THE NUTRITIONAL COMPONENT

OF FARMING SYSTEMS RESEARCH

by William P. Whelan*

*Assistant Professor, Agricultural Economics and Marketing, Cook College, Rutgers University.

Farming Systems Research (FSR) projects have certain similarities to agricultural and rural development projects. This is not surprising since FSR projects essentially constitute a subset of the broader set of agricultural and rural development projects. One important similarity which is striking is the fact that most on-going FSR projects do not explicitly consider nutrition and/or health as integral parts of their activities, in much the same way that agricultural and rural development projects generally do not explicitly consider the nutrition goals of households in project identification, design ynd assessment. This would not be surprising were it not for the fact that national and international institutions have recognized in recent years the potential for reducing protein-energy deficiencies through projects designed to improve the level of living of rural dwellers. The question to be addressed here is how might nutritional considerations be encorporated into FSR projects, if reducing protein-energy deficiencies is an agreed upon objective to pursue.[1] The strategy which will accomplish this objective and the variable(s) to be used in doing so is the focus of discussion.

Shaner, Philipp and Schmehl in Farming Systems Research and Development: Guidelines for Developing Countries (1982) list five principal farming systems research and development activities: 1) target and research area selection, 2) problem identification and development of a research base, 3) planning on-farm research, 4) on-farm research and analysis, and 5) extension of results. For the convenience of this discussion, the first three activities will be referred to as ex ante research activities and the latter two will be referred to as ex post research activities, even though actual on-farm analysis is truly neither an ex ante nor an ex post FSR activity.

I. EX ANTE ANALYSIS OF THE NUTRITIONAL IMPACTS OF FARMING SYSTEMS RESEARCH (FSR)

A. Technology Impact Variables

It can usually be assumed that successful agricultural/rural development/FSR projects seek to accomplish the dual objectives of raising rural levels of living and improving the aggregate food situation by following strategies which increase agricultural output, employment and incomes in rural areas. Incomes, in turn, are viewed as providing the key to achieving the triune goals of higher levels of living (particularly for the poorest of the poor), economic development and the achievement of the demographic transition.

One critical question to ask in this context is do the increases in output and income which result from FSR projects improve the nutritional

[1] For a discussion about why adequate nutrition should be an objective of development per se, see for example, Streeten (1979).

status of individuals who are malnourished? Figure 1 which depicits the relationship between an FSR project and its effects upon nutrition can provide insights with which to address this question. Using Figure 1, a number of very plausible scenarios could be constructed to indicate that the answer to this question could be no. An obvious and simple example would be if income increases were spent on some combination of nonfoods and foods, but an that inefficient nutrient absorption occurred in the individuals due to a worsened health and sanitation environment created by the FSR project which had offset the gains otherwise resulting from improved levels of food consumption.

As a general rule, one might expect the answers to the question posed above to depend on changes in food availability and/or changes in food distribution, i.e., allocation of food available. If the nutritional composition of the available food is changed either by changes in the relative amounts of the various commodities available in the diet, through perhaps crop substition, or by changes in the nutritional composition of the individual commodity or commodities which comprise the food available for consumption, then the nutritional effects can be significant. On the other hand if the allocation of increased food availability was to families with well nourished members or if the intra-household distributional apparatus resulted in a skewed food distribution to favor the well nourished household members, then an FSR project will not be successful in reducing hunger and malnutrition. These are complications which prevent one from readily accepting the often implied assumption that more food production and higher incomes means less actual hunger. These relationships between increases in output and incomes and improvements in the nutritional status of malnourished individuals should be treated not as axioms but as hypotheses to be tested empirically.

If one concedes that output and income improvement in and of themselves are not sufficient to demonstrate that the nutritional profiles of the malnourished are improving, then one faces a dilemma in choosing a strategy. That is to say, does one choose a project that improves incomes and/or output, while disregarding the possibilities alluded to above, or does one look for some means of determining a strategy which minimizes the possibility that income and/or output improvements will have a perverse effect on the nutritional status of the malnourished? It is reasonable to suppose that the latter strategy is preferred and that to be of most practical value some attempt should be made to provide some useful ex ante information. This view is expressed in Abalu and D'Silva's statement about improving cropping systems in Northern Nigeria:

