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NUTRITION, WORK, AND DEMOGRAPHIC BEHAVIOR IN RURAL PHILIPPINE HOUSEHOLDS: A SYNOPSIS OF SEVERAL LAGUNA HOUSEHOLD STUDIES

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I. INTRODUCTION

In 1975 an interdisciplinary group of scholars based at the University of the Philippines at Diliman and the University of the Philippines at Los Baños designed and implemented a sample survey of 576 rural households in Laguna Province in the Philippines.[1] In 1975 and 1976, an "intensive" subsample of 99 households was further surveyed with an emphasis on the allocation of time and individual dietary intake. In 1977, a resurvey of the 1975 sample and of an older household sample originally drawn in 1963 was undertaken. To date several studies based on these data have been made.[2]

This paper provides a synopsis of the survey design and methodology and of the early analytic studies which have used parts of the data set. An attempt is made to assess the limitations of both the survey data and the studies. We also attempt to develop and summarize the empirical picture of behavior of these households as it emerges from these studies.

It is possible in an ex post sense to describe the survey design (or designs) as being multiple-purpose in character. It would not be accurate, however, to claim that a complex multiple-purpose design was developed prior to the initial survey work. The actual survey instruments were developed by stages and reflected the interests of individual members of the interdisciplinary advisory group.[3] The survey work extended over a period of more than two years and an attempt was made to "learn" from previous experience as well as from the pretesting of new survey instruments and methods.

The sequencing of the survey work proceeded as follows: The initial 1975 survey attempted to obtain data on a wide range of household behavior in a single cross-section survey. Some members of the planning group were motivated to collect data suited to testing hypotheses derived from the modern household economics tradition. These members wanted to analyze fertility behavior, investments in children, time allocation, and home production within this framework. Other group members had a more limited analysis in mind.

The initial survey was not entirely adequate in all respects. The flaws were not primarily due to its multipurpose nature. For some purposes, particularly for the collection of time allocation data traditional recall methods were not providing adequate data. This led to the development of the "intensive" phase of the project in which a subsample of 99 households was surveyed from September 1975 to May 1976. Survey teams trained in participant observation methods and in individual dietary intake measurements visited each household for four 24-hour periods over the survey period.

The early studies based on these data (some of which are reviewed here) were instrumental in encouraging further survey work. A related planning group initiated more systematic effort to develop a multipurpose instrument for a survey in the Bicol region in the Philippines. Following the Bicol Multipurpose Survey instrument development, a Laguna Resurvey instrument was designed, and in 1977 the resurvey samples were surveyed. The first was a subsample of households in 22 of the 35 barrios in the 1975 survey. The second was a sample originally surveyed in 1963 and later surveyed in 1968 and 1973. This older sample was resurveyed to obtain data on characteristics of older households, specifically on completed family size and investment in children. This sample also had the merit that direct observation on wage

rates, income, et cetera, was made available on a longitudinal basis.

In the following section, we review some of the measurement objectives of the survey and discuss the problems and limitations encountered. We do so in part to caution the reader about data quality. We also believe that the multipurpose survey merits attention as a research tool. A discussion, even though nontechnical, of this experience may be useful. The section also gives a statistical description of the samples involved.

In part III we review the diet, nutrition, and health studies which used the Laguna survey data. Most of these studies are not directly related to the modern household economics framework. Part IV reviews studies of time allocation and home production. These studies have a somewhat closer adherence to household economic models, particularly to the simplified version developed by Gronau which is reported in Binswanger et al. (forthcoming). Part V reviews three studies of fertility and child investment which are more directly in the household economics tradition.

II. MEASUREMENT OBJECTIVES AND PROBLEMS: A DESCRIPTIVE SUMMARY

The Laguna multipurpose survey was designed to meet a number of measurement objectives and to permit investigation of questions relating to the determinants and consequences of household behavior. Key areas of interest included fertility, health, poverty, time allocation, and home and market production. In this section we will first briefly describe the overall set of instruments and variables measured. Then we will discuss the experience in key areas of interest, particularly income and assets, time allocation, and diet/health data.

The Laguna multipurpose surveys were designed with a number of modules, some dealing with a specific type of economic data, such as women's labor force activity, earnings from a specific occupation, family income and home production, and others with health, fertility, etcetera. There were five types of survey instruments. Each used questions on the household's current situation as well as on its recent past to collect the data desired. The types of survey instruments were:

1. Household recall instruments. To collect information on time allocation we used retrospective recall for the previous seven days for both market and home production and a rough recall of perceived acute and chronic health problems over the past month to gather health data.

2. Diet instruments. These obtained individual and household dietary intake data as well as the value and source of the consumed items.

3. Community module. This included profiles of social services available and prices of various services and goods at a community or barrio level.

4. Time observation. To get much more detailed time allocation patterns and to understand better the nature of jointness in time allocation, we also undertook a direct observation study.

5. Anthropometric Some current simple anthropometric measurements, such as weight and height, were obtained. The anthropometric measurements provide supplementary objective measures of the health status of the population.

The appendix to this chapter provides further detail regarding the instrument modules and sampling procedures.

Prior household and farm surveys in the Philippines had established basic procedures for measuring income, production, and other economic activities. Household income has conventionally been viewed as the sum of the payments for assets owned by the household, such as land, plus payments to the household for work performed. We attempted to collect sufficient data to enable an alternative measure, "full income." Full income, for our purposes, was measured in terms of payments to productive resources, which included, in addition to conventional market income, the value of time devoted to home production plus the value contributed to home production by home capital. The latter two home production components of income must be imputed, but this imputation can be done by using opportunity or replacement cost methods.

Accurate income data are notoriously difficult to obtain. We devoted considerable effort to this task. We collected information on income from a wide variety of income-earning activities, using separate modules for each. These activities include home gardening, agricultural production, livestock raising, wage-earning activities, fishing, and business.

Table 1 provides a summary of income by source in the basic 1975 survey. Some of the limitations of the data methods are apparent in the data which show negative incomes for a number of households. The large number of households with negative income from livestock sources suggests that income may have been under-reported because of home consumption.[4] The distributional data by source provide a picture of substantial disparity between households. The transitory component of incomes is a phenomenon which pervades all cross-section survey data.

Table 2 summarizes the occupational structure of the survey households. Both tables 1 and 2 reflect the complexity of economic activity in rural Philippine barrios. Income from crop production is less than 25 percent of total income and the combined income from crop and livestock production is approximately one third of total income. A substantial portion of the 30 percent of income from wages is from agricultural employment, however.

It is also apparent from these tables that conventional methods for measuring income do not measure full income. The conventionally measured home production and income from home gardening accounted for only 5 percent of total income. The economic activities which produce household goods (such as food preparation), child care, and other household tasks are simply not captured by these measures. Taking the amount of time spent on an activity as a measure of its importance, the data in table 3 provide an indication of the magnitude of the undermeasurement problem of household income. These data show that a substantial part of the total economic time of women and children is devoted to nonincome-producing home production. In a later section we report estimates of the value of this home production. This calculation, while crude, indicates that home production is actually of approximately equal value with income conventionally measured.[5]

The measurement of assets and liabilities, in our experience, was subject to more error than the measurement of income. It is sometimes easy to overlook assets such as the value of a growing crop (against which a liability for a fertilizer loan may exist). We attempted to obtain present market values, purchase values, and age of all home and farm assets. Accuracy of

these values depends heavily on the capability of the interviewer.

In conventional labor force surveys the classification of respondents as employed or unemployed hides the complexity of the decision making or choice process that actually goes on in the household. In labor force surveys,

> a small and rather arbitrary subset is included in the list of activities considered to be supplies for the production of economic goods and services . . . Thus, all wage earning time is included and time spent in producing agricultural commodities is ordinarily included regardless of whether the output is sold in the marketplace or consumed at home, while the treatment of, say, the time spent washing clothes is included only if not for home consumption. (Boulier, 1977:2)

Three methods of obtaining a more complete accounting of time are available: recall, record-keeping, and direct observation. All three methods were tested in the Laguna surveys. Only the recall time data and direct observation or "intensive" time data were actually collected. The record-keeping method proved to be too demanding on respondents to be used.

An open-ended version of the recall method was also tested. Respondents were asked to list home activities, the persons who performed them, and the amount of time spent in each activity by each of these persons. The listing of activities by the household was incomplete. Unimportant activities that required little time and important activities which were deemed unimportant by the household were omitted. The recall method used in the original survey obtained time spent on all market and home activities based on a check list of key activities of the household in the past week, and on market production over the past year.[6] Leisure time (that is, time for consumption, leisure, and personal care) was calculated as a residual. Although ideally each person in the household should have been interviewed regarding his time use, respondents were limited to the wife who was asked to recall her own home production time and those of the other household members, and to the husband who provided time in market production of household members.[7]

For the "intensive" phase of the Laguna survey, detailed home and market production activities data for all household members were collected by direct observation. Observers were stationed in a household for the day and recorded time spent on a prelisted set of as many as 30 different activities. These activities are listed in the Appendix. Recall questions were necessary to obtain data on market activities away from home, when the observer could not be present. Data on activities regarding preschool children was given emphasis, particularly the child care time by parents and older siblings.[8]

Table 4 summarizes time allocation for the 1975 sample of 576 households. The division of labor within the household is quite evident. The husband's market production time accounts for more than half of total market time of the household, confirming his role as its chief income earner. Children in the sample spend less time than their father but more time than their mother in market work. The wife dominates home production but shares about a third of housework with her children and husband. If equal weight was placed on home and market work, the wife appears to have the greatest number of work hours in a week.

Table 5 reports time allocation for the intensive sample in terms of the average hours per day based on an average for the three observation visits. A somewhat more detailed categorization of activities is apparent in this table.

Table 6 provides a comparison between the recall data summarized in table 4 and the observation data summarized in table 5. The data are not strictly comparable even though they are from the same set of 99 households. (The recall data were converted to a daily basis by presuming a six-day work week.)

If we regard the observation data to be the more accurate data, we have evidence that fathers tend to overstate their market time and mothers tend to overstate home production time in recall. Of more significance, however, is the large understatement of both market and home time of children in recall. Parents tend to view many home activities as leisure rather than production.[9]

A further measurement issue arises with respect to simultaneous activities, such as when the wife watches her children and prepares meals at the same time. The intensive survey recorded the beginning and ending time of each activity so that two activities performed simultaneously were treated separately. As a result, a person could have more than 24-hours of activity time in a day. We found that the amount of simultaneous activity as recorded by the observers was generally small.

Measurement of dietary data reflect more standardized procedures than does measurement of time allocation. During the cross-sectional survey of the 576 households, the amounts, values, and sources of household consumption were obtained using a combination 24-hour food record and recall method.[10]

> In this procedure, the trained nutritionist visited the households at least two times. On the first visit, she instructed the mother how to measure the household's 24-hour food intake using measuring cups, spoons and ruler. She also taught the mother how to fill in the food record sheet. After the 24-hour period, she collected the food record sheet and checked it by means of a recall. If a discrepancy was noticed, a new record sheet was left for another 24-hour period and this was repeated until a reliable record was obtained. (Herrera, 1977:2)

The food survey provided an accurate picture of the food consumption in the household.[10] The picture that emerged was that of a rice and fish diet with a small amount of vegetable and coffee, and occasional snacks. Table 7 presents the sources of the household diet. It shows that cereals are a very important source of most nutrients, especially of calories, protein, and carbohydrates. A diet dominated by starchy staple food is common in Asia. As we show later, this diet was generally inadequate in terms of recommended daily allowances (RDAs).

During the intensive survey of 99 households, the allocation of nutrients within the household during three observation periods two months apart was studied. Dietary information was obtained by weighing individual food intake and comparing this with the Philippine RDAs for each person. As with the time observation data, a two-day food-weighing period was selected to correct for

measurement error due to observer bias. During the first period of observation, the first day of the two-day food weighing period was discarded; but for the second and third periods during which observer bias was presumed to be less important, only one day was needed to collect these data.

Dietary intake as a proportion of RDAs was calculated for various age and sex groups. The results will be discussed in the following section. Except for iron intake, the dietary consumption of all age-sex cohorts fell below the recommended levels for each nutrient.

Other nutritional status data collected during the Laguna '75 and Laguna Intensive surveys were the weight and height of each individual in the household and infant-feeding behavior.[11] The latter measured the extent and duration of breast-feeding, bottle feeding, and the knowledge of and attitude towards nutrition. Two further types of health data were collected during each survey period: the social services used by each household, and the perceived morbidity of household members during the two months preceding the survey. The social service utilization data included types of health services used by respondents when the person had any perceived illness, immunization and other health-seeking experiences of sample households, and types of social services used by persons seeking family planning assistance.

A tabulation of these data show that rural Laguna households used modern public and private services frequently (Rimando, 1977). During the two-month period prior to the survey, more than one-third of the respondents visited private doctors and not more than 12 percent visited either traditional practitioners(e.g., herbalists) or public clinics and hospitals.

III. DIET, NUTRITIONAL STATUS AND HEALTH

Dietary intake and its relationship to health, particularly of young children, has been a focal point of research concern for many years. The importance and relevance of diet are readily obvious. Cecilia Florencio in an earlier chapter in this volume sets forth the nutritionist's perspective on socioeconomic aspects of dietary behavior. Several studies based on Laguna data have analyzed dietary intake from this perspective. Corazon Herrera (1977) analyzed the data from the 99-household intensive survey. A study of the demand for nutrients by Susan Ybañez-Gonzalo (1976) and a study of nutritional status of preschool children by Josefina Battad (1976) were also undertaken with the 576-household sample.

Other related studies to be discussed in this section are by Barry Popkin (1978a) on breast feeding behavior and (1978b) on child care, child diet, and nutritional status patterns associated with maternal time allocation changes; by Enriqueta Torres (1976) on adoption of home technology; and by Celia Capule (1977) on the effect of nutritional status on earning capacity.

Herrera's study provides a summary of the dietary adequacy of the sample. Table 8 reports the distribution of households by level of adequacy of this diet. These data are comparable with earlier dietary surveys in the province, and show a very wide dispersionof dietary intakes by households. Since these data are for a single 24-hour period, they are likely to be subject to a substantial transitory component. This transitory component probably does not bias the mean levels of adequacy. However, these data show the diet to

be generally inadequate. As in many other studies, the data indicate that calories and proteins are roughly equivalent as regards the level of adequacy. Vitamin A is clearly the most deficient nutrient with riboflavin and calcium also sharing deficiencies.[12]

Herrera undertook a correlational study of factors affecting nutrient intakes. She found generally that

> an increase in the following factors would mean an improvement in the quality of the diet: income, wealth, and mother's education. It would also increase when it was the mother who prepared the food. An inverse relationship between the quality of diet and household size and distance from 'poblacion' (market center) was observed. Employment of the mother affected dietary quality negatively. (Herrera, 1977)

The importance of RDA specification is heightened in studies of the type conducted by Valenzuela.[13] Valenzuela's study, based on the intensive data from the 99 households, investigated age and sex bias in dietary intake. Table 9 reports the nutrient intake of children in the intensive sample expressed in "adequacy levels" for the age and sex group of children. Clearly the RDA standards themselves are critical to such a comparison. If the RDA levels for females, for example, are "too high" relative to the RDA levels for males, females will appear to be discriminated against.

There is very little evidence, however, to suggest serious age-sex bias in the RDAs. Most of the controversy is over the nutrient levels required per kilogram of body weight. Presuming no age-sex bias in RDAs Valenzuela's data indicate that at all age levels, male children have more adequate diets than female children and that diets of adults are more sufficient than those of children.

Table 10 reports Valenzuela's analysis of the determinants of nutrient adequacy ratios. She regresses these ratios on a set of age-sex dummy variables plus the continuous variables shown in the tables. (Regression 2 includes interaction variables). The results indicate that mother's education and time spent on food preparation increase the nutrient intake, holding food expenditures constant. The negative food expenditure-time interaction terms further support the interpretation that nutrients are produced in the household. (That is, the term reflects diminishing returns in production.)

The mother's skill level and time input can be expected to produce more nutrients per given expenditure on food. It is true, however, that as wages rise, incomes also tend to rise. It is possible for food preparation time to appear to be valuable simply because mothers facing lower wages not only devote more time to food preparation but also change the mix of food toward more nutritious food per person expended. This is partially controlled for by the wife's employment effect. The fact that nutritional status rises with the economic contribution of the family member is consistent with models indicating that nutrients increase earning capacity.[14]

Table 11 summarizes the differences in diet adequacy for each age-sex category relative to the diet of the mother. Both the observed differences and the differences predicted when controlling for the effects of the variables in table 10 are reported. The results show that both the observed and

predicted nutrient adequacy ratios (NARs) differed significantly with females faring less well than males and with adolescents faring less well than preschoolers. The regression variables account for little of the observed age-sex differences[15].

Susan Ybañez-Gonzalo (1975) undertook a related study of the derived demand for nutrients based on the household level data from the 573-household sample. Her results are shown in table 12.

Foods, of course, have taste characteristics as well as nutrient characteristics. Households demand both taste and nutrition, but we have little power to discriminate between a model in which nutrients are truly demanded by households and a model in which they are concomitant, that is, a by-product of the demand for taste characteristics. The results in table 12 show that income and wealth are determinants of nutrient intake but it does not follow that households necessarily demand nutrients per se.[16] The results also suggest that the mother's work and education efforts may differ by income level. At low levels of income, it appears that schooling increases nutrition while market work decreases nutrition. Since a wage rate was not included in the regressions, and mothers income was also excluded, this effect is presumably a combination of the effects of the added income from work, the price of time effects, and other effects related to work status.

