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Impact of Education, Employment, Rural Development  
and Health/Family Planning on Fertility and Women's Roles

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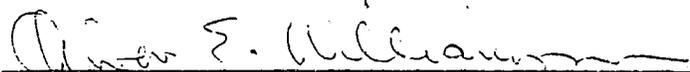
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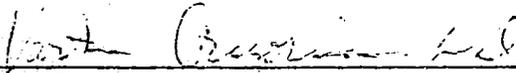


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## I. Project Justification and Potential Utilization

### 1. Summary

Title: Impact of Education, Employment, Rural Development and Health/Family Planning on Fertility and Women's Roles.

Contractor: University of Pennsylvania

Principal Investigator: Jere R. Behrman, Professor and chairperson of Economics, University of Pennsylvania, Philadelphia, Pa., 19174

Status: New Project

Time Period: June 1977 - December 1979

Estimated Cost: FY 1977 \$140,538, FY 1979 \$104,234

Total Cost: \$420,362

Project Manager: Barbara Herz, PPC/PDA/SPA

The goal of AID, reflecting Congressional concerns, and the goal of many LDC's is to increase human welfare among the poor. Human welfare requires understanding of how families function and what affects family welfare. AID has collaborated in providing assistance in major policy areas in order to directly affect family welfare: health, nutrition, education and training, rural development, family planning, etc. Our present understanding of how our assistance or related policies affect individual families is, however, quite sketchy. We particularly lack information on the role of women in development. The paucity of knowledge about the role of women inhibits the achievement of general development goals, and makes efficient implementation of the Percy Amendment directive extremely difficult.

The major purpose of the proposed research is to investigate the roles of women in Nicaragua. The research will use a family decision making model that emphasizes the impacts of and the interactions among education, health, nutrition, population, and rural development policies. The research will focus on the poor, particularly--but not exclusively--in the rural areas. This investigation should shed light on the nature of policy tradeoffs and interactions and the most cost-effective policy package for the objective of increasing human welfare.

Certain hypotheses can be put forward as to the probable impact of individual variables on women's roles and fertility. For example, we expect to demonstrate that increased education and family planning services will expand opportunities for women and decrease fertility; as health and nutrition improve we expect to demonstrate that it will affect women's job opportunities. These concepts are closely interrelated; our research will help explain just how they are related. And our project will help demonstrate what affects fertility and women's roles.

A secondary purpose is to develop (if not already available) and apply statistical techniques that meet the shortcomings of previous studies. These studies have incorrectly specified their models and ignored unobservable influences on the variables. We propose to properly specify the model by including all relevant effects and by adjusting for the statistical error contained in the previous work. These methodological refinements may raise

questions in some important respects about simpler approaches utilized in other related studies and may suggest that widely used and more simple approaches are robust.

Other purposes include: the development of a new data set on micro behavior in LDCs to be placed in the public domain; the testing of sample instruments developed under AID auspices by INCAP and Freedman and Mueller; the further training of LDC collaborators in important aspects of social science research; the development of a new group to be linked to the Rand-National Bureau of Economic Research-Yale Economic Growth Center Consortium on human capital research in LDCs which is being supported by AID; and the stimulation of additional research.

Nicaragua provides an ideal location for the study, since AID/W\_\_\_\_\_ has endorsed the proposed project, national officials are interested in the issues under consideration, and there are capable country scholars collaborating in the project. In addition, the Nicaraguan government will be interested in utilizing the results, which can be applied in other LDCs and therefore utilized by other LDC policymakers and program planners.

The results of this project will be disseminated in (1) a series of technical papers and a monograph concerning the details of the study; (2) a policy-oriented monograph in English and in Spanish addressed to AID officials and LDC decision makers; (3) a conference for academics and policy makers in Nicaragua; and (4) a data bank in the public domain for general use.

## 2. Research Purpose and Expected Products

The overall purpose of AID programs and of many LDC's development plans is to increase individual human welfare. The Foreign Assistance Act requires AID to give particular attention to improving opportunities for women. AID has also devoted major attention and resources to encouraging voluntary family planning, in an effort to mitigate serious and growing demographic pressures on scarce development resources and to improve maternal and child health. This year the Agency has proposed an additional Section 117 for the Foreign Assistance Act that emphasizes the role of development programs and policies in encouraging smaller families. This Section calls upon the Agency to devote additional attention and resources to identifying the ways development influences fertility and to modifying LDC policies and programs and AID projects, in keeping with LDC preferences and objectives, to encourage lower fertility. The Agency already made a similar commitment in the Population Analysis Paper of July, 1976, and is therefore moving to implement this commitment in advance of actual Congressional action on Section 117.

Over the past several years evidence has accumulated to suggest that fertility and women's opportunities have a major impact on each other. In addition to providing family planning services and information, extending opportunities for women--particularly in education and employment--seems to do much to encourage lower fertility. Similarly high fertility can easily discourage or even prevent women from seizing opportunities to move beyond their traditional roles.

The interdependence of fertility and women's opportunities--and the mechanisms for changing either fertility or women's opportunities--remain far too poorly understood. Of course both fertility and women's opportunities are

complicated phenomena, reflecting social, economic, health, and family planning policies and traditions. To fit together even a few pieces of the puzzle properly is a difficult task. Most research has therefore focused on only a few pieces--say family planning services as it relates to demographic data. We have developed considerable helpful information in a limited number of areas.

But we have not taken sufficient advantage of modern statistical techniques developed over the past decades in both the physical and social sciences to sort out multiple influences on, say, fertility and women's opportunities, and to explain how fertility and women's opportunities may interact. <sup>1/</sup>

Such an analysis has the purpose of at least roughing out much of the puzzle, so that particularly well understood sections can be placed in a broader context and areas for priority attention can be more accurately identified. While such analysis begins with consideration of a large number of variables, and requires considerable data it ends by pointing up which of the variables really matter and focuses on these. Thus policy makers can have greater confidence that what they select for priority attention is really appropriate.

Our research would utilize recent methodological advances that permit more accurate sorting out and comparison of multiple influences on fertility and women's opportunities, and more accurate assessment of their interaction. Specifically, we can measure interactions more precisely and can determine with greater accuracy whether there are "thresholds" or particular levels of, say, education which especially influence fertility. This will enable program planners better to understand whether, for example, only three or four years education has a major impact on fertility or whether eight or ten years are necessary.

This research should have direct relevance for both Section 117 activities and AID's efforts to extend opportunities for women. Neither area is well understood; exploratory research is needed in both areas. Quality research on

fertility determinants is particularly short in Latin America. We will use data available in Nicaragua.

We expect, for example to be able to test the propositions that in Nicaragua:

(1) Fertility declines after a threshold of only four-five years education for women or girls--and again particularly after secondary education.

(2) Providing women good wage-earning opportunities encourages both employment and lower fertility.

(3) Providing maternal and child health services encourages lower fertility;

(4) Providing family planning services, in and of itself encourages lower fertility;

(5) Providing integrated health and family planning services particularly encourages lower fertility.

Because we have been in close touch with leading Nicaraguan policy makers (our group includes Nicaraguan researchers and policy makers) and with the AID mission we believe our research would be useful to Nicaraguan policy makers and to the mission.

In addition, we believe the results will have far broader applicability within Latin America; and establishing the effectiveness of the methodology could potentially affect the course of AID's research in other geographic areas.

### 3. Significance and Rationale for Research

3a. The Development Problem and Its Relation to AID. One of AID's primary objectives is to help to increase human welfare in the LDC's on a sustained basis. The Congressional Mandate and the Percy Amendment Directives require that particular emphasis be placed on the situation of the poorer part of

LDC populations and on women. The Agency proposed amendment 117 to the Foreign Assistance Act expands this emphasis to include the identification of the ways development affects fertility, and AID's role in helping LDCs to reduce fertility. Welfare, of course, encompasses a number of factors, among which are the level of per capita income, health and nutrition, education, occupational status, and the quality and quantity of children. The distribution of such factors among family units and within family units also affects the overall level of welfare.

In its effort to help increase human welfare in LDC's on a sustained bases, in recent years AID has focused on the agricultural, education, health, nutrition, and population sectors. Very substantial funds have been devoted to support policies in these sectors throughout the developing world. For example, the recent AID [1976: 6, 48] review of population policy reports that Title X assistance for population policy alone has totaled over \$750 million in the past decade and recommends expenditures of \$200 million per year in the near future.

In Nicaragua, the country for the proposed study, AID activities in these policy sectors has been substantial and are growing. AID/Nicaragua budgets for F.Y. 1977 total over \$16 million in food, nutrition, population, health and education programs alone and over \$19 million has been proposed by the Mission for these areas in F.Y. 1978. AID provided \$12 million to supplement \$18 million from the Nicaraguan government for the first year of the integrated rural development program (INVIERNO), and the Mission has requested another \$11 million for the next fiscal year. The Mission also has submitted PID's for expanded related activities including rural sector development loans, services

for the urban poor, small farm enterprise support, funding for the Office for Women in the Ministry of Labor established in early 1976, and rural women leadership training activities.

Prima facie, the situation in Nicaragua warrants support in these emphasis policy sectors in the sense that existing conclusions are quite poor for the majority of the population. Recent AID/Nicaragua [1974, 1975, 1976a, 1976b] sectoral assessments, the health sector analysis by Holland and Davis [1974], the Kortzen [1973] survey and the AID/Nicaragua sponsored report on the role of women in the economic development of Nicaragua by Diebold de Cruz and Pasos de Rappacioli [1975] all point to very poor conditions. A few examples are useful (see these reports for more extensive characterisations). Over half of the children under five suffer from mild to severe protein calorie malnutrition. Anemia is equally wide spread in rural families, and 40 percent of the males and 54 percent of the females have goiter. Only 64 percent of the urban and 6 percent of the rural population have access to potable water and sanitation. In the early 1970's, 13 percent of all children born died before reaching age one and 15.4 percent died before reaching age five. In 1971 48 percent of the children aged 6 to 14 were in school, illiterates comprised 42.4 percent of the population, there were 0.68 active doctors for each 1000 inhabitants, unemployment was 3.5 percent but underemployment was 22 percent and 20 percent of the heads of households and 47 percent of the youths in Managua did not have steady jobs, and the dependency ratio (those under 15 or over 64 as a percentage of those 15-64) was 105 percent--second only to Bangladesh according to the Population Council. Landless labor accounts for almost half of the rural population of working age. Almost half of the families are headed by women. Women face apparent discrimination in credit availability, occupational opportunities and legal restrictions.

In 1970 the average per capita income for the lower half of the population was \$91 per year--less than 6 percent of the average for the top five percent.

The Nicaraguan government has been following policies, often with AID support, to improve the situation. For example, public expenditures on health increased 736 percent from 1950 to 1970 and government expenditures on education rose nearly 300 percent between 1960 and 1970. The integrated rural development plan for 1975-1980 mentioned above, which apparently is meeting with relatively great initial success,<sup>2</sup> is another example. Despite the increasing policy emphasis on improving the welfare of the majority of the Nicaraguan population which exists in very inadequate conditions, the task is of such magnitude that it will require concerted policy efforts over a number of years to improve the situation to an adequate level.

Moreover, there are substantial problems in evaluating (in terms of the impact on human welfare) the cost-effectiveness of the policies on which AID and the government of Nicaragua have been collaborating. A number of these problems are enunciated clearly in the AID [1976] population policy review and in the AID/Nicaragua recent sector assessments and study on the role of women all of which are cited above: 1) The services and information generated by these policies often are not very widely available so their ultimate impact may be difficult to judge. 2) Data inadequacies are the rule. On many critical issues almost no systematic data exist. 3) The phenomenon of interest are quite complex. 4) There is considerable interaction among the various policy sectors. At times this interaction is reinforcing (e.g., improved nutrition

leads to better health and higher labor productivity and greater returns to many human capital investments), and at times it is partially negating (e.g. increased agriculture production partially based on wider use of irrigation systems, chemical sprayage and migratory labor, as in Nicaragua, may cause greater rural health problems by facilitating the spread of malaria). 5) There is little understanding of the individual and family micro behavior which underlies the macro responses to policies. 6) In making policy choices, trade offs must be made among various determinants of human welfare because of resource constraints even though there is very little knowledge--and conflicting hypotheses--about the nature of these trade offs.

The primary intent of the project is to provide information about the critical underlying behavior parameters which determine the effectiveness of policies, especially in so far as they relate to women and to the poor, all within a simultaneous multivariate system (see footnote 1). The development problem under investigation thus is critical in understanding and analyzing a wide range of actual and potential development policy packages. The benefits in terms of more cost-effective policy packages for important policy sectors and greater knowledge of the development process, therefore, may be quite considerable. The interest in obtaining better knowledge of the underlying behavioral parameters so that better policy choices may be made is strong and widespread. For the Nicaraguan situation, for example, all of the AID/Nicaragua sector assessments and reports which are cited above cry out for such analyses. From a broad AID [1976] viewpoint, the recent population review also joins in the chorus. These documents include a large

number of provocative hypotheses, many of which will be tested in the study (see subsection 7b below). Other development practitioners and researchers, such as those mentioned in section 4 below, also have enthusiastically emphasized the importance of such research--not only for understanding the Nicaraguan situation, but also for our more general understanding of cost-effective policies in the development process. In sum, the principle objective is to improve LDC policy formulation by specifying the interrelationships and relative importance of the variables that affect fertility. In order to initiate adequate and efficient development policies it is essential that the underlying relationships be fully understood. The present study proposes to analyze these relationships so that both the LDC and AID have a better understanding of what the problems are and how they interrelate. Multivariate analysis brings all the pieces of the model together and produces a single output. That output guides the policy makers since it indicates how certain policies can affect the other components of the model. If the underlying statistical techniques are wrong, then the policies based on their results are inadequate or detrimental. To initiate positive policies an understanding of policy impacts must be available, otherwise programs can easily be misdirected. Our research will put the population situation in perspective, provide an extensive data set and give some idea of the probable effects of variables included in the model.

3b. Previous Related Research. Work on the micro aspects of the interrelations among fertility determinants, human capital variables, economic development, income distribution, the role of women and policy variables in Nicaragua is in its infancy. The most relevant studies are two good secondary summaries of the available information and three analyses of sample surveys.

The two secondary summaries are Korten's [1973] macro view of population growth and the quality of life in Nicaragua and Diebold de Cruz and Pasos de Rappacioli's [1975] analysis for AID/ Nicaragua of the role of women in the economic development of Nicaragua. Both include plausible suggestions about the interrelations between population and development in Nicaragua. Neither includes very explicit models of these interrelations, nor hypotheses testing. Both provide good background for our project.

The three surveys are all single-round retrospective KAP and sociological surveys of samples living in Managua: 1) A Instituto Nacional de Seguridad Social 1968 stratified sample of 1168 women, 15-49 years in age, in four classes (i.e., high, medium, worker, and low, as evaluated by the interviewers) with a questionnaire including 157 items and with focus on knowledge and use of contraceptives and abortion (many of the results of which are summarized in Fonesco Pérez and Almanza [1970]); 2) A 1969 random sample by area of 450 heads of households in marginal barrios with a questionnaire including 148 items by Téfel [1969]; and 3) a Banco Central-Asociación Demográfica Nicaraguense 1974 random sample by area of 961 women who had been pregnant, married or living with a man in poor barrios (i.e., areas adjacent to ADN clinics) with a questionnaire including 111 items (the first tabulation of results of which are summarized in Banco Central [1975]).<sup>3</sup> These three surveys shed considerable light on important demographic and sociological characteristics of the population of Managua. However the data are quite limited in the economic dimension, refer only to Managua, and the analysis consists almost exclusively of summary statistics relating to the individual variables with little concern about interaction in a

multivariate simultaneous model and no hypotheses testing. Thus the proposed research in no way duplicates already existing studies on Nicaragua. To the contrary, the proposed research promises a quantum step forward in our knowledge of the Nicaraguan situation.