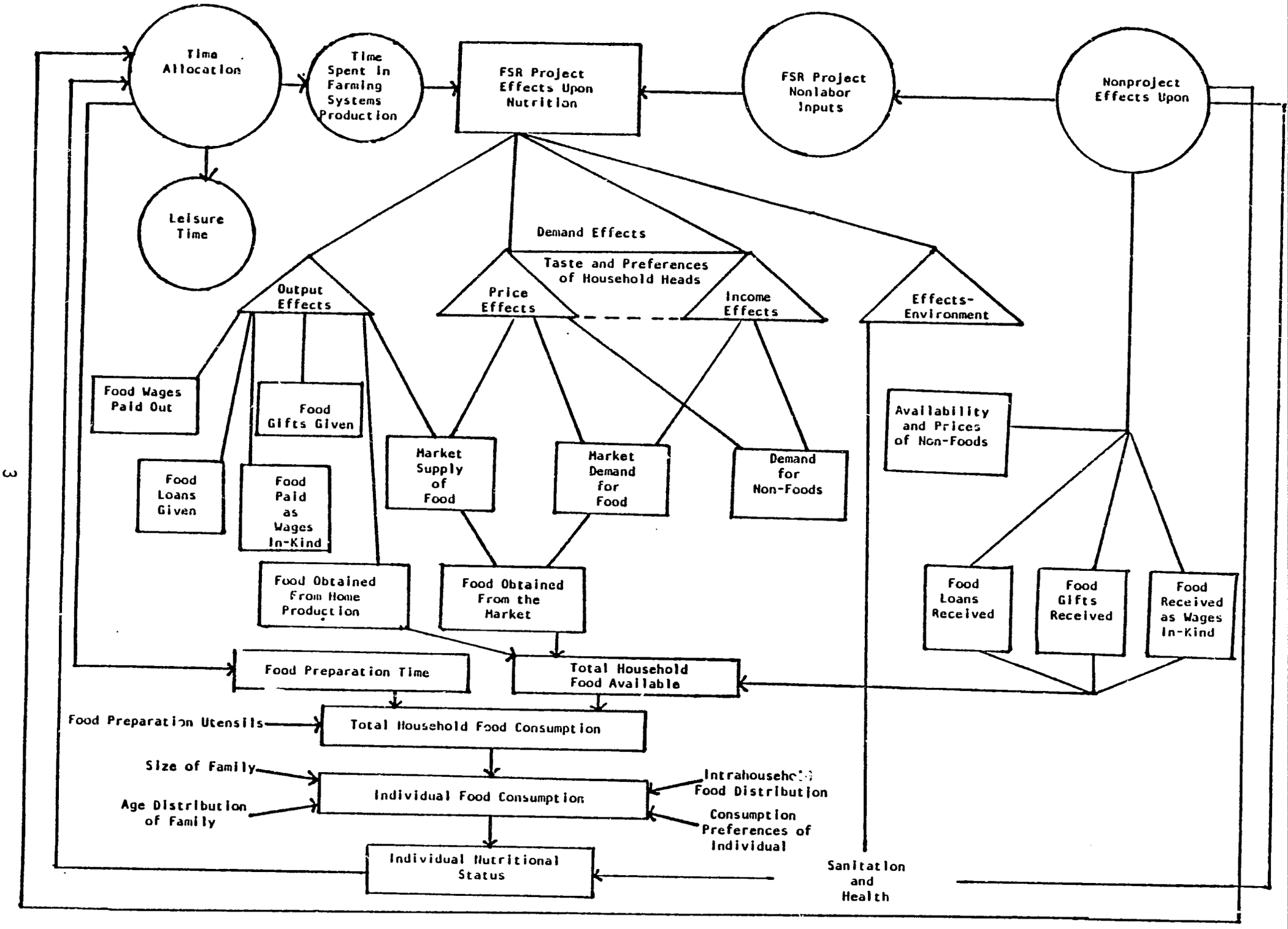

Figure 1. Linkages Between FSR Projects and Nutrition.

"Considerable research on farming systems would be needed to ensure that appropriate farming systems evolve in the future. This research must emphasize the present status of farming systems in the area and their potential for improvement. The research effort must deal with the dynamic nature of the farming system and be done from the "bottom up." This underscores the need for the research to be multidisciplinary and for the social scientist to play not only an ex post but also -perhaps more importantly -ex ante role in the research effort."

A nutritional perspective, if considered at all, is unlikely to engender a great deal of support in the problem identification and development of a research base activity and in the planning and design phase of on-farm research activity, because of the customary positivistic production emphasis of the researchers likely to be planning the research undertakings. On the other hand, nutritional considerations may be evidenced in the target and research area selection activity, particularly if improving the welfare of the rural population is an established national policy goal. In the event that this is not the case, it is essential that the selection of the target area be undertaken with a major consideration given to selecting areas and identifying researchable problems where the consumption and nutrition situations are chronic. Whatever the case may be, once the target area is selected, attention should be paid to the nutritional "merits and demerits" of the existing farming system so as to serve as a suitable background for conducting FSR (Okigbo).