In a related study of child welfare, Popkin also investigated the effect of market work by mothers in child care time and in breast-feeding. His results on child care time are summarized in figure 1 which shows differences between households with working and nonworking mothers. Other studies of time allocation (see section IV) show that when mothers work outside the home, they reduce their home production work but not by enough to avoid a loss in leisure. Popkin's findings show that family composition, particularly the presence of adolescent girls who can substitute for the mother's child care time, is important to child welfare. He also provides evidence that labor force participation of the mother was a small positive impact on diet, but an overall negative impact on the nutritional status of preschool children, especially on those 35 months old and younger. This fact may relate to the impact of maternal work on both child care and breast-feeding patterns. It may reflect low quality care by older siblings who substitute for the mother and the inadequacy of bottle-milk and infant supplementation market substitutes for the time-intensive care and feeding provided by the mother. Most important is his finding of a significant increase in the probability of third degree malnutrition when the mother works or her predicted wage rate increases (especially for lower income mothers).

Battad (1977) examined some of the possible tradeoffs between household income and education increases. She uses percentage of standard weight for ages as the measure of the child's nutritional status. She found that increased education had a larger and significant effect on children aged 6-23 months than on older children, whereas the income-nutritional status elasticity increased as children became older (see table 13). She also found that maternal education increases and that income increases were more important among children whose mothers were higher educated.

Studies of diet and nutritional status have to date not identified very thoroughly the relationship between health and nutritional status and

economic factors. The modern household economics models while influencing some of the studies reported in this section have not been directly used. Later sections of this report take up these models in more detail, but a brief review of the features of these models here may be suggestive for further research in this field.

The household economics model postulates that certain household goods are the direct objects of utility. Further, it postulates that two food-related household goods, "health" and "taste" provide utility and that food per se is only an input into the production of health and taste. A "derived" demand for foods will be based on this input relationship.

Since the taste characteristics of foods cannot be completely separated from the nutrient or health producing characteristics, it is possbile for the demand for foods to be dominated by the demand for taste characteristics. This is due to the nonlinear relationship between nutrition and health. As "adequate" levels of nutrients are ingested, further nutrient intake will not improve health and may impair it.

In a recent paper, Alves, Evenson, and Rosenzweig (1978) have developed a more complete model of the health and nutritional relationship. In this model, the authors show that if there were no demand for taste characteristics, households would seek to consume the "minimum cost diet." Clearly, even the poorest households derive utility from taste characteristics and hence will sacrifice nutrients for taste. We know that households do this. After all no one consumes the minimum cost diets. But how is this choice affected by nutrition knowledge? By prices? With adequate specification of these relationships nutrition education programs and income and price policies could receive valuable guidance.[18]

One of the difficulties for empirical work on these topics is the lack of data with considerable price variation. Most surveys such as the Laguna survey are cross-section surveys where households face similar prices. There is a need for more cross-section, time series surveys. Such surveys would also enable the analyst to deal more effectively with the transitory income problem. The studies reviewed here all show very low income (or income and wealth) elasticities. This is probably the result of transitory income components.

One of the implications of the household economics perspective is that important parts of health and taste are "produced" in the home. The time of household members and the skills with which they conduct household activities are important factors. The studies reviewed in this section generally indicate that the educational level of the mother is important; it appears to be reflecting general skills in home activities and skills in the purchase of foods. The ability to identify nutrition values of foods allows a given expenditure on foods to yield more nutrients without a sacrifice in taste.

Torres (1977) has a study of home management practices using the 1963 and 1968 surveys. She has a measure of home management practices "adopted" by households during the 1963 and 1968 period. Indices of food, health, sanitation, and other practices for households in 1968 were developed. Torres generally found that the schooling of the mother and home management contacts (presumed to be exogenous to the household) affected adoption from

1963 to 1968 positively. The economic importance of home production (see the following section) certainly suggests that more studies of home technology would be useful.

The production of good health in the household is, of course, not simply determined by household activities. The provision of health services at low cost and of "community" health services such as immunization and sanitation services is also important. Crude evidence suggests that a large part of the improvement in life expectancy and the decline in infant mortality in many developing countries is probably related to the provision of community health services. Nonetheless, studies of household use of health services can add to our understanding of the process of health improvement. Rimando (1976) undertook a study of health services use based on the 576-household sample. She found that income and family age structure influenced the use of health services, with families switching to modern services as income rises. Overall she found 21, 29, and 35 percent of the families used traditional, modern public, and modern private health services, respectively. Most important, though, Rimando found that most postnatal and infant care was with traditional practitioners. For example, the presence of an infant was associated with a large increase in the probability of using only traditional midwives and herbalists.

Another study, by Celia Capule (1977), investigated the relationship between nutritional status and the ability to earn income. She found that an index of nutritional status (based on percentage of weight for height) of the rice farm operator behaved in a fashion similar to his education. Nutritional status appeared to be only marginally related to the efficiency of rice production in a technical sense. It was however significantly related to net income from rice farming and from all services, suggesting that nutritional status is related to allocative ability.

IV. TIME ALLOCATION AND HOME PRODUCTION

In an earlier section we discussed the problems of defining and measuring time allocation. In this section, a model of agrarian household behavior is used to develop a basis for more complex econometric analysis. A summary of three econometric studies is presented and discussed. The final part of this section reports an attempt to measure the value of home production.

Consider first a summary of the data from the 99-household intensive sample. More than 40 percent of the fathers and about 5 percent of the mothers report farming as their primary activity (including fishing or livestock raising). Most nonfarmers did not have second jobs, whereas many farmers reported second occupations. The total market production time of farmer and nonfarmer husbands, about seven and a half hours a day for both, does not differ significantly, but that of farmer wives is greater than for nonfarmer wives (table 14). Some degree of diversification in the economic activities of both husband and wife is evident: nonfarmers spend a few hours for farming, livestock raising, and other economic activities, and farmers earn income from wage employment and other market production.[19]

The time budgets of those employed, (in table 15) grouped according to their hours of employment, give interesting results. Husbands who allocate

fewer hours to work in the market devote significantly more time to work at home, both for child care, food preparation, and other home chores. They also enjoy more leisure hours -- more time for personal care, recreation, and other forms of leisure. The general pattern observed is that husbands with only a couple of hours of market work have more home time and more leisure than those with four to six hours of market production, and similarly the latter have greater home time and leisure than husbands who work over six hours or those who average ten and a half hours per day in market production. It may be noted, in particular, that only when market production time averages more than ten hours a day do husbands greatly reduce their time for children and for other household tasks. Moreover, their time for personal care and recreation is also drastically cut down.

The time allocation of the wife is very similar to that of the husband. In general, women who are economically active for only a few hours a day can still devote time for home production and for leisure, but reduce these as market production rises. Only when market time exceeds six hours does the wife reduce her food preparation time. This implies that labor force participation of women per se need not result in a decrease in time spent for essential home production activities. Rather, such time is determined by the degree of market participation or the quantity of labor supplied to the market. When the labor market structure allows flexibility in the number of working hours, such as is the case in the informal business sector and agriculture, labor force participation does not necessarily imply a decline in the role of these women at home. These data also suggest that, since active market participation can cut deeply into home production time, "full" income would be a better measure of household welfare than cash income.

These findings provide a first indicator of a characteristic of both husband and wife which is probably quite important. We observe differences in leisure which are substantial. It is difficult to make the case that differences in the taste for work and leisure exist. Some people are more "hardworking" than others. We have not yet been able to measure this characteristic.

These tabulations are helpful in providing a sense for the data. They are not very helpful, however, as analytic tools. Time allocation is a matter of choice by households. In the general household model the household allocates the time of household members in such a way as to maximize utility subject to a set of constraints which are exogenous or outside the control of the household. Relationships between endogenous variables such as different types of time allocation may be spurious in that a set of exogenous factors jointly determined them.

In the final section of this paper we present a general household model developed by Banskota and Evenson (in press) and presented in the discussion of the analysis of fertility and investment in children. The analysis in the allocation of time is part of the more general analysis but is more complex because of the fact that specialization of household roles affects time allocation directly. Specialization does not have to be dealt with quite so directly in the analysis of the demand for household goods. Reuben Gronau (1976) (see Section V) has provided the foundation for a simpler model. His model has two goods, a composite good, Z, and leisure, L. The composite good can be "produced" in the home or purchased in the market. Gronau developed a

simple geometric analysis of the allocation time to the home production of the good, to work for wages in the labor market (enabling purchase of the good), and leisure. Evenson (1978) has extended this basic model to allow for farm production as well as home production. This extension first develops the single person household case, then the two-person household case.[20]

The Single Person Household Case

Even though we are primarily interested in the behavior of multiple person households, the single person case affords a simpler exposition of the basic features of the model. Figure 2 portrays several cases of interest. Panel A shows the simplest case, a household with a minimum of resources, in the form of shelter, cooking utensils, and a small home garden, in addition to time. We also will presume that the composite good Z can be produced in the home or purchased in the market. This is a critical assumption because it implies that the mix of home-produced and market-produced goods does not affect the productivity of home production time. In the case of farm production to be considered later, this is not as critical.

The composite good is measured on the vertical axis. Leisure is measured on the horizontal axis. The point H is maximum possible leisure. The curve abc traces out what might be termed a home production curve. Its actual shape depends on other sources of income. If sufficient nonlabor income is available to insure adequate nutrition with no home production, the curve will be as depicted by abc. If this is not the case, a relationship between production and consumption will exist. The curve aa'bc shows a nutrition-work effect in which productivity is low at low levels of production. The home production curve is based on a work organization in which the most productive tasks are undertaken first. Because of fixed home capital resources, diminishing marginal product is presumed to occur after some point.

The segment db in panel A shows the goods-leisure locus offered by the labor market. The slope of the line is the wage rate divided by the goods price. It is located so that it is tangent to the home production function, reflecting the fact that at points to the left of the point of tangency, b, the productivity of time in the market exceeds that in the home (presuming that home-time is not sold). In equilibrium, the household will devote OL units of time to leisure, LM to work in the market, and MH to home production.

Panel B portrays a household with access to land resources and that engages in agricultural production. The curve ac' is a home production curve as in panel A. The curve ab_2b_1c reflects the combined product from both home production and farm production. Farm production is net of payments to landlords and to variable factors. The segment b_1d_1 again reflects the opportunities afforded by a labor market.

In the initial equilibrium with indifference curve u_1 with market opportunities b_1d_1, this household will have OL_1 units of leisure, L_1m_1 units of market time, m_1F_1 units of farm time, and F_1H units of home time. Note that the marginal product of home, farm, and market time will be equated so the point F_1 is located where the slope of the curve ac' is equal to the slope of the segment b_1d_1.

Panel B also portrays the simple analytics of the consequences of a rise in the market wage. The segment b_2d_2 reflects the higher wage rate. Note that the point of tangency with the combined home and farm production curve shifts to the right from b_1 to b_2. The effect of the rise in wages has two parts. The first is the conventional income and substitution effect on leisure which in this example results in a decrease in leisure from OL_1 to OL_2. The substitution effect is depicted as outweighing the income effect. (This is for convenience of exposition and is not dictated by the theory.) The second part of the effect is the displacement effect against both farm and home time. In panel B, farm time is reduced from m_1F_1 units to m_2F_2 units, and home time is reduced from F_1H units to F_2H units. The relative shapes of the home and combined curves will determine the relative displacement effects against home and farm time. Thus, even if the income effect of a rise in the wage rate outweighed the substitution effect (total leisure increased), the displacement effect could still produce a positive labor supply response. A backward bending supply curve of labor is highly unlikely for a single person household.

Panel C depicts the effects of an increase in nonlabor income. Suppose nonlabor income is increased by an amount sufficient to purchase ON units of goods. The total opportunity curve abd shifts upward parallel to a'b'd'. The point b' is directly above b, so the increase in nonlabor income has no effect on the amount of home time (or of combined home and farm time in the case where farm activities are involved). It will increase leisure, however, as long as leisure is a normal good (from OL to OL' units). Consequently, it will reduce market time (from LM to L'M units).

Panel D depicts the effects of fixed job costs. Suppose that costs equivalent to OC units of goods must be incurred in the form of job search and maintenance costs. The relevant opportunity locus in this case becomes abd. With job costs, a certain minimum number of time units will be devoted to market work (if undertaken). Note also that small differences in the indifference curve, or in market wages, can yield large differences in time allocation in certain circumstances. With indifference curve u_1, the equilibrium is OL_1 units of leisure, no market work, and L_1H units of home (or farm and home) time. The indifference curve u_2 produces only OL_2 units of leisure, L_2M_2 units of market work, and M_2H units in the home. A slight rise in the market

wage with indifference curve u_1 would have produced a similar effect as the shift from u_1 to u_2 indicates. In the presence of job costs, the "position" of the equilibrium becomes important.

The Two-Person Household

Figure 3 extends the previous analytic framework to the two-person case. (The extension of the analysis to consider children and other household members is taken up later.) Here we are concerned with the economics of specialization within the household.

In panels A and B we depict the single person cases for a husband (panel A) and a wife (panel B) acting independently. The opportunity curves abd are for households without land. The curves ab'd' are for households with land. The home production curve for the husband is equivalent to that for the wife. Note, however, that the husband commands a higher wage in the market and is more productive on the farm in this example. This specification is consistent with most empirical evidence.

Panel C depicts the combined household case for landless households. The axis measures goods per member and leisure per member. The curve abcd represents the nonspecialization combination and is a simple average of the single goods cases. In the segment ab both husband and wife work in the home. In the segment bc the husband is working in the market, the wife is working at home, while both work in the market in the segment cd.

The curve abefg represents specialization according to comparative advantage within the household. We suppose here that the wife's time is a perfect substitute for the husband's time in home production. Over the segment ab, both will work in the home as this maximizes the combined product. Over the segment be, the husband will work in the market. It will now be optimal for the wife to replace her husband's home time. Each additional hour that she replaces allows the husband to work one more hour in the market without changing the leisure of either. The segment be in panel C will have the slope of the husband's wage rate and will be the same length as the segment ab, because the husband's home time will be replaced entirely.

In segment ef, further specialization occurs. The husband will work in the market; the wife will work on both her own and her husband's home production curves. She thus will not enter the market at point m_w, but at some later point, m**, where her marginal product on both home production curves has fallen to her wage rate. Both will be in the market after this point.

In the equilibrium (given a household utility function) depicted in panel C, the wife does not work in the market.

The "gains" from specialization are shown as the shaded area. These gains can be associated with the segment be which will be larger, the higher the husband's wage rate and the more productive the wife's home time. The segment to the left of e is larger the more productive the wife (in home time), and the more easily substitutable her home time is for her husband's home time. It also is apparent that as the wife's wage is increased, the point m** moves to the right. As the wife's wage rises to her husband's level, the gains from specialization are reduced.

Panel D, figure 2, depicts the combined case for households with land. The curve abcd is the simple combination of the single person cases. The curve aefgh is based on specialization. Here the specialization begins immediately because of the presumption that the husband is more productive on the farm. In segment ae, the wife replaces her husband's home time by equating her own home and farm productivity and his own home production time. She may not fully replace his home time at the point e. In the segment ef the husband enters the market and the wife further replaces both his farm and home time. Again, because she is less productive on the farm this is a partial replacement so the linear segment ef is less than the length of the segment m_nH (on the vertical axis). The segment fg is curved because the wife continues to work on the farm and in the home and replaces some of her husband's farm time. At the point g she will enter the market but will not have replaced fully the husband's farm time. Gains from specialization are indicated by the shaded area.

Panels C and D of figure 3 provide a basis for an empirical specification of time allocation. This model, it should be noted, is quite restrictive. The model supposes that husband and wife can freely substitute time among estimates, and that home production is independent of time allocation for example. Nonetheless, the model does guide econometric specification and it does have a number of testable implications.

Tables 16, 17, and 18 summarize regression analyses undertaken, using three sets of Laguna data. Table 16 analyzes the Laguna '75 recall data (Boulier, 1976). Table 17 reports an analysis of the Laguna Intensive "observation" data (King, 1977). Table 18 reports an analysis of the Laguna '75 resurvey recall data (Evenson, 1978). It should be noted that the analysis of the Laguna '75 and Laguna Intensive data was undertaken prior to the collection of the resurvey data. Accordingly, the latter data set is somewhat more complete and includes variables which were not available in the earlier data sets. The two earlier studies did not distinguish between farm and other market time as did the third.

We will discuss the results by variables with emphasis on the theoretical aspects as well as the actual regression results. Dependent variables are the home and market time of husbands and wives. The household economics models state that a set of exogenous variables jointly determine the full set of time allocations within the households as well as the equilibrium set of household goods produced and market goods produced. This joint

determination allows us to use single equation ordinary least squares methods."

1. The husband's market wage

When the husband's wage increases, the price of leisure rises inducing a substitution of market time for leisure. It also produces an income effect which runs in the opposite direction. More leisure is desired when income rises. It, of course, has no effect unless the husband is working in the market (or is induced to enter by the increase). We generally expect the substitution effect to dominate the income effect and thus an increase in the husband's wage will induce him to work more hours in the market. Also, he will work less in the home unless he is already fully specialized in the market. If he has an option of farm work, he will work fewer hours in the farm (and the home) and this displacement of time will result in a larger market time effect.

