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CONSUMPTION/NUTRITION FACTORS  
IN AID IMPACT EVALUATIONS OF  
AGRICULTURAL RESEARCH, RURAL ROADS,  
RURAL ELECTRIFICATION, AND WATER PROJECTS

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## FOREWORD

The Nutrition Economics Group was created in 1977 to assist AID's Office of Nutrition, and is located within the Technical Assistance Division of the Office of International Cooperation and Development of the U. S. Department of Agriculture. It has a multidisciplinary social science staff who provide technical assistance in the implementation and evaluation of food consumption economics and other data gathering projects. The group has responded to requests for technical assistance on how to incorporate nutrition issues in agricultural project design, and has funded technical assistance to project design efforts in Panama, Guatemala, and Indonesia. It has also designed a curriculum and implemented a pilot workshop for training AID agricultural and rural development officers on food production/consumption linkages for application in project design and other programming uses.

The group is especially concerned with the impact of agricultural development projects on nutrition and food consumption, and how projects can be designed to improve the food consumption and nutritional status of target populations. The present study is an extension of these interests. It is intended to encourage and assist evaluation teams and project designers to find feasible ways of projecting and assessing nutritional impacts.

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PREFACE

The authors would like to thank all of those who gave their time and knowledge in the preparation of this report. A complete list of persons interviewed appears in Appendix A. Gary Mullins assisted in rewriting the final draft and prepared the executive summary. Margaret A. Brush completed the final copyediting and proofreading. Our appreciation also goes to Sharon Ramirez, Lisa Bilder and Sheldon Cann who typed several drafts of this report.

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EXECUTIVE SUMMARY

The following report looks at the consideration given consumption and nutrition impacts in impact evaluations of AID sponsored projects in ten developing countries. Project activities are categorized into four areas: agricultural research, water resources, rural electrification, and rural roads development. From the evaluation reports themselves and from information gathered from interviews with evaluation team members, authors Berry and Miller conclude that although in the majority of the projects examined there were numerous ways in which the consumption patterns and nutritional status of the poor may have been affected, in few cases were projects evaluated to determine the extent and nature of these impacts. In many cases, evaluators acknowledged being aware of these potential impacts, but they decided not to attempt to measure these effects for the following reasons:

1. Improving consumption or nutritional status was not one of the primary objectives of the project.
2. Consumption/nutrition improvements held low priority among evaluation team members.
3. There was insufficient data, time and expertise to evaluate the consumption/nutrition impacts of the project.

Perceiving the need for including the evaluation of consumption/nutrition impacts in future AID project impact evaluations, Berry and Miller describe for each project type a

number of issues and approaches which should give both evaluators and programmers greater insight into the effects of AID projects. They make specific recommendations concerning the conduct and content of impact evaluations which could be useful for teams in the process of planning evaluation strategies and activities.

LIST OF ACRONYMS

AID	Agency for International Development
CATIE	Centro Agronómico Tropical de Investigación y Enseñanza (Center for Tropical Agricultural Research and Training)
CNE	Consumption/Nutrition Effects
OPG	Operational Program Grant
PPC	Bureau for Program and Policy Coordination (AID)
ARD	Accelerated Rural Development
PES	Project Evaluation Summary

## INTRODUCTION

The information in this report was gathered to determine the extent to which nutrition and consumption information has been considered in AID's impact evaluations. The report will be circulated among AID evaluators and potential team members in order to give them suggestions on how consumption/nutrition concerns can be incorporated into impact evaluations, other types of AID evaluations, and project monitoring procedures.

This report also illustrates how various types of development projects can have an impact on the food consumption or nutritional status of target populations. This aspect should be of interest to a more general audience, especially to project designers and managers.

### Objectives of the Report

In order to fully examine the impacts of AID development activities the authors feel that AID projects resulting in changed food consumption or changed nutritional status should be identified, and the nature of such changes and their causes should be described.

There are four objectives of this task:

1. To analyze the AID Project Impact Evaluation Reports in terms of their attention to food consumption/nutrition effects
2. To find out from evaluation team members why consumption/nutrition effects were or were not included
3. To determine what constraints existed upon their further consideration

4. To suggest how consideration of the consumption/nutrition effects of AID projects might be enhanced in future impact evaluations.

This review is a modest beginning to the larger goal of encouraging the inclusion of consumption/nutrition issues in future AID project impact evaluations and project design activities.

While we feel that production, income, health status or nutritional impacts of AID projects are not always direct or intended effects, we would like to see impact evaluations address these issues, even though this type of study is broad, quick, and sometimes impressionistic. Clearly, these evaluations cannot capture all of the impacts of every project. However, it is important to devote more attention to effects on nutritional status and food consumption.

#### Assumptions about Project Impact on Nutrition and Consumption

A basic assumption of this paper is that meaningful analysis of a project's food consumption and nutrition impact must in some way deal with the household level. This issue cannot be completely addressed by describing increases in agricultural production on the macro-level. If a country's corn production increases by 10 percent, for example, it does not automatically follow that corn consumption or even income in most rural households will rise. In fact, in many countries, the benefits of such increased production are likely to accrue to urban consumers. These consumers usually have greater purchasing power and, because

of their greater political significance, are often beneficiaries of "cheap food" policies which discriminate against rural producers.

Although it is widely accepted that malnutrition is a function of poverty, it is not accurate to infer that increased income will necessarily result in improved nutritional status.

Nutritional status depends not only on having the resources available to buy or produce food; it is also a function of health, food availability and consumer decisions. Furthermore, it is uncertain that increased cash income of a farm family will be spent on increased food consumption since such increases in cash income are often obtained by foregoing subsistence food production.

A project may have significant impact upon the diets of many individuals even though this is not a focus or stated objective of the project. Such an impact can be either positive or negative. For each type of AID project discussed in this report, we have briefly described possible impacts or linkages that could exist between project implementation and food consumption or nutritional status.

The authors of this paper regard food consumption and nutritional status as two closely related but distinct aspects of food adequacy. For the purposes of this paper, consumption refers to quantity of food intake. Nutritional status is related to the quality of food ingested (i.e., the adequacy and balance of

nutrients) as well as to health status, which determines how efficiently the body is able to utilize the food ingested.

### Impact Evaluations

In October 1979 the administrator of AID requested that the agency undertake an evaluation of twenty to thirty of its projects and programs. The projects to be evaluated were from several sectors of the agency's program, including those dealing with agricultural research, water, rural electrification and rural roads. These evaluations were to analyze the impacts of completed projects on targeted beneficiaries. They were to use existing data together with limited quantities of rapidly gathered new data collected during short inspection trips by AID personnel from Washington bureaus and field missions (other than the implementing mission). These evaluations were to serve as a training activity for in-house staff. The results of these studies were to be written up in simple language and confined to brief reports. Additional materials could appear as appendices. After review by the missions and bureaus involved, these reports would be published to ensure that the findings would be of use to the agency and the larger development community. A final evaluation report for each sector was envisioned as a tool for relating the results to program, policy, and design requirements (USAID, Impact Evaluation Handbook).

It should be pointed out that impact evaluations are not a major portion of the agency's evaluation efforts. Project

monitoring activities, routine evaluations producing Project Evaluation Summaries (PES), and special evaluations constitute the vast majority of agency evaluation activities. These activities, unlike the impact evaluations, are organized and conducted by the implementing mission or bureau, often using outside contractors or personnel from those missions. The attention given in these evaluations to the impact upon intended beneficiaries varies from case to case but, in general, is only one of the evaluations' focuses. Usually, it is also subordinate to issues such as verification of physical project results, verification of movement of money through institutional channels, and other monitoring considerations.

This paper, therefore, should not be construed as a review of all AID evaluation activities. We do hope, however, that the ideas and issues we raise can be used by personnel in all types of project design, implementation, and evaluation activities to better anticipate project impacts and to make appropriate project monitoring and evaluation plans. As a result, the effectiveness of projects could be improved and unanticipated negative consequences in nutritional status and food consumption among beneficiaries could be minimized.

### Procedures

The members of nine impact evaluation teams were interviewed by Berry according to the interview schedule outlined in Appendix B. She did not attempt to interview all of the teams nor every

member of each team. All those interviewed, however, were members of teams that had published final reports of their findings. The final reports were also reviewed for evidence that consumption/nutrition impacts had been considered. If the evaluation concerned the impact of a nutritional program (i.e., Gilmore et al.), it was specifically excluded. The objective was to evaluate consideration of nutritional status and food consumption impacts in projects where they were not a primary focus.