For other developing economies, related work on the micro aspects of the interrelations among fertility determinants, human capital variables, economic development, income distribution, the role of women, and policy variables has burgeoned in recent years. Much of this work has focused on the determinants of the number of children within a single equation, multivariate framework, although recently there have been a growing number of efforts which consider fertility simultaneously with other variables. The conclusions which regularly come out of these studies indicate some systematic patterns for fertility: negative associations with women's education, child education, and women's labor force participation, and a positive association with child mortality (for a more detailed review, see subsection 7a below). Yet most of these studies suffer from the inadequacy of the data base utilized (usually collected for other purposes, with no information on a number of a priori critical variables) and/or biases and inconsistencies due to the statistical methodology adopted (see subsection 8g below). Therefore, even if the whole developing world is considered, it is fair to say that the proposed study does not duplicate already completed studies. Instead it represents a substantial improvement over most of these studies, and will give some insight into the biases and inconsistencies in their parameters estimates which may have led to quite inappropriate conclusions.

Mention should be made of three data collection efforts which are currently underway and which, like the present proposal, promise substantial improvements over earlier studies: the AID supported efforts in Guatemala and Malaysia under the direction of William P. Butz as part of the Rand-National Bureau of Economic Research--Yale Economic Growth Center Consortium [1975] project and the Agricultural Development Council rural survey in the Phillipines under the direction of Robert Evenson. The proposed study should compliment the analysis of these multi purpose surveys by providing another rich data base for multivariate simultaneous analysis of the important micro behavior relations. It also probably will go beyond them in terms of some of the methodological approaches which are discussed below in subsection 8g which never have been applied to some of the issues under investigation--not even for data from more developed economies.

#### 4. Plans to Coordinate and Link Research.

The groundwork has been laid for extensive coordination and linkages in Nicaragua, Central America, and internationally.

In Nicaragua, contact has been maintained with AID/ Nicaragua from the inception of the project. In fact the Mission Program Economist, Charlotte Jones, first introduced the principle investigators to each other after she had heard of their common interests.

Other institutional and personal contacts in Nicaragua are numerous because one or more of the principle investigators has served or is serving on the staff or as a consultant or advisor to a large number of the relevant institutions: the Banco Central and INCAE (the two leading centers of modern social science research in the country), Universidad Centroamericana, Ministry of Public Health, Institute for Rural Welfare

(INVIERNO, Secretaría de la Presidencia, Banco Nicaraguense, Dirección Nacional de Planificación, and the Asociación Demográfica Nicaraguense (for more details, see the curriculum vitae in Appendix B). A number of informal discussions about the project have already been held with various staff members of these organizations. If the project is approved, further informal and formal discussions will be held. We also are in the process of exploring whether either of the two authors of the survey on the role of women in Nicaraguan economy, Paula Diebold de Cruz and Mayra Paoa de Rappacioli, would be available to serve as a project consultant.

Within the Central American framework, the most important linkage is with INCAP. We have had favorable discussions with the staff of INCAP concerning the use of their sample instruments, the comparison and interchange of data, and our integration into the new Central American network of related research currently being organized by Charles Teller of the INCAP staff. Good interchange and disseminations of results seems assured through our relations with INCAP. We also have very good relations with the research unit of SIECA (where one of us is serving or a consultant) which may provide another useful contact point within Central America.

Internationally, our contacts also are broad. Perhaps most important is the enthusiasm with which our proposal has been greeted by various members (eg., Finis Welch, T. Paul Schultz, William Butz, Charles Teller) of the staff of the international consortium on human capital with whom we have had discussions about the project. We have agreed effectively to join this network. We also have good linkages with the World Bank, the Rockefeller and Ford Foundations, the International Planned Parenthood Federation, the National Bureau of Economic Research, the United Nations Development Program, and the Agricultural Development Council, all of whom have extensive related interests. Finally, we have extensive academic linkages in Latin America, North America, and Europe. We plan to present regularly our results at human capital, labor and demography workshops at the University of Pennsylvania and the University of Wisconsin, for example, in order to benefit from the scrutiny of the academic community. AID personnel and other interested parties will be invited to such presentations.

##### 5. Plan to Facilitate Utilization of Research Results.

An essential component of the project is that Nicaraguan social scientists with substantial contacts and influence throughout the Nicaraguan government and educational community will be intimately involved. We should emphasize that this is not a paper collaboration. All of the principal investigators bring special expertise to the project. Behrman contributes substantial background in econometrics and modeling, varied experience in analysis of development problems in Latin America and elsewhere, and linkages to policy makers and to academic researchers in Nicaragua, Central America, and elsewhere. Wolfe brings substantial experience in econometric policy analysis, a thorough background in a number of critical subcomponents of the project (eg. the determinants of fertility, the role of education, and the general role of women), and additional linkages to the general human capital and policy research ongoing in the United States. Belli and Ibarra bring their familiarity with the Nicaraguan situation, their sociological knowledge, their vast experience in social sampling in the Nicaraguan context, and their substantial contacts throughout the Nicaraguan governmental and intellectual community. Given these contacts, their very involvement in the project will practically assure that the results will obtain a fair and extensive hearing in the relevant Nicaraguan community and in AID/Nicaragua. This may be the most important factor assuring effective dissemination of results.

Of course we do not intend to stop at this. In addition, we intend to hold a conference in Nicaragua to which we will invite the

relevant Nicaraguan, AID, and Central American community at which we will summarize the essence of our technical results and focus on the policy implications. For the use of policy-makers in the Nicaraguan government, in AID, and elsewhere we will publish a nontechnical version of our study both in English and in Spanish. For other researchers and the more technical audience with a development interest we will publish a series of working papers and probably a monograph. We will disseminate our results in published form and in verbal presentations through the extensive linkages and networks in Nicaragua, Central America and internationally that are described above in section 4.

#### 6. Management Considerations.

Although all four principle investigators will contribute to the project, someone must accept the ultimate responsibility for heading the project. Behrman will play that role and the project will be channelled through his home institution, the University of Pennsylvania.

A critical subcomponent of the project is the sample surveying to establish the data base. Belli will head this part of the operation with the assistance of Ibarra. This activity will be centered in the Division of Social Studies (of which Ibarra is the Chief) in the Banco Central.

Another critical stage is the computer analysis of the data base. Because of both software and hardware considerations, it is essential that this occur in the United States instead of in Nicaragua. The University of Pennsylvania and/or the University of Wisconsin computer facilities will be utilized, with Behrman or Wolfe directing this phase of the study.

All four principle investigators will cooperate in writing project results and in giving oral presentations. Belli and Ibarra will tend to concentrate on describing the general environment, the sampling procedure, and on sociological analysis and on presentations in Spanish. The Banco Central will help support the dissemination of the Spanish results. Behrman and Wolfe will tend to focus on the econometric modeling and analysis and on presentations in English. These are tendencies, not exclusive jurisdictions. All four principal investigators will contribute to all aspects of the project, especially in regard to analyzing the policy implications.

## II. Research Design, Methodology and Plans

### 7. Technical Review.

As described in detail in paragraph 7b below the study is based on a human capital model (simultaneous multivariate system with some recursive relations) of life cycle family behavior which permits the testing of a set of hypotheses organized around variables associated with women, their male spouse and children. The variables include, for example, income and wage rates, education, migrant status, time of marriage, health and nutrition status, etc. separately for men and women, and the number and "quality" of children.

This section is divided into two parts: (1) a review of the literature that has explored relations among these variables, and (2) a discussion of the model and a list of hypotheses to be explored in the proposed study.

7a. Review of the Current Literature. As is noted in section 3b above, there has been a vertible explosion of recent related multivariate statistical analysis for other developing economics (although not for Nicaragua). Most of this work has focused on the determinants of fertility within a single equation multivariate framework using data sets collected for other purposes. There are some very recent exceptions such as the simultaneous models of DaVanzo [1972], Gregory, Campbell and Cheng [1972a], Harman [1970], Loebner and Driver [1973], Maurer, Ratajczak, and Schultz [1973], Nerlove and Schultz [1970], Rosenzweig [1976], and Rosenzweig and Evenson [1976] and the current multipurpose surveys underway in Guatemala, Malaysia and the Philippines which are mentioned above in section 3b. The present study will go beyond most of these existing studies by specifying a simultaneous system and by providing primary data that is directly related to the subject under analysis.

In her recent comprehensive review of the literature on the effects of economic development on fertility, Williams [1974] focuses on eight major categories which provide a framework within which much of the available evidence can be organized.

7a 1. Income. In some studies some impact of income has been detected. For example, Adelman [1963] finds a positive effect of income on birth rates for women aged 15-19, Rizk [1963] shows that high income women may be more successful in using family planning methods, and Heer [1966] and Schultz [1969b] suggest that procyclical variations have positive short-run effects on fertility in developing as well as in developed economies (although Friedlander and Silver [1967] suggest the opposite). However there are a number of other multivariate studies with no or very little support for an impact on fertility of income. Once associated factors (e.g., education, infant survival, women's labor force participation) are controlled for, it is necessary to conclude that the evidence for the effect of income on fertility is not strong. Of course it is possible that the income effect on fertility is obscured because the demand for quality adjusted children increases and quality becomes cheaper relative to quantity as income rises (Becker and Lewis [1973]), but it is very difficult to measure adequately the quality component.

7a 2. Education. For adults education is hypothesized to affect market productivity (and therefore potential income, but also the opportunity cost of time in terms of labor market participation), nonmarket productivity (i.e., efficiency in the home) and tastes and

attitudes (e.g., expanding the awareness of alternatives). In empirical studies, since ability and motivation usually are not controlled for (or are controlled for inadequately), education also may be serving as a proxy for ability and motivation (for developed countries Behrman, Taubman and Wales [1976] present evidence that this effect may cause substantial overestimates of the impact of education). For children, education is hypothesized both to be a cost factor in the fertility decision (due to direct financial costs and reduced possibilities for current income earned by children in school) and an input into the determination of the quality of children.

A large number of empirical studies support the negative impact of education on fertility in developing countries (Adelman [1963], Ben Porath [1970], DaVanzo [1972], Ekanem [1972], Friedlander and Silver [1967], Harman [1970], Heer [1966], Heer and Turner [1965], Janowitz [1971], Russett [1964], Drakatos [1969], Farooq and Tuncer [1972], Gendell, Maraviglia, and Kreitner [1970], Iutaka, Bock and Varnes [1971], Maurer, Ratajczak and Schultz [1973], Nerlove and Schültz [1970], Repetto [1972], Schultz [1969a, 1969b, 1970, 1973a], Gregory, Campbell and Cheng [1972a], Loebner and Driver [1973], Rosen and Simmons [1971], Mueller [1972], Mitchell [1972], Schuman, Inkeles and Smith [1967], Williamson [1970], and Wat and Hodge [1972]). In cases in which female education is separated from male education, the impact of the former is strongly negative while that of the latter is less often significant and consistent in sign (apparently due to the counter-balancing effects of higher income and higher opportunity cost). In studies in which women's labor force variables are included, much of the effect of education is channelled

through these variables, although some studies indicate that there are direct effects beyond those captured by the labor force variables and indirect effects through the use of contraceptives. There are almost no studies which incorporate the impact of adult and child education on the quality of children, but there are several which reveal some consistent negative impact of child education on fertility. In summary, the empirical support for the negative impact of education (especially of women) on fertility in developing countries is quite strong, but the paths through which this variable works and the extent to which it is only serving as a proxy for unobservable progressive abilities, attitudes and motivation are not clear.

7a 3. Female and Child Labor Force Activity and Wages. Two-way interactions are posited between female labor force participation and fertility: fecund females may limit their number of children in order to work (if there are not other household members who can care for small-children), subfecund women may work because of less competing demands for child care, females with a large number of children may feel more pressure to work to increase household income. For child labor force activity, a positive impact on fertility is generally hypothesized.

The available empirical results consistently show a significantly negative impact of paid, non-agriculture female labor force participation on fertility (Heer and Turner [1965], Gendall, Maraviglia, and Kreitner [1970], Kleinman [1973], Repetto [1972], Schultz [1969a, 1969b, 1970], and Wat and Hodge [1972], and a significantly positive effect of children's labor force participation on fertility (DaVanzo [1972], Harman [1970], Kasarda [1971], Maurer, Ratajczak and Schultz [1973], and Schultz [1970])). Gendall, Maraviglia, and Kreitner [1970] suggest, however, that the type

of occupation may matter in some cases. More specifically, they find fertility to be lower for women employed as domestic servants than for other working women, which ceteris paribus may lead to higher fertility with development. It should also be mentioned again that the women labor force participation variables are highly associated with women's education and represent some of the same factors in these empirical analysis, quite possibly including unobservable attitude, ability and motivational variables.

7a 4. Migration, Urbanization and Industrialization. These variables have been used to represent a range of changes which occur in the process of development regarding the labor market opportunities for women and children, the availability of goods and information, the cost of living, etc. The available evidence of effects of these variables is weak and sometimes contradictory (Macisco et al [1969, 1970], and Myers and Morris [1966] vs. Schultz [1969b] in the case of Puerto Rico). Many of the effects which these variables attempt to represent probably are better captured by more direct indices such as education, labor force participation, and income..

7a 5. Childhood Mortality. If infant mortality declines, fewer births are required to attain any given family size. At the same time less resources are spent on children who die so the costs per surviving child fall. Parents thus may increase their desired family size and/or increase their investment in child quality. The available empirical evidence suggests that the response of births to child mortality is strongly positive in a replacement (as opposed to a pre-emptive) sense, especially for women near the end of their childbearing years (e.g., Gregory, Campbell and Cheng [1972a], Harman [1970], Hassan [1966, 1967],

Heer [1966], Nerlove and Schultz [1970], Schultz and DaVanzo [1970], Schultz [1969a, 1973] and Weintraub [1962]).

7a 6. Fecundity and Family Planning. Health improvements from low initial levels can increase fecundity, and family planning programs can help parents limit their family size to desired levels. Empirical evidence for the former effect appears to be limited, however, to much lower levels of development than will be included in the present study (Barlow [1967], Heer [1967], and Henin [1968, 1969]). Empirical evidence for the latter effect supports a more pervasive role for it in allowing parents to attain desired family size, but the question of what determines the minimum desired levels may be more critical (Hickman [1972], Raulet [1970], Reynolds [1973], Schultz [1973a], and Wat and Hodge [1972]).

7a 7. Marriage and Family Structure. Marriage and family structure are expected to affect fertility by exposure to conception and by the perception of long-run economic and social stability. Empirical studies indicate that marriage has a powerful positive association with fertility (DaVanzo [1972], Kogut [1972], Nerlove and Schultz [1970], and Van de Walle [1965]), more so for legal than for consensual marriages (which are quite common in the population of interest for the present study). But the question remains as to the direction of causality and the degree of possible direct policy impact.

7a 8. Attitudes, Roles, Son Preference, Tastes and Institutions. There are a number of hypotheses about the influence of such variables. For example, many sociologists, demographers and at least one prominent economist active in the field--Leibenstein [1974]--have emphasized the critical role of the norms held by one's social-economic reference group.