The husband's wage rate will also affect the wife although this will primarily be an income effect for her unless there is an agreement on leisure sharing. With equitable leisure sharing, the wife will reduce her leisure even though she does not have a substitution effect per se. It should not affect her nome time at all if she is in the market.

The results in table 16 are at odds with those obtained in tables 17 and 18. We earlier noted that we regarded the Laguna '75 recall data to be subject to substantial error. This may be the reason for the inconsistency with both theory and the other data. In table 17, the effect of the husband's wage rate is as expected on the husband's time allocation. The effect on the wife's time allocation is similar and suggests that leisure is "shared." The table 18 regressions also support the expectations regarding an increase in market time of the husband and a decrease in farm time. The husband's home time effects are not expected to be significant.

2. The wife's market wage

A change in the wife's market wage has no effect unless she is actually working in the market (or would be induced to work by the wage income). If she is working, there will be an income and substitution effect with the substitution effect probably dominating. She will also displace home and farm time so this will almost certainly produce a positive effect on market time and a negative effect on home and farm time. The effect on the husband will depend on the sharing of leisure.

In table 17, we note than an increase in the wife's wage does reduce her own home time and increase her market time. It has a positive effect on her husband's market time, supporting the leisure-sharing hypothesis. The table 18 results also show strong positive effects on the wife's market time and negative effects on her home and farm time. The effect on the husband's time is ambiguous and does not provide strong support for leisure sharing. In fact, in the nonfarming households, it appears that leisure is not shared.

3. Farm replacement wages

For farm households, farm replacement wages reflect the alternative costs of farm time and would be expected to predict time allocation. In particular, they should be positively associated with farm and home time, and negatively with market time because high farm productivity will lend to a displacement against market time. Table 18 provides evidence that in farm households the wife's replacement wage does induce more farm and home time and less market time for her. The husband's replacement wage effect is somewhat weaker.

4. Cost of market jobs

The theory predicts that when job costs are high, substantial market work will be undertaken. A rise in job costs will thus be associated with more market work. Table 18 provides support for this proposition. It should be noted that job costs are subject to some choice and thus are not fully exogenous.

5. Farm and home capital

An increase in home capital should raise the productivity of home work and thus increase home work and decrease farm and market work for the wife. The effect on the husband should be to induce market work. Both tables 17 and 18 provide support for this expectation.

Similarly, an increase in farm capital should lead to an increase in farm work and a decrease in market work and home time for both husband and wife. Again there is some support for this in both tables 17 and 18 (except for the farm time of husbands in table 18).

6. Nonwage income

The effect of an increase in nonwage income depends on whether the husband and wife work in the market. Increased income shifts the "combined" curve (see Panels C and D, figure 3) upward. If both husband and wife work in the market, both will reduce market time because of a pure income effect. Since leisure is a normal good, both will opt for more. If the wife is not in the market, while the husband is, the wife will reduce home time but the effect will be somewhat less than in the first case because her marginal product will rise somewhat. The effect on farm time will be similar. When neither husband nor wife works in the market, negative effects on both home and farm time for each are predicted.

We did not explore this effect in the earlier studies, but table 18 reports some results. The expected negative effect is borne out rather poorly. It is statistically significant for the husband's market time in nonfarming households, however.

7. Education of husband and wife

The effect of education when wages are held constant is difficult to predict since wages presumably are picking up the effects of skills to some extent. We might expect it to induce more market work because of

taste factors. This seems to hold for the husband in table 18 and for the wife in table 17, but results are not very informative on this score.

8. The effect on children

The effect on children in the household can be thought of as having three components:

a. a household life cycle effect;

b. a good effect which comes from the fact that child services are relatively home-type intensive goods;

c. a work effect which comes from the fact that children's time can be employed in home and market production.

The life cycle effect is associated with the timing of the other two effects. Consider the early life cycle during which children are present but contribute little to home production. This has the effect of raising the home production curve because children are home-time intensive. And, because they are intensive in the mother's time, the addition of children at this stage is similar to the case of an increase in the productivity of the mother's home time as analyzed above.

Now consider a middle life cycle stage where the household has both younger children and older children. Here we have two effects. One is the effect of increased home production just discussed. The other is associated with the addition of children as workers to the model. Without developing a further formal analysis, it can be readily seen that the addition of children as workers to the model is roughly equivalent to the addition of a second person. Just as the wife displaced her husband's home production time to enable gains from specialization, older children will replace the home production time of the wife, at least in certain tasks. At a later stage in the life cycle when only older children are present, the specialization effects will dominate. These effects are generally borne out in all three sets of data.

Families choose to some degree the number of children that they will have (see next section). In a long-run sense, variables measuring the number of children are endogenous. In the very short run, a case can be made for treating them as exogenous. The econometric questions raised by this problem and by other issues probably require more sophisticated estimating procedures. These studies are somewhat primitive econometrically. Nonetheless there is enough congruency between theory and data to regard them as a reasonable starting point.

The modern household economics concept of full income differs from the conventional concept in terms of which resources are productive and in the definition of goods. This full income concept discussed earlier includes payments to nonlabor earning assets, payments for work associated with the production of market goods plus the value of time devoted to home production plus the value contributed to home production by home capital. Full income, measured by expenditures, is the sum of expenditures on

household or home goods plus expenditures on investment goods.

Little has actually been done to estimate the value of home production. Several problems are involved in its measurement. First of all, classifying most home activities as work-oriented or consumer-oriented presents problems because of the pervasiveness of joint production, time being itself a source of utility as well as a productive resource. However, perhaps the more serious problem confronting the valuation of home products is that of assigning a money value to the output. On the one hand, home goods can be valued at the prices for which similar items can be bought from the market. On the other hand, they can be valued based on the production costs of home goods and services to the household. The weakness of the first approach is that household goods which are not generally traded in markets do not have market prices. Instead, they have "shadow prices" which can be imputed and which bear the interpretation of costs of production of household goods. The implicit assumption of constant marginal product of home time when using shadow prices and the difficulty of assigning prices to other inputs of home production are the limitations of the second approach.

The dilemma regarding the valuation of home time can be illustrated by turning back to Panel D, figure 3. In the presence of fixed job costs, if the indifference curve is u_2, home production will have an average product in excess of the observed wage rate (the slope of db'). But, if $\bar{u}_1$ is the indifference curve, then the average product of home production is not necessarily higher than the wage rate. In situations where there are job costs (or where home production has a leisure component) and work in the market is not undertaken, the wage rate does not necessarily understate the average product or value of home production time. When actual market work is undertaken by both husband and wife, we can say that the wage rate probably undervalues home production time. The case where it might not is a situation where a nutrition work effect exists, that is, where the amount of home goods produced affects the ability to work. In cases where the wife does not work in the market, one cannot say that the wage which she might be able to earn understates the value of her home production. Gronau (1976) has developed a method for using home production time allocation regressions similar to those reported in table 17 to estimate the marginal and average product of home time.

The Laguna data afford an opportunity to value home production and thus full income. Using Gronau's methodology, the estimates of the value of home production summarized in table 19 were obtained. The estimates are based on home time allocation regression estimated for employed fathers, mothers, and children, which, while not reported here, were quite comparable to the table 17 results. It might also be noted that the estimates in table 19 are quite similar to those computed simply by multiplying home time by wage rates.

The results are of considerable interest. They show that home production is indeed quite important. They show that farming households have somewhat higher home production than nonfarming households, that home production is higher in households where the mother is not employed, and in households with a greater number of children. It might be noted, however, from table 20 that the combination of the market income of the mother and her value of home

production results in a 16 percent higher full income in households where mothers are employed than that in households where mothers are not employed. Another important feature of the results is the impact of children on the value of home production which reflects the value of children both as consumers and producers. Indeed, estimating the full income for these households shows a dramatically different picture of the role of mothers and of children from that portrayed by conventional market income measures. The mother contributes only 20 per cent of market income but her contribution to full income is over 40 per cent. Children in these households contribute about 22 per cent of market income and 32 per cent of full income if school time is not regarded as productive. Under the more reasonable definition of school time as a form of home production, the contribution to full income of children rises to over 30 per cent. The father contributes 57 per cent of market income but only 34 per cent of full income.

V. CHILDREN AND INVESTMENT IN CHILDREN

The general household goods model played a background role in influencing the design of the Laguna Surveys. Its role in the analyses to date has varied according to the interest of the study. In the previous section discussing studies of time allocation, a simplified version of the more general model was developed. In this section we will deal directly with the demand for household goods. It will be useful to develop further the major features of the household goods model.[23]

The modern theoretical treatment of household behavior can be briefly summarized as follows:

1. Households are postulated to have a "joint" household utility function. This does not imply that the household head makes dictatorial choices. It means simply that the household members agree to certain household management rules regarding the distribution of income within the household, and the allocation of household members' time.

2. The arguments in the utility function are home-produced goods. They need not be tradeable or exchangeable in markets. They need not have market prices and may be highly personalized. These goods have shadow prices which measure the costs of production of the goods within the households.

3. Home produced goods are produced in some meaningful sense within the household. Home production can take many complex forms including such activities as child care in the production of the household goods, child services. In general the production processes within the home involve activities which combine household resources, chiefly the time of household members, and capital items such as stoves, with goods purchased in the market. Home production can thus be seen in value-added terms for many goods. The household purchases raw materials such as vegetables and converts them into completed meals (or nutrients such as calories and proteins), using household time and household capital. These production functions and the concepts of home technology and home management are applicable to these activities.

4. The household is constrained in its choice of household goods not by the conventionally defined market income but by full income, which is defined in two equivalent ways. It can be defined either in terms of the value of household resources or in terms of the value of household goods consumed. The resource side of the equation includes the value of income produced by nonlabor assets plus the value of the time of household members used in the production of market goods and home goods. The goods side of the equation is the summation of the quantities of each household good times its shadow price.

5. Each household good has a shadow price which is also the marginal cost of its production within the household. The shadow price thus is defined in a behavioral context. If households allocate their resources so as to minimize the cost of producing the household goods, the shadow price will be a weighted average of market-determined prices and wages. The price of market goods entering into the household good will be weighted by the goods intensity (the quantity of market goods per unit of the household good) of the household good. The wage component of the shadow price will be weighted by the time intensity of the household good (the time per unit of the household good).

6. The household is postulated to maximize household utility, subject to its full income constraint. Effectively this means that it operates as a business would by producing all combinations of goods in the most efficient or cost-minimizing way possible, and then choosing the utility-maximizing set of goods according to the marginal costs of production.

The household utility function can be written as:

(1) $U^h = U(Z_1, Z_2 \text{ --- } Z_n)$

where the Z_i are household goods.

The household production functions are:

(2) $Z_1 = F(X_1, t_{1j}, C_1)$ $\quad j = m,f,c.$ (mother, father, children)

$Z_2 = F(X_2, t_{2j}, C_2)$ $\quad j = m,f,c.$

$\vdots$

$Z_n = F(X_n, t_{nj}, C_3)$ $\quad j = m,f,c.$

where X_i are the market-purchased 'raw' goods and t_{ij} are the time inputs of the j^{th} household member in production of the i^{th} good.

Market income is equal to spending on market goods:

(3) $Y + \sum_j W_j t_{mj} = \sum_i P_i X_i$

where Y is the income from nonlabor sources, W_{ij} the wage rate of the j^{th} family member and t_{mj} the time spent on market production by the j^{th} member.

The total time of the jth household member is fixed and will be allocated either to the market, home production or leisure:

$$(4)\quad T_j = T_{mj} + T_{hj} + T_{lj}$$

Substituting (4) into (3):

$$(5)\quad Y + \Sigma_j W_j(T_j - t_{hj} - t_{lj}) = \Sigma_i P_j X_j$$

Transposing, we obtain the full income constraint:

$$(6)\quad Y + \sum_j W_j T_j = \sum_{ij} P_i X_i + \Sigma t_{ij} W_j + \sum_i t_{lj}$$

This simply states that the value of labor and nonlabor resources of the household must equal the value of market goods plus home production plus leisure. The right hand side of (7) can be rewritten by defining goods and time intensities:

$$(7)\quad X_i' = X_i/Z_i \quad \text{or} \quad X_i = Z_i X_i'$$

$$(8)\quad t_{ij}' = t_{ij}/Z_i \quad \text{or} \quad t_{ij} = Z_i t_{ij}'$$

Substituting:

$$(9)\quad Y + \sum_i W_j T_j = \sum_{ij} Z_i(P_i X_i' + \sum_j t_{ij}' W_j) + \sum_l t_{lj} W_j = \sum_{ji} \pi_i Z_i$$

In this form the shadow prices of the household goods are now defined:

$$(10)\quad \pi_i = P_i X_i' + \sum_j t_{ij}' W_j$$

(In some formulations leisure time is not included on either side of the equation).

The household is faced in the short run with the following exogenous or given factors:

- **Y** : nonlabor income
- **W** : a vector of market determined wages (or marginal products of time) of household member
- **P** : a vector of market determined prices of market goods
- **E** : a vector of "fixed" factors associated with home production, including skill levels, home capital and home technology.

It is hypothesized to maximize household utility (1) subject to full income (10) by choosing the levels of the following endogenous factors:

Z_i : the quantities of household goods

X_i' : the goods intensities

t_{ij}' : the time intensities

Formally, define the Lagrangian function:

$$(11)\quad L = u(\quad) + \lambda[Y + \sum_j W_j T_j - \sum_i Z_i(\pi_i) - \sum_j t_{ij} W_j$$

Where λ is the Lagrangian multiplier and bears interpretation as the marginal utility of full income.

The first order conditions are:

$$(12)\quad \frac{\partial L}{\partial Z_i} = U_i - \lambda\pi_i = 0 \qquad \frac{\partial L}{\partial t_L} = U_L - \lambda\pi_L = 0$$

$$\frac{\partial L}{\partial \lambda} = \text{Full income constraint} = 0$$

These conditions are the familiar conditions of traditional demand theory except that shadow prices are substituted for conventional prices. The ratio of the marginal utility to the shadow price will be equated for all goods.

In equilibrium, the set of exogenous variables will deterimine the sets of endogenous variables jointly. That is:

$$(13)\quad Z_1 = F_1(P,W,Y,E)$$

$$Z_2 = F_2(P,W,Y,E)$$

$$\vdots$$

$$Z_n = F_n(P,W,Y,E)$$

also

$$X_1 = H_1(P,W,Y,E)$$

$$X_2 = H_2(P,W,Y,E)$$

$$\vdots$$

$$X_n = H_n(P,W,Y,E)$$

and

$$T_1 = T_1(P,W,Y,E)$$

$$T_2 = T_2(P,W,Y,E)$$

$$\vdots$$

$$T_n = T_n(P,W,Y,E)$$

Thus one can analyze three different, but closely related, facets of household behavior within this framework. One can investigate the demand for household goods in the first set of equations, the demand for market goods in the second, and the demand for time or the allocation of time in the third. In all cases all independent variables are exogenous, hence no simultaneity exists and single equation methods can be used. Ordinary least squares estimators applied to any single equation in the three sets will be unbiased. They will not necessarily be the most efficient estimators. Certain restrictions across each equation set can be derived from second order conditions, and estimation subject to these restrictions will improve efficiency.[24]

Three studies of the demand for children and investment behavior regarding children have been undertaken with Laguna data to date. Teresa Cabañero (1976) used the data collected from the Laguna Intensive survey to calculate the components of the shadow prices of two household goods, child services and schooling investments in children. Emeline Navera (1977) has also used these data to compute costs of child services and to estimate the demand for children. Kamal Banskota and Robert E. Evenson (1977) have estimated household demand functions for child services, investment in schooling, and child leisure from Laguna Resurvey data.

Cabañero's computations are summarized in tables 21, 22, and 23. The Laguna Intensive survey collected data on individual dietary intake, and on clothing and medical expenses by child. The annual costs of these components for the average child in different age groupings in the sample is reported in table 21. Table 22 reports the time devoted to child care per child on the same basis. Work by children is reported in table 23. Note that this work is reported by observation, not by recall. It may seem surprising that children engage in this much work at early ages but the studies by Nag, White, and Peet (1978) and by Mead Cain (1977) show similar work patterns by children.[25]

Cabañero then computes a shadow price for each child in the sample. These shadow prices reflect the investments made by the parents in the children priced at alternatives costs of time and market goods. They represent the marginal "cost" of children given the time input and schooling input decisions. Table 24 reports these shadow prices for children in the sample grouped by age, sex and income class of parents. The pattern is generally what one would expect. The shadow prices of children tend to rise with income and higher income families invest more in children. Table 25 provides a breakdown of these computations when the sample is stratified by the level of wage offers to the mothers. This stratification almost insures a positive relationship between wages and shadow prices because wages are a component of the prices.

Nonetheless it is an instructive table. The computation of shadow prices is an interesting exercise in a number of respects. It provides a sense for the perceived costs that children mean to families. These shadow prices are endogenous to each family and differ by family. They show certain regularities in that they rise with the value of the time of the mother and generally tend to rise with income. They provide some intuition into the analysis of contraceptive effort. Families with low values of time for mothers and substantial work opportunities for children may have little or no incentive to contracept in any form. Children are simply very low cost household goods in such circumstances.