In this paper, four categories of Project Impact Evaluations are examined: agricultural research, roads, rural electrification, and water projects. Two or three evaluations from each category are reviewed. For each project typology, possible linkages with food consumption/nutrition are discussed. These discussions are amplified using information gathered in interviews with evaluation team members. (The interview schedule appears in Appendix B.)

## AGRICULTURAL RESEARCH PROJECTS

This section reviews the impact of agricultural research projects on food consumption and nutritional status with specific reference to two projects: the Kenyan maize project and the Small Farmer Cropping Systems Project at CATIE.

### Overview: Linkages between Agricultural Research Projects, Food Consumption, and Nutrition

A number of possible linkages, both direct and indirect, exist between agricultural research and consumption/nutrition.

Such linkages include the following:

1. The adoption of research results by farmers could result in changes in quantity or quality of food produced and consumed by the same household.
  - Increased yields in staple crops could lead to diversion of crop land for growing other crops, resulting in diversification in household consumption and in more balanced nutrient intake.
  - Increased yields in staple crops could lead to increased consumption of those same crops.
  - Changed cropping patterns could result from adoption of research, leading to a change in household consumption.
2. The adoption of research results by farmers could lead to changes in rural income, causing changes in food consumption.
  - Yields of staple crops could increase, generating surplus that may be sold.
  - Yields of staple crops could increase, allowing farmers to divert some land to cash crop production.
  - Decrease in real income could result from a rapid expansion in market supply and subsequent price decline.

- High costs of inputs (e.g., fertilizer, irrigation) associated with new varieties could result in a decline of land devoted to growing crops for household consumption.
  - For some households, adoption of new varieties will mean substitution of home food crops for increased production of cash crops, thereby altering incomes and, potentially, diets.
3. The adoption of new varieties from genetic research in breeding could lead to a change in consumption or nutritional status.
    - As a result of altered genetic characteristics, the nutritional quality of crops for consumption could change, precipitating a change in nutritional status, either for better or worse.
  4. Consumption/nutrition could change as a result of changes in household labor requirements.
    - Changes in agricultural practices could lead to changes in labor requirements which might affect consumption or nutritional status (i.e., increased human energy requirements, lessened time for food preparation and processing due to greater field labor demands placed upon women).

Theodore Schultz has written about the effects of research on benefit incidence. He predicts that "benefits derived from...agricultural research accrue predominantly to consumers" (1979). Schultz anticipates that, in general, there are four usual ways agricultural research affects beneficiaries:

1. The benefits of agricultural research are affected by price policies.
2. The benefits of agricultural research shift over time.
3. Producers who adopt research early are more likely to benefit than those who adopt later.
4. Farmers are more likely to benefit from agricultural research through direct consumption rather than through changes in their income.

Using these hypotheses about the benefits of agricultural research, let us now look at some case studies of AID agricultural research projects and the impacts of their results on target populations.

Case Study: Kenya--Kitale Maize: The Limits of Success

AID first became involved in hybrid maize research in Kenya in 1963. The research efforts continued until 1977. An impact evaluation of this program was undertaken in November-December 1979, by a five-person team of AID specialists, including a team leader, an agronomist, an anthropologist, an agricultural economist and a political scientist. Their written report was published in December 1979 (Johnson et al.). The report focused on the impact of hybrid seed on farmer decision-making. It also discussed the differential adoption of the new varieties by larger scale operators, and it delineated important policy dilemmas arising from increased corn production. While the report did discuss issues such as the impact of hybrid maize on food prices in cities, there was little discussion of the impact of these projects on food consumption or nutrition at the household level. Macro-level observations and statements made on topics closely related to household food consumption, however, suggest that further analysis of consumption or nutrition issues would have been productive. Such observations include the following:

1. Maize represents a greater proportion of total food consumption in provinces with high hybrid maize

production than in provinces with low hybrid maize production.

2. Due to higher maize yields, small holders are able to utilize more land for cash crop production without reducing household maize consumption.
3. Small farmers' orientation to the market has been accelerated by the spread of hybrid maize.
4. Hybrid maize helped hold down food prices in cities.

The report might have productively discussed the implications of changes in production time and labor requirements that resulted from the adoption of new crop varieties. Such changes could cause a decline in real food consumption or deterioration of nutritional status.

The maize breeding project had five components:

1. Supporting breeding and dissemination of breeding materials and knowledge
2. Field trials
3. Breeding for marginal rainfall areas
4. Breeding for disease resistance quality
5. Breeding for protein quality

The latter activity included supporting a protein quality laboratory. The team felt that this subproject allocated more resources than were warranted to an effort that would not be likely to improve the nutritional status of most Kenyan maize consumers. (Since maize in Kenya is ordinarily eaten in combination with legumes, the lower protein content of the traditional varieties of maize is not a limiting factor for good nutritional status.)

In short, the impact evaluation of the Kitale maize project makes a number of points from which one could infer that through increased yields and changes in genetic material, changes in food consumption and nutrition had probably occurred. However, those changes are only described in general terms.

Two of the five members of the team, the anthropologist and the agricultural economist, were interviewed separately to find out more about how the team determined the focus of the impact evaluation activities and how they gathered information about consumption and nutrition. Both team members were interested and knowledgeable about the consumption/nutrition effects of agricultural projects. However, the interviews demonstrate somewhat contrasting views on the feasibility and importance of analyzing consumption and nutrition effects in the impact evaluations. One team member said that the analysis of consumption/nutrition effects was included in the original scope of the study, while the other said it was not. They agreed that such an analysis is greatly constrained by the amount of time that impact evaluation teams have to devote to data collection. The agricultural economist felt that if the team had been allowed six weeks in Kenya, an analysis of consumption/nutrition effects could have been done since substantial baseline data already existed. However, the anthropologist reported that the primary focus of the team was on issues of equity, economic growth and distribution.

Both team members expressed strong interest in a follow-up analysis of the links between the adoption of hybrid maize and

changes in consumption and nutritional status. One said that the analysis would be appropriate and important while the other suggested that a long-term sector review might be in order.

The authors agree that a follow-up would be fruitful, especially if the following questions were addressed:

1. Did household maize consumption increase as a result of hybrid maize adoption? If so, under what circumstances and to what extent?
2. Did rural incomes rise as a result of hybrid maize adoption? If so, how was it spent?
3. Was any land used for maize production prior to hybrid maize adoption diverted to production of garden crops for home consumption?
4. Does hybrid maize have the same nutritive value as the traditional varieties? If inferior, does it adversely affect certain population groups? In other words, are there people who cannot profit in a nutritional sense from hybrid maize when they could benefit from indigenous maize?
5. Does hybrid maize adoption require changes in time or labor inputs?

To summarize, the impact evaluation of the Kenyan maize project could have been strengthened by addressing some of the consumption/nutrition issues that clarify whether or not the nutritional well-being of the target groups had been enhanced by the project.

Case Study: Small Farmer Cropping Systems Research at the Center for Tropical Agricultural Research and Training (CATIE)

The Small Farmer Cropping Systems Research Project was conducted by scientists at the Center for Agricultural Research and Training (CATIE) located in Turrialba, Costa Rica, and was funded

by AID from 1975 through 1979. Based upon research carried out in Costa Rica, Nicaragua, Honduras, El Salvador, and Guatemala, the project's aims were to create a coordinated regional research approach for increasing the productivity and incomes of small farmers in Central America through improved cropping systems. An impact evaluation of this project was carried out in February 1980, by a six-person team which included a team leader, an agricultural scientist, an agricultural economist, a rural sociologist, a development anthropologist, and a political/institutional analyst. Their written report was published in December 1980 (Hobgood et al.). Since the report focused on the activities of the research institution, the researchers, and a couple of small farmers who had been involved in the adaptive trials, it could not evaluate the eventual impact on small farmers. Therefore, the team recommended that a follow-up evaluation be undertaken in 1983-4 to look at the actual impacts on the ultimate beneficiaries.

The report includes a number of key statements about the project and its impacts:

1. The researchers at CATIE did not expect the project to have an immediate impact on a large number of farmers. They stated that a ten-year lag normally takes place between investments in agricultural research and measurable impacts on farmers.
2. The project produced a series of important impacts on CATIE and its faculty and students, on national and international institutions, and on the farmers who participated with CATIE researchers in on-farm trials. Specifically, CATIE's work was reoriented toward an approach directly targeted at small farmers.