The presumption that sons are more valued than daughters for various economic reasons and therefore that sexual composition of children affects the number of additional births, for another example, is widespread (although at least some studies, such as Folbre [1976], cast doubt upon this assumption). Despite the frequent speculation on such topics, however, relatively few satisfactory multivariable empirical investigations have been conducted for such hypotheses. The reasonably satisfactory available results suggest that fertility falls with an increase in modern views of women's role in society (Rosen and Simmons [1971], at the margin with more balanced sex ratios (Ben-Porath [1973b] and Ben-Porath and Welch [1972]), and weakly with institutional changes relating to social security systems and compulsory education (Friedlander and Silver [1967]), but there is no evidence of a significant response to exposure to wider horizons through electronic and postal mediums nor to the degree of Catholicism (Friedlander and Silver [1967], Gregory, Campbell, and Cheng [1972a], and Russett et al [1964]).

7a 9. Other Relevant Literature. To this point this review has focused on variables related to the determination of fertility. This has been done because these studies capture much of the flavor of the existing studies on other questions related to this proposal and because by far the most effort has been concentrated on the fertility question. For the reference of the interested reader Blaug [1974] provides a recent listing of the studies on education. There have been very few multivariate statistical analysis pertaining to micro aspects of health, nutrition and income distribution. The leading examples are Weisbrod [1973],

Selowsky and Taylor [1973], and Chiswick [1971]. Unfortunately the available studies have been based on data with substantial inadequacies, have used statistical methodologies which may have resulted in statistical biases and inconsistencies in the relevant parameter estimates, and have not been based on an integrated approach of family behavior.

7b. The Model and the Resulting Hypotheses to be Explored in the Proposed Study. The basic theoretical construct from which hypotheses are derived for the proposed study is the human capital model of life-cycle family behavior which has developed in the past two decades from the pioneering work of Schultz [1961], Mincer [1958], and Becker [1914]. In this model family welfare is maximized according to preferences over time subject to constraints imposed by time, resource endowments under control of the household, household production functions, and external markets, community attitudes, institutions and legal restrictions. Expenditure of resources and time may be made on education, nutrition, health, migration etc. not only for the direct consumption or welfare benefits, but also because of the expected returns over the life cycle to such human capital investments. The implications of this formal model are supplemented by the insights gained in the earlier work reviewed above and in the AID/Nicaragua [1974, 1975, 1976a, 1976b] sector assessments for agriculture, education, health, and nutrition and the AID [1976] population policy review.

The resulting model is a simultaneous multivariate system (with some recursive relations) determining endogeneously: 1) the woman's education, her age of marriage or of first living with a male, whether or not she is a migrant, her health and nutritional status, contraceptive use, her occupational status,

her market wage, her labor market participation, her time and product in non-paid work, income, and her consumption and savings; 2) a similar set of variables for the male with whom she is living (if any) and for other adult members of the living unit; and 3) the number, labor force participation, and quality of children. In the discussion below and in the initial empirical work, the second set of relations will be assumed to be separable and exogenous in order to keep the presentation manageable in length.

The rest of this subsection gives a set of illustrative testable hypotheses which come from the formal model supplemented by field observation and which will be explored in the study. These hypotheses are organized around each of the endogenous variables mentioned in the previous paragraph, followed by two general hypotheses concerning biases and combining subsamples. The determinants of each of these exogenous variables, in addition to the indicated variables, include a disturbance term to represent measurement error, random events, and excluded influences. Unless otherwise noted, each hypothesis is made ceteris paribus.

For most variables, the proposed empirical representation is obvious from the survey instrument in appendix A. In some cases proxies (e.g. health, nutrition and educational status for quality of children) or unmeasurable variable techniques (e.g. ability, attitudes, and motivation, see subsection 8g below) will be used. Note that these hypotheses explore a large number of direct and indirect channels for policy impacts.

7b 1. Women's Pre Adult Education depends on ability and motivation of the woman and a number of background variables (e.g., locale of upbringing, type of family, accessibility of schooling, age, social-economic

status and education of parents, number of siblings, age of first legal or consensual marriage) in a largely recursive relation.<sup>4</sup> Adult education and training depends on opportunity costs in terms of labor force and non labor force activity (including child care), health and nutritional status of women, direct costs of education and training (in terms of money, time, and distance), and availability of family resources (assets and/or income and labor to perform household production activities, including child care), in addition to the above variables. It is hypothesized that a certain level of education is optimal for obtaining employment, given the above mentioned constraints. The threshold effects will specify how much education is optimal for meaningful participation in the labor force.

7b 2. Age of Marriage or of First Living with a Man depends on education, ability and motivation, whether migrant or not, geographic locale at time of marriage, and the various background variables mentioned above.

7b 3. Migration can be considered a type of human capital investment for which the expected returns relate to the situation in the origin and that in the expected destination and the costs of moving. Therefore the decision depends on previous education, ability and motivation, employment and health status, marital status, and other background variables such as mentioned above and variables related to the expected situation in the destination (which might be represented by the estimated wage, etc. there conditional on education, age, etc.). As in any investment, higher moments such as those related to risk, also would be expected to enter a priori.

7b 4. Health and Nutritional Status of the woman depends on her ability and motivation, background variables (e.g., locale of upbringing, social-economic status and education of parents, number of siblings of woman), her education, household assets or income, whether migrant, number of children, availability of potable water and sanitation, type of housing, the nature of preventive and curative health services (clinics versus hospital versus parteras and curanderos versus mobile units; integrated versus fragmented; costs in money and time; immunization) the nature and cost of available food options (including the availability of iodized salt) and the occupation. Clearly the health and nutritional status of women is a function of a great many variables, many of which cannot be controlled. As the health status of women rises, it should have a positive effect on overall welfare since it affects a woman's ability to get and hold a job, and thereby can affect income and fertility; participation in the labor force raises income and lowers fertility, and at the same time expands women's roles.

7b 5. Contraceptive Use depends on a comparison of the expected costs and benefits. These relate to education of the woman and of the man, ability and motivation of the woman, health and nutrition status (especially in so far as it relates to fecundity),<sup>5</sup> background variables (e.g., social-economic status, marital status, age, religion), price or cost of contraceptives (including travel and waiting time, time since last birth, health of the last child), the nature of available family planning services (i.e., clinics versus pulperias; professionals versus paraprofessionals; integrated or fragmented; variety of contraceptive options), information concerning family planning, and variables related to the prior attainment of the minimum desired number of children and insurance births (see 7b 12 below).

As contraceptive use rises it is expected that welfare will also rise since increased use of contraceptives assumes a higher health and nutritional status which raises family income because there are fewer dependents and/or the woman can work. Hence as contraceptive use becomes more common more women are freed from constantly bearing children and can expand their roles.

7b 6. Woman's Occupational Status depends on education ability and motivation, work experience, whether full or part time worker, locale, and background variables such as are mentioned above, among them are the level of fertility, health status and numbers of dependent children.

7b 7. Market Wage of the Woman depends on her years of work experience, her education, ability and motivation, background variables (e.g., social-economic status, age), health and nutrition status, locale and whether part or full time.

7b 8. Women's Labor Force Participation is a reduced form of such supply and demand considerations as her education, ability and motivation, background variables (age, social-economic status), household income from other sources, her wage, her number of children (or, perhaps, the number of children below a certain age), health and nutrition status, opportunity costs in terms of household production, and locale.

As a woman begins to participate in the labor force and her income rises, it is hypothesized that fertility will fall while health and nutritional status will improve.

7b 9. Time and Product in Non-Paid work depend on education, ability and motivation, household resources (e.g. physical assets and other labor), locale, number of children and other background variables.

7b 10. Income is defined by summing labor market and non labor market income (although for some purposes it will be desirable to separate the two).

7b 11. Consumption and Savings depend on family income and assets number and age of family members, locale, availability and returns for institutional financial savings, participation in social security or insurance systems and background variables.

7b 12. The Number of Children<sup>6</sup>, following AID [1976], can be divided approximately into the minimum desired surviving number (which may depend on the sexual composition), the number of insurance births to assure survival of the desired minimum, and extra births beyond that number. The minimum desired number depends on the expected advantages from children (which depend upon monetary factors such as childhood employment, potential security in old age and non monetary factors including child quality), and costs (both direct in regard to expenditures and indirect in regard to foregone alternatives such as labor market participation). Costs and benefits reflect family resources (both physical and human), cultural and social norms from education and other immediate and family background (including age, religion, marital status, locale, number of siblings, and parent's status). (Poor health and nutritional status may preclude attainment even of the minimum desired number or, reduce the number by increasing the costs of child bearing). Insurance births depend on the availability of other forms of insurance, and inversely on child health and mortality experience.

Extra births depend on the lack of use of contraceptive measures and contraceptive failures. In practice it may be difficult to obtain data on these three categories, but it is important that the analyses be specified to distinguish among them since policies which might a priori be expected to have strong effects on one category may have little impact on others (e.g., family planning may reduce extra births, but not affect minimum desired or insurance births).

7b 13. Child Labor Force Participation and Quality. Child quality depends partially on children's nutritional and health status and on education. Investments can be made in these factors, but only with money and time costs and opportunity costs. There is a direct trade off, for example, between child labor force participation or household production for current income and attending school to increase expected long-run income. Factors which affect such decisions and the quality of children may include parent's education; time and money costs of using educational, health, and nutritional services; whether or not children are breast-fed in infancy; family resources (including assets or income and the availability of sufficient labor for household production), the nature of family planning services (since wider spacing of pregnancies greatly improves child health where mothers and children are ill and poorly fed), and the whole range of considerations mentioned above in regard to the woman's health status.

7b 14. Biases in Estimated Coefficients may be substantial due to excluded variables. For example, in earlier fertility studies apparently significant positive effects of income and of husband's education

diminished or disappeared once women's education and/or labor force participation measures were included. We expect that there well may be other substantial biases. For example, the coefficients of women's education in the fertility and wage relations may be overstated substantially if ability and motivation and family effect are not controlled for, with obvious important policy implications.<sup>7</sup> We therefore will devote considerable effort to explore such possibilities, in part through the application for the first time for LDC's of the recently developed unobservable variable methodology (see subsection 8g below).

7b 15. Combining Various Subsamples (e.g., urban versus rural, poor versus rich, migrants versus nonmigrants) may be inappropriate and may disguise the nature of the underlying dynamic processes. Therefore we propose to test the appropriateness of so combining these subsamples through covariance analysis. This will give us insight into the question of the stability of the estimated relations as urbanization and development occur or as the income distribution changes.

## 8. Research Project Design and Methods.

This section is subdivided into the major steps of the project. Table 1 gives the "Milestone Life-of-Project Schedule" for these objectives.

8a. Definition of Survey Instrument. We intend to start with the INCAP (see Appendix A), Freidman and Mueller [1976a, 1976b], and previous Nicaraguan (Banco Central [1975]) instruments and modify them appropriately. The modifications will include deletions to make the survey manageable, additions of critical data (e.g., sibling data, with which to explore family effects), and adaptations to fit the Nicaraguan environment. Since the success of most subsequent stages depends upon the development of as

Table 1. Milestone Life of Project Schedule

Project-Stages <sup>a</sup>	Project Start FY 1977	FY 1978	Project Completion FY 1979
a. Definition of Survey Instrument	S—C		
b. Pretesting of Survey Instrument and Training of Enumerators	S—C		
c. Administering the Questionnaire	S————C		
d. Coding and Key punching the Data	S————C		
e. Calculation of Simple Statistics and Comparison of Data with Other Available Data		S————C	
f. Model Specification	S————C		
g. Development and Application of Statistical Methodology	S————C		
h. Dissemination of the Results	S————C		

<sup>a</sup>Same categories as used in section 8 of the research project statement. Proposed time duration is January 1977 through December 1979.

Key: S = Starting Event

C = Completion event

good a survey instrument as possible, all four principle investigators will be quite involved in this stage. We also plan to use an outside expert consultant at this stage and in designing the sample. The Nicaraguan half of the team of course, will have a comparative advantage in regard to the adaption question. Fortunately, both Belli and Ibarra have considerable experience with social science questionnaires in Nicaragua, which should be of great importance to use for this and the next three steps.

8b. Pretesting the Survey Instrument and Training Enumerators.

This step will be under the primary supervision of the Nicaraguan principal investigators, using Nicaraguan enumerators.

8c. Administering the Questionnaire. The questionnaire will be administered to a national random sample of approximately 3000 women in childbearing ages. The sample will include both rural and urban areas since there are substantial numbers of poor in both areas and since we are interested in knowing whether parameters differ between groups in these two areas or between migrants and others in order to give insight about what to expect with the expected greater urbanization. The sample will cut across income and social classes so that we can analyze structural shifts and gain insight into the implications of changes in development and income distribution on the parameters of interest. In order to investigate family effects and their impact on biases in other coefficients (see the discussion in subsection 8g below on methodology), we also would like information on (at least one) sibling of each respondent. The most satisfactory method of doing so would be to pick one sibling at random for each respondent and also interview that sibling (using information provided by the respondent to locate the sibling). This would result in approximately 3000 additional

interviews. Such a process may be too expensive, however, especially for the rural areas. Therefore we may have to fall back on the use of information from the respondent about her siblings. Throughout the interviewing phase of the project, the Nicaraguan half of the team will play the dominant role.

8d. Coding and Key punching the Data. We now think that it will be most efficient to code and key punch in Managua although we are not certain yet about the best location for the latter activity. Once again, the Nicaraguan half of the team will play the dominant supervisory role.

8e. Calculation of Simple Statistics and Comparison of Data with Other Available Data. The first step in the analysis of the data will be to calculate the basic statistics for the distributions of the variables in the data set and to compare their distributions with those of comparable variables in the other data sets mentioned at the start of subsection 3b above by using a Kolmogorov-Smirnov test and some approaches discussed in Rindfuss [1976]. Some comparisons also may be made with the data from the 1971 census. Unfortunately, however, this possibility is limited because the earthquake of December 1972 caused substantial deaths and relocations of population in Managua and destroyed the individual census returns. We therefore cannot be sure to sample proportionately various population strata. But fortunately, this does not result in biased estimates of the regression parameters in the model (although it would cause problems with a variance components method). This and other computer analyses will have to be conducted at the University of Pennsylvania or

the University of Wisconsin because of the lack of adequate computer hardware and software in Nicaragua. The Nicaraguan principal investigators, however, will participate in the analysis of the computer results.

8f. Model Specification. Subsection 7b above gives the general model specification and behavioral hypothesis. Subsection 7a indicates what empirical evidence is available from other studies for developing countries. Combining all of this material with specific assumptions about the stochastic properties of the system (subsection 8g) gives the general simultaneous model specification. The advantage of the simultaneous framework is that it enables us to obtain estimates of the parameters in the underlying relations within a framework which allows us to take into account possible biases and inconsistencies due to simultaneity, unobservable variables, measurement error, etc. (subsection 8g). Given the nature of available or collectable data, however, we are not able to incorporate very adequately some phenomenon included in a few other studies (e.g., lags as incorporated in a time series of cross sections by Nerlove and Schultz [1970]). This model specification has been and probably will continue to be primarily the task of Behrman and Wolfe. However Belli and Ibarra will continue to make important contributions because of their comparative advantage in knowledge of the sociological literature and in knowledge about Nicaragua. As is discussed above, we also are exploring hiring as a consultant one of the authors of the survey on the economic role of women in Nicaragua to help us in model formulation and interpretation of our results.

8g. Development and Application of Statistical Methodology. As indicated in section 2 above, a major contribution of this study is to

develop and/or apply existing methodologies which may lessen the biases (inconsistencies) in existing estimates of the relations among population change, human capital variables, economic development, income distribution, the role of women and policy variables. While the specific data described in subsection 8c will be used in this project to explore the extent of inconsistencies introduced by alternative assumptions, the results will have broader implications for other related studies in both developing and developed economies.