Emeline Navera (1978) has also analyzed costs of children from a combination of Laguna Intensive and Laguna Resurvey data. Her results are similar to those reported by Cabañero. In addition she reports an analysis of family size based on the Laguna Intensive data. Her results are reported in table 26. The variables, mother's age at marriage and years since marriage, are designed to control for different levels of completion of family size in the sample. Of the remaining effects, the negative impact of the father's education appears to hold at all income levels. The remaining variables are not consistent across income classes although the income and wealth effects appear to be consistent with the "threshold" models of Enscarnción (1974), Canlas (1977), and others.[26]

The Banskota-Evenson results are reported in tables 27 and 28. Table 27 provides a variable dictionary describing the Resurvey data.[27] Almost all of the households had completed family size by 1977 and most had children who had completed schooling. The study was directed to an analysis of three endogenous variables (1) Z_n, numbers of children; (2) Z_h, investment in schooling (including school quality measured by expenditures); and (3) Z_{cl}, child leisure.

Banskota and Evenson (in press) derive "compensated" elasticity relationships from the second order conditions of a model with five household goods. In addition to the three goods to be analyzed here their model includes parent's leisure, Z_{pL}, and a composite of other commodities, Z_s. The compensated elasticities show the relationship between the endogenous household goods choice and exogenous variables. We will discuss the regression results in table 28 in the context of these relationships. The impact of change in the wage rates of the mother, the father, and of children themselves are of particular interest. It should be noted that these elasticities are compensated elasticiities in a special sense. A change in a wage rate will change not only shadow prices but income as well. Full income is held constant in these relationships.

The elasticities of demand for Z_N, Z_H, and Z_{CL} with respect to the mother's wage can be written as:

$$\eta_{NW_M} = A\,\eta_{N\pi N} + B\,\eta_{N\pi H} + C\,\eta_{N\pi S} + \eta_{N\pi PL}$$

$$\eta_{HW_M} = A\,\eta_{H\pi N} + B\,\eta_{H\pi N} + C\,\eta_{H\pi S} + \eta_{H\pi PL}$$

$$\eta_{CLW_M} = A\,\eta_{CL\pi N} + B\,\eta_{CL\pi H} + C\,\eta_{CL\pi S} + \eta_{CL\pi PL}$$

where $A = \frac{W_M (T_{NM} + Ht_{HM})}{\pi_n}$ $B = \frac{W_M t_{NM}}{\pi_h}$ $C = \frac{W_M t_{SM}}{\pi_s}$

Note that each of these elasticities is a weighted average of four other elasticities; the weights A, B, and C are positive and represent the "cost shares" of the other in the shadow prices π_N, π_H, and π_S. The elasticities on the right hand side include "own" shadow price elasticities. ($\eta_{N\pi N}$ & $\eta_{H\pi H}$), must necessarily be negative and cross-shadow price elasticities which are negative for complements and positive for substitutes. It is sometimes difficult to know with much precision what the signs of these cross elasticities will be. It may be regarded as plausible, however, to say that $\eta_{N\pi S}$ and $\eta_{N\pi CL}$ are both positive, that is, the number of children is substituted for human capital per child and for other goods. That number is likely to be complementary to leisure. Thus, the elasticity of number of children with respect to the mother's wage is likely to be negative. A rise in the value of mother's time, other things equal, will lead to a decrease in family size.

The Banskota-Evenson results quite strongly support the expected negative impact of the value of the mother's time on completed family size. The results also show a positive effect of the mother's education on family size. This may appear to be somewhat puzzling in view of the widespread usage of schooling as a proxy for the value of time of women in developing countries. Schooling and the value of time are positively related in this sample. In fact, schooling is used to predict the mother's wages (see the notes to table 27). Thus the schooling variable captures dimensions other than its effect on market productivity in these regressions. If it is measuring home productivity, particularly as regards the production of child services and child training, we would expect education to have a pronatalist effect. (Navera's study [1978] did treat education as a proxy for the value of time and estimated a negative impact in family size for education at low income levels.)

The most likely impact of a rise in the mother's wage on investment in human capital per child is positive. The term $\eta_{H\pi H}$ will be negative but the B weight is likely to be smaller than the A weight. Child human capital is likely to be a substitute to parental leisure. The results reported in table 28 show a negative impact of the mother's wage on the quantity of schooling of children and a positive effect on the quality of schooling (as measured by schooling expenditures). The effect of mother's education, on the other hand, has positive effects on the quantity of schooling and negative effects on the quality of schooling. Again, if education is measuring specialized skills in home production, including home training, the education results make some sense. Educated mothers are substituting their skills for skills which can be purchased in schools. Mothers with comparative market skills

(as reflected in wage rates) put more emphasis on higher quality schooling.

The effect of the mother's wage on child leisure should be positive as all of the terms in the elasticity expression are likely to be positive. This is not borne out by the estimates for the mother's wage reflecting a possible "family work ethic" which may be correlated with the mother's wage rate.

The elasticities showing the impact of the father's wage rate are the same as those for the mother's except that the weights are changed:

$$\eta_{NWF} = A' \eta_{N\pi N} + B' \eta_{N\pi N} + C' \eta_{N\pi S} + \eta_{N\pi PL}$$

$$\eta_{HWF} = A' \eta_{N\pi N} + B' \eta_{N\pi H} + C' \eta_{H\pi S} + \eta_{H\pi PL}$$

$$\eta_{CLWF} = A' \eta_{CL\pi N} + B' \eta_{CL\pi N} + C' \eta_{CL\pi S} + \eta_{CL\pi PL}$$

$$A' = WF \frac{(T_{NF} + Ht_{HF})}{\pi_N} \qquad B' = \frac{W_F T_{HF}}{\pi_H} \qquad C' = \frac{W_F T_{SF}}{\pi_S}$$

For the father, A'will be low and B'will be high. Thus η_{NWF} is likely to be less negative than was the case for the wage of the mother. It may well be positive. Empirically one should note here that if nonlabor income is not carefully specified, the actual impacts measured will be uncompensated. In general, the relationship between compensated and uncompensated elasticities is given by:

$$\eta^{\mu}_{jwi} = \eta^{c}_{jwi} - S_i E_j$$

where $S_M = \frac{W_M I_M}{I}$, $S_F = \frac{W_F I_F}{I}$ $S_C = \frac{N W_C t_C}{I}$

and E_j is the income elasticity of demand for the j^{th} good.

In some studies the inability to measure a full income variable leads to an interpretation of the effect of the father's wage as an income effect. This, of course, makes it more likely that it will be positive since children are almost certainly normal goods. The income elasticity of demand for child human capital is likely to be quite high and this is one of the reasons for the shift from Z_N to Z_H during the so-called demographic transition.

Table 28 shows relatively weak effects of the father's wage and education. This is not necessarily a weak or unexpected result. The model does not have obvious predictions; this is one of the facts of life of household economics. Some variables may not have significant impacts on household choices.

The effects of changes in the child's wage are:

$$\eta_{NWC} = D\ \eta_{N\pi N} + E\ \eta_{N\pi H} + \eta_{N\pi CL}$$

$$\eta_{HWC} = D\ \eta_{H\pi N} + E\ \eta_{H\pi H} + \eta_{H\pi CL}$$

$$\eta_{CLWC} = D\ \eta_{CL\pi N} + E\ \eta_{CL\pi H} + \eta_{CL\pi CL}$$

$$D = W_C\ \frac{(Ht_{HC} + L - T_{WC})}{\pi_N} \qquad E = N\frac{W_C\ T_{HC}}{\pi_H}$$

The expected sign of η_{NWC} is positive because the weight D includes the negative component for the work of the child. Higher child wages should increase family size. They will probably decrease human capital investment and child leisure, however. The Banskota-Evenson (forthcoming) findings are that child wages have had an important positive impact on family size decision in the Philippines. The Cabañero (1977) and Navera (1978) studies also highlight the earnings aspect of children.

We note, however, that child wages also have positive effects on schooling quantities and even on schooling quality. The Banskota-Evenson model does not fully consider the fact that child wages themselves provide signals as to the productive value of schooling. Investment in schooling is treated as a consumption good. The cost of this good in terms of the time of children is taken into account. Higher child wages raise these costs. They also may signal higher future wages or higher future benefits from schooling, thus inducing a positive effect on schooling.

The magnitude of some of the major elasticities computed at the mean of the Banskota-Evenson sample is reported in table 29. Perhaps the major implication of the table is the effects of child wages. They have strong positive impacts on all of the endogenous dependent variables. A rise in the child's wage rate (and presumably employment opportunities) increases family size investment in education and child work. These results present the policy maker with a dilemma. Reducing child wages and employment will reduce family size and increase child leisure, but it appears that it will also reduce investment in child human capital as well. In the Philippines this may not be too serious since schooling levels are relatively high. The critical question is whether the schooling investment variables are measuring more general investment in child health and nutrition.

The mother's wage and education effects are also quite important. An increase in the mother's wage will decrease family size and decrease quantity of schooling while increasing the quality of schooling. Child leisure is also increased. An increase in mother's education holding the wage constant tends to have the opposite effects. It would appear that policies to improve employment opportunities for women would on the

whole have desirable policy effects. Simply increasing the education of women without a rise in wages and employment may not produce particularly desirable effects.

The full income effects are relatively inconsequential except in the case of schooling quality. This may be partly due to measurement problems, however. Finally, we note that home technology or, perhaps more appropriately, home management is an avenue of possible policy intervention. It appears that programs to improve the skills of the home manager will have significant welfare improving consequences.

VI. CONCLUDING REMARKS

The Laguna surveys and the studies undertaken to date are not in all cases on the primary research frontier of household economics. The statistical and econometric techniques are sometimes quite simple. The theoretical models, when stated, are not very "high powered." Furthermore, the statistical quality of many of the results does not appear to be impressive. The data quality is also open to some question as this chapter has noted.

Does this mean that we have really learned very little from enterprises such as this? And even if we agree that we have learned or potentially can learn from these data, was the inefficiency in data collection and analysis associated with "learning-by-doing" necessary? Is it really necessary that we move beyond the limited purpose survey method? Can we not rely on Census Bureaus to collect data and enable the analyst to specialize in theoretical and empirical works?

These are legitimate questions and we should offer some response to them. Briefly, our response is two-fold:

1. The state of understanding of the behavior of rural households is not so complete that simple and seemingly unsophisticated analyses do not have much to tell us.

2. The existing institutions engaged in data collection in most developing countries are not oriented toward household economics quesions. For practical purposes, at this stage the only really new data questions which will be asked will be asked by researchers with a direct interest in the data. Researchers with little experience in survey methods may be quite inefficient.

The sophistication of the theoretical models, and the econometric power employed at the household economics research frontier are more apparent than real. Algebra is sometimes a substitute for intelligent insight into behavior. New maximum likelihood estimates are generally developed because of inadequate data bases and are sometimes blindly used. In short, the modern version of household economics is itself still quite primitive. It has not reached a point where the common sense analysis of data with simple statistical tools can be ignored.

Furthermore, it is clear that human behavior at the household level is governed by more complex factors than is the case with production functions or markets. It is simply not reasonable to compare the R^2 in studies of the type reported here with the R^2 obtained in production function studies. The

comparison is more relevantly made with other related social science studies of household behavior, many of which do not submit explicit or implicit models to a statistical test.

Household economics as with most branches of economics is basically an empirical field. The "verified knowledge" that is being accumulated has an empirical base. Inductive and deductive logic is critical to the organization of facts but does not replace the need for them. In addition, the differences between countries as regards child work, malnutrition, and a host of other factors surely indicate that we cannot advance the body of verified knowledge without data from the developing countries.

Given the importance of home production to family well-being and the importance of such household goods as health and other forms of human capital, there exists an economic justification for more research on household behavior. Hundreds, perhaps thousands, of studies on farm technology have been pursued in developed and developing countries. How many good studies of home technology do we have? Have we attempted in a serious way in economics to study human capital development in the home? Does not the full income concept deserve further application? Can it become an operational improvement in conventional income measures? How are nutrients viewed by the household? Can we measure the impact of nutrition education programs? How important to child development and human capital acquisition are the inputs of mother's time? How are children affected by siblings?

These questions have a natural place in the fabric of modern household economics models. By and large what we know about them has been contributed by disciplines other than economics. (In fact much of what is known has emerged from the old home economics.) Without well designed data surveys and careful empirical work, it is unlikely that economists will add much to what is known. With both empirical and theoretical work the possibilities for expanding our knowledge are substantial. The work focusing on fertility decisions demonstrates this quite clearly.

There is reason then to suppose that enterprises such as the Laguna studies have a role to play. It is important that we explore the possibilities for larger and more detailed data sets than the traditional limited purpose survey methodology can offer. It is, of course, inevitable that mistakes will be made in such ventures. Analytic studies of "new" questions similarly are subject to mistakes, particularly when undertaken by graduate students from developing countries who are motivated to the analysis by the problem rather than by an interest in applying a newly acquired set of econometric tools.

There is every reason to be critical of all studies and to press for more adequate specifications. There is further reason to improve the design of data-gathering methods. It would be ideal if, somehow, progress on these fronts could be made without the costs and inefficencies of a major "learning by doing" component. Experience suggests that we should not be unrealistic on this score. Census agencies generally lack the skills and experience required to collect some of the data of interest, even if one could convince them of its merit. Many survey organizations exist in developing countries and many

are capable of efficient data collection. But these organizations have not been influenced very much by the concepts of modern household economics. They simply have not been exposed to the notion that home activities can be analyzed in a production framework.

The reader, of course, can judge whether the Laguna data have something to tell us. In our judgment they are important on two levels. The first is simply to inform about and quantify certain behavioral characteristics. Until publication of the studies (particularly by Benjamin White [forthcoming]) showing in a quantitative way how much work children were doing, many (probably most) policy makers and journalists seriously understated the importance of child work. Data on child care time, food costs, and so on associated with children (as in the Cabañero study) can inform and enlighten without sophisticated analysis. Similarly, the present study added to our understanding of the diversity of activities undertaken by rural households, especially the off-farm activities of farm households. We would suggest that most of the studies in Binswanger et al. (forthcoming) have informed the reader about rural households.

The second level at which such data can be valuable is much more complex. We refer to the analysis of such data which encompasses the testing of models and the development of policy implications from verified models. Here the progress has been slow, but we are in some substantial danger of being too impatient. The modern treatment of household economics is only a few years old. Most of the analysis has been on data from developed countries which have been collected for other purposes. The congruence between theory and empirical specification is weak. The policy implications derived from studies to date are quite limited. Much of the early enthusiasm for the work has now been lost.

It seems reasonable, however, that we should not expect rich policy implications from a field of inquiry that is as young as this one. To date, very few data sets designed specifically to test household economics theory have been collected. Until this is done in different countries and until our analytic models mature, we should not expect rich policy implications. Other fields of economics and related social sciences have taken quite some time to mature. Studies of farm production, for example, have been underway for a great many years. The policy implications of changes in technology and factor supply prices were not easily developed. Thousands of data sets and years of analytic development produced slow and steady progress toward the level of understanding achieved today.

When judged against this perspective, there is reason to expect progress toward richer policy insights from household studies in the future.