A particularly important consideration in the planning and design of the on-farm research is that of ensuring that research leads to results that do not leave the rural target group participants less well off nutritionally or more nutritionally at risk. However, the research will have broader effects than simply upon the target population itself and, has been the history of agricultural research more generally, the likelihood is that the non-farming population will benefit more from lower food prices than producers will benefit from higher farm incomes, as long as output increases result in increases in what is marketed. It has been suggested in A.I.D.'s Policy Paper on Nutrition (1982, p.4) that improved technology for resource rich farmers (not the target group of FSR) is likely to produce this impact upon the nutritional status of urban communities. It should not be overlooked, however, that resource poor farmers may intentionally produce part of their supply for the market. This marketable supply is distinctly different from a marketable surplus. Resource poor farmers may also contribute to the market supply and therefore produce these secondary effects as well. Viewing what is marketed as being only marketable surplus may be a semantical trap that hides the fact that small resource poor farmers may produce for the market while not producing this output as a surplus. Statements such as "They (rural households which are nutritionally at risk) produce only an occasional marketable surplus and pursue limited economic activities" (A.I.D., p. 4)

should not be interpreted to mean that the poor only produce for the market when subsistence need have first been met. Economic models which suggest behavior such as farmers maximizing income only after satisfying some minimum consumption level may need further refinement to reflect small farmer behavior which may differ from the almost textbook aforementioned perception.

To the extent that output increases are retained by target households, the benefit will accrue primarily to the target households and these secondary effects will be less important. Although these nutritional effects upon non-farming households are in reality likely to be very important, it is assumed here that the primary concern is with the welfare of the farm households most immediately affected by the research. Given this assumption, one critical need is to provide information which will minimize the possibility that the nutritional effects of technology adoption turn out to be negative. The need becomes, therefore, one of defining a suitable variable or variables which will be economical to obtain and will provide useful nutritional information in the strategy design phase. If data for these variables are costly to obtain and if the analysis is also expensive, then there is a greater risk that explicit attention to nutritional considerations in this activity of farming systems research will be sacrificed when budgetary exigencies prevail. If, however, the variables prove to be cost-effective, then they have a greater chance of being incorporated into the design of new FSR projects, even those with little explicit concern for nutritional well-being.

Before discussing the desirable characteristics of the variables which might be used, several types of variables which could be suggested and classified according to the likely impact that the technology is likely to have are presented in Table 1. The first would be a factor intensity type of variable. Such a variable would convey information about newly developed on-farm technologies which would suggest a changed factor intensity in farm production. This may or may not be associated with a change in the production of crops, either primarily for the market or for home use. As will be suggested later, the effect of such a change in market versus home production orientation will impact upon the level and/or timing of use of the human factor, particularly the mother. Where the labor market is well developed, the impact of such technology changes upon nutritional status could be far reaching in areas where mothers are increasingly attracted to off-farm wage earning activities. Other technology impact variables could be classified according to their impacts upon nutrition by way of a relative emphasis upon farm versus household specific technologies, income source technologies, different storage technologies, alternative processing technologies, and market versus home production intensity technology orientation. It is this latter technology impact type of variable that will be the focus of the remainder of this paper. This is so, in part, because the affects of shifts from subsistence to cash crops that is widely held to be a very important factor affecting nutritional status.

A discussion of the impact of these changes upon the incidence of malnutrition can have a broader focus than simply the effects upon the target

Table 1. A Classification of the Types of Variables With Which to Measure the Impact of Technology Upon Nutrition.

Technology Impact Type	Description
1) Factor Intensity	Conveys information about the nutritional effect of newly developed on-farm technologies which are either more or less capital (labor) intensive than associated with the previous technology mixture.
2) Cash Cropping Intensity	Conveys information about the nutritional effect of newly developed on-farm technologies which result in a more or less cash cropping intensity than associated with the previous technology mixture.
3) Household Intensity	Conveys information about the nutritional effect of technologies which are likely to impact more on domestic household activities than on on-farm production activities.
4) Income Source	Conveys information about the nutritional effects of technologies which result in increases in the income flow to household members with higher marginal propensities to spend on food than others within the same household.
5) Storage	Conveys information about the nutritional effects of technologies which are more likely to effect storage than production.
6) Home Processing Technology	Conveys information about the nutritional effects of technologies which are more likely to effect food preparation at home than either storage or production.

group alone. If the interest is in the population wide nutritional effects of these shifts in cropping orientation, then nutritional surveillance activities can be instructive (Mason et. al., p.I 29D). The development of other variables which can illuminate the impact of other types of technology upon nutritional levels of households and individuals will be the subject of future research on this broad topic. Moreover, the farming systems to be discussed do not explicitly address the impact of animal enterprise components. This too will be left for future research.

