PDWAE078

December 16, 1986

MEMORANDUM

TO: S&T/N, Nick Luykx

FROM: S&T/N, Ike Hatchimonji

SUBJECT: Evaluation Planning for the Vitamin A Household and Community Gardens Project

On reviewing the recent paper by Patricia O'Brien-Place, Evaluation of Home Garden Projects and considering the resources we have in the NEG and the new Nutrition-in-Agriculture IQC, it seems appropriate to suggest some actions that could be taken to improve the Vitamin A Household and Community Gardens project and which could benefit other similar activities.

Tricia's paper contains some useful evaluation guidelines in determining the cost effectiveness of consumption based nutritional gardening interventions that would be supportive of and complement the design of the vitamin A project. The timeliness of the paper gives us an opportunity to use the guidelines for this first-project-of-it's-kind activity in Africa and because of the mixed record of gardening projects, we need to focus on ways to assure success. As Tricia says there "is a need for a consistent method of evaluating home gardens." Documented evaluations of projects are also needed to convince other donors of the importance of the project, especially those focussing on vitamin A.

As an example of what initial steps can be taken, before the year one assessment phase begins, an evaluation plan should be designed. In the plan, the objectives of the project should be defined and the criteria against which the project can be evaluated decided upon. Factors such as vitamin A status, dietary intake, food preferences and constraints are stated as part of the assessment. However, the resources of NEG and the new IQC could be utilized as ready sources of skills in these areas or where the AVRDC may not have that much depth. These services would supplement and strengthen what we now have. The objectives of the new IQC coincide with the project and should be used for various activities - design, analysis, evaluation and preparation of case studies on food consumption and nutrition issues that would be useful for this and other gardening activities. Changes in vitamin A status of the target group could be ascertained during the life of the project, as part of an overall impact evaluation. Also, the training curriculum design could be modified, if needed, according to analyses of data collected.

In the Analysis and Synthesis section of Tricia's paper, cost effectiveness and benefit - cost ratios are explained as indicators used in evaluations. Cost effectiveness seems more appropriate for the vitamin A gardening project and since evaluation planning will take place in the assessment phase, the opportunity should be taken for work in this area. Again, data on cost effectiveness would be highly useful in the evaluation and as convincing information for proposals of other activities.

In considering the foregoing suggestions, the role of AVRDC should be clearly understood within the context of the project. Whatever inputs that are used outside of AVRDC's role are meant to improve and support the activities of the project. Coordination however is vital so as not to overshadow the role of AVRDC as the primary implementor of the project.

cc: S&T/N, Sallie Mahone
AVRDC, Jack Gershon

S&T/N:IHatchimonji:lm:12/12/86 #2266E

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EVALUATION OF HOME GARDEN PROJECTS

November 1986

by

Patricia M. O'Brien-Place

for
Nutrition Economics Group
Technical Assistance Division
Office of International Cooperation and Development
United States Department of Agriculture

A report prepared under RSSA-BST-1171-R-AG-3125-01
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Foreword

The Nutrition Economics Group was created in 1977 with funding from AID's Office of Nutrition. The Group's staff of economists help AID implement a program of applied research and technical assistance designed to assist developing countries integrate food consumption and nutrition concerns into their agricultural planning, programming and policy making processes. Located within the Technical Assistance Division of the Office of International Cooperation and Development (OICD) within the Department of Agriculture, the Group can draw on a wide variety of other specialists from within the Department as well as the U.S. land grant university system to complement its work.

The Group has been concerned with improving the cost effectiveness of nutrition interventions as well as the consumption effects of agricultural policies, programs and projects. This paper originated with a request from AID/Office of Nutrition to increase economic evaluation efforts and comparability of evaluation data across home garden projects (and components) as sponsored by PVOs and AID. This paper is seen as a first step in developing an evaluation protocol which could be tested by tOe PVOs, revised as necessary, and eventually applied to all home garden projects.

Dr. Patricia M. O'Brien-Place, the author, is an agricultural economist on the NEG staff. She was given the responsibility of writing this paper given her prior knowledge of evaluation of nutrition interventions for the World Bank and her interest in farming systems work which include gardens, at least theoretically.

As background for this report, O'Brien-Place (1) discussed the reasons for improved evaluations with AID personnel and others in Washington, D.C.; (2) attended the XIII International Nutrition Congress in Brighton, England, August 1985, in order to participate in the session on home gardens and to meet with home garden practitioners from the international organizations; (3) visited the Asian Vegetable Research and Development Center (AVRDC) in Taiwan to observe their home garden research program, their outreach efforts in Thailand, and their evaluation efforts for both.

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In addition, thanks to all those with whom I talked whose names are listed in Appendix A.

I especially wish to acknowledge those who took further time and effort to review this paper and offer suggestions for its improvement: Dr. Donald Ferguson (USDA/OICD), Ms. Maura Mack, Mr. Bart Ensing and Dr. Georg Frerks (Wageningen University, The Netherlands).

Finally, many thanks to Mary Clory and Diann Robinson for their patience and assistance with the typing.

Tricia O'Brien
October 1986

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I. BACKGROUND AND OBJECTIVES

The need for a consistent method for evaluating home garden projects is obvious as a result of recent reviews of the home garden project literature [Brownrigg (1985), Ninez (1984)]. Most evaluations have occurred ex post and have varied from highly technical and thorough reviews [Issariyanukula, et. al. (August 1985), Swift (1980)] to descriptive accounts [Yoon (1983), Van Eijnatten (1978)]. These evaluations are a wealth of information, but due to the inconsistencies between them, little or no comparative analysis is possible. Thus, no general picture of the benefits and costs of home garden projects can be drawn.

A clear accounting of the benefits and costs of home garden projects is needed in order to provide documentation to donor agencies of the efficacy of home garden projects. As stated in the introduction to Brownrigg's review

> ...as long as potential donors cannot clearly see what benefits they are 'buying' if they support home gardening projects, and thus whether they are cost-effective compared to other interventions, they are likely to remain unwilling to invest heavily in them." [Brownrigg (1985), p. IX].

In addition to convincing donors of the usefulness of home garden projects, the implementors of projects themselves need evaluations in order to achieve effective projects consistently. Evaluations can provide better information on what programming successes and problems are occurring. This information in turn allows for intentional replication of successes.

The main objective of this paper is to provide an initial method for documenting through evaluation, the benefits and cost efficiency (or lack thereof) of home garden projects. The steps in developing this method will be to

- define a framework for evaluating home garden projects
- describe the data needed for evaluation
- provide alternative methods of analyzing the data including suggesting a limited number of indicators which should be derived for all home garden projects to provide cross-project comparisons
- discuss the limitations inherent in the evaluation methods suggested by this paper.