Table 1. Summary Income Statistics for All Households--Laguna '75 Survey

		Net Income All Sectors	Rice	Other Crops	Live-stock	Fishing	Wages	Business	Profes-sional	Home Pro-duction	Garden-ing	Other
No. of House-holds with income		575	180	163	345	55	390	87	10	121	287	490
% of Households with Income		99.83	31.25	28.30	59.90	9.55	67.71	15.10	1.74	21.01	49.83	85.07
No. of Households with Negative Income		14	13	28	174	2	0	0	0	0	0	0
Mean		5762	1016	242	636	253	1718	779	27	226	58	808
Household Income Decile	10	696	83	-102	-374	110	240	69	30	20	5	100
	20	1181	224	29	-96	235	504	240	100	72	12	140
	25	1456	375	73	-60	306	626	300	110	100	16	180
	30	1662	599	113	-40	335	800	576	120	144	20	230
	40	2259	920	189	-13	664	1080	1080	160	269	28	275
	50	3182	1281	349	-2	986	1680	1440	220	396	45	360
	60	4255	2112	521	38	1408	2304	2200	240	672	75	500
	70	5674	3289	655	192	1966	2072	3360	2764	1008	110	600
	75	6862	4590	736	266	2498	3456	3960	2962	1248	125	782
	80	8713	6054	923	559	3726	3844	5040	3160	1690	150	1200
	90	12899	9404	2300	1350	5738	6120	8760	3600	2760	290	1800
	100	88298	34347	19416	59945	40437	26439	87000	5400	11011	3027	13659
% of Income by Source		100.0	17.63	4.20	11.04	4.39	29.81	13.52	.47	3.92	1.01	14.02

Table 2. Distribution of Major Occupations of Fathers and Mothers: Laguna Barrios, May-June 1975 (percentages)

Occupation	Fathers	Mothers
Unemployed or housework only	8.3	59.9
Farmer	36.3	3.1
Hired farm laborer	19.4	6.4
Weaving	0.3	8.9
Buy-and-sell entrepreneur	2.3	8.0
Sari-sari storekeeper	0.3	4.7
Fisher	6.4	0.3
Manual laborer	5.4	0.3
Private business employee	4.0	0.2
Jeepney or tricycle operator	3.8	—
Government employee	3.1	0.2
Carpenter	3.0	—
Livestock raiser	4.2	0.9
Laundry woman	—	1.6
Garments maker	0.2	1.9
Teacher	—	1.4
Factory worker	1.4	1.0
Mechanic	0.5	—
Shopkeeper	0.5	0.2
Food-beverage preparer	0.3	0.5
Others	0.2	0.2
	100.0	100.0

N = 576

Table 3. Contributions of Family Members in Hours per Week (H) and Pesos per Year (₱)--Laguna '75 Survey

	Father		Mother		Children		Total	
	H	₱	H	₱	H	₱	H	₱
FARM FAMILIES								
Income-Earning								
Crops	22.0	1818	1.3	77	1.5	148	24.9	2043
Poultry & livestock	9.8	624	4.5	332	1.4	83	15.7	1038
Home production	2.0	30	2.8	123	2.3	57	7.2	210
Fishing	0.4	39	-	-	-	-	0.4	39
Wages	15.7	670	4.3	150	6.7	439	26.7	1259
Business & profession	2.1	135	3.8	145	0.2	22	6.0	298
Total	52.1	3552	16.3	882	12.4	810	80.9	5244
Nonincome-Earning								
Home production	2.9		41.0		17.0		60.8	
Child care	0.3		9.4		3.2		12.8	
Total	3.2		50.3		20.2		73.7	
Overall Total	55.3	3552	66.7	882	32.6	810	154.6	5244
NONFARM FAMILIES								
Income-Earning								
Crops	-	-	-	-	-	-	-	-
Poultry & livestock	6.8	400	2.9	181	1.0	68	10.7	650
Home production	1.5	45	2.3	101	1.1	57	4.9	202
Fishing	2.9	152	-	-	-	-	2.9	152
Wages	31.0	1497	8.9	236	8.5	613	48.4	2346
Business & profession	3.7	901	4.5	153	0.6	119	8.8	1194
Total	45.5	4881	17.7	741	11.7	857	75.0	6479
Nonincome-Earning								
Home production	2.6		42.4		11.0		56.1	
Child care	1.2		10.9		4.6		16.7	
Total	3.8		53.3		15.7		72.8	
Overall Total	49.3	4881	71.0	741	27.5	857	147.8	6479

Source: Boulier (1976)

Table 4. Intrafamily Allocation of Time--Lacuna '75 Survey

Activity	Father		Mother		Children		Total	
	Hours per week	%	Hours per week	%	Hours per week	%	Hours per week	%
Market production time	49.41	62.98	16.90	21.54	12.14	15.47	18.45	100.0
Nonfarming	24.75	57.83	10.25	23.95	7.80	18.22	42.80	100.0
Crop farming	12.96	88.59	0.77	5.26	0.90	6.15	14.63	100.0
Livestock raising	8.58	62.86	3.83	28.06	1.24	9.09	13.65	100.0
Fishing	1.45	100.0	-	-	-	-	1.45	100.0
Gardening	1.81	29.43	2.50	40.65	1.83	29.76	6.15	100.0
Home production time	3.44	4.69	51.56	70.31	18.33	25.00	73.33	100.0
Child care	0.65	4.50	10.01	69.37	3.77	26.13	14.43	100.0
Food preparation, Other housework	2.75	4.67	41.55	70.59	14.56	24.74	58.86	100.0
Other time	115.1	32.69	99.5	28.26	135.53	39.06	352.13	100.0
Total production time	52.85	33.66	73.68	46.93	30.47	19.41	157.00	100.0

Survey period: April-June 1975
N = 571 households

Source: King (1977)

Table 5. Time Budgets in Laguna Rural Households--Laguna Intensive Survey (hours per day for 99 households)

Activities	Father	Mother	Children*
Wage employment	1.91	0.56	1.17
Profession	0.35	0.14	0.11
Business	0.45	0.44	0.50
Preharvest	1.32	0.28	1.10
Postharvest	0.58	0.27	0.54
Coconut production	0.54	0.16	0.62
Sugar cane production	0.02	0.00	0.02
Vegetable production	0.15	0.11	0.24
Home gardening	0.07	0.03	0.05
Livestock raising	0.70	0.28	0.57
Handicraft	0.02	0.13	0.05
Marketing	0.08	0.05	0.05
Fishing	0.25	0.01	0.22
Repair	0.16	0.03	0.02
Travel	0.25	0.08	0.18
Hunting	0.00	0.00	0.12
Others	0.00	0.00	0.00
Total economic production	6.86	2.55	5.56
Cooking	0.41	2.06	0.84
Breast-feeding	-	0.36	-
Bottle feeding	0.01	0.01	0.01
Caring of children	0.38	1.69	0.44
Marketing & travel	0.10	0.39	0.31
Fetching or chopping	0.13	0.07	0.20
Household chores	0.22	2.76	1.71
Story-telling	0.01	0.003	0.07
Care of aged & sick	0.004	0.04	0.00
School or class	0.04	0.04	9.77
Total home production	1.29	7.44	13.36
Sleeping	7.89	8.64	34.63
Eating	0.59	0.67	2.85
Playing with children	0.02	0.04	0.45
Passive recreation	4.22	3.77	12.77
Active recreation	0.01	0.00	1.39
Being sick or immobile	0.08	0.10	0.34
Church activities	0.02	0.09	0.19
Festive activities	0.77	0.60	1.99
SSU (Social Service use)	0.07	0.08	0.24
Other	0.00	0.00	0.00
Total leisure	13.56	14.00	54.75

*The average number of children in the sample household is 4.

Table 6. Budgets of Household Members Using Phase I and Phase II of the Laguna Data: A Comparison (in hours per day)

Activity	Recall			Observation		
	Father	Mother	Children	Father	Mother	Children
MARKET PRODUCTION	8.20	2.80	1.80	6.86	2.55	5.56
Wage employment	4.40	1.40	1.40	2.71	1.14	0.78
Farming	1.80	0.10	0.10	2.60	0.82	2.52
Livestock raising	1.40	0.60	0.20	0.70	0.28	0.57
Fishing	0.20	0.00	0.00	0.25	0.01	0.22
Income earning home production	0.40	0.40	0.20	0.09	0.16	0.10
Other	-	-	-	0.51	0.14	0.37
HOME PRODUCTION	0.60	8.30	2.60	1.29	7.44	13.36*
Child care	0.20	1.70	0.60	0.41	2.11	0.97
Food preparation	0.20	3.60	0.70	0.41	2.06	0.84
Other	-	-	-	0.47	2.27	11.55
LEISURE	15.20	12.90	91.60	13.60	14.04	54.75
Personal care	-	-	-	8.48	9.31	37.48
Recreation	-	-	-	4.23	3.77	14.16
Others	-	-	-	0.89	0.96	3.11
	(n = 573)			(n = 99)		

*This figure includes time spent by children in school or doing school work (9.77 hours per day). The corresponding figure using Phase I data does not include this. Class or school time is classified under leisure.

Source: King (1977)

TABLE 7

Table 7. Contribution of Different Food Groups to Mean Nutrient Intake Per Household (percentages)

Food group	Calories (gm)	Protein (gm)	Fat (gm)	Carbohydrates (gm)	Calcium (mg)	Iron (mg)	Vitamin A (IU)	Thiamine (mg)	Riboflavin (mg)	Niacin (mg)	Vitamin C (mg)
Leafy, yellow vegetables	<1	<1	<1	<1	3	2	29	2	3	1	10
Vitamin C rich foods	<1	<1	<1	<1	2	2	13	2	2	1	20
Other fruits and vegetables	4	4	2	5	13	12	14	13	10	6	39
Fats	14	3	72	<1	<1	3	<1	6	1	1	<1
Milk	1	1	1	<1	5	<1	<1	1	3	1	<1
Meat, fish, poultry	7	39	14	<1	30	22	24	22	30	40	<1
Eggs	<1	1	1	<1	<1	<1	8	3	4	1	1
Beans, nuts	2	4	<1	2	4	4	7	10	7	3	8
Cereals	62	44	9	79	27	40	<1	37	36	38	1
Kamote, potatoes	2	<1	<1	3	3	3	2	4	1	2	20
Sugar	5	<1	<1	8	3	2	0	<1	<1	<1	0
Miscellaneous	1	3	1	<1	9	8	1	<1	2	7	1
Total	8084.60	209.84	180.66	1387.17	1515.48	61.44	6314.12	2.811	2.456	57.58	234.52

Source: Herrera (1976)

Table 8. Distribution of 576 Households by Levels of Adequacy of Nutrient Intake--Laguna '75 Survey

Nutrient	Percent of Recommended Daily Allowance (RDA)							Mean % RDA
	<50	50-59	60-69	70-79	80-89	90-99	100+	
Calories	12	13	14	11	13	9	28	90
Protein	16	10	11	15	10	9	29	90
Calcium	52	14	8	7	6	3	10	65
Iron	5	8	7	9	8	8	56	135
Vitamin A	84	5	4	1	1	1	64	33
Thiamine	56	10	7	5	6	4	12	61
Riboflavin	58	13	8	5	5	2	9	53
Niacin	19	11	12	11	8	9	30	93
Vitamin C	53	6	5	5	4	4	23	78

Source: Herrera, 1976

Table 9. Nutrient Intake of Children Grouped According to Age and Sex

Mean Nutrient Intake Expressed as % RDA

	Male				Female			
	Age Grouping of Children				Age Grouping of Children			
Nutrients	1* n=55	2 n=70	3 n=47	4 n=15	1 n=64	2 n=61	3 n=33	4 n=12
Calories	81	79	73	101	82	70	70	87
Protein	111	119	78	116	96	88	64	79
Calcium	58	66	57	84	63	60	46	94
Iron	121	161	120	180	132	142	89	61
Vitamin A	16	17	21	24	27	16	22	19
Thiamin	47	39	32	49	50	43	35	45
Riboflavin	66	40	34	46	53	42	33	52
Niacin	71	76	74	112	71	66	76	82
Vitamin C	22	52	38	40	62	64	56	42
Diet Rating	56	57	54	65	55	53	50	56

Age groups: 1 = preschoolers; 2 = schoolers; 3 = adeolescents; 4 = adults

Source: Valenzuela (1977)

Table 10. Factors Affecting Nutrient Adequacy Ratio, Regression Analysis 2 with Interaction Variables

Independent Variables	Mean Nutrient Adequacy Ratio for Calories	Protein	Vit. A	Vit. C	Diet Rating
Family Size (FS)	-5.09** (5.20)	-4.56** (3.77)	-2.74* (2.30)	-8.37 (1.26)	-3.42** (5.79
Education of Mothers (EM)	-1.32 (0.79)	1.45 (0.70)	1.92 (1.04)	-3.50 (0.31)	0.59 (0.58)
Time Spent in Food Preparation (TFP)	0.25** (14.03)	0.22** (9.81)	0.11** (4.88)	0.22* (1.83)	0.17** (15.54)
Per Capita Food Expenditure (FE)	4.94* (1.90)	-3.08 (0.96)	-0.35 (0.14)	-25.14 (1.42)	-0.08 (0.05)
% Monetary Income Contribution of Member (% IC)	4.81 (1.29)	6.14 (1.33)	10.61* (2.28)	32.93 (1.29)	2.51 (1.11)
Employment Status of Mothers (ESM)	6.54** (3.99)	1.52 (0.75)	3.89* (1.91)	8.04 (0.72)	3.23** (3.27)
FE . TFP	-0.06** (8.34)	-0.06** (6.31)	-0.03** (3.46)	-0.04 (0.77)	-0.04** (9.74)
FE . FS	1.52** (4.44)	2.90** (6.86)	0.91* (2.25)	3.03 (1.30)	1.48** (7.18)
FS . EM	0.30 (1.36)	-0.55** (1.98)	-0.31 (1.12)	-0.64 (0.42)	-0.12 (0.85)
FE . EM	0.25 (0.68)	1.14** (2.53)	0.74 (0.09)	4.78* (1.93)	0.50* (2.29)
Constant	60.58	48.25	19.82	81.34	39.31
r^2	0.255	0.219	0.040	0.018	0.278
Adj. r^2	0.246	0.209	0.029	0.005	0.268
F	26.20**	21.44**	3.34	1.38	29.39**

**p<0.01
* p<0.05

Source: Valenzuela (1977)

Table 11. Comparison Between Observed and Predicted Nutrient Adequacy Ratio and Diet Rating Among Age-Sex Groups

	Calorie NAR		Protein NAR		Vitamin N NAR		Vitamin C NAR		Diet Rating	
	Obser.	Pred.	Obser.	Pred.	Obser.	Pred.	Obser.	Pred.	Obser.	Pred.
Constant (Mothers)	87.1	60.6	72.7	48.2	26.7	19.8	58.7	81.3	55.6	39.3
Male Preschoolers	-9.6 **	-7.8 **	16.0 **	18.9	-4.8	-3.3	27.5	31.2	-0.6	0.6
Female Preschoolers	-19.7 **	-17.6 **	10.2 **	12.2 **	-4.6	-2.5	4.1	8.5	-5.1 *	-3.8 *
Male Schoolers	-14.2 **	-13.2 **	18.1 **	17.4 **	-7.6 *	-4.8	-12.4	-5.7	-2.8	-2.1
Female Schoolers	-17.8 **	-17.4 **	11.6 **	11.0 **	-6.7 *	-4.3	5.7	9.7	-3.3	-2.7
Male Adolescents	-20.8 **	-19.7 **	1.3	1.5	-7.1	-4.6	-27.5	-19.6	-7.9 **	-6.3 **
Female Adolescents	-25.8 **	-23.8 **	-14.4 **	-13.4 **	-12.0 *	-9.5 *	-16.8	-8.4	-12.9 **	-11.3 **
Male Adults	-13.3 *	-12.9 **	6.5	1.7	-7.8	-7.2	-31.5	-22.1	-3.2	-4.4
Female Adults	-13.3 *	-10.8 *	7.5	-7.4	-1.2	1.6	-14.6	-6.9	-5.9 *	-5.2
Fathers	0.4	-1.5	10.3 *	7.3 *	3.0	-3.1	28.8	9.6	4.4 *	3.6 *

**p<0.01
* p<0.05

Source: Valenzuala (1977)

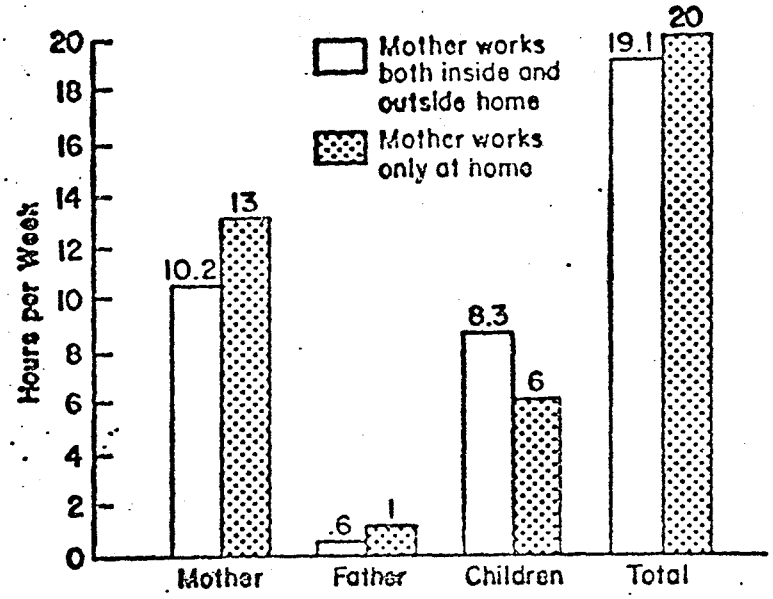
Table 12. Per Capita Dietary Intake in Laguna Households Using Interaction Terms[a] and Associated Regression Factors

	Calories	Protein	Vitamin A	Food Expenditure
Constant	3.079	1.337	2.465	0.292
Income	0 0.033* (2.175)[b]	0.062* (3.683)	0.086* (1.774)	0.043* (2.838)
Wealth	0.047* (3.625)	0.061* (4.228)	0.108* (2.634)	0.077* (5.980)
Household size	-0.260* (-6.537)	-0.222* (-5.063)	-0.281* (-2.235)	-0.400* (-10.148)
MOCC High income households	0.079* (2.685)	0.049 (1.232)	-0.075 (-0.804)	0.017 (0.570)
MOCC low income households	-0.011* (-1.632)	-0.025 (-1.282)	-0.173* (-3.082)	-0.019 (-1.080)
EDUCM Low income households	-0.013* (-2.096)	-0.007 (-1.037)	0.010 (0.516)	0.005 (-0.793)
EDUCM Low income households	0.006 (1.296)	0.008 (1.573)	0.019 (1.294)	0.006 (1.289)
R^2	0.1327	0.1313	0.0597	0.2507
$\bar{R}^2$	0.1235	0.1221	0.0497	0.2427
F	12.354	12.1980	5.1198	26.9990
No. of cases	573	573	573	573

a. Double-logarithmic functional form.
b. Figures in parentheses are t-values.
*Significance at 5 percent level.
MOCC: Mother occupied in market work
EDUCM: Education level of mother.