3. It was the objective of this project to improve levels of living for large numbers of farmers.
4. CATIE planned to continue work in the area and to expand its impacts through students trained in the systems approach.
5. The AID project itself did not fund any outreach activities nor larger scale dissemination/verification activities since these were beyond the AID four to five year program cycle. This accounted for much of the lack of impact on small farmers.

The team members visited four of the countries in which the research was carried out, and interviewed 28 of the 75 farmers who had participated in the project. The evaluators were critical of the haphazard means used by researchers to select participating farmers. (Ideally, the farmers should have been selected for representativeness.) During the evaluation team's interviews with participating farmers, no pre-set questionnaires were developed, although there were some illustrative questions. One general question could have elicited responses related to food consumption or nutrition effects: "Are things better now than before?" However, the evaluation report does not mention any findings on consumption or nutrition. It summarizes the interview responses in terms of changes in yields, intention to continue using the small farmer cropping systems, and attitudes toward the project itself. (Limited price and cost information used in final evaluations of alternative crops may be of interest in future analyses.)

To summarize the contents of the written report, the impact of the CAITE on farmers is given little attention, presumably because adoption of research results has barely begun. What the

team seemed most interested in with respect to individual farmers were changes in yields and farmers' intentions to continue using research recommendations. While an analysis of consumption and nutrition effects might be inappropriate at this stage in the CATIE project, it seems unfortunate that even in pilot studies such extensive efforts are being expended to promote changes in farmer behavior without monitoring and formulating hypotheses about the consumption and nutritional consequences. Furthermore, it seems that now is an excellent time to collect baseline data for use in a future consumption/nutrition analysis of the impact on the well-being of small farmers who adopt CATIE's Small Farmer Cropping innovations.

According to the anthropologist on the team, the way the team sought to measure impact on small farmers was limited to determining changes in production and income. He said that although the team was aware of the consumption issue, they felt that since the objective of the research was to produce tentative cropping alternatives for a variety of ecosystems, it would be inappropriate to focus on consumption effects in the impact evaluation. One team member who was interviewed stated that a consumption and nutrition goal and an impact assessment might appropriately be incorporated into an extension component of CATIE's program. However, there are no plans for such a component. It appears, therefore, that the evaluation team consciously chose not to include consumption/nutrition measures in its assessment, sensing that it would be unfair to judge a project

on criterion not stated as a goal in the project design. Nevertheless, it might be appropriate to do so since the Impact Evaluation Handbook expressly mandates the analysis and assessment of unplanned effects on beneficiaries (p. 41).

### WATER PROJECTS

#### Overview: Linkages between Water Projects, Food Consumption, and Nutritional Status

Both irrigation and potable water projects are included in this category. Although both deal with water, irrigation projects are usually aimed at making more water available for agricultural purposes, while potable water projects are expressly geared toward improving water quality and availability for domestic use. In practice, there is some impact of irrigation projects on domestic use and of piped water projects on gardening.

There is a relatively straightforward link between the actual potability of water and the nutritional status of those who consume it. If the incidence of water-borne disease could be lessened through potable water projects, nutrient wastage would decrease. More efficient metabolism of nutrients would result in improved nutritional status. Nevertheless, it is not clear that potable water projects funded by AID have resulted in those changes. One intervening factor is the system's susceptibility to contamination through poor maintenance practices, inferior construction, and human error. In other words, installed, piped water systems do not necessarily produce potable water. Secondly,

water systems are not the only factors contributing to the spread of diseases that waste nutrients. Waste disposal practices can cause endemic problems even in places that have potable water systems. Thirdly, it is extremely difficult to isolate and measure the impact of potable water alone on nutritional status.

Potable water projects may also affect consumption/nutrition by changing time and labor availability. If the time required for obtaining water decreases, time then becomes available for other activities, such as gardening or income producing activities. Again, however, the consumption/nutrition effect depends on how the additional time or income is utilized.

Human energy can also be saved if water is available closer to home. This can lead to improved nutritional status, as the trip to the well, spring, stream, or ditch is often a long and difficult one that must be undertaken a number of times daily. In many societies this task is assigned to women and children. Thus, the caloric saving from reducing the water-carrying tasks is likely to benefit the groups most at risk nutritionally.

Irrigation projects, on the other hand, may lead to increased labor requirements for agricultural production. This can result in less time available for off-farm labor, and greater vulnerability to price declines caused by surpluses. In those cases, income decreases although production rises.

Irrigation projects, and the augmented water availability which results from them, can often lead to increased yields and increased crop diversification since presumably it takes less

acreage to grow equal amounts of staple crops (if water is the limiting factor). Food consumption and nutritional status may be directly influenced in the following manner:

1. Home consumption could increase.
2. Home consumption could become more diversified.
3. Seasonal stability could be enhanced.
4. Income could increase, allowing purchase of more, better, or a greater variety of foods. In this case, the consumption/nutrition effect depends on market supply and prices as well as on household consumption decisions.

Increased water availability of improved quality could lead to improved health and nutritional status through increased laundering, washing, bathing, and use of water-sealed privies. However, sanitation components in projects which promote latrine use might decrease fertilization of fields from human stools. Also, water wastage sometimes results from constructing irrigation systems in areas with limited water resources. Finally, the ability to pay for a water hook-up to one's home might allow benefits to disproportionately accrue to privileged groups.

Keeping these issues in mind, let us look at the impact evaluations of two potable water projects and one irrigation project to see how consumption/nutrition concerns were treated.

#### Case Study: CARE Water Projects in Tunisia

Between 1975 and 1979, four potable water projects that entailed substantial AID funding were implemented by CARE in Tunisia. A major goal of these projects was to improve the health and quality of life for rural Tunisians in the areas affected by

the projects. Three purposes were identified: to make potable water available, to install and maintain disinfection systems, and to improve health awareness among beneficiaries.

A six-member evaluation team from AID, CARE, and the Peace Corps conducted an impact evaluation over a three-week period in 1980, during which they visited 31 of 325 project sites. The sample was selected randomly, stratified by type of water point and geographical region. Four nonproject sites were also visited. The team found that although 325 water points had been renovated, the disinfection and health awareness components of the project had had little impact.

The impact evaluation report (Bigelow et al.) makes no direct reference to food consumption or nutrition, with the exception of a description of the subsistence patterns, which consisted of wheat and barley cultivation and animal raising. It was mentioned that in at least one case, chlorination procedures were discontinued because people did not like the taste in their tea.

The team did try to ascertain the impact of the project on health status, which in many cases has a direct influence on nutritional status. However, that influence was not referred to or analyzed in the report. In a questionnaire administered to beneficiaries of the projects, there is a specific question on the source of water used for cooking. Several of the other 40 questions also address the impact of the projects on health. Specifically, respondents were asked, "Has the health of the population changed since the improved water source was provided (skin,

intestinal problems, etc.)?" The team found, however, that they could not determine whether the projects directly influenced health because baseline statistics on a site-by-site basis did not exist. Secondly, the Tunisian government's own records indicate that the vast majority of the sites no longer had water that could be called potable. Finally, interviews with beneficiaries indicated mixed results in impacts on health, in part because the beneficiaries were unable to recall changes in health in conjunction with the change in water source. One beneficiary, who may be typical of many others, reported that the health of her own children born after the project was completed was poorer because she gave unboiled water to them, believing (incorrectly) that the well water was disinfected. (Prior to the project, she had always boiled water for her children.) However, health officials claimed that the incidence of cholera and typhoid had fallen during the project's implementation period.

Several issues that might have related to the impact of the projects on consumption and nutritional status were not explored. For instance, the time saving issue was not explored: For instance, whose time was saved, and how was that time used? Was it used for productive purposes? Did additional income accrue to the family?

An interview with a member of the evaluation team revealed that the team was not oriented toward or interested in the consumption/nutrition issue. Consequently, it was not included in the

original scope of work. The team member suggested that there may have been two areas of impact:

1. Increased gardening activity for some beneficiaries due to augmented water supply
2. Improved nutritional status through a decrease in illnesses associated with nutrient wastage. (The team did not obtain data on these illnesses.)

With respect to the first area, the interviewed team member reported that those who owned land adjacent to well sites were able to use well water for home gardens. Furthermore, some farmers brought water vessels on horse-drawn carts to the mechanized pumps in order to procure water for irrigation. Most beneficiaries, however, did not report significant changes in water use.