II. DEFINING A FRAMEWORK FOR EVALUATION

Evaluation has different definitions depending on the type of project

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being evaluated, the stage of the project, and the professional background of the evaluator. This section will discuss evaluation as it theoretically should be from the perspective of nutrition evaluation specialists and define the term evaluation as it will be used in this paper.

A. Evaluation in Theory

The first two steps in any evaluation should be:

- defining the project you are evaluating
- deciding on the criteria against which the project is to be evaluated.

Defining a project consists of expressing the plan for the project. The major objectives of the project (explicit and implicit) provide the criteria for evaluation.

After these preliminary tasks are accomplished, three more stages of evaluation need to be addressed before the net outcome of the project can be determined [Mason and Habicht (1984), p.26]. These stages are

- evaluating the plan for the project: are the objectives fully and clearly specified and are inputs compatible with objectives? do implementation, targeting, and outcome objectives follow from each other?
- evaluating the implementation of the project: is the intended target group being reached? is delivery going as expected? do deviations from the original objectives effect the expected outcomes? how can implementation be improved?
- evaluating gross outcome of the project: choose outcome indicators, measure gross outcome given available data, is this outcome adequate? is further data needed?
- evaluating net outcome of the project: comparison of gross outcome with costs [Mason and Habicht (1984), pp. 29-41].

An assumption behind this paper is that the above stages will be performed in the order indicated, either in full or in part, before an evaluator moves to evaluating the net outcomes of the project. If a project fails at any stage, then one should not attempt the next stage for the results will be necessarily based on insufficient or contradictory data. For instance, trying to evaluate the implementation of a project when there were no clear objectives in the plan of the project will necessitate guessing the original objectives or providing ex post objectives.

B. Evaluation for Home Garden Projects

Home garden project evaluation is a method for determining the effectiveness of a home garden project in improving the diet and/or the income of households, while keeping the costs of the project within limits consistent with the project area's income. As stated above, the first steps in evaluation are to define the "project" and to decide on the criteria it will be evaluated against. The next two subsections deal with these issues.

1. Defining Home Garden Projects

Given the variety of home garden projects, inherent differences across countries and project implementation and funding agencies, other papers [Brownrigg (1985), Ninez (1984), Binkert (1981), and others] have gone into great detail to define gardens. Simply put, gardening is, in reality, a very intensive form of agriculture. It usually involves the use of high levels of inputs per unit of land area as compared to inputs used for field crops. The resulting garden output per unit area is "high", justifying the higher level of inputs. Given both the higher level of inputs and outputs, gardens are generally located near the household to ease transport of inputs and outputs, and to ensure the produce is not stolen or injured by animals. To provide further security for the produce, gardens are often inside the homestead (for example, African compound farms) or fences. Home gardens are usually multifunctional, multi-storyed, mixed cropping systems which have varying levels of adaptation to the ecological environment. That is, gardens produce items for food, utensils, and fuel (multifunctional). They include tree crops as well as ground crops (multi-storyed) and these crops are intercropped (mixed cropping systems). In addition these gardens can range from the Western version with its rows of vegetables and high use of purchased inputs, to the Asian version which looks like a slightly tamed jungle and utilizes few purchased inputs.

Therefore, "gardening" as the term is used in this paper, can include not only vegetables, but perennial food crops (e.g. taro), fruit bushes and trees, fish ponds, and small livestock when these are used together in a systematic way to ensure home food supplies. For the purposes of this paper home (or school or community) gardens will be defined as <u>the intensive use of land and other resources</u> (household wastes, fertilizer, seed, livestock, etc.) <u>near the household</u> (or school or community) <u>for the production of food, largely intended for use by the household</u> (or school or community) <u>members.</u>

In order to define home garden projects, one must first clarify the difference between projects and programs. A "program" is a well-defined set of activities designed collectively to accomplish certain broadly stated goals and objectives. A program may be composed of several sub-programs or "projects". For example, a country may have an extension program designed to encourage the adoption of more productive technology and methods by farmers with the objective of increasing the agricultural output for the country. A home garden project could be a part of this program with the objective of increasing the productivity of home gardens in order to

improve rural food consumption through training of rural people. Such a project could be financed by a private voluntary organization (PVO) or an expatriate development agency (e.g. AID). The distinction between "program" and "project" needs to be made, so that the objectives of the program do not become confused with those of the project.

2. Criteria for Evaluating Home Garden Projects

The wide variation in home garden projects and in their intended objectives, along with the large number of organizations performing them, results in different goals and objectives for home garden projects. These goals and objectives in turn result in different criteria for evaluating the projects. Table I lists some of the possible criteria, and illustrates the data necessary for two approaches to evaluation that have been practiced to date.

The two evaluation methods illustrated in the table follow from a review of the home garden literature on economic evaluation. The alternatives are:

- the general, unstructured gathering of data practiced on most home garden projects; and

- a detailed economic evaluation as developed and practiced by the Asian Vegetable Research and Development Center (AVRDC) in Taiwan and Thailand.

Although additional methods have been practiced, these were the only two methods which have been repeated significantly. Several variations of the AVRDC evaluation protocol have existed during its development. Prior variations of it have been applied by others to projects domestically and abroad, but again not in a systematic manner. The information presented in the table is a theoretical amalgam of these approaches for purposes of illustration.

The criteria presented are a compilation of those mentioned to the author during interviews with people working with or interested in home gardens (see Appendix A). Criteria in any actual case necessarily follow from answering the questions: who is doing the evaluation? for whom? for what purpose? [Mason and Habicht (1984), p. 27]. The answers to these questions for the purposes of this paper and according to information gleaned from interviews are

- Who?
  = Present project staff not professionally trained in evaluation

- For whom?
  Two possible answers
  = donor (funding) agencies
  = implementation agencies

TABLE I: Illustration Of Past Evaluation Methods

CRITERIA (data required)	ALTERNATIVES (data collected)	
	Unstructured Information	Detailed Economic Evaluation
Provide economic benefits:		
amount of food produced	self-estimates for season by crop and household	weekly production
market value of food produced	none	market prices obtained
amount of produce sold or bartered	self-estimates of total sales for crops as a group	weekly sales
time saved in going to market for food	none	none
Economic costs must be reasonable:		
cost of inputs (seed, etc.)	intended cost to participants estimated a priori	weekly
labor time and/or cost	none	weekly
alternative uses of labor or market wage	none	weekly
project costs	original estimates plus updates	original estimates
Provide nutrition benefits:		
nutritional content of food produced	general estimates of a few nutrients for the total crop	specific estimates of calories, protein, & vitamin A by crop (and sometimes by variety)
household nutritional needs	anecdotal information based on other studies	per capita requirements based on household structure