What characteristics then might such a variable have to be "useful" in the strategy design stage? I suggest that the variable must satisfy at least four requirements, the first of which is that it would have to distinguish between groups of different nutritional status, which are likely to be effected most directly by the FSR project. The second requirement is that it would have to allow for examining whether some correlation exists between different nutritional status groups and some indicator of the food and nutrition benefit-incidence to these groups. Third, the information used to represent the variable must be easily and quickly obtained prior to or during the strategy design phase. Fourth, the information must have acceptable levels of accuracy.

II. THE MEASUREMENT OF THE EFFECTS UPON NUTRITION OF CHANGES IN CASH CROPPING INTENSITY TECHNOLOGY

A. Level of Nutrition: The Malnourished and the Well Nourished

Among the possible variables which fulfill the criteria pertaining to identifying groups of different nutritional status, the one that immediately comes to mind is one that distinguishes between the malnourished and the adequately nourished. If one were to define a variable on this basis, the immediate question which arises is what the appropriate unit of analysis is: the individual, the household, or some other social grouping? Although one might like to look at individuals who are malnourished, the individual as a unit of analysis poses great difficulties both in terms of facility and expense of data collection. The household would appear to be a more appropriate unit of analysis, given the fact that most other project data will be collected on a household basis; however, problems of clarity of meaning arise with respect to use of the term malnourished household.[2] Is the

[2] I will assume henceforth that the household is the relevant unit of analysis. However, there are likely to be contexts in which the household is inappropriate. The most appropriate unit of analysis is the one most relevant to the production-consumption sphere and should be the same as that used to examine the production aspects of FSR. In this sense the choice of the appropriate unit of analysis should be made so that both production and

household characterized as malnourished because it has a high risk of having malnourished members or because it actually has malnourished members? Moreover, if the latter is the case, should the distinction be made, for instance, between farming households who may have malnourished members due to an occasional bad harvest, or because they are farmers with limited resources who experience chronic low levels of output?

Whichever definition of malnourished is selected, there will be the need to make some ex ante nutritional assessment in order to identify who are the malnourished and what their characteristics are. Theoretically, anthropometric measurements could be taken and/or some dietary intake survey could be made. Despite the inherent value of both these approaches, however, there are several factors why they might not be practicable. First, unwillingness by some to submit themselves to anthropometric measurements, e.g. young children resisting the use of skinfold calipers, may result in dubious coverage of the particularly relevant age and sex categories. Dietary intake studies, on the other hand, may be problematic because of the cost associated with the great necessity to pay close attention to detail. Consider what is involved in measuring intake amounts, and one will acknowledge the problems in doing so. For example, if farm households in low-income societies are usually privy to a relatively diverse array of food sources: food from own production, food purchases from the retail market, food from in-kind wages paid, food "eaten out", either purchased or nonpurchased, food gifts, food loans, and repayment of food loans, then coverage of nutritional intakes from only those sources perceived to be most important may result in significant inaccuracies. Other inaccuracies are likely to result due to memory lapses if recall of any length of time is involved, memory errors if the individual provides information about the volume of food consumed which the enumerator has not actually been able to observe, and conversion of foods ingested to their nutritional equivalency.

With regard to this latter issue of the measurement of food in terms of nutrients and energy, one should keep in mind that the nutritional composition of local diets are not well understood. The conversion factors used are usually highly aggregative and are often based on only a few observations.

Even if the dietary surveys are exhaustive in their coverage of sources and accurate in their estimation of the level and nutritional values of food consumed, there still remains the problem of defining the requirements to which the intake levels themselves will be compared. This would not be a problem were it not for the simple fact that the nutritional needs of individuals are not well understood. Currently available data on the protein and energy requirements of populations in developing countries are still fragmentary and seriously inadequate, and even if accurate averages of either requirements or recommended intake levels were obtained, they would not help

---

consumption behavior of the identical unit can be examined. By virtue of this, choice of the unit of analysis is more likely to be cost-effective.

to ensure that proper focus is placed upon those for whom the averages are still too low. Perhaps of even greater importance is the fact that the individual "requirements" upon which they are based have considerable variation for the individual depending upon the complex array of environmental factors which he or she faces. Moreover, "required" intake needs and "recommended" intake needs are inherently different and these differences can blur the distinction necessary for any attempts made to assess the nutritional status of a population group or segments of a population group.

