	4.9 mu	.8	13.3 mu	1.8
Live plants	30.9 mu	2.1	57.6	1.8
<b>Honduras</b>				
Pineapple juice	5.7 ml	.6	17.2 ml	2.0
Melons	2471 mt	1.5	22,607 mt	6.8
Plantains	171 mt	.039	8878 mt	2.4
Snow peas	-	-	177 mt	.16
Live plants	29 mu	1.3	14.7 mu	1.3

mt = metric tonnes; mu = million units; ml = million liters  
 From: Stonich (1991) p. 730.



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