In the second area, the team member reported that due to the difficulty in measuring changes in health status, the team chose to measure changes in potability instead. Therefore, the impact of these projects on health has not been determined. However, if potability is a measure of the potential for impact on health, the impact could only have been sustained in the 25 percent of cases where the water is currently potable. Further investigation might be possible in comparing beneficiaries with nonbeneficiaries, or by collecting local health records. (The team focused most of its efforts on inspecting sites rather than on collecting existing data for comparison.) The team also seemed hesitant to draw the conclusion that well-being had probably not been significantly changed by the projects. Certainly, the measurement issue is a problem, but much of the quantitative data in the report is tentatively presented without using qualitative and observational

data to draw conclusions. This kind of data could be readily gathered to corroborate a hypothesis of no impact.

Case Study: The Potable Water Project in Rural Thailand

The Potable Water Project was implemented in Thailand between 1966 and 1972, with over half of its funding from AID. Its goals were to aid the Thai government in obtaining rural support, to develop institutional capacity to sustain potable water efforts in other areas, and to improve health in 600 security sensitive communities. The impact of this project was evaluated by a two-person team from AID-Washington with the assistance of two Thai nationals, one an employee of the AID Mission and the other of the Ministry of Health. The study was undertaken during five weeks between October and December 1979. The published report appeared in May 1980 (Dworkin et al.).

The report found that most of the systems built under the project's auspices continued to function as self-sufficient, user-financed operations. Local perceptions of health improvement were positive, although beneficiaries reportedly do not drink the water because of its poor taste. According to the report, improved water availability has saved time, permitting more gardening, livestock raising and crafts production. As a result, all socio-economic groups have received economic benefits.

While food consumption and nutrition effects were not directly analyzed in the report, some of the impacts discussed have direct bearing on this subject. According to the report,

baseline health data did not exist at the village level; therefore, it is not possible to confirm that health improved in project communities. However, interviews with Thai villagers revealed that these projects probably did have a positive health impact as well as a positive economic impact, both of which could have resulted in improved food consumption or nutritional status.

Despite the absence of adequate health-related data, the report cautiously concludes that health improvements, including the decrease of skin disease and diarrhea, resulted from project implementation. These benefits, however, are attributed to increased water availability rather than to improved water quality since piped water was not used for drinking. According to the team, increased availability leads to improved infant and child hygiene as a result of more frequent bathing and washing and the use of water-sealed privies.

The impact of these changes on nutritional status is briefly mentioned in the report's summary (Dworkin et al.: iii). "Local perceptions are that improvements have resulted in large part because the increased quantity and convenience of piped water permits more raising of vegetables and small livestock for home consumption and for sale..." In a telephone interview, a team member stated that the potential consumption/nutrition effects of potable water projects could be more beneficial than those of supplemental feeding programs, referring to the health-related effects of both improved potability and increased availability.

With respect to economic impact, water availability closer to home saved time, which in turn permitted more time to be spent on income-producing activities such as crafts production. While it seems that real incomes did increase as a result of such activity, the use of that increase was not explored. Furthermore, the proportions of the increases in food production which households allocated to home consumption or to sales are not separated.

A further economic impact was the increase in seasonal stability of crop production. Villagers told evaluation team members that the water provided insurance against income loss during drought. Since more income was gained through agricultural activities, the migration of men to Bangkok for wage labor was reduced. It is not clear from the report that the reduction in seasonal migration of males resulted in improved consumption patterns or nutritional status for the affected households. The issue of increased expenditures for agricultural inputs was also not mentioned in the report.

One team member was interviewed; he was most enthusiastic about the health-related benefits of water projects, and viewed improved nutritional status as one such benefit. He reported that the project resulted in increased agricultural yields, which in turn led to improvements in consumption and nutritional status. The report, however, did not reflect this belief; the study as described in the report did not look at how increased production affected consumption.

### Conclusions about Potable Water Projects

Team members from both the Tunisia and Thailand studies agreed that potable water projects do not produce the desired health benefits because water becomes contaminated between the well and the homes it reaches. However, consumption effects could be addressed in future studies about water projects by asking the following questions:

1. If project implementation did, in fact, result in increased income, how was it used?
2. To what extent was increased agricultural production utilized for home consumption?
3. Did diversification in agricultural production and/or consumption result from increased availability of piped water?
4. How did changes in seasonal variation in income affect consumption and nutritional status?

Finally, the reports demonstrate a reluctance to evaluate the link between potability and improved health, probably because in many cases, like that of Tunisia, there is little evidence that any enduring change in potability has been accomplished. Also, there are so many intervening variables affecting the health status of rural residents in developing countries that potability may not be a very significant factor in regard to health, as in the case of Thailand. Nonetheless, evaluators need to articulate informed judgments based on data of multiple types and quality so that planners and policy makers can make decisions based on the utility and success of such projects.

Case Study: Philippines Small Scale Irrigation

In 1976, AID began support of a Philippine government program to expand village irrigation systems. This support was initially provided through the Small Scale Irrigation Project 1976-1978, and later was incorporated into the Small Farmers Systems Project 1978-1982. AID support totalled \$18.3 million over the period 1976-1981. The focus of these activities was on engineering components and on geographic expansion of irrigation. AID's goals in the first project were to improve farmer income, to at least double employment opportunities, and to decrease the national rice deficit by 50 percent. The Philippine government's objective was to increase rice production. The major goal of the subsequent projects was to improve the quality of life of small farmers by increasing the development of farm systems that use irrigation.

An impact evaluation of these projects was carried out in December 1979, by a four-person team, three from AID/Washington and one from the Philippine mission. Their written report was published in May 1980 (Steinberg et al.). Unlike the previously discussed water projects, these projects were designed to increase water availability rather than potability. Between 1976 and 1979, 1000 systems had been built or rehabilitated. As a result of these improvements, double cropping, rice production, and gross farm income increased. However, the evaluation team questioned whether net farm income had increased in real terms.

Specifically, the team questioned the cost-benefit calculations used by the project designers because the calculations were

based on the growers obtaining the most favorable prices for their rice. Many small farmers simply cannot produce the quality of rice necessary to obtain these prices (95 percent pure, low moisture grains) due to lack of access to cost effective post-harvest processing, cheap fertilizers, and timely, adequate credit.

A major thrust of the report is that irrigation systems necessitate increased agricultural inputs, including household labor and credit. The team explored how this necessity affected real income and, to some extent, household consumption. They found that the high rates of interest charged for credit and the ensuing large debt forces some farmers to sell all of their crops immediately at lower harvest prices in order to meet payments and then to buy food later for their home consumption needs at higher prices (1979: 11).

A related consumption/nutrition issue that the evaluation team tried to examine was how increased income was utilized. In the data gathered, the team found that the beneficiaries did not mention using additional income for better food, although the report stated it would be unwise to conclude that this was never done (1979: 11).

The report also mentions that irrigation improved the evenness of food availability across the seasons (1979: 8). From this it might be inferred that crops grown on irrigated land were used for home consumption; however, other than this inference, the

direct consumption effects of these irrigation systems were not mentioned.

The report did state that increased income did not "necessarily translate into improved family nutrition" (1979: iv). Rather, beneficiaries reportedly preferred to use such income for education, which promotes social mobility.

Generally, the emphasis of the evaluation report was on production and income, both of which were AID's original project goals, rather than on household consumption and other "quality of life" issues (even though improved quality of life is a stated project goal of the follow-up projects). The report states, however, that "The role which crop diversification could play in nutritional improvement should also be considered" (1979: 11). That topic is not further explored in the report.

The team investigated the effect of increased water availability on household time and labor. The team found that as a result of the project, more time was needed on the farm, and often less time was available for cash-generating, off-farm employment. As a result, family income frequently declined while farm income increased.

During an interview, one of the team members said that the natural tendency of the team was to focus on yields since this was top priority. Furthermore, he stated, without increased yields improved consumption was unlikely.

According to the team member, total consumption measured by caloric intake is the only measure appropriate to a three-week

study. Other measures of nutritional composition, biochemical analyses or functional assessments, would not have been possible in that amount of time.

A key finding of the report emphasized in the interview was that social mobility acquired through education was highly valued, and this strongly influenced the allocation of increased income.

Although it took consumption/nutrition into account, the report did not answer the following questions, which have direct bearing on the impact of the project:

1. What proportion (if any) of the increase in yields was directly utilized for home consumption?
2. Did crop diversification occur as a consequence of introducing irrigation systems? If so, did this result in dietary diversification?
3. Does the accumulating debt burden faced by many farmers affect food consumption? If so, what is the consumption/nutrition effect?