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CRITERIA (data required)	ALTERNATIVES (data collected)	
	Unstructured Information	Detailed Economic Evaluation
Promote community development:		
Participation levels in other community activities	anecdotal information	none
Households not in project area who are adopting methods	estimates by project staff	none
Programming issues:		
availability of inputs	anecdotal information	none
coverage of extension	self-reports by participants	none
sources of inputs after the project is over	none	none
choice of crops by households (which and why)	anecdotal information	reasons can be derived from data gathered
variety choice and why	none	can be derived from data gathered
Household background data:		
households participating	number on annual basis	number on weekly basis
family composition	none	age-sex distribution
socioeconomic information	anecdotal information	income and farm data
Baseline data:		
Type of gardening activities	anecdotal information	none
Number of households participating	anecdotal information	none

CRITERIA (data required)	ALTERNATIVES (data collected)	
	Unstructured Information	Detailed Economic Evaluation
Nutritional status of households	information based on previous studies	none
Evidence of labor availability	anecdotal information	none
Constraints to gardening	usually collected	some information
Audience for evaluation:		
Convince Donors that home garden projects have a benefit-cost ratio > 1	not working now	too complicated to be applied in non-experimental context
Provide information to improve programming efforts	found insufficient for explaining what does and doesn't work or why	can provide partial information
Costs of evaluation:		
low-cost preferred	low to zero additional cost	high cost
can be done with a minimum of training	already being done by PVOs	requires professionals

- For what purpose?
  Corresponds to answers on "for whom?"--
  = to determine whether home gardens are a cost effective mechanism of increasing incomes, increasing food consumption, or improving nutrition
  = to examine the effectiveness of different programming alternatives and determine where changes are needed on a timely basis.

The dichotomy expressed above is not necessarily mutually exclusive. Information derived to answer the donors' questions can (and should) be used by the project administrators. The differences are more in timing of evaluation reports and the type of detail necessary on any question. For example, program personnel probably prefer information more frequently such as detail on questions of input availability (why or why not, what are the bottlenecks, etc.), whereas the donor agency would prefer less frequent reports with information on costs and amounts of inputs used.

Within the context of this report, the criteria will follow primarily from the donor-related questions as this is necessary to meet the major objective of this paper: providing a method for determining the cost effectiveness of home garden projects. Questions related to improving programming will be addressed as they fit within the context of questions asked by donor agencies, e.g. which programs are the most successful and where?

The criteria, with the justification for each of them, which will be emphasized in this paper are

- economic benefits for the household: to provide evidence of the cost effectiveness of home garden projects, to the extent possible, given the implicit objective in any project of utilizing resources efficiently;

- nutritional benefits: to provide evidence of nonmonetary benefits from a project, given the majority of such projects cite nutritional improvement as a primary objective.

The rest of this paper will address the issue of how to obtain gross outcomes and from that net outcomes of home garden projects. The paper will necessarily address all the stages of evaluation (including the earlier ones) as they effect the evaluation of net outcome. Again the author realizes given the complicated interplay of people, crops and livestock in the home garden, that any attempt to describe this system at one point in time will necessarily be an abstraction from reality. As an economist I will present methods for calculating the "stocks" of the home garden while taking account of the "flow" of the system with background and baseline information.

III. DATA NEEDS

This section describes the data necessary to evaluate home garden projects, given the dual requirements of meeting economic and

nutrition information needs. In order to provide data which is easily comparable between different types of home garden projects, simple indicators of the economic and nutrition effects of the projects are needed. These outcome indicators can range from a number that is directly collected by the evaluators, e.g. number of households participating, to numbers which require some calculations, e.g. food produced by the garden (weight) per person in the household. Suggested indicators will be discussed in the section on "Analysis and Synthesis", for now, keep these in mind as data needs are discussed.

Data is often collected for its own sake, that is, once it is available little is done to utilize the information effectively. To avoid this, the data discussed here are directly related to the outcome indicators derived in the following section. Not all of these data are necessary in every case. The choices are dependent on the evaluation criteria and data collection and analysis capabilities of the evaluators.

A. Baseline Data

Baseline data is descriptive of what households are like prior to the start of a project. Baseline data has several uses. In order to fully evaluate a project which is near completion, comparisons between the state of the project beneficiaries before and after the project are preferable. However, given the fact many projects are likely to address the issue of evaluation only after being underway, not much can be done at that point except to suggest future collection of the data. Interim evaluations of projects should also have access to the baseline data. The information from the baseline data is also a useful tool in planning project interventions, in particular, providing implementors with information on the participants' gardening (or small livestock) activities prior to the inception of the project.

The baseline data should consist of three major categories of information: the intended project participants, the project plans and costs (including any available documentation), and the larger environment of the project area.

The household information should include

- socioeconomic factors: background information such as number of household members, education levels, age-sex distribution, size of land holdings

- food habits and preferences: what vegetables, fruits, and other possible garden produce do they eat? which do they prefer? why? where do they get them from? how much do they purchase? similar questions should be asked about small livestock if they are to be included in the project

- gardening: description of present garden or small livestock (if any), why (or why not) do they garden? for what purpose(s)?

These data are listed in more detail in Table II along with justifications for their use.

The project information should include

- project implementation plans
- expected costs of the project to the implementing agency, to the host government, and to the participating households
- objectives of the project, implicit and explicit.

The larger environment of the project, or macro-environment, can have a very significant effect on whether the project succeeds or not. The factors which should be accounted for at the outset of the project and be updated as often as evaluations are made should include:

- significant changes in the physical environment, e.g. an irrigation scheme is put in place
- significant variations from the norm in weather, e.g. a drought
- major agricultural policy changes which effect the project area
- major political disruptions
- the project area's transportation, credit resources, storage facilities, marketing system, and extension services [Hagan (1982), Supplement, p. 9]
- the project area's public health, ecucation and food aid systems (if any)
- existence of monetary or technical assistance form the world donor community in addition to the particular garden project.

B. Background Data Collection During Implementation

Once the baseline data is collected and analyzed, a subset of the baseline data questions should be chosen to provide continuing background information which would be gathered throughout the project cycle . These would include:

- socioeconomic information: number and type of households participating and age-sex distribution of household members;
- food habits: any significant changes in food preferences, such as, acceptance of a "new" vegetable, fruit, or other garden produce

TABLE II: Household Background Data for Baseline

DATA	JUSTIFICATION
1. Socioeconomic factors	Provide a general description of the household for classification
- size of household - age and sex of each member	- used to index other data - necessary for deriving consumption needs of the household
- education level of the head of household and oldest child	- indicator of knowledge level and abilities to self-collect evaluation data
- size of farm	- economic base of household
- availability of water for drinking and other uses	- economic and health indicator
2. Food habits and preferences	Indicator of possible crops to suggest or avoid
- present consumption of typical garden produce (e.g. vegetables and fruits) type and amount	- indicates present preferences
- where produce obtained and at what cost?	- indicates dependence (or lack of) on markets
- what would they like more of? less of?	- provides information for crops to suggest for the garden
- is there any garden produce which is taboo? or only given to certain types of people?	- suggests food to avoid trying to introduce (or emphasize if they go primarily to a nutritionally vulnerable group)
- what small livestock do they consume? where is it obtained?	- indicates possibility for encouraging small livestock production
3. Gardening (before project)	Basis from which to design new or improved gardens
- why do they (do they not) garden?	- knowledge of incentives (or constraints to gardening
- what is being produced now?	- provides indicator of present garden knowledge
- do they raise small livestock?	- indicates present level of knowledge of livestock practices
- how much land do they (or could they) have available to garden?	- use to plan possible cropping patterns
- where is the land located?	- indicates time costs to household in getting to and from garden
- what type and where is water source?	- time costs in watering
- what is done with what is grown now?	- indicates present selling or home consumption habits

- project costs: yearly figures

- environment: note the occurrence (time and event) of any major changes in the project environment.