Source: Ybanez-Gonzalo (1977)

Figure 1. Hours per Week Spent on Child Care by Family Members according to Work Location of Mother--Laguna, 1975-76



Source: Popkin (1978b)

Table 13. Regression: Factors Associated with Laguna Pre-schoolers' Percent of Standard Weight Including Wealth and Mother's Occupational Status by Age Group

Factors	Age Group			
	Total	6-23 months A	24-47 months B	48-83 months C
Income of others per capita	.016 (1.869)**	-0.01 (0.032)	0.08 (0.616)	0.27 (2.746)*
Level of education of mother	1.04 (2.558)*	1.94 (1.475)***	0.89 (1.172)	0.59 (1.442)***
Age of child	-0.15 (-4.961)*	-1.35 (-3.394)*	0.37 (2.032)**	-0.08 (-1.316)***
Sex of child	-3.05 (-2.361)*	-4.71 (-1.226)	-1.22 (-0.524)	-2.78 (-2.072)**
Mother's percent weight for height	0.06 (1.734)**	0.22 (1.811)**	0.06 (0.810)	0.02 (0.713)
Number of children zero to six years	-2.00 (-2.833)*	-1.78 (-0.773)	-3.32 (-2.430)*	-1.84 (-2.706)*
Mother participates in labor force	-2.00 (-1.430)***	-5.45 (-1.202)	-2.35 (-0.957)	0.76 (0.530)
Net Wealth	0.07 (1.743)**	0.15 (1.384)***	0.20 (1.631)***	0.01 (0.351)
Constant	82.35	85.99	64.29	81.44
R^2	0.10	0.16	0.11	0.08
$\bar{R}^2$	0.09	0.12	0.07	0.06
F	8.08*	2.93**	2.42***	3.15**
Cases	578	128	165	285

Note: The t-values are in parentheses:
Levels of significance
*** = 10% level
** = 5% level
* = 1% level

continued

Table 13 continued

Variable	Definition
Percent of standard weight	Measure of child nutritional status: $\frac{\text{actual weight of child}}{\text{Standard weight for age and sex}} \times 100$ (Harvard standard at 50th percentile)
Income of others per capita	Total household income less mother's income divided by household size (100 units)
Level of education of mother	0 - 9 range: levels of formal schooling
Age of child	Age in Months
Sex of child	1 = male 2 = female
Mother's percent of weight	Mothers current nutritional status: $\frac{\text{actual weight of mother}}{\text{std weight for given height}} \times 100$ (Jelliffe std for women at 90th percentile)
No. of children 0 - 7 years	Incl. child himself + all children 0 - 83 months
Net wealth	Value of assets less liabilities, 1000 units
Participates in labor force	1 = mother participates; 0 = otherwise

Source: Battad (1976)

Table 14. Time Allocation of Fathers and Mothers in Laguna Households by Occupation Group (in hours per day)

Activity	Father		Mother	
	Farmer	Nonfarmer	Farmer	Nonfarmer
MARKET PRODUCTION	7.50	7.56	4.61	3.92
Wage employment	1.06	5.02*	1.10	2.19*
Farming	5.17	0.97*	3.36	0.01*
Livestock raising	0.59	0.44	0.02	0.32
Others	0.69	1.21*	0.13	0.34
HOME PRODUCTION	1.00	1.21	4.34	6.06*
Child care	0.26	0.37	0.79	1.64*
Food preparation	0.34	0.32	1.74	1.76
Others	0.41	0.45	1.80	2.66
LEISURE	14.60	13.42*	14.95	14.02
Personal care	9.75	9.20	11.58	10.37
Recreation	4.21	3.64	2.93	2.98
Others	0.64	0.58	0.88	0.67

*Difference between means is significant at the 5 percent level.

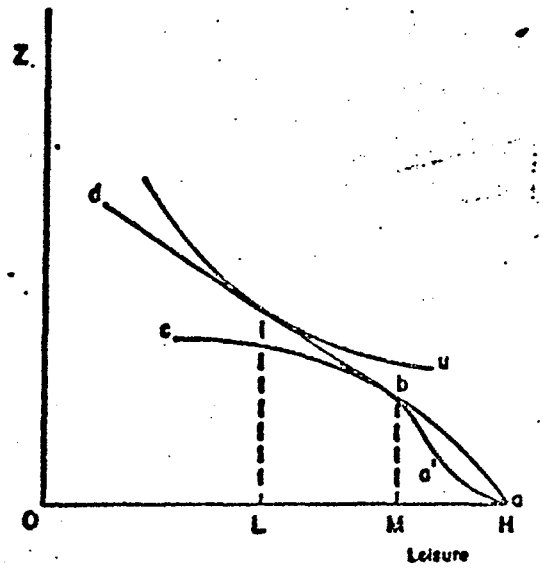
Source: King (1977)

Table 15. Time Allocation of Fathers and Mothers in Laguna Households by Work Status (in hours per day of market employment)

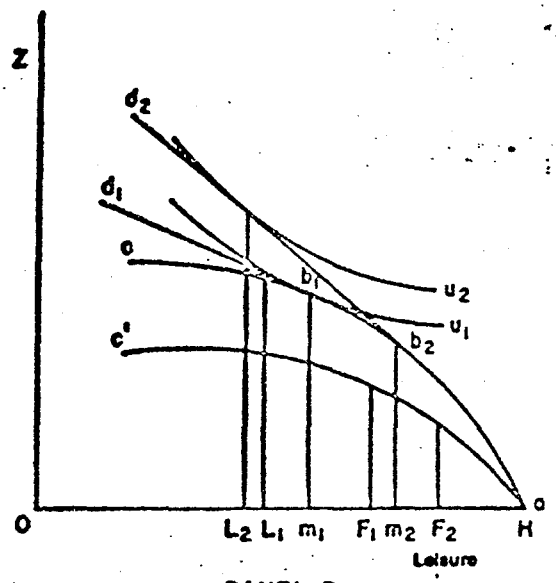
Activity	Mothers					Fathers				
	none	0-4	4-6	6+		none	0-4	4-6	6+	
Market Production	0.00	1.92	4.92	10.51	*	0.00	1.31	5.10	8.91	*
Wage employment	0.00	0.22	0.51	4.72	*	0.00	0.28	2.49	4.71	*
Farming	0.00	0.50	2.28	3.97	*	0.00	0.35	1.20	3.23	*
Livestock raising	0.00	0.65	1.39	0.68	*	0.00	0.37	1.08	0.13	*
Fishing	0.00	0.12	0.27	0.34		0.00	0.01	0.01	0.00	
Income-earning home production	0.00	0.12	0.14	0.08		0.00	0.18	0.12	0.38	
Others	0.00	0.31	0.33	0.72	*	0.00	0.12	0.20	0.46	*
Home Production	1.15	2.51	2.22	0.81	*	8.95	8.26	5.49	3.65	*
Child care	0.11	0.81	0.82	0.24	*	3.19	2.06	0.65	1.14	*
Food preparation	0.24	0.89	0.61	0.25		2.04	2.29	2.28	1.38	*
Others	0.80	0.81	0.79	0.32	*	3.72	3.91	2.56	1.13	*
Leisure	21.41	18.58	16.20	12.65	*	15.09	14.62	12.85	11.55	
Personal care	9.24	10.24	9.91	8.65	*	9.51	9.33	9.14	9.02	*
Recreation	6.25	6.77	5.72	3.42	*	3.87	4.42	3.48	1.98	*
Others	5.92	1.57	0.57	0.58	*	1.71	0.87	0.23	0.55	

*Difference between means is significant at the 5 percent level.

Source: King (1977)



PANEL A



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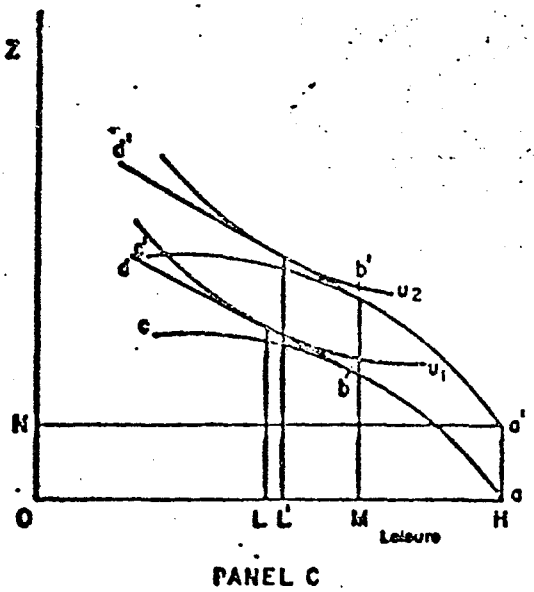

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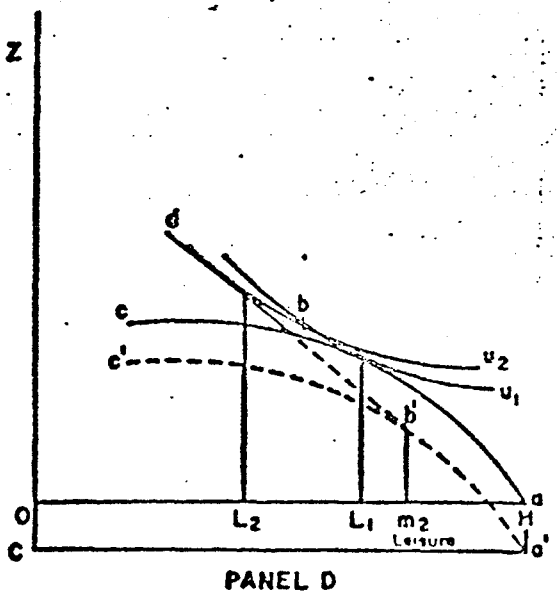
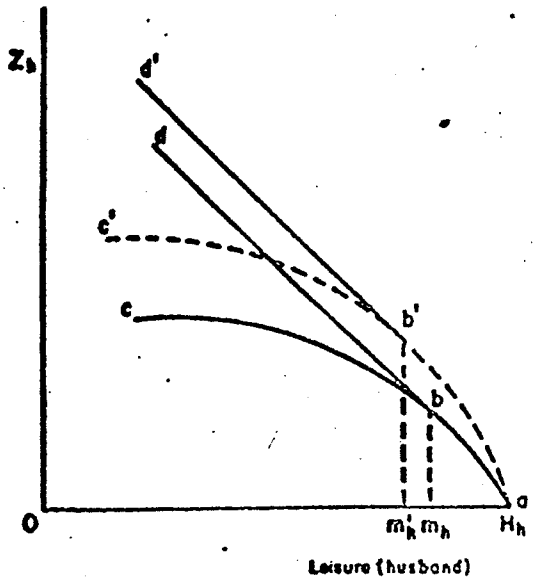


PANEL D

Figure 2 Single Person Household Cases



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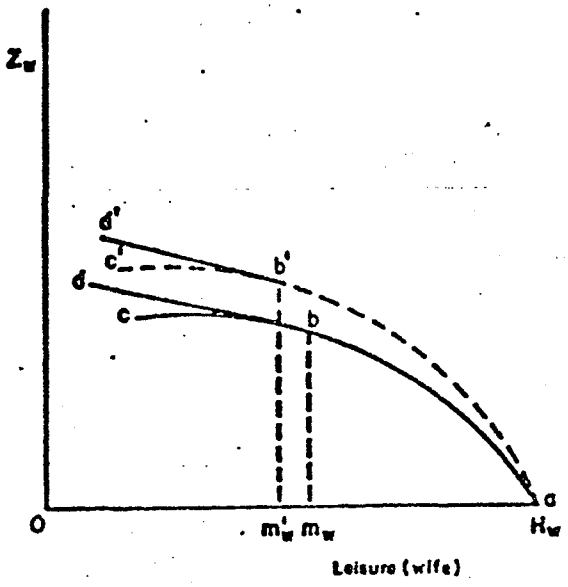

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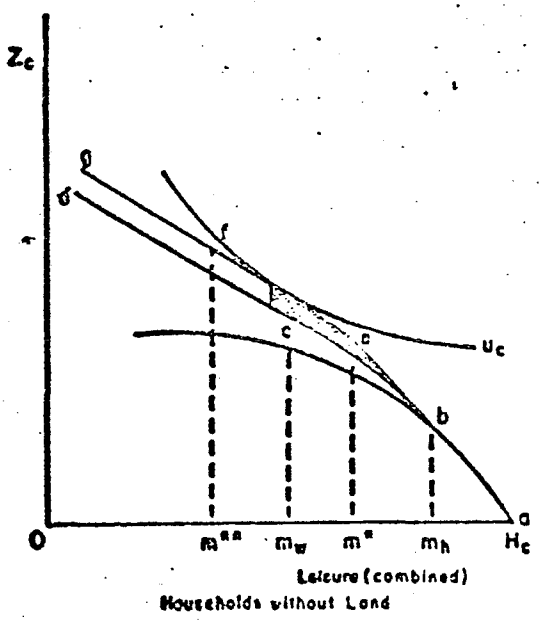

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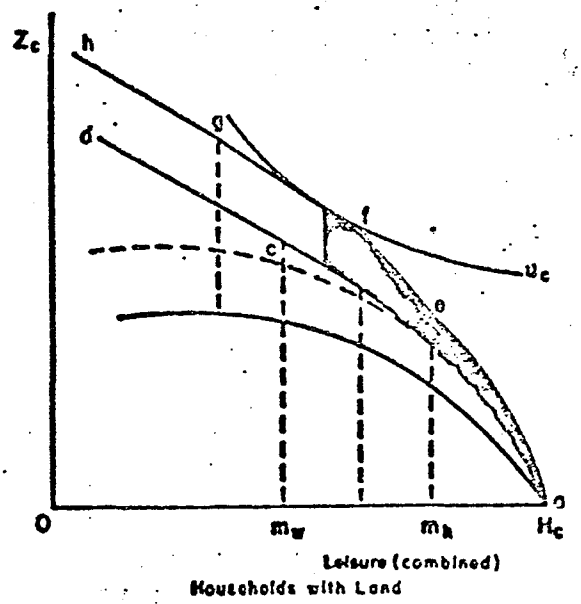

PANEL D

Figure 3 Two Person Household Cases

Table 16. Regression on Time Allocation Using Laguna '75 Survey Data

	Wife		Husband	
	Home time	Market time	Home time	Market time
Constant	49.65	-11.49	1.17	49.63
Wife's market wage	0.53	-0.91	-0.01	-0.09
	(1.68)	(3.17)	(0.15)	(0.09)
Husband's market wage	-0.85	-0.16	0.07	-1.20
	(2.10)	(0.43)	(0.64)	(2.42)
Wealth variables:				
Farm capital	0.44	-0.83	0.05	0.69
	(0.70)	(1.44)	(0.30)	(0.86)
House & home capital	1.55	0.38	-0.22	-1.40
	(1.10)	(0.29)	(0.54)	(0.78)
Non-labor income	4.48	2.92	0.73	7.73
	(1.03)	(0.73)	(0.59)	(1.39)
Number of other household members	-1.35	-0.77	-0.33	1.46
	(1.04)	(0.55)	(0.87)	(0.87)
Children:				
0-1	1.13	-4.22	0.64	2.00
	(0.38)	(1.54)	(0.75)	(0.53)
1-6	2.21	0.65	0.77	2.46
	(1.98)	(0.63)	(2.49)	(1.78)
7-9 Male	2.93	-0.72	-0.43	-0.93
	(1.40)	(0.38)	(0.72)	(0.35)
10-12 Male	-0.74	-1.78	-0.47	1.52
	(0.30)	(0.79)	(0.66)	(0.48)
13-15 Male	-0.90	-4.57	0.13	-1.73
	(0.38)	(2.10)	(0.19)	(0.57)
16-19 Male	-0.53	0.42	0.87	4.72
	(0.23)	(0.20	(1.32)	(1.61)
20+ Male	-0.67	-2.50	0.95	0.72
	(0.35)	(1.41)	(1.69)	(0.29)
7-9 Female	1.41	3.08	0.09	-1.06
	(0.64)	(1.52)	(0.13)	(0.38)
10-12 Female	-2.58	3.39	-0.22	5.02
	(1.19)	(1.71)	(0.35)	(1.84)
13-15 Female	-4.19	-0.52	-1.28	0.95
	(1.76)	(0.24)	(1.86)	(0.31)
16-19 Female	-4.09	1.02	-0.57	3.82
	(1.71)	(0.46)	(0.82)	(1.25)
20+ Female	-2.45	-1.07	0.21	-2.80
	(1.13)	(0.54)	(0.34)	(1.01)
Education (own)	-2.56	0.20	0.22	1.05
	(3.85)	(0.32)	(1.29)	(1.38)

continued next page

Table 16 continued

	Wife		Husband	
	Home time	Market time	Home time	Market time
Age	0.28	1.36	0.02	-0.15
	(0.46)	(2.44)	(0.88)	(1.66)
Age^2	-0.01	-0.01		
	(0.88)	(2.01)		
Farm household	-1.20	-0.94	-0.79	5.47
	(0.57)	(0.49)	(1.30)	(2.01
R^2	0.11	0.08	0.04	0.06

N = 534 households
Standard errors in parentheses.