### RURAL ELECTRIFICATION PROJECTS

#### Overview: Linkages between Rural Electrification Projects, Food Consumption, and Nutrition

Of all the types of AID projects discussed in this paper, rural electrification appears to have the fewest direct linkages with food consumption and nutrition. However, these linkages are not so tenuous that they may be disregarded. It is quite realistic to believe that rural electrification could generate overall rural development and lead to higher household incomes. For example, due to the convenience of electrification, rural households could earn extra income by increasing productivity

during normal working hours, or by engaging in such activities as producing crafts at home in the evening. Increases in income might also occur because electricity is less expensive than traditional sources. Additional income could then be utilized for improved or additional food purchases.

Rural electrification could have an impact on food consumption or nutritional status by improving the reliability of potable water and irrigation systems. Since electric pumps are more reliable and efficient than diesel pumps, potable water service could improve; this could result in a decline in water-borne disease and, subsequently, lead to improved nutritional status. Similarly, electricity would be used to power irrigation pumps; the resulting increase in agricultural yields could be consumed by the producing household or sold for additional income. In some cases, the additional income could be allocated for food purchases.

Yet, on the other hand, rural electrification could also bring about a clustering of homes near power lines, the effect of which might be the over-utilization of public facilities and a decline in living conditions and health status. Hence, it is apparent from these illustrations that there are a number of linkages, both positive and negative, between rural electrification and food consumption or nutrition.

In recent years, AID's objective with respect to rural electrification has been to improve the welfare of people living in rural areas by increasing employment and income. This

objective has been incorporated in rural electrification projects in the Philippines, Bolivia, and elsewhere. The possible consumption and nutrition impacts of rural electrification projects in the Philippines and Bolivia through employment and income generation, as well as unanticipated consequences, are reviewed below.

Case Study: Rural Electrification in the Philippines

AID first became involved in rural electrification in the Philippines in 1965 when it financed a power survey that recommended testing the feasibility of extending electricity to the rural areas. Upon this recommendation, a feasibility study was conducted, and later, AID assisted the government of the Philippines in establishing two pilot electrical cooperatives. By 1980 there were 117 registered cooperatives, 101 of which were energized. From 1965 through 1980, \$382 million had been invested in rural electrification in the Philippines, \$92 million of which was contributed by AID.

In April 1980, a six-member team comprised of four AID personnel and two consultants traveled to the Philippines to review the impact of this assistance. Their report (Mandel et al.) was published in December 1980. The team drew the following major conclusions:

1. The introduction of electricity does not automatically stimulate economic growth.
2. The benefits of rural electrification, such as new employment opportunities or higher levels of productivity, will affect the rural poor only if the development process itself is directed to meeting the needs of the poor.

3. The financial viability of rural electric distribution systems is difficult to achieve if the systems are rapidly expanded into thinly populated rural areas; they may actually exacerbate financial problems by raising energy costs.

On the basis of these findings, the team recommended cautious and careful study prior to programming additional funds for rural electrification.

Although the evaluation team did examine the effects of rural electrification on overall economic development, agriculture, and health, their report did not directly discuss these effects in the context of food consumption and nutrition. In part, this could be ascribed to the project's minimal impact in some areas, such as agriculture and irrigation; the team probably perceived that consumption or nutritional status would also not change as a result of rural electrification.

The team found that of all socio-economic groups the rural poor were least affected by the project. This underscores the team's conclusion that the rural poor are only likely to benefit from rural electrification if complementary economic development assistance (i.e., through loan programs) is also provided.

Moreover, the team discovered that electrification had a low priority among the rural poor. When asked in household interviews what they would buy if they had surplus money, the majority of the respondents stated they would use it for food, clothing, or improved housing rather than to bring electricity into their homes. The team also found that in a number of cases electricity was not cheaper than kerosene, and that any savings that might

have resulted from lower electricity rates were small. Few of those who used electricity for lighting emphasized the benefit of increased savings. It appeared that whatever savings were accrued went primarily toward the additional purchase of "essentials" (Mandel et al.: 12). It was not specified whether food was among those essentials, but it is logical to assume that it was.

In an interview, the anthropologist on the evaluation team stated that the team was not directly concerned with consumption/nutrition effects. The team was primarily interested in assessing socio-economic impact at the community level, institutional impact such as the development of cooperatives, and macro-economic impact. In the opinion of the anthropologist, food consumption or nutritional analysis was of peripheral interest to the team members. Furthermore, he added, time constraints would have prohibited consumption/nutrition analysis.

Although consumption/nutrition impacts were not included in the team's definition of their tasks, there was interest displayed in how additional income that had been generated from electrification was spent. The team found that lower income groups tended to purchase essential goods, whereas higher income groups often preferred to spend additional income on education, a high priority for many Filipinos. However, because the saving effect of electrification was minimal in regard to the poor, this line of inquiry was not particularly revealing.

Though not examined in the Philippine Rural Electrification Project evaluation, excellent baseline data were available to

study the consumption/nutrition effects of rural electrification. One potentially revealing aspect of such a study would have been whether rural electrification projects affected the supply of potable water. The linkage between electrification and potable water supply was not mentioned in this report.

#### Case Study: Bolivia Rural Electrification

AID funded four electrification projects in Bolivia. The initial grant in 1962 and a loan in 1966 focused on the urban environments of the city of Santa Cruz, while two loans in 1973 and 1974 were almost exclusively used for rural electrification. This evaluation focuses on the impact of the 1973 and 1974 loans, which were designed to improve the social and economic conditions in the rural areas adjacent to six major urban areas. It was assumed that the availability of electric power would stimulate the development of rural industry and irrigation as well as improve social conditions through residential and public service usage. The evaluation took place over a three-week period in May and June 1980, and was carried out by a three-person team comprised of a senior rural development officer, an anthropologist, and an economist. The report (Butler et al.) was published in December 1980.

The team found that average household consumption was lower than projected and that the uses of electricity for irrigation and small industry was "almost negligible...Electric power did not seem to play a catalytic role in the economic development of rural

areas nor to be a pre-condition for it" (Butler et al: iv). Because the new system's capacity was underutilized, the utilities have not generated the anticipated revenues. As a consequence, financial viability has not been achieved. In addition, other anticipated benefits of the project were not achieved. For example, the advent of electricity did not result in educational improvement by allowing night classes, health benefits did not result from the use of electrical equipment in health centers, and public safety did not improve because of public lighting. The team did note, however, that household lighting had improved the physical quality of life for 7 percent of the rural population of Bolivia and that electricity was cheaper, safer, and healthier than traditional lighting sources.

As with the Philippines evaluation, the impact of rural electrification upon food consumption/nutrition was not discussed in the Bolivian project impact evaluation report. Yet certain aspects examined by the evaluation team held definite implications for consumption and nutritional status:

1. Migration. Increased nucleation in rural areas frequently leads to an initial overutilization of health and water facilities, with subsequent negative effects on health. Land prices also rose due to nucleation, forcing the poor to live farther from facilities (Butler et al.: B1-2).
2. Income. The team observed some increased commercial activity and productivity at the village level, but they viewed this as a response to a complex of factors, of which rural electrification was only one. Although individuals could extend their work days at home (i.e. work on handicrafts at night), the team concluded that the impact on production was minor in the Bolivian project.

3. Savings. Because the cost of electricity for household lighting was about one-quarter of the cost for kerosene or candles, it would be informative to know if the savings generated were used to improve the quality of food consumed.
4. Potable water. Though thus far implemented only on a modest scale, the team found potable water projects to be the most potentially significant social use of electric power. As discussed earlier, by reducing the incidence of water-borne diseases, and by facilitating the more efficient metabolism of nutrients, potable water may have substantial impact on improving the nutritional status of local populations.

According to its leader, the team was primarily looking for impacts on production, living conditions, health, and education. They were particularly interested in the clustering of houses in electrified areas; they did not intent to investigate consumption/nutrition effects of rural electrification.

The team leader stated that consumption/nutrition analysis was not very relevant to this project. Consequently, the team was not selected for expertise in this area, and household interviewees were not asked how they spent either increased income or savings.

To summarize, analysis of the consumption/nutrition effects of rural electrification in Bolivia could have benefited by recording how increased income or savings were spent. In addition, the linkages between rural electrification, potable water supply, and public health warrant further investigation.

#### RURAL ROADS PROJECTS

This section deals with the impact evaluations of rural roads projects in three countries: Liberia, Thailand, and Honduras.

The authors also reviewed a yet-to-be published impact evaluation

on rural roads in Kenya. However, since the report was not yet published and since the AID-financed roads had, according to a team member, little overall impact, it was decided not to include Kenya in this review.