In this subsection the basic model is considered to be given by a set of simultaneous relations, one for each of the endogenous variables discussed in subsection 7b above. A linearized version of this model for any one individual can be written in matrix form as follows:<sup>8</sup>

$$1. \quad X = \alpha X + \beta Z + V$$

where  $X$  = a vector of endogenous variables;  $V$  = a vector of disturbance terms;  $\alpha$  = a matrix of coefficients of the endogenous variables which appear on the right hand side of the relations (a number of the elements of which are constrained a priori to be zero);  $\beta$  = a matrix of coefficients of the exogenous variables which appear on the right hand side of the relations (a number of the elements of which are constrained a priori to be zero).

We call the set of relations in 1 the "structural" relations of the model, since they include endogenous variables on the right-hand side.<sup>9</sup> Simple matrix manipulations give the "reduced form" relations:

$$2. \quad X = (1 - \alpha)^{-1} \beta Z + (1 - \alpha)^{-1} V = \gamma Z + V^*$$

The rest of this subsection sketches briefly the various statistical procedures which will be utilized with the sample data in order to obtain alternative estimates and some notion of the degree of biases or incon-

sistencies introduced by procedures which are widely utilized to estimate parameters in relations like those in 1 or 2.

8g 1. Thresholds and Interaction Terms. Systems 1 and 2--and the individual relations therein--are written as if there are neither thresholds nor interaction terms. Yet hypotheses abound about such effects (see subsection 7b above).

If, for example, thresholds and interaction terms are ignored and relation 3 is estimated instead of the true relation 3', the ordinary least squares estimates will be biased and inconsistent because of an error in the variables problem:

$$3. y = x\delta + u$$

$$3'. y = \tilde{x}\delta + u$$

where  $y$  = vector of observations on dependent variable

$\tilde{x}$  = matrix of true values of exogenous variables

$x$  = matrix of observed values of exogenous variables

$\delta$  = vector of structural parameters to be estimated

$u$  = vector of disturbance terms.

To be more explicit; if ignoring the threshold effect or the interaction term results in an additional error in the observed matrix (i.e.,  $x = \tilde{x} + v$ ),<sup>10</sup> the true model may be written as relation 4, the least squares estimator is given by relation 5, and consistency depends on the term in relation 6 vanishing:

$$4. y = x\delta + (v - v\delta)$$

$$5. \hat{\delta} = \delta + (x'x)^{-1}x'(u - v\delta)$$

$$6. \text{plim} \left[ \frac{1}{n} x'(u - v\delta) \right] = \text{plim} \left( \frac{1}{n} x'u \right) - \text{plim} \left( \frac{1}{n} x'v \right) \delta$$

Even in the case in which the measurement errors ( $v$ ) are uncorrelated with the disturbance term ( $u$ ) so that the first right-hand side term in 6 vanishes,

the second term will not vanish because it depends on the variance-covariance matrix of the measurement error which does not vanish by assumption. Within a two variable model, therefore, the asymptotic bias of the OLS estimator of  $\delta$  is indicated in relation 7, so that the true slope is underestimated:

$$7. \text{plim } \tilde{\delta} = \frac{\delta}{1 + \frac{\sigma_v^2}{\sigma_x^2}}$$

In the present context, we will attempt to deal with these problems both 1) by explicitly exploring the significance of threshold and interaction terms and 2) by estimating the degree of measurement error within the maximum likelihood estimation method for unobservable variables (see below).<sup>11</sup>

8g 2. Incorrectly Combining Samples. Leibenstein [1974] argues that a system of equations such as in 1 or 2 might represent well behavior within a particular social-economic reference group, but not across such groups. One means of exploring this hypothesis is to include a social-economic status measure in the background variable (as is proposed in subsection 7b above).

But such a treatment may not be adequate since the flavor of Leibenstein's hypothesis is that a number of structural coefficients are affected. This may suggest the use of a number of interaction terms, each of which incorporates the social-economic index. The posited pervasiveness of this variable, however, suggests another alternative. The entire sample will be partitioned on the base of analysis of variance of the social-economic status variables. Then covariance analysis will be utilized to explore whether or not the relations estimated for the subsamples have homogenous intercepts, homogenous slopes and are homo-

genous overall. Johnston [1972: 192-207] discusses the standard procedures and the F-tests for this exploration. As an outcome of this procedure we will test Leibenstein's hypothesis about whether or not the subpopulations for different social-economic groups should be combined. If the tests indicate that they should not be combined, we will have estimates for this sample of the impact of inappropriately combining them.

8g 3. Alternative Variable Definitions and Proxies. The data to be collected permit alternative definitions of some variables. At times these alternative definitions allow us to explore the impact on the coefficient estimates of utilizing related but differential concepts (i.e., marginal versus average decisions in regard to having children). In such cases covariance analysis may be appropriate to see if the alternative structures are the same or not.

In other cases alternative definitions are given because of the difficulty of being sure that one can locate an adequate measure of the desired variable (e.g., quality of children). For such cases we propose two alternatives. 1) We will estimate the relations with the alternative proxies incorporated and test with covariance analysis whether differences arise in the structural estimates. 2) We will explore the degree of measurement error by considering such variables to be unobservable and using the methodology described below in subsection 8g 5.

8g 4. Simultaneity. Although exceptions have been growing (see some examples at the start of subsection 7a), most of the work on estimating micro behavior relations for LDC's has been within a single equation framework. To see what is the impact of using single equation estimates when the relation is embedded in simultaneous model, consider

simplified linear versions which determine the number of children (N) and the quality of children (Q):

$$8. N = aQ + bZ^* + u_8$$

$$9. Q = cN + dZ^* + u_9$$

where  $Z^*$  = all other relevant variables

a,b,c,d = relevant coefficient matrices (with a and c scalars).

If ordinary least squares are utilized to estimate relation 8, the estimate of a will be biased and inconsistent because Q is not independent of  $u_8$ , as can be seen by substituting 8 into 9 to obtain 10:

$$10. Q = c(aQ + bZ^* + u_8) + dZ^* + u_9$$

$$= \left( \frac{cb}{1-ca} + \frac{d}{1-ca} \right) Z^* + \frac{c}{1-ca} u_8 + \frac{1}{1-ca} u_9$$

Assuming that the model is identified and that there are no other problems, we can obtain consistent estimates of the parameters by estimating the reduced form (i.e., relation 2) directly (which is done for the unobservable variable case discussed next) or by using some simultaneous estimator (e.g., 2SLS, instrument variables) on the structural relations (see Johnston [1972: 34-423]). Once again, the comparison between the ordinary least squares estimates and the alternative estimates should be instructive.

8g 5. Unobservable Variables. In addition to enabling us to try to avoid biased and inconsistent estimates due to simultaneity, consideration of the system in relation 2 as a complete whole enables us to apply methods to our knowledge never before utilized in micro economic behavioral studies for less developed economies (or, in respect to many of the variables of concern in this project, not for developed countries either) in order to estimate the impact of unobservable variables.

Why are such methods of interest? The reasons are two. First of all, the coefficients of the unobservable variables (e.g., ability, motivation and attitudes) may be of considerable interest. Secondly, the exclusion of such variables will lead to inconsistent estimates unless they are uncorrelated with all of the included variables. To see this consider a simplified version of the fertility row of system 2:

$$11. N = \gamma_{31} A + \gamma_{32} Z' + V_3^*$$

where A is the ability, motivation, and attitude variable

Z' is assumed to combine all of the variables other than A,

with a true coefficient of  $\gamma_{32}$ .

If A is unobservable and therefore cannot be included in the direct estimation of relation 11 and if the regression of the excluded variable A on the included variable Z' gives a coefficient f and  $\rho$  is the correlation between A and Z', then ordinary least squares estimates of 11 give the following bias in the estimate of  $\gamma_{32}$ :

$$12. \hat{\gamma}_{32} - \gamma_{32} = \rho f$$

Thus the exclusion of unobserved variables may result in serious biases and inferences based on such estimates may be inaccurate since the estimate of the residual variance will be biased upwards.

Based on methods developed originally by Zellner [1970] and Goldberger [1973], but expanded substantially recently by one of the principal investigators and others,<sup>12</sup> we intend to include unobservable variables within the framework of our maximum likelihood estimates of the model given in 2. The details are too long and too technical for this proposal, but a simple example should prove useful.

Assume that the reduced form version of the system in 2 is compressed to contain three relations, each of which has the unobservable A and a relation-specific disturbance term on the right hand side (for simplification all other variables are assumed to be partialled out prior to this stage):

$$\begin{aligned} 13. \quad X_1 &= \gamma_1 A + V_1^* \\ X_2 &= \gamma_2 A + V_2^* \\ X_3 &= \gamma_3 A + V_3^* \end{aligned}$$

Under the assumption that the  $V_i^*$ 's are distributed independently of all of the other variables and of each other, the following six variances and covariances can be calculated:

$$\begin{aligned} 14. \quad \sigma_{X_1}^2 &= \gamma_1^2 \sigma_A^2 + \sigma_{V_1^*}^2 \\ \sigma_{X_2}^2 &= \gamma_2^2 \sigma_A^2 + \sigma_{V_2^*}^2 \\ \sigma_{X_3}^2 &= \gamma_3^2 \sigma_A^2 + \sigma_{V_3^*}^2 \\ \sigma_{X_1 X_2} &= 2\gamma_1 \gamma_2 \sigma_A^2 \\ \sigma_{X_1 X_3} &= 2\gamma_1 \gamma_3 \sigma_A^2 \\ \sigma_{X_2 X_3} &= 2\gamma_2 \gamma_3 \sigma_A^2 \end{aligned}$$

On the left-hand side are six observable statistics. On the right hand side are seven observable variables ( $\gamma_1, \gamma_2, \gamma_3, \sigma_{V_1^*}^2, \sigma_{V_2^*}^2, \sigma_{V_3^*}^2, \text{ and } \sigma_A^2$ ). However we are allowed one normalization since A is unobservable. Let, say  $\sigma_A^2 = 1$  (the choice of normalization is arbitrary). Then we have

an identified system in which we can estimate the coefficients of the unobservable variable and the variances of the disturbance terms.

This, indeed, is a powerful method which can be utilized to obtain insights into important unobservable variables - such as ability, attitudes, and motivation - which would seem to have substantial impact in a fertility - labor force participation system such as in 2. Although the example here is just identified, moreover, the expansion of the system to all of the relations in 2 will result in an over-identified system. Thus we may add other unobservable variables to the system, explore the possibility of measurement error in specific variables, and test hypotheses about the system. Under the assumption that  $V^*$  is independently normally distributed, then the logarithm of the likelihood of observing our sample with its  $n + 1$  observations is given by (aside from a constant):

$$15. L = -\frac{n}{2} (\log/\Omega/ + \text{tr} [\Omega^{-1}W])$$

$$\text{where } \Omega = E(V^*V^{*T})$$

$W =$  matrix of observed sample variances and covariances  
of the dependent variables.

By utilizing the second order condition for the likelihood function, asymptotic standard errors for the parameter estimates can be obtained (e.g., Behrman [1968]).

With sibling data, the method becomes even more powerful. By incorporating the sibling relation we can identify the family effect. In some studies for the United States this approach has led to the conclusion that many micro behavioral parameter estimates might be biased substantially--

and thus be quite misleading for policy purposes--if unmeasured family effects are excluded.<sup>13</sup> The same result well may obtain for LDC's. A priori we expect that unobserved family effects (e.g. pre-school aptitude and motivation) influence some of the left-hand side variables of interest (e.g., fertility, wages, occupational status) and are positively correlated with observable human capital investment variables (e.g. education) the size of the estimated parameter of which has important policy implications.

8g 6. Wages for Women Not Working Outside Household. One relation in 1 determines wages for women, but a substantial portion of the population does not hold paid positions. Frequently a relation has been estimated for women who are so working, and then data generated from such a relation for those who are not working outside of the household. The procedure is subject to at least two major criticisms: 1) under the assumption that women who are not working outside of the household choose not to do so, this procedure may underestimate the value which they place on their time since they would be indifferent between working or not if they valued their time exactly as indicated by such a procedure. 2) This approach leaves the unobservable variable and simultaneous system problems unexplored.

Therefore we propose to extend the work of Heckman [1974, 1976] by incorporating a relation which is conditional upon the woman actively participating in the labor force. We will do this within the framework of the maximum likelihood estimates discussed above, and thus maintain the simultaneous and unobservable variable considerations within the

estimation of micro economic behavioral systems not previously explored.

These (and probably future) methodological developments in the project are primarily the work of the North American economists. The Nicaraguan collaborators, however, will contribute extensively to the interpretation of the results.

8h. Dissemination of the Results. Our plans for dissemination of the results are given in section 2, the networks and linkages are listed in section 4, and the plans to facilitate utilization of the results are described in section 5. We will prepare policy oriented and technical papers and monographs in Spanish and English. We will hold a conference for policy-makers and other interested parties in Managua. We will inform the relevant networks in Nicaragua, Central America and internationally through formal and informal presentations. All four principal investigators will be actively involved in all parts of these efforts, although comparative advantage will imply that the Nicaraguans will focus more on Spanish disseminations on describing the data set, and on sociological analysis while the North American economists will concentrate more on English disseminations, technical details, and economic analysis.

#### 9. Overall Cost Estimates

Table 2 gives the fiscal year and total estimated costs for the project. This table is subdivided into four parts, one for each of the different home institutions of the principal investigators and a grand total.

We submitted a proposal to the Ford-Rockefeller competition to cover a small part of the project (i.e., the determinants of fertility of Managua, not including the sibling data, see Behrman, Belli, Ibarra and Wolfe (1976), and have received \$29,800 from them. Ford-Rockefeller are enthusiastic about cooperating in the larger venture under proposal here. Of course, credit for support will be attributed primarily to AID.

Table 2: Budget for Project

	FY 1977	FY 1978	FY 1979	TOTAL
1. Basic Contract-University of Pennsylvania				
1.1 Principal Investigator-Behrman <sup>a</sup>				
Academic Year	8125	8938	9831	26894
Summer	<u>3611</u>	<u>11917</u>	<u>8739</u>	<u>24267</u>
Total	11736	20855	18570	51161
1.2 Other Personnel				
Research Assistants	5000	12000	6600	23600
Secretary (1/2 time)	1900	4180	2300	8380
Administrative Assistance (1/4 time)	<u>1250</u>	<u>2750</u>	<u>1513</u>	<u>5513</u>
Total	8150	18930	10413	37493
1.3 Fringe Benefits <sup>b</sup>				
Principal Investigator, Research Assistants	3531	7425	5814	16770
Secretary, Administrative Assistant	<u>630</u>	<u>1490</u>	<u>915</u>	<u>3035</u>
Total	4161	8915	6729	19805
1.4 Current Expenses				
Computers	1000	13000	6000	20000
Telephone	250	550	300	1100
Office Supplies	250	550	300	1100
Postage	250	600	350	1200
Travel-Domestic	700	1500	800	3000
Travel-International	2500	5000	3000	10500
Per Diem	1100	2300	1200	4600
Printing, copying, publication	500	1000	1500	3000
Miscellaneous	<u>1000</u>	<u>2000</u>	<u>1000</u>	<u>4000</u>
Total	7550	26500	14450	48500
1.5 Total Direct Cost (1.1 + 1.2 + 1.3 + 1.4)	31597	75200	50162	156959
1.6 Indirect Cost <sup>c</sup>	<u>16114</u>	<u>38352</u>	<u>25583</u>	<u>80049</u>
1.7 Total Cost (1.5 + 1.6)	47711	113552	75745	237008
2. Subcontract to Nicaraguan counterparts				
2.1 Principal Investigators-Belli and Ibarra	9000	9900	5445	24345
2.2 Survey Costs (including coding, key punching)	70000	30000		100000

Table 2. (continued)

	FY 1977	FY 1978	FY 1979	TOTAL
2.3 Current Expenses	2000	2000	2000	6000
2.4 Consultant on Role of Women	1500	2000	1000	4500
2.5 Conference	_____	_____	<u>10000</u>	<u>10000</u>
2.6 Total Cost (2.1 + 2.2 + 2.3 + 2.4 + 2.5)	82500	43900	18445	144845
3. Subcontract to University of Wisconsin				
3.1 Principal Investigator-Wolfe	4625	10175	5596	20396
3.2 Fringe Benefits <sup>d</sup>	944	2076	1142	4162
3.3 Current Expenses	1000	2000	1200	4200
3.4 Consultant on Survey and Sampling	2000			2000
3.5 Total Direct Cost (3.1 + 3.2 + 3.3 + 3.4)	8569	14251	7938	30758
3.6 Indirect Cost <sup>e</sup>	1758	3867	2126	7751
3.7 Total Cost (3.5 + 3.6)	10327	18118	10064	38509
3a. Rockefeller-Ford funding*		-14900	-14900	-29800
4. Grand Total (1.7 + 2.6 + 3.7)	140538	160670	89354	390562

<sup>a</sup>It is assumed that Behrman will devote one quarter of his academic year to the project each fiscal year, one summer month in FY 1977, three summer months in FY 1978, and two summer months in FY 1979. It is assumed that salaries will increase 10 percent per year.