B. Level and Source of Nutrition: Subsistence Potential Ratio (SPR)

The previous section dealt with the problems associated with providing highly accurate measurements of who the malnourished are through the two principal approaches of anthropometry and dietary intake methods. It is undoubtedly more difficult to provide accurate measures of this sort ex ante such that they are useful in the strategy design phase than to provide them ex post. However, there are variables which serve as substitutes for the functional categories of the well-nourished and the malnourished.

Pinstrup-Anderson (1981) has suggested that income level is a useful and suitable substitute for nutrition level. There are three associated problems with use of this variable in an ex ante context, however. First, the measurement of income most likely to be used which preserves considerations of economic theory is total expenditure. This is, however, one further step away from measuring what one actually would like to measure; namely, nutritional status. Secondly, total expenditure is by definition relevant to some period of time, usually one year or one full agricultural production cycle. To obtain a measurement of total expenditure which would be useful in the strategy design phase one would either have one calculated for the target population from a previous time period or borrow one from some non-target population from a previous time period. An important question is how appropriate would estimates of income based on nontarget populations be for the target population. If this were the only available information, one could surely justify using it, although information from the target group is preferable.

Finally, in addition to the problem of sheer expense, both in time and in money of collecting this information, the necessary information obtained may be replete with inaccuracies. These inaccuracies could be of two types: systematic inaccuracies and incidental inaccuracies. The systematic inaccuracies could be deliberately created by those being studied or by those suspicious about how the information might be used. Incidental inaccuracies could be the result of memory lapses and memory errors and do not bias thee estimates in any systematic way.

The subsistence potential ratio (SPR) variable is perhaps a better

substitute for nutritional status than either income or total expenditure. In its simplest sense, the SPR is simply the ratio of the household's ability to feed itself to its need to feed itself. The household's ability to feed itself may simply be expressed by the energy or protein value of the food which the household can produce over the course of the agricultural production-consumption cycle.[3] The household's need to feed itself may simply be expressed by the energy or protein requirements of the entire household for the combined agricultural production-consumption cycle. In its simplest form the variable could be calculated if the following information were known: size of the farm, age and sex composition of the household, and expected output yield of typical enterprise activities. Refinements of this variable to ensure that it is not so crude so as to be meaningless are likely to be beneficial.

This variable is attractive for six reasons. First, that it contains a measure of the productive potential of land, an essential component of income earning potential. Second, it would express this earning potential in terms of its capacity to meet satisfactory food and nutritional intake levels, and in this respect show the inherent interrelationship between the production and consumption spheres of household activity. Third, it would be easily, quickly and cheaply obtainable. Fourth, its accuracy in certain respects would be greater than by using either the anthropometry approach, the dietary survey approach or the income - expenditure approach because the emphasis on memory is limited and it broaches no sensitive areas, e.g., income, skinfolds, etc. Fifth, it would distinguish between those units of observation most likely to have some malnourished members (or be at greater risk of having some malnourished members at some future point in time) due to chronic conditions of limited resources from those units unlikely to have either malnourished household members (or be at nutritional risk) because of a periodic chance occurrence such as a drought or a flood. Sixth, it is likely to be correlated with the primary food source(s) upon which the household depends for its food. This last point will be discussed in the following several paragraphs.

The principal arguments on behalf of a variable of this nature is that it is useful as a corollary measurement of the level of consumption and it can be useful in measuring the importance of the source of consumption as well. A moment's reflection should result in the conclusion that using information obtained about the source of consumption may be important in understanding the level of nutrition of consuming units as well. It is well worth testing the hypothesis that this correlation is positive and strong.

In light of the principal sources of food the household has for obtaining the food it consumes, one can examine the principal strategies which

---

[3] Modifications can be made to this one expression of a household's ability to feed itself. For instance, one could examine the energy or protein value of the food which the household is likely to purchase and produce for home consumption during the course of a production-consumption year. Other interpretations are possible.

households follow in choosing what to produce and in deciding how to dispose of their production, namely to sell all, some or none of their output. If the household can obtain more food from the market by converting cash crops into income with which to buy foodstuffs than it could by consuming directly the food which it produces, then a cash cropping strategy makes good sense. Conversely, a food cropping strategy emphasis may make better sense if the above situation were reversed. Consequently, nutritional betterment is neither synonymous with subsistence cropping nor cash cropping and is likely to vary depending upon the situation. Changes in patterns of disposal caused by production improvements made in the farming systems can then be viewed both as being dependent upon the food source mix and as causing changes in the food source mix. To the extent that increased agricultural output is either consumed on the farm, sold in the market, or partially consumed and partially sold, then the positive or negative nutrition consequences which occur will occur through changes in the type of food consumption, changes in the level of consumption and changes in the relative importance of the food sources relied upon for consumption. The type i.e., quality of food consumption can be favorably influenced by diversified diets made possible by farming systems research undertakings that redress the previous research imbalance in favor of cash crops and against subsistence crops, particularly nutritious traditional crops of little or no commercial value. Berg (1982, p. 32) suggests that this research imbalance can be explained as having been "undertaken in response to market forces that reflect purchasing power more than nutritional need." Where the opportunities for research on nutritious crops for which few market options exist, the choice seems to be an obvious one. Anthropometry, dietary surveys and income studies, which have all already been discussed, are possible ex ante approaches used to examine changes in levels as well as changes in the quality of food consumption.