These background data will be very useful for the project implementors to monitor the project. Some of these data will eventually be very useful in evaluating the overall outcome of the project.

C. Garden Output and Input Data

The most basic information to be collected throughout the project cycle will be on the output (production) and inputs (costs) of the garden activity. The author is aware just how difficult it is to obtain valid data on these factors, but not withstanding the problems it is necessary to make the attempt, to be able to say even with reservation, what is the likely relation between your project efforts and any observable outcome. In the following discussion, keep in mind that two levels of costs and benefits are being discussed: the household level and the project level.

Basic to any economic or nutritional measure of outcome is the data on total garden production (note that in the case of a garden project in an area where gardens already existed, the relevant production for evaluation purposes will be the increase in production from the baseline period not the total production). A method for either weighing or estimating the garden produce will have to be instituted to provide this data. Since a garden produces continuously over a long period of time, output is not as easily estimated as for field crops which are usually harvested all at one time. A choice of method for gathering output data should be made depending on two constraints:

- How much time does the data collector have?

- What is the level of literacy of the project households?

Depending on the time the data collector has, the options range from collecting detailed production data on a few gardens and extrapolating to the rest (least time consuming) to visiting several farms in turn once a week and multiplying the result by seven. If a member of the household is literate and able to weigh the produce daily, all the data collector needs to do is give an initial lesson in weighing and recording, then monitor the situation. This latter method is used quite successfully by the AVRDC Outreach Program in Thailand. [Personal observation, 9/85]. A third method would be to estimate typical yields by crop from a small sample of plots and only gather area information on the rest of the participating gardens by crop. Estimated total yields for the gardens could then be calculated by multiplying yield per crop by area of crop, then summing these products for all crops to get total yield.

Costs to the household of the garden project fall in two categories: time (labor) and physical inputs (e.g. seeds, fertilizer, water).

The cost of time in a rigorous cost-benefit analysis would generally be set at the relevant wage rate per hour. In the case of home gardens, the labor utilized (other than start-up labor) is often children, who would not otherwise be employed, or spare moments by the adults, which would not necessarily be productively employed elsewhere. In these cases, the "relevant" wage rate for alternative uses of that labor is zero, and thus need not be considered. In a case where there are alternative uses for the labor, the wage in the alternative employment should be used. In either case, the time spent on the garden, preferably by whom, should be collected.

Physical inputs might be purchased or "free" from the household point-of-view. If purchased, the quantity and price of the input should be recorded to provide cost information for the garden. If free, the quantity should be kept at the household level, and the price information at the project level (assuming the project is the source of the free input).

Water is an input different from the others because it will seldom have a price, but may entail a cost, e.g. labor to fetch it. Given that the time involved in watering the garden should be collected under the time (labor) data discussed above, any cost will be attributed through that point in the analysis.

All of the input data could be collected by any of the methods discussed for output, that is, the method chosen will depend on the time available to the data collector and the literacy of the household.

D. Prices and Transport Cost

Market prices for the garden produce will be needed to value the home production. These should be local prices preferably for the season in which production occurs. In addition, if significant transport costs (i.e. large in comparison to the value of the products or transport costs not already being incurred for other purposes) are incurred in marketing the vegetables, these should be gathered. Transport costs for purchase or collection (from project office) of inputs should also be gathered if significant. Market prices and transport costs would only need to be gathered a few times over the growing season either directly in the market or indirectly from household recall. These could then be averaged and used for all project participants.

E. Programming Information

The implementation of the project should be evaluated prior to estimating the gross outcome of the project (see Section II above), however, throughout the life of the project, data will have to be gathered to perform this evaluation. The background data discussed above will also assist in evaluating the implementation of the project. The main programming issues include

- delivery and availability of inputs provided under the project

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- availability and timeliness of technical assistance on garden methods
- timeliness of demonstration garden plots
- other items as appropriate to the project design.

These data should be gathered on a routine basis throughout the project and constantly fed back to management to improve the programming.

IV. ANALYSIS AND SYNTHESIS

This section will utilize the data described above to develop indicators of project performance in three categories: economics, program implementation, and nutrition.

A. Economic Indicators

Within economic terminology, two evaluation "indicators" are used: cost effectiveness and benefit-cost ratios. Benefit-cost ratios are most appropriate to projects which have largely monetary outputs or with benefits which can be monetized. Cost effectiveness ratios answer the question: given an objective, how can you meet it in the most efficient way? Depending on the intended use of the indicator, evaluation of home garden projects would require one or both of these ratios. Cost effectiveness is more appropriate when nutrition benefits (non-monetary) are expected to be high or are the main objective of the project. A benefit-cost ratio would be preferable if income was the major objective or benefit of the garden. Given that income and nutrition improvement are likely to be joint objectives, it is suggested both ratios be calculated. The interpretations of the ratios is the most important aspect of their use, misinterpretation can lead to funding (or not funding) the wrong project.

1. Benefit-cost Ratio

Table III presents steps for calculating an approximation of the benefit-cost ratio for a project. This is only an approximation since it does not use discounted streams of benefits and costs over the whole life of the project. This provides an abridged version of the benefit-cost ratio to minimize the data collection process and level of complexity of the analysis. Table III and this discussion draw heavily from two draft papers by Robert Nathan Associates [(1983), pp. 28-34; (1984), pp. IV:3-7]. The following discussion will provide details on gathering the data for Table III.