<sup>b</sup>Computed at 21.1 percent (FY 1977), 22.6 percent (FY 1978) and 23.1 percent (FY 1979) for principal investigator and research assistants and at 20 percent (FY 1977), 21.5 percent (FY 1978) and 24 percent (FY 1979) for secretary and administrative assistant.

<sup>c</sup>51 percent of direct cost

<sup>d</sup>Computed at 20.4 percent.

<sup>e</sup>38 percent of salaries and wages.

\*The funding allocation is arbitrary as the specific periods for spending have not yet been specified.

Footnotes

<sup>1</sup>Previous studies have attempted to estimate fertility determinants within a single equation framework and thus have neglected the feedback effects. This study proposes a multivariate (many variables) simultaneous system which considers a number of inter-related variables that are solved for within the model. A simultaneous system will provide consistent results which is necessary if the estimates are to be considered reliable. (See Sec. 8g4 for an example of a simultaneous system).

<sup>2</sup>According to AID/Nicaragua, operations were in the field in six months, about half of the time which had been expected. In the first year there were about 3,000 clients, over twice as many as had been anticipated.

<sup>3</sup>Two of the principal investigators (Belli and Ibarra) for the present project had instrumental roles in the 1974 study.

<sup>4</sup>Ideally one would want to explore the same hypotheses as we indicated below for education for the children. Retrospective data, however, are not likely to provide adequate information for some of the necessary data.

<sup>5</sup>We may treat fecundity as a separate endogenous variable with an additional relationship parallel to that for health and nutrition.

<sup>6</sup>The spacing of children may be considered separately. It would seem to depend on the possibility of the next conception (i.e., health and nutritional status and period of lactation) and on the desirability

of close spacing (which has advantages in terms of the health of both the mother and the infant). Contraceptive use may be an intervening variable.

<sup>7</sup> For United States data Behrman, Taubman and Wales [1976] report such a finding for earnings functions.

<sup>8</sup> To avoid unnecessary confusion in the notation, throughout this proposal the relations are written only for one individual and individual subscripts are suppressed. There will be one such set of observations for each of the  $n$  individuals in the sample, so  $X$ ,  $Z$ , and  $V$  can be thought to be one slice of matrices which have  $n$  observations.

<sup>9</sup> Actually this is somewhat of a misnomer since some of these relations involve both supply and demand elements. The wage relation, for example, under strong assumptions can be considered to be a hedonic index in which the prices for individual skills are the ones which equilibrate supply and demand for that skill. Alternatively, the coefficients of the right-hand side variables in this relation can be thought of as efficiency units weights for the inputs which are necessary for the production of skills. However, it is convenient to distinguish between the "structural" relations which incorporate both endogenous and exogenous variables, and the "reduced form" relations which are in terms only of the exogenous variables.

<sup>10</sup> As an approximation, at least, such an assumption can be used to represent misspecification of threshold and interaction effects to obtain the traditional errors in the independent variable model as presented, for example, in Johnston [1972: 281-291]. Of course more complicated assumptions could be made about the nature of the errors in the variables.

<sup>11</sup>A third alternative of using instrumental variable estimators also may be explored.

<sup>12</sup>In May 1976 a Mathematics in the Social Sciences Board Conference was held to discuss the frontier use of these methods as applied to family data. Relevant papers presented there include Behrman, Taubman and Wales [1976], Chamberlain [1976], Goldberger [1976], Chamberlain and Griliches [1976], Jencks and Brown [1976], Olneck [1976].

<sup>13</sup>See the references in the previous note which also elaborate on the methodology.

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Appendix A: INCAP Questionnaires

Appendix A: Questionnaire  
Used for 1974 Banco Central -  
Asociación Demográfica Nicaraguense  
Survey (see Banco Central [1975]).

Name of interviewer \_\_\_\_\_ Date \_\_\_\_\_

Name of ward \_\_\_\_\_ Block \_\_\_\_\_

\*A - Do you live in this house? \_\_\_\_\_ (if answer is no suspend interview and thank the respondent)

\*01. Could you tell me what your age is? (approximate age if respondent is not sure)

- |                  |                    |
|------------------|--------------------|
| 1. _____ 14      | 6. _____ 35 - 39   |
| 2. _____ 15 - 19 | 7. _____ 40 - 44   |
| 3. _____ 20 - 24 | 8. _____ 45 - 49   |
| 4. _____ 25 - 29 | 9. _____ 50 - over |
| 5. _____ 30 - 34 |                    |

02. Have you ever felt you were an ~~interesting~~ (or attractive) person? (if yes, go to question 04, if no go the following question) \_\_\_\_\_

\* 03. Have you ever been married or lived with someone? \_\_\_\_\_ (if answer is no, suspend interview and thank the respondent. If yes proceed with the interview)

\* 04. Where were you raised in your childhood? (press for accuracy)

1. \_\_\_\_\_ Managua (city)
2. \_\_\_\_\_ another city, which? \_\_\_\_\_
3. \_\_\_\_\_ town, which? \_\_\_\_\_
4. \_\_\_\_\_ country, farm, or village, which one? \_\_\_\_\_

\* 05. How long have you been living in Managua? (approximately)

- |                              |                              |
|------------------------------|------------------------------|
| 1. _____ 0 to 23 months      | 6. _____ from 20 to 24 years |
| 2. _____ from 2 to 5 years   | 7. _____ from 25 to 34 years |
| 3. _____ from 6 to 9 years   | 8. _____ from 35 to 45 years |
| 4. _____ from 10 to 14 years | 9. _____ 45 years and over   |
| 5. _____ from 15 to 19 years |                              |

\*06. Who raised you as a child? \_\_\_\_\_

\*07. Do you know how to read and write well?

- |                         |                                    |
|-------------------------|------------------------------------|
| 1. _____ no             | 4. _____ write only                |
| 2. _____ read and write | 5. _____ other reply (be specific) |
| 3. _____ read only      |                                    |

- \*08. What was the last grade complete in school? (fill in the appropriate box in the Table on Education)
- \*09. What was the last grade completed by the person who raised you? (refer to the person mentioned in question no. 06)
- \*10. What was the last grade completed by your husband or the man with whom you live? (present husband or companion, or the most recent one if she currently lives without husband or companion)

Table on Education

education level completed:	respondent	person who raised her	husband or companion
1. none			
2. grade school: 1st to 3rd grade			
3. grade school: 4th to 6th grade			
4. Secondary school 1st to 4th years			
5. completed secondary education			
6. years of university education			
7. finished university			
8. other professional education. How many years?			
9. id. completed professional education			
10. not known, or not applicable			

\*11. For whom do you work? (does she work for others not member of her family) AE.

- 1. \_\_\_\_\_ works for her family only.
- 2. \_\_\_\_\_ works for another person not a member of the family
- 3. \_\_\_\_\_ does not work
- 4. \_\_\_\_\_ other (be specific) \_\_\_\_\_

\*12. What is your work or occupation?

\*13. (to be filled by interviewer on the basis of previous questions and inquiries that he considers pertinent). occupational classification:

- 1. \_\_\_\_\_ unpaid domestic work
- 2. \_\_\_\_\_ self-employed (no employer)
- 3. \_\_\_\_\_ works for an employer
- 4. \_\_\_\_\_ other (be specific)

\* 14. How many hours a day do you normally work? AE

- |                            |                              |
|----------------------------|------------------------------|
| 0. _____ does not work     | 5. _____ from 9 to 10 hours  |
| 1. _____ less than 2 hours | 6. _____ from 11 to 12 hours |
| 2. _____ from 2 to 4 hours | 7. _____ from 13 to 14 hours |
| 3. _____ from 5 to 6 hours | 8. _____ from 15 to 16 hours |
| 4. _____ from 7 to 8 hours | 9. _____ more than 16 hours  |

\* 15. What was (or is) the work or occupation of the person who raised you? (if several persons, identify them on the left column and their occupation on the right).

person who raised her:

occupation:

\_\_\_\_\_  
\_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_

\* 16. What is your religion?

1. \_\_\_\_\_ Catholic
2. \_\_\_\_\_ other (be specific) \_\_\_\_\_
3. \_\_\_\_\_ none, or undecided.

\* 17. Who lives with you in this house? (ask how many from the following categories, and circle the number pertaining to each).

1. Grandparents (on her mother's as well as father's side) 1 - 2 - 3 - 4
2. Parents (id.) 1 - 2 - 3 - 4
3. Children (id.) 1-2-3-4-5-6-7-8-9-10-11-12 or more
4. Grandchildren (id.) 1-2-3-4-5-6-7-8-9 or more
5. Brothers or sisters (id.) 1-2-3-4-5-6-7-8-9 or more
6. Other relatives (uncles, nephews, etc.) 1-2-3-4-5-6-7-8-9 or more
7. Friends 1-2-3-4-5-6-7-8-9 or more
8. Husband or companion \_\_\_\_\_
9. Others (be specific) \_\_\_\_\_

\* 18. What is your present status: single or married? (press for an exact answer)

- |                                  |                                       |
|----------------------------------|---------------------------------------|
| 1. _____ single                  | 5. _____ married: civil and by church |
| 2. _____ living with a companion | 6. _____ separated                    |
| 3. _____ married: civil only     | 7. _____ widowed                      |
| 4. _____ married: by church only | 8. _____ divorced                     |

Only if living with present husband or companion:

\* 19. Does your husband or companion work?

1. \_\_\_\_\_ yes. 2. \_\_\_\_\_ no. If no, how long has he been out of work
1. \_\_\_\_\_ does not know nor remember
  2. \_\_\_\_\_ 0 - 6 months
  3. \_\_\_\_\_ 7 months to 1 year
  4. \_\_\_\_\_ 1 to 2 years
  5. \_\_\_\_\_ more than 2 years

\* 20. What is his occupation? (determine the exact classification)

1. \_\_\_\_\_ self-employed (without employer)
2. \_\_\_\_\_ employer
3. \_\_\_\_\_ employed (works under someone's supervision)
4. \_\_\_\_\_ works in the household without remuneration

\* 21 What is his age? (approximately)

\_\_\_\_\_ years

\* 22. How long have you been living with him?

- |                             |                             |
|-----------------------------|-----------------------------|
| 1. _____ less than 6 months | 6. _____ 5 to 7 years       |
| 2. _____ 6 months to 1 year | 7. _____ 7 to 10 years      |
| 3. _____ 1 to 2 years       | 8. _____ 10 to 15 years     |
| 4. _____ 2 to 3 years       | 9. _____ more than 15 years |
| 5. _____ 3 to 5 years       |                             |

Only if she has answered affirmatively to one of the alternatives 1 to 5 in question 18, (if she is single, or married in one of the stated situations):

\* 23. Have you been married or lived with a man before your present relation?

1. \_\_\_\_\_ no. 2. \_\_\_\_\_ yes. If you don't mind could you say how many times?
- \_\_\_\_\_

Only if the answer to question no 23 is yes or if she is separated or divorced according to question no. 18:

24. If you don't mind could you explain why you were divorced or separated from your previous husband or companion? \_\_\_\_\_

25. When you were separated from your previous husband or companion who was the one that moved out of the house?

1. \_\_\_\_\_ she moved
2. \_\_\_\_\_ he moved

26. Does your previous husband or companion (or some of them, as the case may be) visit your children?.

- 1. \_\_\_\_\_no
- 2. \_\_\_\_\_yes, they (he) visit(s) her
- 3. \_\_\_\_\_yes, they (he) visit(s) the children
- 4. \_\_\_\_\_yes, they (he) visit(s) her and the children

Only if the answer to the previous question is yes:

27. Does he stay several days when visiting?

- 1. \_\_\_\_\_no
- 2. \_\_\_\_\_yes

\* 28. Does he provide any economic assistance in any form to you or the children?

- 1. \_\_\_\_\_no. Has he provided any assistance before? 1. \_\_\_\_\_yes. 2. \_\_\_\_\_no
- 2. \_\_\_\_\_yes. Are you satisfied (happy) with the assistance you get?  
 (press for a concrete answer) 1. \_\_\_\_\_satisfied  
 2. \_\_\_\_\_middling satisfied  
 3. \_\_\_\_\_unsatisfied

\* 29. How old were you when you first married or lived with a companion?

\_\_\_\_\_years

Only if the answer to the previous question is 16 years and under:

30. Why did you marry or decide to live with your companion at that age? \_\_\_\_\_

\* 31. How many brothers (sisters) from your father and mother do you have and how many half-brothers (sisters)? (Mark the correct no., with an X)

brothers (sisters) from her father and mother: 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, more \_\_\_\_\_; \_\_\_\_\_does not know.

half-brothers (sisters) 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, more than 10 \_\_\_\_\_; \_\_\_\_\_does not know.

\* 32. In what place amongst them are you as far as age is concerned? Are you the eldest, the youngest...? (include the deceased as well as the living)

- 1. \_\_\_\_\_the eldest
- 2. \_\_\_\_\_the youngest
- 3. \_\_\_\_\_in the middle
- 4. \_\_\_\_\_the first half
- 5. \_\_\_\_\_the second half

33. Is your mother living?

1. \_\_\_\_\_ yes (go to question no. 34)
2. \_\_\_\_\_ no, is your father living?
  1. \_\_\_\_\_ yes (go to question no. 34)
  2. \_\_\_\_\_ no (go to question no. 40)

34. Where does he or she live?

1. \_\_\_\_\_ in the same house
2. \_\_\_\_\_ another house, same neighborhood
3. \_\_\_\_\_ another neighborhood in Managua
4. \_\_\_\_\_ outside Managua

35. How frequently do you see him or her?

1. \_\_\_\_\_ daily
2. \_\_\_\_\_ almost daily
3. \_\_\_\_\_ about once a week
4. \_\_\_\_\_ about once a month
5. \_\_\_\_\_ about once a year
6. \_\_\_\_\_ about once in several years
7. \_\_\_\_\_ never

36. Do you seek his or her advice?

1. \_\_\_\_\_ often
2. \_\_\_\_\_ sometimes
3. \_\_\_\_\_ rarely
4. \_\_\_\_\_ never

37. In what situation have you sought his or her advice in the past year?

38. Would you act against the wishes of your (father or mother) (do not mention the father or mother, to whichever one it may pertain)

1. \_\_\_\_\_ never
2. \_\_\_\_\_ with difficulty
3. \_\_\_\_\_ it depends, maybe
4. \_\_\_\_\_ yes

39. Have you gone against (their wishes?)

1. \_\_\_\_\_ yes, on which occasion? (press for sufficient information) \_\_\_\_\_
2. \_\_\_\_\_ no
3. \_\_\_\_\_ does not know

\*40. Does your family, some relative or friend, or some other person, not your husband or companion provide any economic assistance.