Overview: Linkages Between Rural Roads Construction, Food Consumption, and Nutrition

The introduction of a road into a rural area can have far-reaching consequences in a society. The traffic in persons, goods, and services entering and leaving an area is likely to increase; consequently, values and consumers' preferences may change. Some changes in food consumption or nutritional status that may result from road construction follow:

1. Average food consumption and nutritional status may improve because greater commercial activity, increased accessibility, and lower transportation costs can result in increases in productivity and improved family income. Food prices may decrease as a result of lower cost agricultural inputs, greater accessibility to extension activities, and lower transportation costs. These lower costs could stimulate demand for higher levels of agricultural production.
2. Food consumption and nutritional status for lower income groups may decline even if production and income increase, depending on how benefits of increased production and income accrue. (In a stratified society, benefits of change usually accrue disproportionately to those who control existing resources.)
3. Diets may become diversified, resulting in improved or declining nutritional status. More types of products would probably become available locally, such as low-fiber, high-sugar processed foods, and alcoholic and carbonated beverages. Also, local agriculture might become more diversified in response to market demand.
4. Expanded contact and communications not only with nearby urban areas but also with national and international markets might eventually alter consumption decisions.

Combined with greater diversity in available food, consumption and nutritional status may change dramatically.

5. More job opportunities could result from the growth in commercialization that often accompanies rural road construction. Some of these changes have a negative effect on consumption and nutrition; for example, greater off-farm job opportunities for women may result in a decline in home gardening. Also, some job opportunities tend to induce male seasonal migration; this often creates single parent families, doubling the burden on female heads of household.
6. Road construction may, in the long run, alter patterns of resource distribution. For example, land closest to rural roads is likely to increase in value; this might result in poor farmers being pushed onto marginal agricultural land. The consumption/nutrition effect would be negative for those farmers.
7. Increased incidence of disease often accompanies the construction of roads and the increased movement of people and animals. Intestinal diseases and parasitic and other infections adversely affect absorption and utilization of otherwise adequate consumption intakes.
8. Road building can lead to altered ecological patterns reducing protein-rich game and fish and destroying forest and soil resources through short-term exploitation, introducing too many people into an area, overgrazing, growing inappropriate crops, and using inappropriate cropping techniques.

Keeping these possible impacts in mind, let us look at the three impact evaluations and their findings for examples of such analysis.

#### Case Study: Impact of Rural Roads in Liberia

Between 1969 and 1980, two rural roads projects were implemented in Liberia with AID loan funds, resulting in 155 miles of all-weather laterite roads. The projects were initiated to improve agricultural production, to increase business and marketing activities, and to expand the reach of welfare and

social and political goals. No explicit consumption/nutrition goal was mentioned, although Liberia had reported little severe malnutrition before the projects were undertaken (Cobb et al.: 2).

A five-member evaluation team from AID/Washington and the Department of Transportation conducted an impact evaluation of the projects over a seven-week period in 1980 including three to four weeks in Liberia in February 1980. They were assisted in-country by research assistants, AID mission employees, and Liberian government officials. The team administered traffic surveys, reviewed two Liberian censuses, and collected and analyzed interview data obtained from farmers and officials. They used a purposive sample of types of sites and roads. Their report was published in June 1980.

The team found that the roads had a mixed impact. The roads reportedly resulted in cheaper transportation, improved the availability of educational opportunities, the amount of cash crop produced, and access to health care and markets. The environment (especially soils) suffered detrimental impacts. There were also problems associated with a lack of popular participation in development activities, and the loss of land use by small, poor farmers requiring increased migration of women and elderly to remote areas to make new farms.

The team concluded that the emphasis on cash cropping results in the increasing dependency of farmers on purchased foods, often of foreign origin, thus making them "more vulnerable" to distant patrons and fluctuations in prices (1980: 18).

The report also mentions that while there was an expansion in acreage farmed due to the roads, it was for tree crops and did not involve either an increase in quantities of food produced nor an increase in acres grown per farm. The conclusion was that improvements in agriculture were not reducing the food deficit of Liberia. The team explored the labor requirements of tree crops, pointing out that periods of peak labor needs of food crops partly overlapped with those of tree crops. The team observed a stagnation in food production and predicted a decline in subsistence production due to expanding tree crop production.

There were other issues brought up in the report for which consumption/nutrition links had not been developed as clearly; for instance, the increased incidence of water-related diseases, such as malaria and schistosomiasis, is mentioned. However, not mentioned are the effects on nutritional status of these diseases (for example, the underutilization of food ingested [See Keuch 1979]), and socio-economic costs to food availability arising from labor losses. Another example of an issue for which nutrition links have not been developed is the effect of increased income on food purchases (Cobb 1980: 11). The report highlights the improved buying power of farmers living near roads, but the nature of the goods purchased is not clearly explored so that improved food consumption patterns can be detected. The report describes the displacement effect of the rural roads project when women and the elderly migrate farther from the roads to grow small subsistence gardens, but the need for additional caloric intake

required by people who must travel between remote gardens and roadside farms where cash crops are produced is only implied.

Despite the necessarily brief nature of the report, it does raise a sufficient number of issues to imply that nutritional status in rural Liberia was, and will continue to be, affected by the rural roads. In an interview, a team member said that the focus of the evaluation was on studying the expanded choices that resulted from the roads projects. That is, the team wanted to know how people's choices increased or decreased due to the new roads. The team planned to investigate the quality of consumption and to study if people with increased incomes were able to buy more food as well as diversify their diets. The interviewee said that the team assumed that increased income would tend to result in enhanced consumption, including more dietary variety. Again, the team's focus was on availability and choice and not on measuring improvement at the household level. (It is understandable, of course, that the time constraints on the study prevented a great deal of household-level primary data from being gathered.)

According to the team member, analysis of project consumption/nutrition effects by the team was limited by the lack of three inputs: 1) time, 2) a nutritionist on the team, and 3) baseline data. The interviewed team member stated that the project's major consumption/nutrition impacts would probably be a function of higher income in conjunction with greater market choice. He rated the analysis of consumption/nutrition impacts as highly significant in the matrix of interconnected quality-of-life

variables. He stated that a deeper analysis could be undertaken if more time were allotted to link project implementation with changed consumption/nutrition. However, given the purposes of the impact evaluations, he questioned the cost-effectiveness of undertaking such analysis.

Case Study: Rural Roads in Thailand

AID made grants to the Accelerated Rural Development program of the Thai government between 1964 and 1974 totaling \$65 million for road building and other basic infrastructure projects within the sector. The goals of the ARD program included the following:

1. To win loyalty of the people
2. To increase rural income
3. To increase integration of rural areas with the national government
4. To promote effective local government.

Improved food consumption and nutritional status was not an expressed goal.

In July 1980 a team of five social scientists including two AID/Washington staffers and one Thai anthropologist spent three weeks in Thailand to evaluate the impact of completed road building activities in the ARD program. Their report was published in December 1980 (Moore et al.).

The evaluation report on rural roads in Thailand deals with consumption and related topics within the general context of political/institutional, social, economic, and environmental

impacts. The team concluded that everyone received some benefits from rural road construction (1980:3), and inferred that for many these benefits included increases in real income. The report stated, "In the first instance, then, the welfare curve merely shifts to a higher level without any essential change in shape. The poor remain relatively poor, although a whole range of new services and new experiences to which the roads provide access enhances their potential for economic and social mobility" (1980:16).

Diversification in food availability was mentioned several times in the report. Not only did rural farmers diversify their output, but a greater diversity of goods became available in local markets. "For everyone, the easier and more frequent access to town leads to increased availability of a wide range of foods, including fresh fish and meat, in the local market. This helps to promote a more varied and nutritious diet" (1980: vii). However, aside from this statement, no data in the report support the thesis that diets of target beneficiaries (the rural poor) actually became more nutritious after roads were completed.

The report describes project impacts, such as "increased flow of ideas" and "modernization," and mentions that "growth of opportunities" took place in many domains (1980:7). Increased job opportunities are mentioned, particularly for women. The subject of changes in labor availability is not discussed in the context of domestic food production except for the observation that women

expect to return home from the cities during important times in religious festivals and agricultural cycles (1980:8).

Two possible results of changes in consumption/nutrition patterns are not treated as fully as they could be. Although the spread of epidemic and contagious disease was reported as an unfortunate effect of road projects, the impact of endemic and chronic infection on at-risk groups,<sup>1</sup> increasing nutrient requirements for recovery and subsequent growths, was not treated. Furthermore, the issues of displacement of home food crops by cash crops was not fully explored in the report. This omission is probably due to the difficulty of separating rice grown for home consumption from rice grown for market production.