Therefore, an examination of the relative importance of the food sources relied upon for consumption at different SPR levels would be of value in determining whether the production design of the FSR undertaking would place the nutritional status of households in jeopardy. What emphasis should be placed upon researching farming systems enterprises which are likely to result in increased consumption of home produced foods or increased consumption of market acquired foods. It would then be possible to infer whether the production design of the FSR undertaking would place the nutritional status of households in jeopardy. Consider the following four alternative scenarios in Table 2: Scenario one in which both high and low SPR household consume primarily from home production, scenario two in which both high and low SPR households consume food primarily from market sources, scenario three in which high SPR households consume food primarily obtained from the market and low SPR households consume primarily out of home production, and scenario four in which high SPR households consume primarily out of home production and low SPR households consume food primarily obtained through the market. Each of these settings, empirically verifiable, would then suggest the blend of research effort to be placed on enterprises primarily intended to result in the consumption of on-farm output and on enterprises intended primarily to result in consumption of off-farm output

Table 2. The Subsistence Potential Ratio and the Primary Source of Food Consumption Scenario.

Subsistence Potential Ratio	Primary Source of Food Consumption			
	Scenario 1	Scenario 2	Scenario 3	Scenario 4
High	H	M	M	H
Low	H	M	H	M

M = Food consumed is obtained primarily from the market.

H = Food consumed is obtained primarily from home production.

through market channels. For example, I would hypothesize that emphasizing research into crops primarily intended for sale would result in a worsened nutritional situation for households in scenario one because increased income is less likely to "buy" nutrition than would increased farming resources or improved productivity of farming resources in existing enterprise activities. An improved nutritional situation may result in scenario two because increased income is more likely to buy improved nutrition than would increased farming resource or improved productivity of farming resource in existing enterprise activities. The impact upon the nutritional situation of households in scenarios three and four could be hypothesized to be a function of the magnitude of the increase in incomes likely to occur from the adoption of the new technology.[4] If these hypotheses could not be rejected, then they provide some ex ante guidance to the appropriateness in a nutritional sense of an FSR research emphasis which is likely to stress increases in output for sale and/or increases in output for home consumption. The level of these changes of total output upon SPR and the effect of SPR upon total food consumption can also be studied.

The rationale for using the SPR in the strategy design phase of FSR projects would therefore be that it satisfied the four previously discussed criteria for a useful strategy design variable. It distinguishes between groups of different nutritional status; it permits the examination of the

[4]Berg (1982) suggests that if increases in income are quite large and if an effective private or public system exists for marketing foods, then a switch to cash crops will not result in reduced consumption levels. If income increases were only moderate, nutrition levels would fall, he agrees, due to the fact that increases in income could not buy as much food at retail market prices as the family could previously have sold at farm gate prices.

nutrition benefit incidence to these different groups, it is based upon easily, quickly and cheaply obtainable information and finally, it has acceptable levels of accuracy. More detailed ex ante variables, such as the calorie consumption indicator, might provide extremely useful information in the strategy design phase; however, at apparent great expense.[5] Whatever variable or combination of variables are used in the ex ante phase of FSR being discussed, a preliminary analysis of the possible nutritional impacts of the proposed technological change on the farmers should be made by the research team.

III. ON-GOING AND EX POST ANALYSIS OF THE NUTRITIONAL IMPACTS OF FSR

Although the major emphasis has been upon determining the likely effects of FSR activities upon food consumption before the research gets underway, there are effects of FSR activities upon food consumption and nutrition which occur both during the period of the output-augmenting adoption and, finally, once the period of adoption is completed. With respect to the effects which occur during the adoption period, the most important are perhaps those which occur as a result of the seasonal dimensions of cropping changes. This may occur when they impact upon the demand for labor and time allocation, particularly the demand for the mother's time. The concern would arise if the household became less liquid with respect to consumable food than it was prior to the advent of changes in the farming system. An examination to see whether or not there are periods in which food becomes relatively more scarce would be warranted. Particular attention should be paid to the intra-household food distribution process and would undoubtedly provide valuable insights into the presumably important distributional impacts of changes in household food availability. Moreover, the normal cycle of the seasons itself imposes certain strains upon food consumption and nutrition levels and the synergism between disease incidence and low energy, food and nutrition levels in the wet season of the production cycle is particularly pronounced. Chambers, Longhurst et al., suggest in Table 3 a series of variables which could be used to monitor nutritional status in seasons likely to pose significant overall threats to general health and well-being, although variables which examine the synergism referred to above are lacking.