1. \_\_\_\_\_ no
2. \_\_\_\_\_ yes. who?
  1. \_\_\_\_\_ father and/or mother of her husband or companion
  2. \_\_\_\_\_ her father and/or mother
  3. \_\_\_\_\_ other relatives of her husband or companion
  4. \_\_\_\_\_ her other relatives
  5. \_\_\_\_\_ children
  6. \_\_\_\_\_ other (be specific) \_\_\_\_\_

41. Was your childhood a happy or sad one? (if it does not annoy the respondent read the following alternatives)

1. \_\_\_\_\_ more sad than happy
2. \_\_\_\_\_ as sad as it has been a happy one
3. \_\_\_\_\_ more happy than sad
4. \_\_\_\_\_ does not know, undecided

Only if the answer to the previous question is "more sad than happy":

42. Why? (press for more reasons)

\*43A. How many of your children are living? (include all children, from previous marriage and those not living with her)

43B. How many times have you been an attractive (interesting) person? (if the answer is none go to question no. 47)

\*44A. Have you ever given birth to a child that has later died?

1. \_\_\_\_\_ no (go to question no 44B)
2. \_\_\_\_\_ yes. How many of your children have died after birth \_\_\_\_\_.  
Approximate age(s) of the deceased child(ren). (if the age is in months, use a zero before the number of months, e.g. 06 instead of 6 months)  
age of the 1st \_\_\_\_\_ 2nd \_\_\_\_\_ ... 9th \_\_\_\_\_  
How many of the deceased children have you registered with the District or some other government office? \_\_\_\_\_

\*44B. Is there a child that was born and died only a few hours afterwards whom we have not taken note of? 1. \_\_\_\_\_ no 2. \_\_\_\_\_ yes. How many? \_\_\_\_\_

\*44C. How many of your children have been registered with the District or some other government office?

\*45A. Many women have had pregnancies in which the child is never born, either because of an accident, taking something, or some other motive. People call this a miscarriage. How many times has this happened to you? \_\_\_\_\_  
If it has happened: Sometimes when the mother has felt attractive she does not want to have a child at that time, perhaps because of her poverty or some problem. They sometimes take some course of action to terminate the pregnancy and provoke a loss or miscarriage. Has this happened to you? \_\_\_\_\_ If her answer is yes: Could you tell me how many times? \_\_\_\_\_ Have you ever been hospitalized because of that 1. \_\_\_\_\_ no. 2. \_\_\_\_\_ yes. How many times? \_\_\_\_\_

\*46A. Since the earthquake have you been pregnant or given birth?

1. \_\_\_\_\_ no (go to question 47)
2. \_\_\_\_\_ yes (fill in the following:)

RESULTS OF THE PREGNANCY

Results:	pregnancy		
	1st	2nd	3rd
1. born alive*			
2. born dead			
3. miscarriage			
4. miscarriage, provoked* (abortion)			
5. still pregnant			
6. born alive but later died*			

date

7. (age)

\*write down the date in the boxes

Only if she has been pregnant after the earthquake:

\*46B. The last time you were pregnant did you wish to become pregnant?

1. \_\_\_\_\_yes
2. \_\_\_\_\_no (read the following alternatives to the respondent)
  1. \_\_\_\_\_you wanted another child but at a later time
  2. \_\_\_\_\_you did not want any more children
  3. \_\_\_\_\_other reply (be specific)

\* 47. There are couples who cannot have children, do you think you can become pregnant if you tried?

1. \_\_\_\_\_she is pregnant or can have children
2. \_\_\_\_\_is not sure, it is possible that she may be sterile but is not sure
3. \_\_\_\_\_sterile, she is certain she cannot become pregnant

(if she chose the third alternative): Have you or your husband been operated to prevent further pregnancy?

1. \_\_\_\_\_yes
- Which one? 1. \_\_\_\_\_man  
2. \_\_\_\_\_woman

\*48. How do you feel about a family in your situation having many children? (read alternatives 1, 2, 3 to the respondent)

1. \_\_\_\_\_a blessing to our home
2. \_\_\_\_\_a problem
3. \_\_\_\_\_useful
4. \_\_\_\_\_other (be specific)

\* 49. What do you feel is the best number of children that a common family in Nicaragua should have? (how many children do you feel that a couple should have?) (If she answers note down the number, if the answer is 2 or 3 mark down the two)

1. \_\_\_\_\_ none 2. \_\_\_\_\_ 1 ... 8. \_\_\_\_\_ 7 or more 9. \_\_\_\_\_ other (be specific)

Only if the respondent is less than 35 years old

\* 50. Considering the children you now have, how many more would you want to have?

1. \_\_\_\_\_ none 2. \_\_\_\_\_ 1 ... 8. \_\_\_\_\_ 7 or more 9. \_\_\_\_\_ other (be specific)

\* 51. You have just told me how many MORE children you would like to have (read her answer to the previous question). Now, do you think you will ever have more children than you would like to?

1. \_\_\_\_\_ no 2. \_\_\_\_\_ does not know 3. \_\_\_\_\_ yes Why will you have more children than you desire? \_\_\_\_\_

\* 52. Considering how things are now, how many children would you like to have if you were to start all over again? (AE)

1. \_\_\_\_\_ 0 2. \_\_\_\_\_ 1 ... 7. \_\_\_\_\_ 6 or more 8. \_\_\_\_\_ does not know 9. \_\_\_\_\_ other  
(be specific)

Only if the number of children mentioned in the previous question is less than the number she has at present:

\* 53. Why would you like to have a smaller family than what you actually have?

\* 54. And why did you have a larger family than what you had planned? (press for more reasons) \_\_\_\_\_

Only if the respondent has had a child(ren)

\* 55. What have been the advantages--the good--and the disadvantages--the bad-- in having children?(AE)

1. Positive things (compensation, advantages, etc.) \_\_\_\_\_

2. Negative things \_\_\_\_\_

Only if the respondent lives with her husband or companion:

\* 56. How many children would your husband or companion like to have? (read the alternatives to the respondent)

1. \_\_\_\_\_ the same number as you would like

2. \_\_\_\_\_ more than what you would like

3. \_\_\_\_\_ less than what you would like

4. \_\_\_\_\_ does not know, or other answer (be specific) \_\_\_\_\_

- \* 57. Suppose that there is a family with four (4) females and no males. Some feel that they should have more children until they have a male child, and others don't. What is your opinion? (read alternatives to the respondent)
1. \_\_\_\_\_ they should have more children until they get a male
  2. \_\_\_\_\_ remain with the four (4) females
  3. \_\_\_\_\_ other (be specific)
- \* 58. And what do you think would be the opinion of your husband or companion? (read the following alternatives)
1. \_\_\_\_\_ have more children
  2. \_\_\_\_\_ no more children
  3. \_\_\_\_\_ other (be specific)
- \* 59. There are people who talk of methods to prevent having children. If you know of any of these methods could you tell me which one? (Or which one she has heard mentioned) (if she mentions one method ask again if she knows of any others) (take note of all the methods she mentions)
- |  |                                      |
|--|--------------------------------------|
| 0. _____ none, doesn't know, couldn't tell | 5. _____ injections                  |
| 1. _____ pills                             | 6. _____ rhythm                      |
| 2. _____ IUD (Intrauterine device, spiral) | 7. _____ interruption of the sex act |
| 3. _____ foam or jel                       | 8. _____ abortion                    |
| 4. _____ condoms                           | 9. _____ others (be specific)        |
- \* 60. Would you like to be informed about one of these methods.
0. \_\_\_\_\_ (she is already familiar with them)
  1. \_\_\_\_\_ yes
  2. \_\_\_\_\_ no, Why? \_\_\_\_\_
- Only if she is familiar with any of the methods:
- \* 61. How did you find out about the methods to prevent pregnancy?
- |  |  |
|--|--|
| 1. _____ through her parents<br>or other relatives | 6. _____ through a doctor, nurse<br>medicaster, or other |
| 2. _____ through her brothers<br>or sisters        | 7. _____ read about it, or heard<br>through the radio    |
| 3. _____ through her friends                       | 8. _____ other means (be specific)                       |
| 4. _____ through school                            | 9. _____ does not remember                               |
- \* 62. Do you think that any of these birth control methods might complicate or be dangerous to the mother's health?
1. \_\_\_\_\_ no
  2. \_\_\_\_\_ does not know
  3. \_\_\_\_\_ yes Could you tell me which of the methods you consider harmful to a mother's health? (write all those mentioned) \_\_\_\_\_

And why do you think that this (these) method(s) is harmful to a mother's health? (If she cannot answer specifically mark down a question mark) \_\_\_\_\_

Only if she has given an specific reason: How did you find out about it?

1. \_\_\_\_\_ own experience
2. \_\_\_\_\_ a friend's experience
3. \_\_\_\_\_ has heard in conversation with other people
4. \_\_\_\_\_ other (be specific) \_\_\_\_\_

\*63. Have you used (or your husband or companion in your relationships with them) any of the birth control devices?

1. \_\_\_\_\_ use currently (go to question 67A)
2. \_\_\_\_\_ do not use currently but did in the past (go to question 68A)
3. \_\_\_\_\_ has never used any of the methods (go to question 64)

Only if she has never used a birth control method

\*64. Why have you never used any of the methods for preventing pregnancy? \_\_\_\_\_

\*65. Do you plan to use any in the future?

1. \_\_\_\_\_ yes
2. \_\_\_\_\_ does not know
3. \_\_\_\_\_ no Why? \_\_\_\_\_

\*66. Suppose you decide to use one of the birth control methods, would you conceal it from anyone? AE (read the alternatives and mark the proper ones)

1. \_\_\_\_\_ no one
2. \_\_\_\_\_ her parents or some relative
3. \_\_\_\_\_ her husband or companion
4. \_\_\_\_\_ her friends
5. \_\_\_\_\_ the neighbors
0. \_\_\_\_\_ does not apply, never plans to use a method, or does not answer. Go to question 73.

Only if she has indicated she is currently using birth control devices:  
(alternative 1 from question 63)

\*67A. Which method are you currently using? \_\_\_\_\_

\*67B. Where do you obtain it? (mark down everything she mentions)

1. \_\_\_\_\_ Pharmacy
2. \_\_\_\_\_ private doctor
3. \_\_\_\_\_ public health
4. \_\_\_\_\_ health center
5. \_\_\_\_\_

\*67C. If she answered any of 3, 4, or 5 in previous question: when was the last time you visited any of these places? \_\_\_\_\_ (month and year)

Go to question 69.

Only if she has indicated she does not currently use birth control devices but has used them in the past (alternative 2 from question 63)

\* 68A. Which was the method you used previously? \_\_\_\_\_

\* 68B. Where did you obtain it (mark down everything she says)

1. \_\_\_\_\_ pharmacy    2. \_\_\_\_\_ private doctor    3. \_\_\_\_\_ public health

4. \_\_\_\_\_ health center    5. \_\_\_\_\_

If she answered any of 3, 4, or 5: When was your last visit to any of these places: \_\_\_\_\_ (month and year)

\* 68C. Why did you stop using the method(s) (press for more information: e.g. was there any other motive?) \_\_\_\_\_

Continue with the following questions:

\* 69. Who advised you on which method to use?

1. \_\_\_\_\_ parents or other relatives

6. \_\_\_\_\_ doctor, nurse, medicaster, or other

2. \_\_\_\_\_ brothers or sisters

7. \_\_\_\_\_ read about it, or through the radio

3. \_\_\_\_\_ friends

8. \_\_\_\_\_ other (be specific)

4. \_\_\_\_\_ a man, companion or husband

9. \_\_\_\_\_ does not remember

5. \_\_\_\_\_ school personnel

\*70. In your first sexual relationship with a man were you aware of any of the birth control devices?

1. \_\_\_\_\_ no

2. \_\_\_\_\_ yes

3. \_\_\_\_\_ does not remember

\*71. How does your husband or companion feel about the use of birth control devices? (AE: does he approve or not) \_\_\_\_\_

\*72. Do you conceal or have concealed from anyone the fact that you use (or have used) birth control methods?

1. \_\_\_\_\_ no

2. \_\_\_\_\_ yes, From whom? \_\_\_\_\_

\*73. Have you visited or have been visited by a doctor for reasons of pregnancy, childbirth or other things related to having children?

1. \_\_\_\_\_ yes

2. \_\_\_\_\_ does not know, not remember

3. \_\_\_\_\_ no. Would you have liked to have seen a doctor for any of these things?

1. \_\_\_\_\_ yes. Why didn't you do it? \_\_\_\_\_

2. \_\_\_\_\_ no. Why not?

\* 74. Have you ever heard any talk of family planning?

1. \_\_\_\_\_no
2. \_\_\_\_\_does not know, not remember, undecided
3. \_\_\_\_\_yes

Only if the answer to the last question is yes:

75. What do you think family planning is about more or less? AE \_\_\_\_\_

76. How did you find out about family planning? \_\_\_\_\_

77. Have you ever heard about maternity clinics? Or clinics that assist only those mothers who want to have the children?

1. \_\_\_\_\_no
2. \_\_\_\_\_yes. Do you know where the nearest one is located?
  1. \_\_\_\_\_no
  2. \_\_\_\_\_yes. Have you visited before.
    1. \_\_\_\_\_yes
    2. \_\_\_\_\_no. Why not? \_\_\_\_\_

78. Have you ever been or felt yourself attractive without wanting to be? (have you remained attractive against your will, by pure accident, by chance, etc.?)

1. \_\_\_\_\_no
2. \_\_\_\_\_yes. Could you tell me how many times this has happened to you? \_\_\_\_\_

\* 79. How many children have you had who are not from your current husband or companion (or last, if she lives alone)?

1. \_\_\_\_\_none
2. \_\_\_\_\_1
3. \_\_\_\_\_2
- ... , 8. \_\_\_\_\_7 and more
9. \_\_\_\_\_not known

80. You probably have neighbors or friends who complain to you about their husbands or companions (or the men they go out with). Which is the one complaint that you hear most often? (what do they most complain about?)