In an interview with a team member, the subject of the effects of the rural roads on consumption/nutrition in Thailand was raised. He reported that the team assigned priorities to possible impacts prior to the fieldwork; food consumption was not selected as a topic of major importance. The issues identified for emphasis were those related to the immediate impacts of road construction, such as effects on travel, transportation, agriculture, and production. Furthermore, according to the team member, the team did not regard malnutrition as a great problem in Thailand and concluded that people did not change what they ate as a result of changes brought about by road construction. When

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<sup>1</sup>See Keuch 1979 for discussion of this phenomenon.

asked how income increases in Thailand were utilized, the team member replied that interview data indicated that expenditures on transportation, education, health, and agricultural inputs were viewed as the most important expenses by the target population.

Nevertheless, there are some questions bearing directly on the issues of benefit incidence that could easily have been addressed by the team:

1. How does the increased employment of women affect home food production, processing, and consumption?
2. How have changes in income, food availability, and the influx of new ideas resulted in changed food consumption patterns?

#### Case Study: Honduras Rural Roads

In June and July 1980, a four-member team comprised of a team leader, an anthropologist, a transportation expert, and a development economist, spent three weeks in Honduras evaluating two AID rural roads projects. The first of the two projects was a \$15.2 million loan approved in 1965 for the construction of 16 all-weather roads totaling 602 kilometers. The second project evaluated was a \$1.75 million farm access roads project that was part of a larger agricultural sector loan program approved in 1974, and was designed to assist selected farm groups by connecting cooperatives' fields to the nearest all-weather highway. The team's report was published in January 1981 (Hamilton et al.).

At first glance, the results of the earlier feeder roads appear less than satisfying. Of the 16 all-weather roads planned, just 4 were completed by the project's termination date totaling

only 113 of the 602 kilometers originally planned. Upon closer examination, however, the project had provided opportunities for local firms to bid on small contracts, stimulating the formation of Honduran firms that have since handled the bulk of the country's road construction. The farm access roads program, on the other hand, was more successful in meeting its major objective, completing 53 access roads that reached 61 farmers' cooperatives.

Case studies from the feeder road project revealed that local populations received a number of benefits from these roads. Generally, the roads helped bring additional land into cultivation as well as increase production of cash crops; these facts combined with the greater availability of fertilizers and other agricultural inputs resulted in higher average yields. Those farmers who were successful in shifting their cropping patterns experienced income increases of three to four times that of previous subsistence levels. Also, more employment opportunities were generated by increased production. Furthermore, having easier access to urban centers increased the rural population's use of urban social services.

The team noted, however, that corollary policies and economic circumstances exercise a strong influence over whether or not roads have a beneficial impact and who receives the benefits. Without the appropriate policy support, road projects might actually lead to a concentration of land ownership among fewer owners, and hence to the deterioration of the small farmer's

position. The team concluded that the success of road projects in improving the standards of living of small farmers and landless workers depends heavily upon whether or not policy supports are forthcoming, targeted, and sustained. Without additional development activities, the team concluded, "...at least in Honduras, the roads do not automatically result in higher production and income for small farmers" (Hamilton et al.:iv).

The effects of rural roads projects on consumption and nutrition were only implied while the effects on agricultural production were explicitly analyzed. One team member stated in an interview that the primary concerns of the Honduras roads project evaluation were with the social changes that may have occurred (i.e., changes in family planning, women's roles, life styles, family incomes, and health status). These priorities were based on a definition of basic human needs that emphasized education, income, and health.

In the course of the interview, the same team member was asked what he thought the linkages were between the Honduras road projects and consumption/nutrition. The interviewee responded that changed consumption patterns may have resulted from diversification in gardening, cash cropping, greater access to markets and an intensified exposure to Western culture. In addition, the interviewee noted that real income seemed to have increased. The interviewee stated that team members were keenly interested in consumption/nutrition issues; in fact, the team did try to estimate the quantity of crops grown for household consumption through

interviews with farmers (Farm Budget Data Sheet Format, Appendix B). However, since the team was more interested in income than nutrition, nutrition issues received little attention in the team's final report. The team member interviewed reported that team priorities reflected Congressional priorities.

An analysis of the consumption/nutrition effects of rural road construction in Honduras might have indicated significant, policy-relevant issues. Because cash crops are almost exclusively grown by cooperatives, it is relatively easy to distinguish them from crops grown for household consumption. This distinguishing feature could have greatly facilitated the measurement of consumption effects of rural roads projects, which in turn might have furnished decision-makers with valuable information for improved policy formulation.

## CONCLUSIONS

### The Conduct of Impact Evaluations

The review of these nine impact evaluation reports brings to light several general issues which ought to be emphasized. First, time, cost, and personnel constraints precluded attempting certain kinds of systematic data collection. Team members frequently complained that usable food consumption and nutrition data was impossible to collect in the extremely limited fieldwork time allowed. In the opinion of the authors, however, usable food consumption and nutritional status data can be obtained and analyzed if adequate personnel and priorities are assigned to the task.

While nutrition intervention and education projects are important methods for dealing with certain kinds of acute nutritional problems and are evaluated accordingly, it must be recognized that AID projects such as these nine may have as much, or greater, impact on food consumption. Apparently, many team members assumed that food production, household income, and food availability were adequate indicators of household food consumption and nutritional status. While these factors are certainly related to consumption/nutrition, the assumption that any of these variables directly reflects changes in household-level nutritional status is simply not valid.

A second issue to be emphasized is that the teams often lacked expertise and background in food consumption and nutritional status analysis. Given such lack of familiarity, they were likely to investigate aspects more closely aligned with their training and prior experience, such as income levels and production changes.

Third, because of the teams' orientations, projects in agricultural research, potable water, irrigation, rural electrification, and rural roads were not expected to have an impact on food consumption and nutritional status.

Fourth, the project design, and implementation and monitoring frameworks rarely included nutritional status or food consumption measurements, even though the goal of many projects was to improve well-being by expanding food availability and utilization. Therefore, team members often felt it was unfair to evaluate

projects on criteria of success imposed after the fact even though impact evaluations are supposed to assess unanticipated consequences.

Fifth, team members strongly believed that food consumption and nutritional status data are so difficult to collect and analyze that it would not be cost-effective to do so. (However, impact evaluations of nutritional programs [i. e., Gilmore et al.] do analyze such issues under the same constraints.)

Water, electrification, and roads projects pose no unusual problems for the evaluation of consumption, except for the issue of sorting out which change created which impact: the issue of intervening variables. Potable water projects in particular had unanticipated, favorable nutrition effects despite not having attained their health and sanitation goals.

#### The Content of Project Evaluation and Analysis

All types of projects that have impacts on health, education, income, production, employment, and other areas targeted for development frequently have impacts on food consumption, and they may also have an impact on nutritional status. For instance, food consumption can be altered by changes in income, educational level, and employment. However, in the types of stratified societies found in most developing (and developed) countries, aggregate changes in production or income cannot be assumed to reach the lowest social strata and affect the quality or quantity of food consumed. It cannot be assumed, even when cash income

increases in a given household, that overall consumption/nutrition patterns have improved, especially when increases in cash income are accompanied by declining production for home consumption.

Therefore, project analysis, whether in the design, implementation, or evaluation phase, should always attempt to consider the following factors:

1. The nature of pre-project food consumption, accounting for seasonal variation
2. The pre-project social structure of household and community which affect food resources and distribution
3. Project strategy for maximizing positive consumption/nutrition benefits
4. Unplanned impacts, such as crop substitutions and labor shifts
5. Changes in types and quantities of food consumed
6. Changes in income, expenditures, and prices.

A more complete list of issues related to food consumption and nutritional impacts is recommended for inclusion in the Impact Evaluation Handbook. It appears in Appendix D.

### Recommendations

In addition to incorporating the guidelines for impact evaluation teams into the Handbook, the following measures should be taken into account in order to insure appropriate inclusion of consumption/nutrition concerns:

1. Timing Problems
  - a. In order to maximize short in-country experience, teams should be better prepared before field work is attempted.

- b. Some time should be allowed to elapse between the completion of research projects and the impact evaluation.

## 2. Personnel

- a. Projects with anticipated consumption or nutrition impacts should be evaluated by a team that includes the appropriate expertise.
- b. If trained personnel are not available, those who are on the team should be made aware of the necessity of considering nutrition and consumption concerns, and they should become prepared to analyze these concerns.
- c. The guidelines in Appendix D should be of use in focusing nonspecialists on consumption/nutrition issues.
- d. Team members should be encouraged to consult with specialized experts before designing the evaluation procedures to make up for possible training deficiencies.