In the case of home garden projects, the gross benefits received (on a monetary basis) would be the produce of the garden valued at local market prices. This requires estimates of production and collection of market prices. These data could be gathered directly or indirectly according to the methods outlined above. The sum, over all crops, of production by crop times market price by crop, equals gross benefits to the household. One way to simplify the estimation is to

TABLE III: Steps for Computing an Approximate Benefit-Cost Ratio

1. Number of project participants for current year (sum of individuals over households) _____

2. Outside funding received to date (investment costs) _____

3. Gross value of garden produce* (before subtraction of costs) for the most recent year (or those projected to a 12-month period) _____

4. Gross benefits per participant (line 3 ÷ line 1) _____

5. Recurring and variable costs of the project for current year (operational expenditures, plus expenses incurred by participants and not covered by project) _____

6. Annual cost per participant (line 5 ÷ line 1) _____

7. Net benfits per participant (line 4 - line 6) _____

8. Ratio of benefits to cost (line 7÷ line 2) _____

* Garden production is defined here as additional food produced as a result of the project. If at all possible this should be calculated as the difference between what was produced before the project and what is produced as a result of the project. This increased production would be valued at current market prices to provide the gross value of garden produce.

use average annual production over groups of similar households and average prices, then multiply by the number of households in that group. These group estimates would then be added to obtain total gross benefits. This process allows one to avoid figuring gross benefits on a garden-by-garden basis.

Recurrent costs of the project will include

- operational expenditures for the current year
  salaries and wages
  maintenance of equipment
  rent
  other costs which will reoccur year-to-year,

  variable costs to the project:
  fuel for extension vehicles
  inputs for gardens provided by the project
  other costs which vary by the number of participants,

  costs incurred by the households:
  inputs not supplied by the project
  labor cost (if relevant, see above)
  transport cost (or savings) if significant.

The transport cost (or savings) figure in most cases will be zero. If, however, significant transport costs are saved by the household not having to buy produce or are incurred by marketing home produce, these should be estimated. A transport cost savings will be a positive cost, thus reducing total costs to the household. Whether transport is significant will depend on

- the distance to markets (the farther the market the higher the cost in time or fares)

- the frequency of market trips for other reasons (if the trip to market would occur anyway, the cost or saving is irrelevant).

The benefit-cost ratio of a home garden project could be interpreted as the dollars of food supplied per dollar spent on the project. The benefit-cost ratio can be interpreted through the help of Table IV given the cautions listed in Table V. In essence, the benefit-cost ratio is a simplified annual rate of return on investment, i.e. it estimates how long it will be before the original investment will be repaid. For example, if the ratio is 0.50 then it will take two years (1 divided by 0.50) for the original investment to be repaid. Therefore, home garden projects intended to increase consumption, could be compared with the effectiveness of food stamp and income transfers with the same intent. According to Reutlinger and Selowsky [1976, p. 52], only $0.50 of each food stamp dollar in the U.S. is spent on food, and direct income transfers are estimated to provide only $0.20 per dollar of transfer. Neither of these estimates include administrative costs of the programs which would lower these numbers significantly. These are estimates for the U.S., but similar

TABLE IV: Ranges of Ratios of Benefits to Costs and Their Interpretation

Ratio Value	Interpretation
Ratios greater than 1.0:	The project is an excellent one. Full benefits, if they continue for several years, are more than adequate to cover outside funding.
Ratios from 0.31to 0.99:	The project is probably cost effective. The more years that the project is able to generate full benefits without additional infusion of outside funds, the better the project looks.
Ratios from 0.0 to 0.31:	The project is probably not cost-effective in an economic sense when the impact of inflation and the value of time are taken into account. It would require many years of full benefits to cover outside funding.
Ratios less than 0.0:	The project is not cost-effective. The benefits can not even pay for local operating costs.

Source: Robert Nathan Associates (1983), p. 32.

TABLE V: Checklist of Considerations for Interpreting the Ratio of Net Benefits to Costs

Question	Interpretation
Benefits	
1. Was the project evaluated in a year when benefits had reached their full level?	If projects in early stages of implementation are compared with mature projects which have reached full benefits, a newer project may appear relatively less favorable than it really is.
2. Will benefits continue at a similar level for a substantial number of years?	To the extent that a given project's benefits continue considerably longer than for other projects, the project's current ratio will understate its true relative value.
3. Were benefits larger in years prior to the evaluation?	If the project returned larger benefits in earlier years it may have already reached the break even point and the ratio may understate the level of benefits relative to other projects with similar ratios.
Costs	
1. Have all outside contributions to the project been completed at the time of the evaluation?	If this is not the case, the ratio may overstate the relative cost effectiveness of the project since total outside costs are not included in the calculation.
2. Are the outside contributions large in the first year and gradually reduced?	If this is not the case, the ratio may overstate the relative real benefits in an economic sense when considering the time value of money.

Source: Robert Nathan Associates (1983), p. 34.

figures for other countries could be estimated using the calculations presented in Reutlinger and Selowsky [1976].

2. Cost Effectiveness

Cost effectiveness ratios require data on costs and on a quantifiable, nonmonetary indicator of benefits. The benefit indicator should be chosen to illustrate the major benefit of the project and to compare with known ratios or factors. For home garden projects possible benefit indicators are

- number of participants (households or individuals)
- food produced (kg)
- nutrient(s) produced (for a specific nutrient known to be low in supply)
- reduction in number of malnourished children (as defined by a chosen standard).

The first two of these will be the most generally applicable given the data available and the ease of their use and interpretation. The latter two should be considered if nutrition improvement is expected to be the major observable benefit of the project or as additional information to the other ratios. Table VI presents steps for computing various cost effectiveness ratios. Note as per Table VII that it is important to have the annualized investment and fixed costs as well as recurrent and variable costs when figuring cost effectiveness ratios [for detailed instructions on depreciation, inflation and foreign exchange ratios, see Robert Nathan Associates [1984), pp. 38-47].

Cost effectiveness ratios cannot stand alone, unlike the benefit-cost ratio which has an interpretation by itself. Cost effectiveness ratios only have meaning as they compare

- with other known factors
- over time within a given project
- with alternative approaches within a given project
- with other projects [Robert Nathan Associates (1984), pp. 49-50].

For home garden projects, all of these comparisons are possible. In fact comparison across projects, once this method is consistently applied, is one of the intentions of this paper. However, from the point of view of any one project, a comparison with "other known factors" is likely to be the most informative. Table VIII lists some of the possible factors to be compared with the respective cost effectiveness ratios for home garden projects.

TABLE VI: Steps for Computing Indicators of Cost Effectiveness

Note: compute on annual basis for each year of project.

1. Number of households

2. Number of participants (individuals) (either line 1 X average household size or actual sum)

3. Food production*, Kg (either line 1 X average production or actual sum) _____

4. Food production per capita (line 3 ÷ line 2) _____

5. Value of food production (Table III, line 3) _____

6. Value of food production per capita (line 5 ÷ line 2) _____

7. Project costs (from Table VII, Total Annual Budget) _____

8. Food production converted to nutrient content for a nutrient "N" [sum of (Kg of food by crop X units of nutrient "N" per Kg by crop) over all crops] _____

9. Cost of providing home gardens to each household, $/household (line 7 ÷ line 1) _____

10. Cost of providing home gardens by individual reached, $/individual (line 7 ÷ line 2) _____

11. Cost of increasing home food supply by 1 Kg of food, $/Kg (line 7 ÷ line 3) _____

12. Cost of providing nutrient "N", $/unit of "N" (line 7 ÷ line 8) _____

* Food production is defined here as additional food produced as a result of the project. If at all possible this should be calculated as the difference between what was produced before the project and what is produced as a result of the project.