81. Do you think the majority of those complaints are justified? (are they right in what they say?)

1. \_\_\_\_\_in general they are
2. \_\_\_\_\_sometimes yes, sometimes no, or it depends
3. \_\_\_\_\_generally they are not
4. \_\_\_\_\_does not know, or does not answer

82. What do you think are the obligations (or responsibilities) of the man? (as far as the family is concerned) (if she cannot answer mark down a question mark) \_\_\_\_\_

83. What do you think are the obligations (or responsibilities) of the woman? (as far as the family is concerned) (If she does not answer mark down a question mark) \_\_\_\_\_
84. What do you think a man should do when the woman lies to him? (that is, when the woman is unfaithful) \_\_\_\_\_
85. And what do you think the woman should do when the man lies to her? (that is, when the man is unfaithful) \_\_\_\_\_
86. What do you think is the best thing of being married? (or living with a man if the respondent is not married). (If she does not understand the question: which is the greatest advantage of being married?) \_\_\_\_\_
87. a) How much do you talk with your husband or companion about work?  
(read the following alternatives)  
1. \_\_\_\_\_much 2. \_\_\_\_\_little 3. \_\_\_\_\_never
- b) How much do you talk with your husband or companion about the children?  
1. \_\_\_\_\_much 2. \_\_\_\_\_little 3. \_\_\_\_\_never
- c) How much do you talk with your husband or companion about your problems?  
1. \_\_\_\_\_much 2. \_\_\_\_\_little 3. \_\_\_\_\_never.
- d) How much do you talk with your husband about politics?  
1. \_\_\_\_\_much 2. \_\_\_\_\_little 3. \_\_\_\_\_never
88. As far as educating or taking care of your children (both sexes) your husband involves himself
1. \_\_\_\_\_much?  
2. \_\_\_\_\_little?  
3. \_\_\_\_\_or never?
89. If you want one of your children to do something, and your husband wants him (or her) to do something else, does the child do what the husband wants, or what you want? AE
1. \_\_\_\_\_generally what the husband wants  
2. \_\_\_\_\_generally what she wants  
3. \_\_\_\_\_varies: it depends, sometimes, does not know.  
4. \_\_\_\_\_other (be specific)
90. When you move to another house or another neighborhood, who makes the final decision in choosing the neighborhood or house? AE (generally)
1. \_\_\_\_\_generally he does  
2. \_\_\_\_\_generally she does  
3. \_\_\_\_\_generally a joint decision  
4. \_\_\_\_\_does not know, undecided, depends  
5. \_\_\_\_\_other person (be specific)

91. Who decides on how to spend the money? (generally) (press for more information)
1. \_\_\_\_\_generally he does
  2. \_\_\_\_\_generally she does
  3. \_\_\_\_\_generally a joint decision
  4. \_\_\_\_\_other persons (be specific) \_\_\_\_\_
  5. \_\_\_\_\_other answer (be specific, write down everything she says) \_\_\_\_\_
92. If you wanted to change or get a new job, with whom would you consult? (May mark down more than one alternative) (If undecided, read the alternatives)
1. \_\_\_\_\_with no one
  2. \_\_\_\_\_with her husband or companion
  3. \_\_\_\_\_with some relative
  4. \_\_\_\_\_with some friend
  5. \_\_\_\_\_with another person (be specific)
  6. \_\_\_\_\_does not know, undecided, depends
- \*93. Who decides whether to have more children? (who decides, we shall have another child or not?)
1. \_\_\_\_\_generally he does
  2. \_\_\_\_\_generally she does
  3. \_\_\_\_\_generally a joint decision
  4. \_\_\_\_\_depends, undecided, not know
  5. \_\_\_\_\_other person (be specific) \_\_\_\_\_
- \* 94. If your husband (or companion) wanted to have a child and you did not, would you do what he wants?
1. \_\_\_\_\_generally yes
  2. \_\_\_\_\_generally no
  3. \_\_\_\_\_depends, sometimes, not know
  4. \_\_\_\_\_other answer
- \* 95. I am going to mention several people. <sup>A</sup>Afterwards I want you to tell me which one is the most important person for you
1. \_\_\_\_\_your father
  2. \_\_\_\_\_your mother
  3. \_\_\_\_\_your husband or companion
  4. \_\_\_\_\_your child (or children)
  5. \_\_\_\_\_your friends

Which of those people do you consider the first most important? (reread the alternatives if necessary) (mark a one in the proper entry)

Which of those people do you consider is the second most important? (same instructions where this time a two is marked in the proper entry)

Which of those people do you consider the third most important? (same instructions, mark a three in the proper entry)

Only if she has any children:

\*96. Have you breast-fed your children?

1. \_\_\_\_\_ no (go to question no. 97)

2. \_\_\_\_\_ yes How many? \_\_\_\_\_ how long, more or less? \_\_\_\_\_ months

Have you looked attractive while you breast-fed any of your children? AE \_\_\_\_\_

\*97. Who sleep in the same room as you? (in addition to your husband)

children, number: 1-2-3-4-5-6-7-8-9 and more

other relatives: 1-2-3-4-5-6-7-8-9 and more

others: 1-2-3-4-5-6-7-8-9 and more

Only if she has children between 5 and 14 years of age:

98. Do your children go to school?

1. \_\_\_\_\_ yes How many? \_\_\_\_\_ How much do you pay for the school? \_\_\_\_\_

2. \_\_\_\_\_ no (If she answered no, or if some of the children do not go to school).  
Why does (do) this (these) child (children) not go to school? \_\_\_\_\_

99. What types of games do you play with your children? (or grandchildren?) \_\_\_\_\_

100. Do you tell them stories?

1. \_\_\_\_\_ no

2. \_\_\_\_\_ yes Which ones? \_\_\_\_\_

101. If the child misbehaves every so often, what do you think the mother should do?  
\_\_\_\_\_

102. If he is misbehaving, what would the father do (the child's father) \_\_\_\_\_

103. Who do you tolerate the most, the males or females?

0. \_\_\_\_\_ does not apply

1. \_\_\_\_\_ the males

2. \_\_\_\_\_ the females

3. \_\_\_\_\_ the two equally

4. \_\_\_\_\_ depends, undecided, not know

5. \_\_\_\_\_ other answer

104. Who does your husband or companion tolerate the most, the males or females?
0. \_\_\_\_\_ does not apply
  1. \_\_\_\_\_ the males
  2. \_\_\_\_\_ the females
  3. \_\_\_\_\_ the two equally
  4. \_\_\_\_\_ depends, undecided, not know
  5. \_\_\_\_\_ other answer
105. In your opinion, which is the best way to educate the children, being strict or lenient?
1. \_\_\_\_\_ strict
  2. \_\_\_\_\_ lenient
  3. \_\_\_\_\_ other answer (be specific)
106. How do you consider yourself, strict or lenient?
1. \_\_\_\_\_ strict
  2. \_\_\_\_\_ lenient
  3. \_\_\_\_\_ other answer (be specific)
- \* 107. What are the most important things that should be taught the male children? (which are the most important virtues that they should be taught? \_\_\_\_\_)
- \* 108. What are the most important things that should be taught the female children?
109. Some people believe that when a child misbehaves he should be beaten in order to set him straight. Do you think that beating the child
1. \_\_\_\_\_ will make him afraid
  2. \_\_\_\_\_ will be harmful to him
  3. \_\_\_\_\_ will make him conform to the rules
  4. \_\_\_\_\_ will make him more of a man
  5. \_\_\_\_\_ other answers \_\_\_\_\_
- \* 110. At what age do you think a child should be taught not to wet his pants or the floor? \_\_\_\_\_
- What do you do if they continue to wet their pants or the floor? (find out whether she would use harsh punishment or be more understanding) \_\_\_\_\_
- \* 111. As a last question, could you tell me what is the most important thing in your life? \_\_\_\_\_
- In addition (if she did not answer the previous question): Would you like to make any comment or remarks? \_\_\_\_\_

Thank the respondent for her time and patience.

Additional Questions for New Survey

- 1a. Do you or anyone else in this household own this dwelling unit?
- 1b. How many rooms do you have in your compound which are for the exclusive use of your family?

1c. Ownership of Modern Objects

(Interviewer: Read each listed item separately and record whether or not they have the item.)

"Do you have in this household any of the following household items?"

1. Watch or clock
2. Bicycle
3. Radio
4. Sewing machine
5. Television
6. Blender
7. Refrigerator
8. Automobile

2. How much did \_\_\_\_\_ make on \_\_\_\_\_ regular job during the last month? (Ask of each person in the household.)

- 2a. Did you receive from an employer any compensation that you haven't included yet in the form of free housing, rental allowance, food and the like?

If yes: About how much would be the value of these things per year? I mean how much would they cost you per year if you had to pay for them?

- 2b. Did anyone else in your household receive any other income from their regular work that you haven't included yet, such as a bonus, pay for extra hours, other allowances, etc.?

- 2c. If works but hours less than full-time, ask about availability of additional work:

"If you wanted to work full-time, do you think you could find such an opportunity?"

Yes

No

Uncertain

- 2d. If does not work:

"If you wanted to work for pay do you think you could find work around here which would be all right for you?"

How much do you think you might be earning in the average week in such work?"

3. See 6 below.

4. Add to 44A: Sex of children who later died.

5a. What do you think is the price of the following contraceptives?

- pill per month's supply
- IUD
- condom per month's supply
- diaphragm
- jelly per month's supply

5b. If you use a contraceptive, how much did you last pay for it? (Record in appropriate unit.)

6. Questions relating to children: Do for each child.

What is the age of your \_\_\_\_\_ child?  
 Is the child male or female?  
 Is the child currently in school? If so, in what grade?  
 How many years of schooling do you eventually expect the child to complete?

Children	Age	Sex	Not in school (or present grade)	Grade expected to complete (or completed)
oldest				
_____				
_____				
_____				
_____				
_____				
_____				
_____				

7. Questions on child quality.

Are your children as \_\_\_\_\_ as you want them to be?

yes      most of the time      some of the time      no

Fill in blank with

- religious
- well-behaved
- healthy
- educated
- happy
- comfortable with others

Do you approve of your children's appearance?

yes      most of the time      some of the time      no

Do your children do as well in school as you would like them to?

yes      most of the time      some of the time      no

Do you expect your children to be as successful in terms of \_\_\_\_\_  
as you would like them to be?

yes      probably      perhaps      no

Fill in blank with      occupation  
   income  
   marital stability

8. Did you work at all between \_\_\_\_\_? (Ask for each interval up to last child; record all answers in Table.)

(For each interval in which respondent worked, also ask the following question:)

How many months did you work during that time? What was your work or occupation? About how much did you earn from this work in the average month?

Interval	W = worked NW = did not work	No. of months worked	Work or occupation	Average monthly income
Time first worked until first legal or consensual marriage				
Time first marriage and birth of your first child				
Birth of your first child and your second child				
Birth of your second child and your third child				
Birth of your third child and your fourth child				
Birth of your fourth child and your fifth child				
Birth of your fifth child and your sixth child				

9a. Do you have any health problems that limit in any way the amount or kind of work you can do?

If yes: How long have you been limited in this way? \_\_\_\_\_ years.

9b. If living with a male, does your male companion's health limit the amount or kind of work he can do?

If yes: How long has he been limited in this way? \_\_\_\_\_ years.

9c. Have you ever had any of the following diseases?

Pneumonia?      Bronchitis, emphysema, asthma?      Influenza?  
Tuberculosis?      Diphtheria?      Typhoid or parathyroid fever?  
Syphilis?      Anemia?      Cancer?  
Other?

9d. How often in an average week do you eat

meat, eggs  
fish  
cheese  
milk or other dairy products  
green vegetables, legumes, fruit  
grains

10a. In your current employment, are you an

- 1) employer
- 2) own-account worker
- 3) employee
- 4) family worker
- 5) member of producer's co-operative?
- 6) other

10b. I have a list of a number of jobs; please indicate which of these best describes your own job and that of your male companion (if any).

- 1) Professional, technical and related workers
- 2) Administrative, executive and managerial workers
- 3) Clerical workers
- 4) Sales workers
- 5) Farmers, fishermen, hunters, loggers and related workers
- 6) Miners, quarrymen and related workers
- 7) Workers in transport and communication occupations
- 8) Craftsmen, production process workers, and labor not elsewhere classified
- 9) Service, sport and recreation workers
- 10) Workers not classifiable by occupation
- 11) Members of the armed forces

10c. Major industries (U.N. classification)

For whom do you work? (Please try to classify by this scheme.)

- 1) Agriculture
- 2) Mining and quarry
- 3) Manufacturing
- 4) Construction
- 5) Electricity, gas, water and sanitary services
- 6) Commerce
- 7) Transport, storage and communication
- 9) Services
- 10) Activities not adequately described

11. Now I have a few questions about your brothers and sisters:

Do you have any living brothers or sisters?  
 If yes, list each brother and sister's name.  
 Where does he (she) live? List each brother and sister's address.  
 What is his (her) age as of December, 1976?  
 What is the highest grade of school he or she completed?  
 What is his or her occupation?  
 How many children does he or she have?

Name	Address	Age (as of 12/1/76)	Highest grade completed	Occupation	Number of children

**Appendix B: Curriculum Vitae of Principal Investigators**

CURRICULUM VITAE

Jere Richard Behrman  
Department of Economics  
University of Pennsylvania  
Philadelphia, Penna. 19174

Born: [REDACTED]

Office Telephone: (215) 243-7704

Education:

Massachusetts Institute of Technology, Cambridge, Mass., Ph.D.,  
1962-1966.

Doctoral Dissertation:

"Supply Response in Underdeveloped Agriculture: A Case Study  
of Major Annual Crops in Thailand, 1937-1963," 1966.

Williams College, Williamstown, Massachusetts, B.A., Summa Cum Laude,  
Highest Honors in Physics, 1958-1962.

Indiana University, Bloomington, Indiana, Russian Language Institute,  
Summers, 1960-1961.

Honors, Scholarships, and Fellowships:

Ford Foundation Faculty Fellowship in Economics 1971-1972.

American Farm Economic Association Award of Merit for outstanding  
research in agricultural economics, 1967.

National Science Foundation Fellowship, 1962-63.

Danforth Foundation Fellowship, 1962-1966.

Tyng Foundation Fellowship, 1958-1964.

M.I.T. Center for International Studies Fellowship for Thesis Field  
Research in Thailand, 1964-1965.

Carnegie Fellowship for Russian Language Study Tour, 1961.

National Merit Scholarship, 1958-1962.

Phi Beta Kappa, Junior Year, Williams College, 1961.

Benedict Prize (Outstanding Mathematics Student, Williams College),  
1960.

Grosvenor Cup (Outstanding member of class of 1962, Williams College), 1961.

Teaching Positions:

Assistant Professor, University of Pennsylvania, 1965-1968.  
 Associate Professor, University of Pennsylvania, 1968-1971.  
 Full Professor, University of Pennsylvania, 1971-  
 Visiting Seminar Coordinator, Universidad Catolica, Santiago, Chile, 1969.  
 Visiting Lecturer in Public and International Affairs, Princeton University, 1973.

Administrative Positions:

Chairperson, Department of Economics, University of Pennsylvania, 1973 -  
 Personnel Advisory Committee for the Dean of the Wharton School, 1972-1973.  
 Chairperson, Annual Meeting of Chairpersons of Economics Departments, Dallas ASSA Meetings, 1975.

Research Positions:

Faculty Associate, National Science Foundation sponsored project on "Econometric Approach to the Structure and Characteristics of World Primary Commodity Markets and International Commodity Trade," Economic Research Services Unit, University of Pennsylvania, 1965-1968.  
 Consultant, Economics Department, I.B.R.D., Washington, 1966-1969.  
 Research Associate and Consultant, MIT-ODEPLAN — Ford Project, Office of National Economic Planning, Santiago, Chile, 1968-1971.  
 Consultant, Wharton Economic Forecasting Associates, Inc., on Commodity disposal studies for the General Service Administration, 1970-1971.  
 National Bureau of Economic Research, associate working on Bhagwati-Krueger study of effects of quantitative trade policies on developing economies, 1969-1975.  
 National Science Foundation, Principal Investigator on Project entitled "A Macroeconometric Investigation of the General Equilibrium Impacts of Fiscal, Monetary, Income and International Policies in a Developing Country," 1972-1975.  
 Consultant, Development Research Center, I.B.R.D. on macro-model integration project, 1972-1973.  
 Consultant, United States Treasury, 1972.  
 Consultant, Brookings-SIECA project on Central American Common Market,

National Science Foundation, Co-Investigator (with P. Taubman) on Project entitled "The Importance of Nature and Nurture on Earnings, Occupational Mobility, Healthiness, and Family Size Using Twin Sample," 1973-1976.