## 3. Project Design and Project Paper Preparation

Baseline data collection should be encouraged as a routine part of project design when nutrition or consumption and nutritional status indicators are within the logical framework of the project.

## 4. Methodology

Methods should be developed that could be used in a short time frame (three to four weeks) to measure the consumption/nutrition impacts of projects. These could include protocols for observing the presence or absence of certain phenomena, for developing techniques for surveying settlement patterns, and for establishing proper procedures for stratifying samples.

The successful implementation of these recommendations would greatly improve project management from its design to the final evaluation by accurately and cost-effectively considering food consumption and nutritional status effects.

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APPENDIX A

List of Team Members Interviewed

Edward Butler  
Douglas Caton  
Lisa Chiles  
Richard Cobb  
Mike Demetri  
Daniel Dworkin  
Patrick Fleuret  
Gerald Hickey  
Twig Johnson  
Emmy Simmons  
Dick Suttor

APPENDIX B

Interview Schedule  
by Elizabeth Berry

The following is a list of questions prepared for the purpose of interviewing evaluation team members. However, in some cases the list was not strictly adhered to, especially if the person being interviewed had given little or no thought to the consumption/nutrition impact of AID projects.

1. What was the team's implicit or explicit definitions of basic human needs?
2. What was the team looking for? What sorts of impacts were you most concerned with?
3. Were the consumption/nutrition effects of this project in your original scope of work for evaluation? If not, why not?
4. Were consumption/nutrition impact evaluations made? If not, why not? If so, what could have been done to further address these issues?
5. What were the constraints in your team's undertaking consumption/nutrition impact analysis?
6. Did you notice some possible consumption/nutrition effects, but not include them in your report? What were they? Why were they not included?
7. Was baseline data available for analysis of consumption/nutrition effects?

8. What additional data gathering effort would have been required to measure consumption/nutrition effects adequately?
9. Generally, what sorts of linkages might exist between implementation of this type of project and food consumption/nutrition?
10. Do you think it's important to evaluate the consumption/nutrition effects of this sort of project?
11. If the team had wanted to evaluate consumption/nutrition effects further, what would the constraints have been?
12. Did team interest and/or expertise exist for analysis of consumption/nutrition effects of this project?
13. Generally, how could project design or other aspects of programming change in order to support more comprehensive analysis of consumption/nutrition effects of AID projects?
14. Would it be possible to link, either directly or indirectly, this project's implementation to changed consumption and/or nutrition?
15. Do you think a follow-up visit by a team concerned with consumption/nutrition effects would be appropriate in the case of this project?

APPENDIX C

HONDURAS RURAL ROADS EVALUATION

Farm Budget Data Sheet Format Date \_\_\_\_\_

Project Title \_\_\_\_\_

Country: \_\_\_\_\_ Region: \_\_\_\_\_

Production Credit Loan Interest Rate (if any): \_\_\_\_\_

Wage per day for family and unskilled labor: \_\_\_\_\_

Maximum family labor per year (monetary units): \_\_\_\_\_

Project Life: \_\_\_\_\_ Project Type: \_\_\_\_\_ Project No. \_\_\_\_\_

Unit Measure: 1) \_\_\_\_\_ 2) Weight \_\_\_\_\_ 3) Currency \_\_\_\_\_

Total Farm Size: \_\_\_\_\_ Number of Farm Products: \_\_\_\_\_

Sensitivity Runs: (State which account is to be varied)

<u>Run No.</u>	<u>Section numbers to be varied each run</u>	<u>Respective rates of variation</u>
1.	_____	_____
2.	_____	_____
3.	_____	_____
4.	_____	_____
5.	_____	_____
6.	_____	_____



Home  
Consumption  
by Crop

YR 1

PRESENT

1. _____	_____	_____
2. _____	_____	_____
3. _____	_____	_____
4. _____	_____	_____
5. _____	_____	_____
6. _____	_____	_____
7. _____	_____	_____
8. _____	_____	_____

Farmgate Prices  
Crop

Price per  
Unit Weight

1. _____	_____
2. _____	_____
3. _____	_____
4. _____	_____
5. _____	_____
6. _____	_____
7. _____	_____
8. _____	_____

Additional Cash Income and Expenditures

Production Credit Purchases (expenditure matrix)

Fert: \_\_\_\_\_ Pest: \_\_\_\_\_ Fencing: \_\_\_\_\_ Insect: \_\_\_\_\_  
Seed: \_\_\_\_\_ Others(specify): \_\_\_\_\_

Intermediate Credit Purchase

<u>Purchased Item</u>	<u>Amount</u>	<u>Year of Purchase</u>	<u>Grace</u>	<u>Term</u>	<u>Int. Rate</u>
1. _____	_____	_____	_____	_____	_____
2. _____	_____	_____	_____	_____	_____
3. _____	_____	_____	_____	_____	_____
4. _____	_____	_____	_____	_____	_____
5. _____	_____	_____	_____	_____	_____
6. _____	_____	_____	_____	_____	_____
7. _____	_____	_____	_____	_____	_____
8. _____	_____	_____	_____	_____	_____

Other Non-Credit Cash Income and Expenditures

<u>Item</u>	<u>YR 1</u>	<u>PRESENT</u>
1. _____	_____	_____
2. _____	_____	_____
3. _____	_____	_____
4. _____	_____	_____
5. _____	_____	_____
6. _____	_____	_____
7. _____	_____	_____
8. _____	_____	_____

Pre-Project Income

First Year Value \_\_\_\_\_

Other Income \_\_\_\_\_  
Present \_\_\_\_\_

Economic Benefits and Costs

<u>Item</u>	<u>YR 1</u>	<u>PRESENT</u>
1. _____	_____	_____
2. _____	_____	_____
3. _____	_____	_____
4. _____	_____	_____
5. _____	_____	_____
6. _____	_____	_____
7. _____	_____	_____
8. _____	_____	_____



## APPENDIX D

### Issues Related to Food Consumption and Nutritional Impacts

#### Questions relating to Project Setting

1. What were national policies on food production, subsidies, and imports prior to the project's implementation?
2. What was the food production and nutritional impact development strategy of the government?
3. What were the national health and nutritional indicators of well-being?
4. How did the region in which project activities took place compare to other regions in the nation with respect to diversification or specialization of food production and market dependency?
5. What was the subsistence base for most families at the village level? What were the class differences in total food consumption, market dependency for food stuffs, and proportion of subsistence production?
6. What foods were consumed regularly, occasionally, and seasonally?
7. What nutritionally-related diseases were present: i.e., protein calorie malnutrition, marasmus, kwashiorkor, anemia, parasitosis, gastro-enteritis, beri-beri, pellagra, xerophthalmia, keratomalacia, rickets, osteomalacia, scurvy, goiter?
8. What were sex and age differences in control over food resources and distribution of food within households?
9. What were key food beliefs, taboos and preferences?
10. Did people use cash or barter transactions to make purchases, including food and non-food items?

#### Questions relating to Project Description

1. To what extent did the project paper give consideration to the nutritional status of the target group or area?
2. Was nutrition a stated project objective?

3. Did the project design team include anyone knowledgeable in nutrition, food, or consumption/nutrition economics?
4. Was the project strategy capable of reaching a consumption/nutrition objective?
5. What outputs of the project indicate nutrition impact?
6. If improving nutrition was a project goal or purpose, what means of evaluation were planned?

Questions relating to Project Impacts

1. Were nutritional goals, targets, purposes achieved?
2. Were there unplanned consumption or nutritional impacts; e.g., crop substitutions; labor shifts from auto-consumption to market production activities?
3. Did the food policy climate change during the implementation of the project? For example, were the following introduced, eliminated or changed: Price supports, subsidies, food stamps, land reform?
4. Had there been any changes in the types or quantities of food consumed by households?
5. Had nutritional status changed for different socio-economic groups?
6. Had household income changed?
7. Had household expenditures changed, comparing food and non-food items?
8. Had there been shortages of any foods? What were these due to?
9. Had there been changes in the incidence of nutritionally related diseases?
10. Had there been price effects as a result of changes in supply or demand?
11. In projects with food donation components, what were the substitution, production, and income effects of such aid?
12. Were non-beneficiaries of food aid impacted by price or production effects?
13. What was the impact of food aid on the nutritional status of beneficiaries and non-beneficiaries?

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14. What was the impact of the end of the food aid program on nutrition and consumption of beneficiaries?

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