TABLE VII: Annual Project Costs

Item	(Units of Currency)
INVESTMENT COSTS*	
Land	
Buildings	
Vehicles	
Labor	
Training	
ANNUAL OPERATING COSTS	
Fixed Costs	
Administrative salaries	
Other labor	
Supplies	
Utilities	
Variable Costs	
Garden inputs	
Fuel	
Labor	
Maintenance	
TOTAL ANNUAL BUDGET	

* Use depreciated values to get investment costs on an annual basis.

Source: Derived from Robert Nathan Associates (1984), p. 12.

TABLE VIII: Some Comparison Factors for Cost Effectiveness Ratios

Ratio of Cost Effectiveness of ...	Factors to Compare
Providing home gardens to households* ($/individual)	Standard % of Cost/person in relation to income/person e.g. government expenditure for health and nutrition as percent of GNP **
Increasing home food supply ($/Kg)	Average price of food/kg, if available or price of a major staple or vegetable per kg.
Providing nutrient "N" ($/unit of "N")	Cost of providing nutrient "N" through fortification or health services
Food production per capita (Kg/person)	Average annual kg of food in adequate diet
Annual food value per capita ($ food produced/person)	Average (or average for low-income group) annual food expenditure per capita

* Divide line 4 Table VI by per capita income for low-income households in order to standardize it for comparison (See Appendix B, Table I)

** See Appendix B, Table II.

B. Nutrition Indicators

Nutrition indicators can be derived either indirectly through revision of the economic indicators or directly. An example of an indirectly derived nutrition indicator are the cost effectiveness ratios above which use indicators such as nutrients produced. These can be taken even further and limited to the increase in nutrients consumed by the household (or target group within the household) as a result of the project. This would of course necessitate baseline data on food consumption prior to the project in order to calculate the change in food consumed.

Another indirect indicator of nutrition benefit is calculated by converting the food produced into the relevant nutrient(s) provided on a daily basis. This indicator of total nutrients could be indexed per capita, by household, or by project cost (see Table VI, line 8). The result could be further revised to a percentage contribution of the nutrients from the garden to the diet by dividing the total garden nutrients by the Recommended Dietary Allowance (RDA) for the household or individual. A decision would need to be made as to what nutrient (or nutrients) was appropriate as an indicator of project benefits. Although gardens are not likely to be a major source of calories or protein (exceptions to this exist in Asia), these are general nutrients which indicate the overall adequacy of the diet. In addition, calories and protein from the garden could be readily compared with the amount of calories and protein from other sources. The garden is likely to be a major source of vitamins A and C, and to a lesser degree, iron.

An addititional indirect method for describing the contribution of a garden to the household diet combines nutrition and economics: relative nutrient cost (RNC) [Tsou, et. al. (198?) pp. 181-182]. This method derives a "cost" for nutrients based on the present consumption of nutrients and the present food expenditures:

$$\underset{(\$/\text{unit})}{\text{RNC of nutrient } j} = \frac{\text{food expenditure } (\$)}{\text{intake of nutrient } j \ \ (\text{units})}$$

where units are the units typical to nutrient j, such as, milligrams (mgs). The RNC can be estimated for any population group on which the data is available. The most easily available data will be at the national level, i.e. use national average food expenditures per capita and FAO food balance sheets for nutrient consumption per capita. If data is available at the garden project level, that would provide the most pertinent RNC.

Given the RNC for each nutrient, the value of any commodity can be expressed as

$$\underset{(\$/\text{kg})}{\text{Total nutrition value of commodity } i} = NVi = \sum_j \left(\underset{(\$/\text{unit})}{RNC_j} \times \underset{(\text{units/kg})}{C_{ji}} \right),$$

where C_{ji} is the units of nutrient j per kilogram (kg) of food i.

These nutrition values (NV) can be used in conjunction with yield data (available from AVRDC or in-country) to provide nutrition yields per square meter:

$$\underset{(\$/m^2)}{\text{Nutritional Yield}} = NY_i = \underset{(kg/m^2)}{yield_i} \times \underset{(\$/kg)}{NV_i}$$

Then, these can be compared with production costs (in a home garden):

$$\text{Cost ratio} = CR_i = \underset{(\$/m^2)}{\text{production costs}_i} \div \underset{(\$/m^2)}{NV_i}$$

where production costs are in terms of $\$/m^2$. [Note: if production costs are available only in $/kg, convert this to $\$/m^2$, by multiplying by yield (kg/m^2)]. If a vegetable is both low in production costs and high in nutrient value, the CR will be less than 1. If the CR is greater than 1, the vegetable is likely to be too costly given its low nutritional value. These data can be used to suggest crops which would be the most cost effective for improving the nutrition of households by using home gardens.

Another method for describing the relation between production costs and nutrition is provided by deriving the Relative Nutrient Production Cost (RNPC) of each commodity i for a specific nutrient j:

$$\underset{(\$/unit)}{\text{Relative Nutrient Production Cost}} = RNPC_{ij} = \underset{(\$/kg)}{\text{production costs}_i} \div \underset{(units/kg)}{C_{ji}}$$

The RNPC concept allows a comparison across commodities, as to which commodity is most cost effective at providing a particular nutrient. Whereas, the CR provides a comparison across commodities, as to which commodity is the most cost effective at providing nutrients overall (given the NV_i).

The RNC concept could also be used to evaluate the effects of a home garden project. If the NV of each crop was used, instead of market price, to value total ouput, it would provide a monetary measure of the nutrition benefits of the project. This benefit figure could be used instead of the value of food production calculation (Table III, line 3) to derive the benefit-cost ratio (Table III, line 8). The RNC and NV measures should be used with caution until they are applied on several examples. A clearer understanding of their possibilities and limitations is neded.

The direct method for calculating the nutritional impact of a home garden project would be to gather anthropometric data (heights, weights, and ages) on the households before and after the intervention. The analyst would also have to gather the background data discussed earlier and attempt to assign the change in anthropometric status from before to after the project while taking account of any possible confounding variables. Since nutritional status is effected by many factors, only one of which is diet, this

process can be rife with difficulty. Although the indirect methods may seem crude from a nutritional status standpoint, they are perhaps closer to capturing the true project effects.

C. Program Evaluation Indicators

Evaluation of the overall program entails two steps

- is the program functioning optimally? e.g. are inputs received in a timely manner?
- is the program cost effective?

The first item is outside the scope of this article as stated in the introductory sections, however, these issues are basic to home garden project monitoring and evaluation. Seed supply has at times been cited as a major problem on home garden projects. If seeds are in low supply, then any discussion of the garden output is likely to be useless or misleading.