Source: Boulier (1976)

Table 17. Regression Analysis: Time Allocation, Laguna Intensive

Independent variables	Wife		Husband	
	Home time	Market time	Home time	Market time
Constant	363.20	196.63	88.06	266.06
Wife's market wage	-3.53 (3.72)	6.16 (3.69)	-0.28 (7.00)	4.76 (5.41)
Husband's market wage	-27.22 (10.80)	13.01 (10.66)	-5.10 (0.74)	26.69 (11.55)
Home capital	29.35 (10.91)		-9.18 (5.58)	
House	-2.90 (1.87)		1.56 (1.01)	
Farm capital		2.39 (2.08)		7.31 (2.86)
Children 0-1	186.77 (30.72)	-37.43 (30.43)	27.35 (16.58)	-7.16 (44.75)
Children 1-6	37.18 (14.03)	-3.68 (13.63)	-1.05 (7.50	12.47 (20.44)
Children 7-15	-5.47 (9.77)	9.03 (10.33)	-6.96 (5.27)	18.97 (14.82)
Children 16+	12.60 (16.15)	-8.90 (16.18)	5.85 (8.01)	-14.78 (21.42)
Education of wife	-4.19 (9.52)	16.82 (8.99)	7.51 (5.04)	4.76 (5.41)
Education of husband	-6.46 (8.18)	2.50 (8.06)	5.56 (4.38)	-14.29 (13.23)
Wife's age	10.78 (7.76)	-13.42 (7.80)		
Wife's age^2	-0.24 (0.12)	0.26 (0.12)		
Husband's age			3.32 (3.65)	0.82 (10.25)
Husband's age^2			-0.07 (0.06)	-0.03 (0.14
Wet season	-8.13 (27.10)	20.78 (26.99)	-30.67 (14.54)	14.60 (39.46)
Cool season	-5.03 (31.44)	-5.17 (30.41)	-19.84 (16.53)	16.34 (45.39)
R^2	0.320	0.118	0.113	0.108
No. of cases	291	291	291	291

[a](Standard errors in parentheses)

Source: King (1976)

Table 18. Regression Analysis: Time Allocation Data, Rural Philippines

Independent Variables	Non-farming Households (101)				Farming Households (124)					
	Wife		Husband		Wife			Husband		
	Home time	Market time	Home time	Market time	Home time	Farm time	Market time	Home time	Farm time	Market time
Non-wage Income	-.00004	.00006	.00084	-.00004^{xx}	.098^{x}	.014	.045^{x}	-.002	-.009	.012
Wife's Market Wage	-1.085^{x}	.983^{xx}	-.474^{x}	-.796^{x}	-.32	-.76	.708^{xx}	-.014	.155	.035
Husband's Market Wage	.091	.015	.007	.336^{xx}	.275	-.56	.069	-.014	-.336^{xx}	1.01^{xx}
Home Capital	.0018	.0018	.0004	-.0003^{x}	.00025	.0005	.00005	-.00005	.0005^{xx}	-.0001
Farm Capital					.0005	.0003^{x}	-.0003^{x}	-.0005^{xx}	-0.0004	-.58^{x}
Farm Replacement Wage, Wife					.0276^{xx}	.0063^{xx}	-.060^{x}	.002	.002	.0046
Farm Replacement Wage, Husband					.020	-.0002	-.0099^{x}	-.0004	.084	-.002
Cost of Market Job		.208		3.17^{xx}			.049			.009
Children										
0 - 3	-2.99	-4.53	3.19	-2.61	6.16	-1.48	-3.55^{x}	.98	.30	-4.22
3 - 6	1.67	-2.05	.009	1.37	7.19^{x}	1.98	-1.36	-.28	2.55	.34
6 - 9	-2.65	4.16^{x}	-.25	5.36^{x}	-4.04	-.10	4.82^{xx}	.13	-1.31	.31
9+	-5.40^{xx}	1.43	-1.14	-.61	-.55	-.08	.27	-.22	-.94	.78
Education of Wife	-.25	.16	-.67^{xx}	.27	.42	-.46	.035	.27^{x}	-.30	.21
Education of Husband	-.66	-.20	.54^{xx}	.56^{xx}	-1.53^{xx}	.52	.031	-.093	.23	.61^{xx}
Year Married	.61^{xx}	.15	-.016	.29^{x}	.51^{x}	.80	.05	.13	.36	.21
Days Sick	.339	-.03	-.011	-.033	-.607	-.282	-.20	.38^{xx}	.067	-.07
R^2 (unadjusted)	.331	.226	.237	.550	.297	.157	.508	.452	.291	.459

Dependent variables: x Coefficient$_{1.5-2}$ times standard error; xx Coefficient more than twice standard error

Table 19. Estimated Value of Home Production in Laguna Rural Household by Types of Households--Laguna Intensive Survey (in ₱ per year)

Types of Household	Father	Mother	Children*	Total
Farm	631	3342	2820	6793
Nonfarm	710	3280	1757	5947
Mother Employed	396	3067	2275	5738
0 - 3 children	460	3274	1009	4742
4 - 6 children	354	2833	3057	6244
7 + children	288	2967	4869	8124
Mother Nonemployed	661	3954	1217	5832
0 - 3 children	788	3874	541	5203
4 - 6 children	511	3862	1481	5855
7 + children	783	4169	4658	9610
Mother Employed	396	3067	2275	5738
with infant	630	4864	845	6339
without infant	331	2554	2038	5523
Mother Nonemployed	661	3954	1217	5832
with infant	884	5368	1381	7633
without infant	578	3359	1162	5099
Mother with				
0 - 6 years of schooling	463	3338	2212	6014
7 + years of schooling	507	2955	1062	4524

*Excluding the value of school time.

Source: King-Quizon (1977)

Table 20. Value of Market Production, Home Production and Full Income Based on Laguna Intensive Data (regression estimate method)

	Pesos per year
Market Income	
Father	3334
Mother	1148
Children	1301
Total	5783
Value of home production	
Father	668
Mother	3287
Children (excluding school time)	2061
Total	6016
Children (including school time)	3599
Total (including school time)	7554
Full income	
Father	4002
Mother	4435
Children excluding school time	3362
Total	11799
Children including school time	4900
Total	13337

Source: King-Quizon (1977)

Table 21. Average Annual Expenditure per Child, by Age Group, Sex, and Type of Expenditure (in pesos)

	Food			Clothing			Medical		
Age Group	Male	Female	Total	Male	Female	Total	Male	Female	Total
0 - 2	143.33	189.60	171.29	25.64	18.58	21.37	13.90	12.48	13.04
3 - 5	206.53	155.60	179.89	27.86	20.79	24.22	40.00	19.06	29.05
6 - 8	165.58	144.26	155.95	33.65	25.62	30.07	11.19	58.59	32.62
9 - 11	190.13	191.79	190.97	39.13	33.20	36.07	13.11	3.81	8.32
12 - 14	204.26	185.43	196.47	50.13	45.44	48.19	2.07	5.41	3.92
15 - 17	214.33	149.23	188.29	57.72	52.20	55.51	0.01	0.61	0.25
18 - up	267.31	172.57	220.83	52.88	47.34	50.16	0.94	21.26	10.91
Sample Size	(209)	(196)	(4.05)	(211)	(197)	(408)	(209)	(197)	(406)

Source: Cabañero (1977)

Table 22. Home Production Time Associated with Child Care (average annual hours per child)

	By Mother		By Father		By Siblings	
Age group	Males	Females	Males	Females	Males	Females
0-2	940	762	163	151	196	146
3-5	652	606	124	118	65	94
6-8	457	341	104	57	127	208
9-11	341	326	52	48	173	201
12-14	322	307	44	29	71	77
15-17	322	223	39	23	95	64
18+	292	286	37	42	66	115

Source: Cabañero (1977)

Table 23. Time Contributions of Children to the Household. (average annual hours per child)

Age Group	Work in Market		Work at Home		School Time
	Males	Females	Males	Females	All
3-5	0	0	92	137	91
6-8	218	116	200	274	416
9-11	302	434	306	473	730
12-14	885	464	351	790	720
15-17	1148	979	454	633	430
18+	1523	1320	170	925	180

Source: Cabañero (1977)

Table 24. The Shadow Price of Child Number by Age Group, Sex, and Income

	Low Income			Middle Income			High Income		
Age Group	Male	Female	All	Male	Female	All	Male	Female	All
0 - 2	1,943	1,673	1,758	1,604	2,033	1,880	1,941	880	1,516
3 - 5	1,338	1,568	1,430	1,645	1,278	1,389	1,090	956	1,016
6 - 8	956	944	950	1,399	941	1,179	719	1,299	1,009
9 - 11	462	296	392	727	725	726	(1)	233	132
12 - 14	(484)	719	(230)	(123)	(537)	(330)	93	479	222
15 - 17	(1,243)	(1,175)	(1,206)	(3,132)	177	(1,714)	43	(577)	(112)
18+	(1.193)	(783)	(1,081)	(347)	(72)	(255)	(832)	(2,606)	(1,397)
Sample size	63	51	114	47	57	104	64	45	109

Figures in parentheses are "negative costs."

Source: Cabañero (1977)

Table 25. The Full Shadow Price of Children by Age Group, Sex, and Wage of Mother

	Low Income			Middle Income			High Income		
Age Group	Male	Female	All	Male	Female	All	Male	Female	All
0 - 2	1,617	1,589	1,601	2,052	1,381	1,620	1,846	2,382	2,221
3 - 5	1,094	864	997	1,383	1,309	1,341	2,437	1,864	2,036
6 - 8	507	788	675	1,021	1,068	1,039	2,084	1,603	1,825
9 - 11	(18)	(42)	(34)	645	621	636	420	934	694
12 - 14	(186)	(152)	(174)	(418)	263	(223)	767	509	657
15 - 17	(1,045)	(501)	(821)	(1,188)	(1,141)	(1,168)	(140)	(397)	(314)
18+	(976)	(202)	(797)	(1,627)	(2,233)	(1,869)	280	(3,329)	(613)
Sample size	62	587	119	78	60	138	34	36	70

Figures in parentheses are "negative costs"

Source: Cabañero (1977)

Table 26. Effects of Household Variables on Family Size: Estimated Regression Cofficients--Laguna '75

Independent variables	Income Levels			
	Low	Medium	High	All
Constant	4.176	3.314	88.848	3.044
Duration of Marriage	0.151 (0.018)	0.195 (0.034)	0.192 (0.063)	0.191 (0.015)
Mother's age at Marriage	-0.007 (0.032)	-0.00010 (0.09895)	-0.082 (0.072)	+0.015 (0.028)
Household Income	0.00024 (0.00012)	-0.00001 (0.00017)	-0.00018 (0.00012)	0.00003 (0.00003)
Father's Education	-0.162 (0.099)	-0.996 (0.274)	-0.340 (0.174)	-0.131 (0.083)
Mother's Education	-0.450 (0.104)	0.482 (0.259)	0.081 (0.230)	-0.182 (0.088)
Wealth	0.00004 (0.00002)	0.00011 (0.00003)	-0.00008 (0.00002)	0.00001 (0.00001)
$\bar{R}^2$	0.698	0.748	0.577	0.649
R^2	0.708	0.779	0.620	0.657
F	54.246	20.558	11.688	72.081

Family size refers to the number of children ever born to a household regardless of whether the child survived or not.
Numbers in parentheses are standard errors of estimates.

Source: Navera (1978)

Table 27. Variables Dictionary: Rural Laguna Households

Variables	Definitional Notes	Mean	S.D.
Endogenous Dependent			
1. Children Ever Born	The number of children born to the household (includes stillborn children)	6.84	2.85
2. Education of Sons	Number of years of school completed by sons--based on older sons in household where younger sons were still in school	8.18	3.07
3. Education of Daughters	Number of years of schooling completed by daughters--based on older daughters in household where younger daughters were still in school	8.50	3.68
4. Schooling Expenditures	Expenditure on tuition, books, food, and clothing per year per child	222.04	443.37
5. Child Employment	A dummy variable--1 y children between 8 and 16 were reported to be working on farm or nonfarm tasks	.55	.50
Exogenous Independent			
1. Infant Deaths	Number of stillborn and infant deaths	.69	1.13
2. Education Father	Number of years of school completed by fathers	4.06	4.56
3. Education Mother	Number of years of school completed by mothers	3.52	4.55
4. Wage, Father (63)	Wage rate per day for employed father in 1963 pesos	3.07	4.27
5. Wage, Mother (P)*	Predicted daily wage rate of mothers in 1968 pesos	9.93	5.45

continued

Table 27 continued

Variables	Definitional Notes	Mean	S.D.
Exogenous Independent (continued)			
6. Wage, Child (P)**	Predicted daily wage rate of children in 1977 pesos	8.75	1.65
7. Full Income	A measure of full income in 1968 pesos computed as labor income of mother and father plus 10 percent of the value of farm and household assets	1649.24	1557.16
8. Home Technology Index	An index based on the number of home management practices actually adopted in 1963	37.88	31.27
9. Land	Land (in hectares) under cultivation by the household	1.18	3.12
10. Years Married	Year of marriage (-1900)	48.20	10.75
11. Father Farmer	Dummy variable = 1 if father is a farmer	.48	.50
12. Mother Farmer	Dummy variable = 1 if mother is a farmer	.03	.18
13. Mother Nonfarmer	Dummy variable = 1 if mother has nonfarm occupation	.58	.49

*The wage of the mother was a predicted wage rate. Only 170 of the mothers had wage data for 1963 and 1968. The measures were also quite erratic. It was desirable then to devise a predicted wage to expand the sample using this variable and to smooth out some of the irregularities in the measure. The prediction equation was:

$$\text{mother's wage} = 15.981 - \underset{(.107)}{.203}\ \text{year married} + \underset{(.0009)}{.0031}\ \text{farm assets} - 1.829\ \text{mother's health} + \underset{(1.815)}{.63} + \underset{(.265)}{.68}\ \text{mother's education} \quad (R^2 = .12)$$

continued

Table 27 continued

The mother's health index is 1 for good health, 2 for poor, 3 for bad. Farm assets and mother's health are excluded exogenous variables.

**The child wage rate was a predicted wage for two reasons. First, only 177 households had observable wage rates and it was desirable to analyze the full sample. But more importantly, child's wages and child education are related through the productivity of schooling creating a simultaneity problem. The child's wage is not strictly exogenous. The predicted wage is then a two-stage least squares procedure. The predicting equation was:

child's wage = 7.015 - .326 child health index + .128 child education +
(.683) (.056)

.021 years of marriage - .017 land rented + .0009 farm assets +
(.040) (.027) (.0008)

.971 father farmer - .104 mother farmer - .103 mother nonfarmer +
(.671) (1.379) (.619)

.008 land owned (R^2 = .14)
(.035)

Farm assets, the child health index, land rented, and land owned are the excluded exogenous variables.

Source: Banskota and Evenson (forthcoming)

Table 28. Regression Coefficients: Laguna Household Data

Independent Variables	Dependent Variables: Children ever born	Completed education of sons	Completed education of daughters	Schooling expenditure per child	Employment of children
Infant deaths	0.92166	-0.08574	-0.04460	1.12521	0.00312
	(0.12503)	(0.16332)	(0.03608)	(31.83800)	(0.02555)
Education, father	-0.04944	0.03021	0.02460	0.09817	-0.00437
	(0.03452)	(0.04538)	(0.05343)	(7.39536)	(0.00705)
Education, mother	0.17219	0.25465	0.22300	-23.70830	0.02911
	(0.05205)	(0.07314)	(0.08668)	(11.41064)	(0.01064)
Wage, father (63)	-0.02228	-0.00016	0.03417	11.11335	0.00120
	(0.03272)	(0.04093)	(0.04882)	(6.14572)	(0.00669)
Wage, mother*	-0.18414	-0.34569	-0.14411	31.97361	-0.02652
	(0.05951)	(0.09491)	(0.10960)	(12.02390)	(0.01216)
Wage, child**	0.57505	1.58735	1.20129	27.93008	0.07863
	(0.03812)	(0.24376)	(0.28044)	(28.74437)	(0.02822)
Full income	0.00006	0.00024	0.00022	0.04850	-0.00003
	(0.00010)	(0.00013)	(0.00015)	(0.01826)	(0.00002)
Home technology index	-0.03530	-0.00359	0.00112	0.889040	-0.00410
	(0.00445)	(0.00684)	(0.00931)	(1.09462)	(0.00091)
Land	0.00686	-0.01009	-0.00371	-0.14743	-0.00205
	(0.0454)	(0.00553)	(0.00651)	(0.83491)	(0.00093)
Year married	-0.03904	-0.10305	-0.04462	0.66365	-0.00800
	(0.01871)	(0.02972)	(0.03608)	(4.05529)	(0.00382)
Father farmer	0.70862	0.44104	-0.15501	-5.96042	0.13662
	(0.34047)	(0.44776)	(0.55022)	(73.37958)	(0.06957)
Mother farmer	0.82284	-0.44927	1.48336	-145.87323	0.36083
	(0.74334)	(1.06449)	(0.07885)	(152.00739)	(0.15189)
Mother non-farmer	0.02207	0.29151	0.12773	76.53250	-0.04114
	(0.28441)	(0.38205)	(0.01714)	(58.86663)	(0.05812)
No. of cases	320	233	227	226	320
R^2	0.408	0.329	0.384	0.310	0.191
F	7.4610	6.608	4.590	3.301	2.557

Source: Banskota and Evenson (1978)

Table 29. Elasticities: Household Data

Dependent Variables	Children Ever Born	Education of Sons	Education of Daughters	School Expenditures	Child Employment
Elasticities with respect to:					
Mother's wage	-.27	-.39	-.16	1.43	-.47
Mother's education	.09	.11	.09	-.38	.19
Child wage	.74	1.70	1.24	1.09	1.25
Full income	.02	.05	.04	.36	-.09
Home technology	-.16	-.02	.01	.13	-.23

Computed at mean data levels from estimates in table 28.

Notes

1. The authors, listed alphabetically are Robert E. Evenson, Professor of Economics, Yale University; Barry M. Popkin, Assistant Professor, School of Public Health, University of North Carolina at Chapel Hill; and Elizabeth King-Quizon, graduate student, Department of Economics, Yale University.