Performing some kind of ex post appraisal about the effect of FSR adoption on nutrition, once the adoption process is relatively complete, will likely be most useful as background information for other FSR undertakings. In this sense ex post analysis serves ex ante analysis. Meaningful ex post analysis requires a solid theoretical foundation such as that provided by the economic theory of the household-firm. Renewed interest in this area has resulted in the development of household-firm models which re-emphasize the

---

[5] See Pinstrup-Anderson's brief discussion of the calorie consumption indicator (1981) pages 75-79.

Table 3. Hypothesized Seasonal Variations.

Factors		Seasons						
		Dry			Wet			Harvest
		Early	Mid	Late	Early	Mid	Late	
Diseases	C-S Meningitis			-				
	Malaria					-	-	-
	Diarrhoea					-	-	-
	Guinea Worm					-	-	-
	Skin Infections					-	-	-
	Filariasis	-						
	Schistosomiasis	-						
	Yaws					-	-	
Energy, Food and Nutrition	Agricultural energy demand	(-)	+		-	-	-	-
	" " Men		+		-		(-)	-
	" " Women	(-)	+			-	(-)	-
	Food stocks	+	+		-	-	-	+
	Prices for food purchase	+	+		-	-	-	+
	Food quality	+	+			-	-	+
	Body weight/ energy balance	+	+		-	-	-	-/+
Economic	Debt and repayment factors			(-)	-	-	-	-
	Screws and ratchets	+	+		-	-	-	(-)
Social and Demographic	Child care	+	+		-	-	-	-
	Deaths	-	+	+		-	-	-
	Neo-natal deaths as % of births					-	-	
	Conceptions		H	H				
	Births						H	H

Key:

+ = a positive, favourable, condition or effect
- = a negative, unfavourable, condition or effect
(-) = a less marked or less widespread negative, unfavourable condition or effect
H = High

Source: Chambers, Longhurst, et al., 1979, Appendix B.

importance of consumption as a driving force behind production and of linkages among production, consumption and marketing. These models have suggested new ways of examining firm-household interrelationship which are of direct relevance to the study of farm behavior because of the interconnection between the farm as firm and the farm as a consuming household unit. A very practical offshoot of this theory is the recognition that data collected for each functional group should trace the production cycle (beginning with land preparation and clearing and ending with harvest) as well as the consumption cycle (beginning with harvest and ending with the period immediately prior to the following harvest).[6] Any useful analysis requires, therefore, that the data collection cycle be greater than for simply the production cycle which would need to be augmented to represent more accurately the integrated production-consumption cycle of the household. Good food storage data, particularly beginning, ending, and other periodic inventories, along with records of changes which occur to household size due to labor migration, absence for schooling, death, etc., are also essential.

Income elasticities for calories by SPR, expenditure, or other nutritional status categories, should be calculated in order to examine the effect that food preferences and food quality considerations have on the functional categories of interest. These elasticities should also be calculated according to income source if one wishes to examine the hypothesis that the source of income, perhaps a change in the wage earnings of female household members, is an important influence upon food consumption and nutritional status. This would necessitate collecting information on income and/or expenditures during the full data collection cycle. The elasticity of calories with respect to the SPR would also be interesting to examine and would provide an additional use of the SPR concept. The elasticity of demand for calories should also be calculated by functional category and should be based upon the prices for real goods, not a fictitious price of calories.

The extent to which FSR activities benefit large versus small farmers, through perhaps a possible FSR emphasis upon cash crop versus subsistence crop or sole versus mixed/multiple cropping technologies, and have significant long run effects upon nutritional status can only be answered after the project is completed. There is no reason, however, why ex post findings such as these cannot be stated ex ante as plausible occurrences given various circumstances. The primary value in incorporating nutritional considerations into FSR activities, lies in ensuring that the ex post findings as such do not evidence increased disparity in levels of nutritional well-being with higher levels of food poverty and concomitant malnutrition. The research emphasis among those concerned about using FSR as a vehicle to reduce intolerably high levels of malnutrition among the rural poor should therefore be upon advancing viable ex ante strategies which protect the nutritional interests of those likely to be affected by farming systems research throughout the world. If the incidence of malnutrition lessens due to more thoughtfully conceived FSR ventures, then

---

[6] See Smith et al. (p. 69-73) for a discussion of methodological problems which result when data are not collected to cover both cycles.

this might lessen the need for the more costly ex post analysis. Whatever the case may be, a promising direction to follow requires researchers to develop and refine variables such as the SPR which are of direct usefulness in the planning stage and to use ex post analysis to help identify well conceived ex ante variables for future farming systems research.