Similar issues over the long run must be faced within the context of whether the program is cost effective. These issues can best be addressed through a "Checklist" procedure developed by Robert Nathan Associates [(1983), (1984)] for use by PVOs. A home garden project version of their checklist of impacts on participants is given in the first part of Table IX. The Checklist is intended to be self-explanatory, except possibly item 4: "cost per participant being proportional to local resources and incomes". Table X provides steps for calculating this income indicator: if it is positive the project is probably sustainable, if negative it is probably not. This indicator is based on the assumption that the donors plan to eventually turn the operation of the project over to the local people to support. If the annual costs of the project (less start-up and expatriate costs) are proportionately higher than what is being spent in the country on such efforts at present, the project is not likely to continue after the donors depart.

The second part of Table IX provides even less structured indicators of what might be termed project "success". With "success" being defined here as the people (the beneficiaries or end clients) change something about the way they are producing food and obtain "better" results as defined by the people themselves. These indicators would vary with the project area and its objectives, but for the most part some or all of the indicators in Table IX would provide a basis for considering the project a success whether or not more quantitative indicators could be derived.

V. LIMITATIONS OF THE METHOD AND CONCLUSIONS

This paper has presented methods for evaluating home garden projects with the main emphasis on economic issues and secondary emphasis on nutrition. Given the complexities of home garden projects and the diverse audience for evaluation reports, not every view or issue could be included in the methods outlined here. In particular the view of gardens as an all inclusive metaphor for home production of

TABLE IX: Checklist of Indicators of Cost Effectiveness of Home Garden Projects

Direct Indicators of Success with the Participants*

1. Gardeners assisted by the project are investing their own funds in the garden enterprise, and this investment is increasing each year.

2. Households feel they can continue (or actually do continue) the gardens without project support, i.e., the earnings are greater than the operating expense.

3. Costs per participant for the garden project are proportionate to the incomes and resources of the participants and their communities.

Indirect Indicators of a "Successful" Project

1. Gardens start next to project area without project support.

2. A greater variety (or volume) of food is available which fills nutrition gaps which may be seasonal or target group oriented gaps.

3. Some "surplus" garden produce is available for sale or barter.

4. Inputs are (or will be) available after the project at affordable prices in the local markets, or will be replaced with locally available inputs.

4. Individuals have learned skill and/or gained resources sufficient to expand production beyond family needs.

5. Crop rotations and other learned techniques prevent pest and disease build up and maintain soil fertility with minimum of purchased inputs.

6. Individuals continue to seek guidance as to hot to further "improve" their garden enterprises.

7. Participants encourage others to adopt the new crops or methods.

Source: Partially based on Robert Nathan Associates (1983) p. III-3 and (1984) p. 13; along with personal communication from Donald Ferguson, USDA/OICD.

TABLE X: Steps for Computing the Ratio of Project Costs

Calculations:

1. Annual per participant cost of the project (Table VI, line 9) _____

2. Average per capita income of participants (Appendix B, Table I) _____

3. Annual per participant cost as a percent of per capita income (line 1 ÷ line 2 X 100) _____

4. Percent of government expenditures in project sector (Appendix B, Table II) _____

5. Per capita income indicator (line 4 - line 3) _____

Interpretation of Results:

If line 5 is positive, the project is probably sustainable.

If line 5 is negative, the project is probably not sustainable.

Source: Derived from Robert Nathan Associates (1984) p. III-5

food in all its forms is not addressed by this paper. The author has intentionally abstracted from the real world those variables for which estimates can possibly be derived, in order to provide decision makers with a starting point for the evaluation of home gardens. As with all abstractions, this method can be misused if accompanying knowledge of local conditions and habits are not gathered and analyzed (as suggested in the baseline data section) along with this largely economic and numeric approach.

Some specific issues which are not covered by this paper are

- how do gardens fit into the larger farm enterprise?
- how is the food grown in the gardens distributed within the household?
- what role do small livestock play in home gardens?
- what is the relation between perennial (usually fruit) crops and annual (usually vegetable) crops?

These and other issues of concern could still be considered in part by using rapid appraisal techniques during the baseline and monitoring surveys. Using focused questions, a qualitative answer to these issues could be reached.

Other issues for which no agreement was obvious amongst home garden project practitioners are

- will (or do) households have home gardens for nutritional reasons? or must there be a clear income benefit before households will garden?
- how much effort (if any) should be put into evaluations?

The reasons households will perform a home garden activity need to be investigated rigorously to provide an answer that will be accepted by a majority of practitioners. The evaluation methods above could provide valuable data for such an analysis. The level of effort to be placed in evaluations will vary according to resources, however, an effort must be made or home garden projects will continue to be limited in their scope and applicability.

In conclusion, evaluation is a necessary adjunct to good project work, it is as important (or more so) than the design and implementation. Without evaluations a project cannot learn from its mistakes and successes, and would always be limited in its growth. Evaluation should start with the appraisal process at the design stage (baseline data) continue through implementation (monitoring) and conclude with a final evaluation report.

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Gershon, J.

"A Combination Consumption/Income Generation Garden: What Kind of Data to Collect?" (DRAFT) Prepared for visit to Asian Vegetable Research and Development Center by Dr. Patricia O'Brien-Place, AVRDC, September 15-21, 1985 (unpublished).

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O'Brien-Place, P.

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Robert R. Nathan Associates, Inc.

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Comment: Excellent example of home gardens in Asia. Good discussion of garden characteristics and their relation to the socioeconomics of the household.

Swift, J.

"Agro-Forestry Garden in Morobe Province: Agronomic Results and Observations after Five Years of Continuous Production" Wau Ecology Institute, Papua New Guinea, 1981 (unpublished).

Comment: Example garden from Papua New Guinea, data collected on yield, minutes per land area spent in preparation, and reasons for having (or not having) a garden.

Tsou, S., et.al.

"Promoting Household Gardens for Nutrition Improvement" Household Gardens and Vitamin A Deficiency pp 179-185, 1982.

Comment: Presents Relative Nutrient Cost (RNC) with examples for Taiwan

UNICEF

The UNICEF Home Gardens Handbook: for People Promoting Mixed Gardening in the Humid Tropics New York: United Nations, 1981.

Comment: Good on design of Projects.

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Utaipatanacheep, A. and J. Gershon

Nutritional Aspect of Gardens in Farming/Family Living System in Thailand Department of Home Economics, Faculty of Agriculture, Kasetsart University, Bangkok, Thailand, March 1985.

Comment: Report on nutrition output of AVRDC outreach gardens in Thailand. Existence of gardens compared with food expenditures, incomes, and other socioeconomic variables.

Utzinger, J. and H. Connolly

"Economic Value of a Home Vegetable Garden" HortScience 13(2). pp 148, 1978.

Comment: U.S. example of returns to labor in home gardens.

van Eijnatten, C.