2. The sample sizes were: 576 households in the Laguna 1975 sample, 99 in the 1975-76 intensive sample. In 1977, 245 of the 576 households were resurveyed. The 1963 sample resurvey included 247 households. In addition, 340 households of the 1963 sample were resurveyed using a "reduced" instrument in 1977.

3. The original Laguna survey was developed by an advisory group with several persons contributing to instrument design and field testing. From the University of the Philippines, Diliman, were Bryan Boulier, Teresa Jayme-Ho, Barry Popkin (School of Economics), and Cecile Florencio (School of Home Economics); and from the University of the Philippines, Los Baños, were Robert E. Evenson and Enriqueta B. Torres (Institute of Agricultural Development Administration (IADA)).

The field staff was directed by Concepcion Branco for Laguna '75 and the intensive phase. The resurvey in 1975 was assisted by Emeline Navera, Juanita Baskiñas, and N. Q. Trung of IADA.

Funding for the Laguna '75 and the intensive phase was provided by the Agricultural Development Council (ADC), the Interdisciplinary Communications Program of the Smithsonian Institute, and the Population Center Foundation of the Philippines. The ADC, Rockefeller Foundation, University of the Philippines College of Home Economics and the University of the Philippines School of Economics and the IADA are thanked for other support. The Agricultural Development Council supported the resurvey in 1977.

4. We made an attempt to include home-consumed milk and eggs in the income measure. Also we may have undervalued the value added of livestock.

5. One of the measurement issues of relevance to wage employment is the relationship between costs of maintaining a job and the wage rate. We attempted to obtain time costs and travel costs in order to enable a more reasonable analysis of the supply of labor to the market. In addition, we attempted to obtain "alternative wages" for tasks which family members perform but for which hired labor is also sometimes employed.

6. The home production recall section first asked who performed each specific activity and then how much time the person spent in this activity.

7. We also had problems with double-counting of time such as in handicraft and home gardening the products of which may be partly sold and partly consumed at home. Such time was then reported by the wife and the husband as both home and market production. That portion of time spent in growing home-consumed products was difficult to separate from that portion spent in growing the marketed product. The problem of doublecounting was "solved" by arbitrarily classifying as market activity any home time in

which all or part of the product was sold in the market though this approach does not solve the problem of classifying time into activities.

8. Some "observer bias" was noted as the presence of the interviewer appeared to influence the activities of household members particularly on the first days. Our evaluation of the bias tests of the two-day observation indicate little difference. While an observation period of three days or more would have been preferred, the two-day approach was used and the first day's data was discarded.

9. To make the comparison, the number of hours in a week spent on any activity was simply divided by seven days.

10. Unlike the time record study, mothers were willing to record household consumption. Food consumed elsewhere was excluded.

11. Valenzuela (1978) provides a full discussion of the dietary procedures developed. Cecile Florencio was primarily responsible for developing this data collection methodology. "At mealtime, the amount of foods eaten was measured by weighing the foods with their serving utensils every time a member took a share. Since this procedure provided a record of weights before and after foods were drawn from the serving utensils, it enabled the interviewers to determine the amounts actually taken by each member. In households where foods were apportioned to individual respondents, the allotted amount was weighed before the meal was served. Participants were able to carry on eating activities without further disruption in this modified procedure." Careful field editing of these individual data were carried out and checks were made during the final editing and computerization phases. A few discrepancies noted in the Philippine Food Composition table, such as the percentage edible portion of fish, were corrected during the editing phase.

The morbidity data were based on words and phrases the Department of Health had found both to occur frequently and to be used by Laguna households. Dr. Francisco Aguilar, the Department of Health, and Dr. Leda Layo assisted in the preparation of these questions.

12. These data should be interpreted in light of the processes by which the recommended daily allowances (RDA) are set. The procedures for setting the RDAs are themselves subject to disagreement and have a generally conservative bias. The RDA for protein has been strongly challenged by numerous Asian groups as being relatively higher than other RDAs.

13. See Valenzuela (1977).

14. See Mirless (1975) for a model in which consumption affects production.

15. The diet rating is a simple average of the nutrient adequacy ratios (truncated at 100 percent).

16. For some purposes this may be irrelevant. An increase in income may lead to an increase in nutrient intake even if the nutrients are concomitant.

17. Dietary intake is very difficult to measure for the very young children. Even when measured accurately it is not regarded to be a good measure of nutritional status.

18. Alves, Evenson, and Rosenzweig (1978) develop a method for separating the diet into nutrition and tast components and define price for each component. They econometrically identify price and income effects in a Brazilian sample.

19. The data suggest some effort to achieve lower risk in income variation as farm wives undertake a relatively large amount of nonfarm work.

20. This section is taken directly from Evenson (1978).

21. OLS estimates are not necessarily the most efficient estimates but should be unbiased.

22. Efforts to model job costs and wages as jointly determined are now being developed.

23. This section is based on Banskota and Evenson (forthcoming).

24. Symmetry conditions between cross-effects can be imposed in a partial analysis but other restrictions require a complete data set measuring all household goods.

25. See White, Nag, and Peet (1977) and Mead Cain (1978).

26. See Evenson (1978) for a discussion of the threshold effect. Note further that Navera's model is not fully compatible with the Banskota-Evenson approach.

27. Note that this is an "old" sample drawn in 1963 and resurveyed in 1968.

APPENDIX

LAGUNA PROJECT DESIGN

I. Sampling

A. Barrio Sampling

Laguna Province has 576 barrios and 30 municipalities. Barrios were stratified into 4 types: (1) upland cropping barrios, (2) fishing barrios, (3) intensive lowland rice farming barrios, and (4) intensive lowland rice farming barrios located near wage employment opportunities. Six upland barrios, 3 fishing barrios, 13 lowland barrios, and 12 lowland wage employment barrios were randomly selected from the 4-barrio type list.

In 1963, the Farm and Home Development Office (FHDO) of the University of the Philippines, Los Banos (UPLB) selected a sample of barrios. The FHDO lowland intensive rice barrios were adopted as the "lowland rice barrios" sample. This earlier study is described in Rural Change in a Philippine Setting by the Farm and Home Development Office (Los Banos, Laguna: University of the Philippines), 1971:13-16. This survey selected 13 of the 16 original FHDO "intensive rice-producing barrios."

B. Household Selection

Sixteen households were randomly selected from each barrio except for the fishing barrios from which 27 households were selected. A census of each selected barrio was conducted to develop barrio household lists. Since barrio populations range from 223 to 5,000 persons, such a procedure provides barrio representativeness rather than a pure population representative sample.

In the Resurvey in 1977, efforts were made to search for all households covered in earlier surveys—approximately 80 percent of the original FHDO sample. The Resurvey surveyed the households in the 1975 survey which are located in 22 of the 25 sample lowland barrios. In addition, 34 barrios included in the earlier FHDO study were resurveyed.

II. Survey Detail

The "modules" included in the survey were:

1. Demographic Characteristics: includes birth dates, death dates, schooling, marital status, and status for all past and present household members.

2. Schooling and Nonfood Expenditures: includes costs of schooling such as travel costs, time spent in school, clothing, and other nonfood expenditures for each child. An attempt to obtain data on home training of children produced little of value.

3. Time Allocation in Home Production: a recall instrument asking for hours in the past week spent on a set of home production activities (marketing, cleaning, cooking, sewing, childcare, home gardening, etc.)

4. Morbidity: a recall instrument for illnesses in the past six months

5. Pregnancy and Delivery History, Family Planning Practice: data for all pregnancies in the past five years, including costs of delivery, and so on.

6. Work History of the Mother: wage employment, farm and business activities over the past five years.

7. Housing/Home Lot: Consumer Durables Inventory: present value, purchase price, year acquired, and liabilities of a specified list of durable assets.

8. Food Consumption Recall: over past week, including quantity and price for major items.

9. Wage Employment: standard labor supply and detailed time allocation recall questions. Attention was paid to resurvey of wage rates including payments in kind.

10. Organization Participation

11. Land Data: tenancy, use and value, and liabilities by parcel.

12. Farm Capital Inventory: includes year acquired, price, present value, liabilities, repair, and maintenance costs by item.

13. Credit and Finance: includes present liabilities, own auto, terms of loan, dates, collateral.

14. Crop Production (Rice, Coconuts, Other Crops): includes all inputs, products, prices, techniques, tenancy arrangements, family, and hired labor by task. In addition, wage rates paid to hired labor and replacement cost wages for family labor were obtained. Management time was included as a specific task.

15. Livestock and Poultry Production: similar to crop production.

16. Business and Professional Income

17. Dietary Intake

18. Time Observation (see following section)

19. Baranguy Characteristics: includes data on educational institutions, agricultural extension services, social services, sanitation, irrigation facilities, transport availability, community organizations, commercial establishments, and prices for important commodities at time of survey.

III. Intensive Phase Time Allocation Survey

Below we describe the codes used to categorize activities by each household member.

ACTIVITY GROUPS USED IN THE LAGUNA HOUSEHOLD SURVEY: TIME OBSERVATION STUDY

Group I activities: Market Production

Wage and other related activities. Refers to activities for which members receive regular income either in the form of salary or wages. Examples are wage or salary earners; farm laborer, seamstress, yardboy, water tender, caretaker, etc. All activities pertaining to this source of income are classified here although the time spent in the performance of such activity is beyond respondent's prescribed working hours. For example, the time a respondent spends attending a labor union meeting is entered in this category.

Profession and other related activities. Refers to activities using specialized skill that enables one to be self-employed. Such skill may or may not require a college degree. All activities undertaken to enhance one's profession are also included here. Say, the time spent by a manicurist who goes to town to have her nippers sharpened is entered under this category.

Business and other related activities. Includes all business related activities. For example, when a buy-and-sell respondent goes to his compadre to learn from him the latest saleable items in the city, the time spent is recorded under this activity group. Example: tending sari-sari stores, selling newspaper, etc.

Rice farming: preharvest work: Refers to all activities prior to harvesting like land preparation, seedling production, planting, transplanting, weeding, fertilizing, chemical application, purchase of inputs, arranging credit, and the supervisory and managerial tasks associated with rice farming. Hence, anything and everything that is directly associated with rice farming prior to harvesting is included here. These activities may be performed by a landlord, tenant, or any farm worker.

Rice farming: harvesting and postharvest work. Harvesting and postharvest activities such as harvesting, hauling, drying, milling, and the like are classified under this. Credit which is arranged during this period for purposes of processing or marketing the palay is also included here, but marketing is considered under marketing farm produce.

Coconut production and other related activities. Refers to time used in coconut production and processing of such as a source of income. Any related activity undertaken so long as it is not for household consumption nor for business is included here. If the respondent shelled the coconut prior to marketing, this activity is recorded here.

Sugar cane production and other related activities. Refers to time for sugar cane production and/or processing of such as a source of income. However, the time of hired sugar planters is considered under activity group Wage and other related activities.

Vegetable production and other related activities. Does not include backyard gardening except in cases where the backyard garden is greater than 200 square meters. Any activity pertaining to vegetable production is included here such as weeding, chemical application, purchase of inputs, and other gardening activities.

Home gardening and other related activities. Refers to gardening a backyard of less than 200 square meters. This may include cultivating fruits, vegetables, and flowers, part of which may be sold. Any activity done in relation to this undertaking is considered here such as smoking the mango tree, weeding the tomatoes, watering the plants, etc.

Livestock-poultry work and other related activities. Any activity pertaining to this work must be considered here such as collecting grass for the carabao's feed, i.e., if the carabao is not used for rice farming. If it is used for rice farming, this activity is recorded under activity group Farming. . . . Feeding chickens, pigs, goats are also included here.

Home-production of goods and services: handicrafts, etc. Refers to activities that are done at home but part or all of the produce is sold either for cash or kind or profit. This includes activities like washing, weaving, sewing, food preservation, embroidery, ironing, making or repairing tools and farm implements, building a fence, and others. If the mother sews or does any other activity, part of her output may be consumed by family members. Goods strictly produced for home consumption are not included here but in home activity group Household Chores.

Marketing farm produce and home-produced goods and services. Any activity undertaken in relation with selling one's produce either from the farm or the home is included here, with the exception of fish catch. Efforts like canvassing market outlets, delivery of, say, washed or ironed clothes, delivery of orders, and the like are included here.

Fishing and other related activities. Refers to fishing or fish farming activities. All activities that pertains to this undertaking are included here, such as the mending of fishing nets, placing of fingerlings in a fish pond, marketing of catch, etc.

Repairs, construction, and other related activities. Refers to repairs and construction outside of the work requirements in the above activity groups. Repairing the house is included here.

Travel to and from work. Departure for and arrival from work, or any other activity related to work must be recorded under this activity. This includes, say, walking to the fields for farming.

Hunting, gathering wild plants, and other related activities. Refers to shooting animals like birds, wild pigs and the like, and gathering wild plants like mushrooms as a source of income. Any activity pertaining to these like greasing a gun, cleaning a tin can to collect mushrooms, and the like are included here.

Others. Any economic activity which cannot be entered in the above activity groups are included here.

Group II Activities: Home Production

Cooking and preparing food for the household. Includes the preparation of cooking ingredients, other than buying, like cutting and washing of food prior to cooking.

Breastfeeding. Applies strictly to breastfeeding women only.

Bottlefeeding. Includes all aspects of bottle feeding like cleaning bottles, heating milk (if done), and the actual feeding.

Caring and other related activities pertaining to children. Refers to the time devoted to caring for children like feeding, washing, cleaning, dressing, putting the child to bed and the like. This does not include playing with the children which is classified separately.

Playing with children. Refers to the playful side of caring for the children like cooing, teasing, talking to the baby, playing games. However, reading and telling stories and other related learning situations are classified separately.

Reading to or telling stories to children. Listeners or recipients of the stories should be strictly children. If they are adult, the time used is recorded as passive recreation.

Marketing/shopping plus travel time. Refers to time used for buying items (food and/or nonfood) which will be used strictly for the home. This includes borrowing food items from a neighbor as well as purchasing them in the market. Travel time is also included here though the source of a commodity may be just the nearby sari-sari store.

Fetching or chopping wood, fetching water. Refers to time used for chopping wood, carrying it to the house, fetching water, and all time related to such work.

Household chores like washing, etc. Pertains to household chores like washing, ironing, cleaning house/yard/dishes, arranging/decorating the house, and the like.

Attending school, lectures, adult education class. Refers to activities related to the pursuit of academic and/or nonacademic (specialization or vocational) knowledge. These include doing homework or assignments except class projects like artificial flower making which should be recorded

under activity group Passive recreation. Example: Adult education class, home management courses, rural improvement, club meetings, agricultural extension class, Samahang Nayon seminars, mothercraft, educational trips, etc.

Group III Activities: Other Home Time

Sleeping, washing, bathing, resting, and other personal activities. Refers to strictly personal activities like dressing, grooming, sexual relationships, waking up, etc.

Eating. Includes the time all persons spend when eating, including meals and snacks. If members spend an extra hour socializing after dinner, this is recorded as Passive recreation. Drinking beer at a bar is also considered Passive recreation.

Passive recreation. Refers to activities that do not require much physical effort. Playing with children is not included here. Activities which may be considered here are watching sports/movies/TV, gambling, reading, gossiping, listening to the radio, entertaining visitors at home, discussions, and talking with friends. The idea is that minimal energy is expended in the activity.

Active recreation. Refers to recreational activities that require physical effort like bowling, basketball, volleyball, "hide and seek", and the like.

Being sick. Pertains to time of nonmobility of persons due to illness, frailty or fragility, such as convalescing time.

Church activities. Any church-related activities like going to Mass, attending church club meetings, joining processions, visiting the priest, and the like are included here.

Festivals and visitations elsewhere including travel time. Any social activity undertaken outside of the home or barrio including travel time are classified under this. Example: Attending weddings, fiestas, vigils for the dead, and the like.

SSU activities. Any use of social services including travel time must be included here. Examples of social units: Hospitals, Rural Health Units, hilots, nutritionists, social workers, etc.

Caring for the aged and the sick. Refers to the time spent by household members caring for the aged and the sick, such as bathing them, feeding, cleaning, and the like.

Others. Any social activity which cannot be entered under the activity groups above are coded here.

Group III Activities: Preschoolers

51 Being Breastfed. This refers to the time the preschooler is sucking his/her mother's breast milk.

52 Being Bottlefed. This refers to the time the preschooler is sucking milk or other items from the bottle or receiving milk or infant formula in some other container.

53 Being Fed Other Food. This refers to the time the preschooler is fed other than the two preceding categories.

54 Resting/Sleeping. This refers to the time the preschooler is inactive because he/she is resting/sleeping.

55 Playing with Adults. Active play with an adult (strictly).

56 Playing with Children. Same as above, so long as play is with other children strictly. Active playing together with children.

57 Playing Alone. May be passive or active so long as the playing is by the preschooler alone.

58 Being Sick. Self-explanatory.

59 Being Taken Care of by Adults. This refers to the time of adults consumed by the preschooler. Include activities like cuddling/holding/bathing/dressing and the like. Passive cuddling or holding is included here but not in Playing with Adults.

60 Being Taken Care of by Children. Same as above so long as the preschooler consumes the time of children and not adults. Not active playing.

61 Being Read/Told Stories. May be adult or children so long as the time consumed by the preschooler is devoted to being read/told stories.

62 Others. Any preschooler's activity which cannot be entered from activity code #51 to #61 above must be coded starting this number downwards. Again, notify the field supervisor on this.

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