References

1. Abalu, G. and D'Silva, B. (1979). Socio-economic analysis of existing farming systems in Northern Nigeria. Paper presented at the Workshop on Development of Semi-Arid Agriculture. ICRISAT, India, 19-23 February, 1979.

2. Berg, A. 1982. "Malnourished People: A Policy View." World Bank, Washington, D.C.

3. Chambers, R., Longhurst, R., Bradley, D. and Feachem, R. 1979. "Seasonal Dimensions to Rural Poverty: Analysis and Practical Implications." Institute of Development Studies Discussion Paper No. 142. University of Sussex. Brighton, England.

4. Mason, J.; Habicht, J.; Tabatabai, H.; and Valverde, V. 1982. "Nutritional Surveillance." Draft. Cornell University, Ithaca, New York.

5. Okigbo, B. 1981. "Introducing Nutritional Considerations into Research and Training in Farming Systems." Paper presented at the Seventh Session of the ACC/SCN Symposium. Rome, Italy.

6. Pinstrup-Andersen, P. 1981. "Nutrition Consequences of Agricultural Projects: Conceptual Relationships and Assessment Approaches." World Bank Staff Working Paper No. 456. Washington, D.C.

7. Scrimshaw, N. 1977. "Through a Glass Darkly: Discerning the Practical Implications of Human Dietary Protein-Energy Interrelationships." W.O. Atwater Memorial Lecture. Nutrition Review. Vol. 35, No. 12, pp. 321-337.

8. Shaner, Philipp, P. and Schmehl, W. 1982. Farming Systems Research and Development: Guidelines for Developing Countries. Consortium for International Development Study. Westview Press. Boulder, Colorado.

9. Smith, V.; Lynch, S.; Whelan, W.; Strauss, J.; and Baker, D. 1979. "Household Food Consumption in Rural Sierra Leone." Rural Development Working Paper No. 7. Department of Agricultural Economics, Michigan State University, East Lansing, Michigan.

10. Srinivasan, T. 1981. "Malnutrition: Some Measurement and Policy Issues." Journal of Development Economics. Vol. 8, pp. 3-19.

11. Streeten P. 1979. "From Growth to Basic Needs." Finance and Development. Vol. 16, No. 3, pp. 28-31.

12. Sukhatme, P.V. 1977. "Malnutrition and Poverty." Ninth Lal Bahadur Shastri Memorial Lecture.

13. United States Agency for International Development (A.I.D.). 1982. "A.I.D. Policy Paper: Nutrition" Washington, D.C.

14. Whelan, William 1982. "Determinants of Food and Calorie Consumption for Farm Households in the North of Nigeria." Ph.D. Dissertation. Department of Agricultural Economics, Michigan State University.

Rutgers University/Cook College

INTERNATIONAL AGRICULTURAL AND FOOD PROGRAM WORKING PAPERS

Objectives

These working papers are intended to stimulate interest in internationally relevant research, make international work at Rutgers more immediately visible, promote new professional linkages and collaboration, and provide interested faculty with a vehicle for obtaining timely comments on work which is nearing completion.

Scope

Submitted papers should include research and technical work that are in a preliminary state. Analytical, empirical, and scholarl papers will receive highest priority. The series is intended to be multidisciplinary and will include any subject of international relevance.

Format

Single spaced submissions of 10 pages or less will be preferred. Style may follow that of any professional journal. Authors are required to submit an abstract not exceeding 100 lines.

Editing

Authors will be responsible for the grammatical quality of the manscript and abstract. Papers will be reviewed by the IAFP faculty, but reproduced largely as submitted.

Distribution

Individual papers will be distributed as they are received, together with a list of titles of other papers in the series. This will facilitate quick feedback to authors, while giving readers an overview of current work. Papers will be sent to approximately 200 individuals and institutions, including all Cook College department chairs, all international agricultural program directors in U.S. universities, AID and BIFAD, multilateral banks, USDA, and the international agricultural research centers. Authors may designate other recipients.

Costs

Reproduction and distribution costs will be assumed by the International Agricultural and Food Program.

Further Information

Contact Dr. G. William Wolfe, Department of Economic Zoology and Entomology, Cook College. Phone: 201-932-9459