"Home Gardens: Principles and Experiences" Small Vegetable Gardens Resource Packet, Part-C, Peace Corps, Washington, D.C., 1978.

Comment: General article on African and Asian home gardens.

WHO/UNICEF Joint Nutrition Support Programme

Gardening for Food in the Semi-Humid Tropics: A Handbook for Programme Planners UNICEF, 1985.

Comment: Good discussion of the trade-off between nutrition and income as household goals.

Wishnetsky, T. and J. Cash,

"Home Gardening and Canning vs. Buying Canned Goods" Extension Bulletin E936/MSU Ag Fact No. 74. East Lansing, Michigan: Cooperative Extension Service, Michigan State University, May 1976.

Comment: U.S. example of costs of gardens and preserving produce.

Yoon, S.

"Women's Garden Groups in Casamance, Senegal: Assignment: Children, 63/64, pp 133-153, 1983.

Comment: Excellent, successful example of gardens in Africa.

APPENDIX A

Persons Contacted

NAME	TITLE/AFFILIATION
Washington, D.C., 1985	
Ms. Denise Conley-Lione	Coordinator, League for International Food Education
Ms. Calvina Dupre	Agricultural Research Advisor, USDA/OICD
Dr. Don Ferguson	Natural Resource Development Officer, USDA/OICD
Ms. Maura Mack	Nutrition Officer, Office of Nutrition, S&T Bureau, AID
Mr. Al Meisel	Executive Director, League for International Food Education
Dr. John McKigney	Nutrition Officer, Office of Nutrition, S&T Bureau, AID
Mr. Hal Rice	Nutrition Advisor, Asia Bureau, AID
Mr. Tom Wilson	Agricultural Economist, Asia Bureau, AID
XIII International Nutrition Congress, Brighton, England, August 18-23, 1985	
Mr. Alan Berg	Nutrition Advisor, World Bank
Dr. Peter Greaves	Joint Nutrition Support Program, UNICEF
Dr. Jane Kusin	Medical Doctor, Tropical Institute, Amsterdam
Dr. Richard Longhurst	Economist, Institute for Development Studies, Sussex, England
Ms. Vera Ninez	Researcher, International Potato Center, Peru

Dr. Per Pinstrup-Andersen	Agricultural Economist, International Food Policy Research Institute
Dr. Barry Popkin	Agricultural Economist, School of Public Health University of North Carolina
Mr. Irwin Shor	Nutrition Survey Consultant, UNICEF
Mr. Paul Sommers	Home Garden Advisor, UNICEF/UNDP, Fiji
Dr. Leonard Teply	Nutrition Advisor, UNICEF, New York
Dr. Barbara Underwood	Senior Scientist, National Eye Institute, National Institutes of Health
Dr. Marianne Zeitlin	Nutritionist, Tufts University

AVRDC, Taiwan, September 1985

Dr. Diosado Castro	Training and Development, Head
Dr. Jack Gershon	Consulting Nutritionist, Small-Scale Food Production
Dr. Sylvia Green	Plant Pathology
Dr. George Kuo	Plant Physiologist, Head
Miss Jen-Fong Kuo	Home Garden Research, Assistant
Mr. Hsin-fa Lin	Home Garden Field, Assistant
Mr. Bruce McLean	Office of Information Services, Head
Dr. Paul Sun	Acting Director General
Dr. Arnold Tschanz	Plant Pathology, Head
Dr. Samson Tsou	Chemistry (Nutritional), Head

AVRDC Outreach Program, Thailand, September 1985

Dr. Chamnien Boonma	Director, Center for Applied Economic Research, Faculty of Econ. and Bus. Admin., Kasetsart University

Dr. Apisith Issariyanukula	Agricultural Economist
Dr. Thavat Lavapaurya	Horticulturalist
Mrs. Napaporn Promchana	Lecturer in Agricultural Economics
Dr. Anchanee Utaipatanacheep	Home Economist and Nutritionist
Extension Agents	Don Yai, Bangpae district, Ratchaburi province

APPENDIX B

Income and Government Expenditures in Selected Countries

The representative government expenditure levels given in Table B-II are not in categories which directly relate to home garden projects. These categories are given as representative of expenditures with similar goals because the data was available for them. They should be considered as the general range of acceptable expenditures for comparative purposes not as strict limits.

TABLE 8-1: Average Per Capita Income (1983 Dollars)

Country	Average Per Capita Income
Bangladesh	104
Benin	232
Bolivia	408
Burkina Faso	144
Burma	144
Burundi	192
Cameroon	656
Central African Republic	224
Chad	64A
Congo	984
Costa Rica	816
Dominican Republic	1,096
Ecuador	1,136
Egypt	560
El Salvador	568
Ethiopia	96
Ghana	248
Guatemala	896
Guinea	240
Haiti	240
Honduras	536
India	208
Indonesia	448
Ivory Coast	568
Jamaica	1,040
Jordan	1,312
Kenya	272
Lesotho	368
Liberia	384
Madagascar	248
Malawi	168
Malaysia	1,488
Mali	128
Mauritania	384
Morocco	608
Nepal	128
Nicaragua	704
Niger	192
Nigeria	616
Pakistan	312
Papua New Guinea	608
Peru	832
Philippines	608

Country	Average Per Capita Income
Rwanda	216
Senegal	352
Sierra Leone	264
Somalia	200
Sri Lanka	264
Sudan	320
Tanzania	192
Thailand	656
Togo	224
Tunisia	1,032
Uganda	176
Yemen (YAR)	440
Zaire	136
Zambia	464
Zimbabwe	592

[A] 1982 dollars from 1984 report.

Source: The World Bank, World Development Report: 1985 (Oxford University Press: New York), 1985. Calculated from Table 1 by multiplying 0.8 X GNP per capita [Robert Nathan Associates (1983) p. 18].

TABLE 8-II: Government Expenditures on Education, Health, and Housing and Community Services

Sector/country category	Percent of government expenditures	Decription of expenditures
Education		
Low income countries[A]	10.6	Public expenditures for the provisions, management, inspection, andsupport of pre-primary and secondary schools; of university and colleges; and of vocational, technical and other training institutions
Middle income countries[B]	11.6	
Health		
Low income countries[A]	4.0	Public expenditures on hospitals, medical and dental centers, clinics, family plannings, and preventive care
Middle income countries[B]	4.7	
Housing and Community Services		
Low income countries[A]	6.0	Public expenditures on housing; on provision and support of housing and slum clearance activities; on community devlopment; on sanitary services; and on cost of welfare services such as care of aged, disabled, and children
Middle income countries[B]	17.7	

[A]Countries with per capita income less than $320.
[B]Countries with per capita income greater than $320.

Source: Data from the World Bank, World Development Report: 1985 (Oxford University Press: New York), 1985, Table 26; format from Robert Nathan Associates (1984) p.III-7.