Consultant (with F.G. Adams), United Nations Committee on Trade and Development on World Commodity Models, 1974-1976.

Consultant, Harvard Institute for International Development, INCAE - Central Bank of Nicaragua Economic Modeling Project, 1975-1976.

Consultant, ILPES-NBER - UN Project on Short Term Policy in Latin American Economies, 1975.

National Bureau of Economic Research Project on Trade Strategies and Employment, 1975-1977.

Consultant, UNDP-ILPES study on macroeconometric modeling of short term policy in Panama, 1975-1976.

Consultant, American Technical Assistance Corporation, to evaluate report on Strategies for Small Farmer Development for AID, 1976.

Consultant SIECA (Secretaria Permanente del Tratado General de Integración Economía Centroamericana), 1976-1977.

Senior Research Advisor, Institute of Applied Economic Research, Sir George Williams Campus, Concordia University, Montreal, 1976.

Consultant, Rockefeller Foundation, University of Pennsylvania project on Analysis of Policy Alternatives for Price and Quantity Stabilization for Selected Primary Commodities in World Markets, 1976-1978.

Professional Organizations:

American Economic Association  
Econometric Society  
Society for Religion in Higher Education  
American Agricultural Economics Association  
Society for International Development

Directorships:

Wharton Econometric Forecasting Associates, Inc. 1973-  
National Bureau of Economic Research, Inc. 1974-

Journal Referee:

American Economic Review, Journal of Political Economy, Econometrica,  
International Economic Review, Economic Development and Cultural Change,  
Journal of Econometrics, Journal of Development Economics, Economic  
Record, American Journal of Agricultural Economics, Journal of Farm  
Economics, Journal of Developing Areas, Journal of International Economics.

Experience Abroad:

U.S.S.R., Russian Language Study Tour (under Cultural Exchange Agreement), 1961.  
Hong Kong, Teaching English as a Second Language (sponsored by Williams College Haystack Program), 1962.

Ghana, Work camp project (with Operations Crossroads Africa), 1963.

Thailand, Ph.D. thesis research, 1964-1965.

Chile, Office of National Economic Planning (ODEPLAN), resident research associate, 1968-1969.

Conferences and short consulting trips: Philippines, Costa Rica, England, Mexico, Brazil, Chile, Pakistan, India, Panama, Nicaragua, Guatemala, and Colombia.

### Monographs:

Supply Response in Underdeveloped Agriculture: A Case Study of Four Major Annual Crops in Thailand, 1937-1963. Contributions to Economic Analysis Series, North-Holland Publishing Co., Amsterdam, 1968.

An Econometric Study of the World Rubber Market. Report to I.B.R.D., 1969.

Forecasting Properties and Prototype Simulations of a Model of the Copper Market. Report to General Services Administration, 1970.

Stockpile Disposal Simulations with an Econometric Model of the World Rubber Market, (with F.G. Adams). Report to General Services Administration, 1971.

Foreign Trade Regimes and Economic Development: Chile, (New York: NBER, 1975).

Macroeconomic Policy in a Developing Country: An Econometric Investigation of the Postwar Chilean Experience (in process, expected 1976 publication).

Seven Models of International Commodities (with F.G. Adams). Report to United Nations Committee on Trade and Development, 1974.

Econometric Models of World Agricultural Commodity Markets: Coffee, Cocoa, Tea, Wool, Cotton, Sugar, Wheat, Rice (with F.G. Adams) (Ballinger Publishing Co., Cambridge, 1976).

Short Term Macroeconomic Policy in Latin America (editor, with James Hanson of IPLES-NBER-Minister of Planning of Panama Conference Volume, English and Spanish, 1976).

Nature and Nurture in the Determination of Earnings and Occupational Status (tentative title, with Paul Taubman, expected 1976 completion).

### Papers:

"Cocoa: Demand Elasticities in the Five Leading Consuming Countries," Journal of Farm Economics, 47: 2, May 1965, pp. 410-417.

"Price Elasticity of the Marketed Surplus of a Subsistence Crop," Journal of Farm Economics, 48: 4, Part I, November 1966, pp. 279-283.

- "The Economic Significance of Intra-Country Variations in the Growth Rates of a Peasant Produced Staple Crop: A Case Study of the Growth of Thai Rice Production in the 1940-1963 Period," Asian Survey March 1968, pp. 157-173.
- "Econometric Models of Mineral Commodity Markets: Uses and Limitations," Proceedings of AFME 1968 Meetings.
- "Monopolistic Cocoa Pricing," American Journal of Agricultural Economics 50:3, August 1968, pp. 702-719.
- "Supply Response and the Modernization of Peasant Agriculture," in C.R. Wharton, Jr., (ed.) Subsistence Agriculture and Economic Development (Chicago: Aldine, 1969), pp. 229-242.
- "Econometric Growth Models for the Developing Economy," (with L.R. Klein) in W.A. Eltis, M.F.G. Scott, and J.N. Wolfe, (eds.), Induction, Growth and Trade: Essays in Honour of Sir Roy Harrod, Oxford: Clarendon Press, 1970, pp. 167-187.
- "Econometric Model Simulations of the World Rubber Market, 1950-1980," in Lawrence R. Klein, (ed.), Essays in Industrial Econometrics, Volume III; Philadelphia: Economic Research Unit, University of Pennsylvania, 1971, pp. 1-96.
- "Review Article: Trade Prospects and Capital Needs of Developing Countries," International Economic Review 12:3, October 1971, pp. 519-525.
- "Sectoral Elasticities of Substitution Between Capital and Labor in a Developing Economy: Time Series Analysis in the Case of Postwar Chile," Econometrica 40:2 March, 1972, pp. 311-327. (Spanish translation in Cuadernos de Economía 9:26, April 1972, pp. 70-83).
- "The Determinants of the Annual Rates of Change of Sectoral Money Wages in a Developing Economy," International Economic Review 12:3, October 1971, pp. 431-447 (Spanish translation in Cuadernos de Economía 9:27, August 1972, pp. 102-119).
- "Short-Run Flexibility in a Developing Economy," Journal of Political Economy 80:2 (March/April 1972), pp. 292-313.
- "Cyclical Sectoral Capacity Utilization in a Developing Economy," in Richard Eckaus and Paul N. Rosenstein-Rodan, (eds.), Analysis of Development Problems: Studies of the Chilean Economy, Amsterdam: North-Holland Publishing Co., 1973, pp. 251-266.
- "Price Determination in an Inflationary Economy: The Dynamics of Chilean Inflation Revisited," in Richard Eckaus and Paul N. Rosenstein-Rodan, (eds.), Analysis of Development Problems: Studies of the Chilean Economy, Amsterdam: North-Holland Publishing Co., 1973, pp. 369-397.
- "Sectoral Investment Determination in a Developing Economy," American

Economic Review 62:5, December 1972, pp. 825-841.

- "A Study of Quarterly Nominal Wage Change Determinants in an Inflationary Developing Economy," (with Jorge García) in Richard Eckaus and Paul N. Rosenstein-Rodan, (eds.), Analysis of Development Problems: Studies of the Chilean Economy, Amsterdam: North-Holland Publishing Co., 1973, pp. 399-416.
- "Aggregative Market Response in Developing Agriculture: The Postwar Chilean Experience," in Richard Eckaus and Paul N. Rosenstein-Rodan, (eds.), Analysis of Development Problems: Studies of the Chilean Economy, Amsterdam: North-Holland Publishing Co., 1973, pp. 229-250.
- "Econometric Modeling of National Income Determination in Latin America, with Special Reference to the Chilean Experience," in Annals of Economic and Social Measurement, 4:4, October-November 1975, pp. 461-488 (Spanish Translation in Demografía y Economía, February 1976).
- "Modeling Stabilization Policy for the LDC's in an International Setting," in A. Ando, R. Herring and R. Marston (eds.), International Aspects of Stabilization Policy (1975, The Federal Reserve Bank of Boston and the International Seminar in Public Economics), pp. 421-449.
- "Foreign-Sector Regimes and Economic Development in Chile," in Proceedings of 1975 ECLA-NBER Bogota Conference.
- "Econometric Modeling of Commodity Markets - A Model of Cocoa," (with F. G. Adams) in John Simmons, (ed.), Cocoa Production: Economic and Botanical Perspectives, New York: Praeger, 1976.
- "Structure and Performance of Seven Commodity Market Models," (with F. G. Adams, mimeo, 1975).
- "Nature and Nurture in the Determination of Earnings and Occupational Status," (with Paul Taubman, mimeo, 1975).
- "Development Economics" in Sidney Weintraub, (ed.), Trends in Modern Economic Thought, Philadelphia: University of Pennsylvania, 1976.
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- Desai, Padma, Import Substitution in the Indian Economy 1951-1963 and Tariff Protections and Industrialization, The Annals of the American Academy of Political and Social Science, 407 (May 1973), pp. 247-8.
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- Corbo Lioi, Vittorio, Inflation in Developing Countries: An Economic Study of Chilean Inflation, Journal of Development Economics, March 1976.

Presentations:

- Paper on demand for cocoa, Econometric Society/American Farm Economic Association panel on "Measuring Supply and Demand in Underdeveloped Agriculture," Chicago December 27-30, 1964.
- Paper on estimation of price elasticity of marketed surplus, Agricultural Development Council/University of Minnesota Seminar on "Supply and Market Surplus Relationships in Peasant Agriculture," Minneapolis, February 19-20, 1966.
- Paper on implications of possible international cocoa agreements, African Studies Association panel on "International Trade and Monetary Problems of African Development," Bloomington, Indiana, October 30, 1966.
- Paper on Thai agricultural supply response, Agricultural Economics Workshop, University of Chicago, January 17, 1967.

Paper on intracountry agricultural variations in Thailand, panel on "Asian Agricultural Prospects: The Significance of Intracountry Variations," Association for Asian Studies, Chicago, March 22, 1967.

Paper on economic aspects of U.S. involvement in Thailand, Conference on "U.S. Involvement in Thailand," Foreign Policy Roundtable, Washington University, St. Louis, May 5-6, 1967.

Paper on Thai agricultural supply response, panel on "Comparative Studies in the History of the Modernization of Agriculture," International Congress of Orientalists, Ann Arbor, August 12-20, 1967 (abstract in Proceedings, (ed.), by Denis Sinor, 1971).

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Paper on "Econometric models of mineral commodity markets: uses and limitations," A.I.M.E. Meetings, February 26, 1968.

Paper on Peasant behavior and supply response, Economic Growth Center Seminar, Yale University, November 7, 1967.

Paper on the Thai model of economic growth, Economic Development Seminar, Cornell University, April 1968.

Papers on short-term stabilization model of Chile, ODEPLAN internal Seminars, Santiago, Chile, April-May 1969.

Papers on a short-term annual econometric model of Chile, seminar on economic development, Department of Economics, Universidad Catolica, Santiago, Chile, May 1969.

Paper on Phillips' curves in an inflationary developing economy, Instituto de Economia, Universidad de Chile, July 1969.

Paper on Chilean macroeconometric model, semiannual meetings of WEFA-Mexico project, Mexico City, August 3-4, 1970.

Paper on "Short-run flexibility in a developing economy," Second World Congress of the Econometric Society, Cambridge, England, September 8-14, 1970.

Paper on sectoral econometric studies in Chile, University of Minnesota Faculty Seminar, November 14, 1970.

Paper on econometric model of Chile, Harvard University Seminar on Economic Development, April 12, 1971.

Paper on short-run flexibility in a developing economy, Williams College Economics Department Seminar, November 8, 1971.

Paper on the use of macroeconomic models of developing countries. Development Research Center Seminar, I.B.R.D., November 21, 1972

Paper on modeling stabilization policies in open developing economies, International Seminar in Public Economics - Federal Reserve Bank of Boston, Conference on International Aspects of Stabilization Policies, Williamstown, Massachusetts, June 9-12, 1974

Paper on econometric modeling of national income determinations in developing countries, NBER-EL Colegio de Mexico Conference on The Use of Econometric Models in Latin America, November 27-29, 1974.

Paper on foreign-sectors regimes and economic development in Chile, NBER-ECLA Conference, Bogota, April 1975.

Paper on world econometric commodity market models (with F.G. Adams), Third World Congress of the Econometric Society, Toronto, Canada, August 20-26, 1975

Paper on the role of genetics and environment in the determination of earnings, schooling and occupational status (with Paul Taubman), Third World Congress of the Econometric Society, Toronto, Canada, August 20-26, 1975.

Paper on problems in econometric modeling of Latin America (with James A. Hanson), NBER-ILPES Ministry of Planning of Panama Conference on Short-Term Macroeconomic Policy in Latin America, Panama, October 31 - November 2, 1975.

Paper on the intergenerational transmission of income and wealth (with Paul Taubman) AEA Annual Meetings, Dallas, December 1975.

Paper on macroeconomic modeling in developing countries, Sir George Williams Campus, Concordia University, Montreal, March 5, 1976.

Paper on controlling for and measuring genetic and environment effects on equations for schooling and labor market success," MSSB conference on Effects of family on labor market success, Williamstown, May 24-27, 1976 (with P. Taubman and T. Wales).

#### Other Professional Activities:

Discussant on papers on "Structural Characteristics and Theoretical Interpretations of Village-Level Product and Input Market," Conference on "Adapting Cooperatives and Quasi-Cooperatives to the Market Structures and Conditions of Underdeveloped Areas," Agricultural Development Council, University of Kentucky, Lexington, April 26-30, 1967.

Discussant of paper presented by Robert Evenson on "The Green Revolution and Development Experience," at the December Meetings of the American Agricultural Economic Society, New York, 1973. (Discussion is printed in American Journal of Agricultural Economics, May 1973, 56:2, pp. 393-395.

Chairman of Econometric Society Session on Economic Development, December Meetings, San Francisco, 1974.

Organizer (with James Hanson) of NBER-ILPES-Ministry of Planning of Panama Conference on "Short-Term Policy in Latin America," in Panama, October 30 - November 2, 1975.

Discussant, Session on Comparisons of Economic Structure, AEA Annual Meetings, Dallas, 1975.

Discussant, Symposium on Nicaraguan macroeconomic model, Managua, March 30, 1976

Current Research:

Determinants and degree of status mobility in the occupational structure of the United States.

Industrial factor returns and marginal productivity theory in a developing economy.

(With Paul Taubman) project on the importance of nature and nurture on earnings, occupational mobility, healthiness, and family size using twin samples.

Econometric Models of International Commodity Markets.

Quarterly Econometric Model of Panama.

Trade Strategies and Employment, Substitution Possibilities Within Production Function Framework.

Determinants of fertility, quality of children, women's labor force participation, migration and wages in developing countries.

CURRICULUM VITAE

GENERAL INFORMATION:

Name : Humberto Belli P.

Birth Date : [REDACTED]

EDUCATION:

: Ph.D (Cand) University of Pennsylvania, 1973

M.A. in Sociology, University of Pennsylvania, 1972.

Graduate Courses in Economics, Georgetown, University, 1970.

Licenciado en Derecho, Universidad de Madrid, 1969.

Doctor in Law before The Supreme Court of Justice of Nicaragua.

STATUS:

: Associate Professor in Sociology, Universidad Centroamericana, 1969.

Associate Professor in Business Law, Universidad Centroamericana, 1969.

Director of a Seminar on General Ware Houses, 1969.

Private Advisor in the Branch of Law, 1969-1970.

Professor of Sociology, Universidad Centroamericana, 1973.

Director of the Department of Sociology, Universidad Centroamericana, 1973-1975.

Director of the Nicaraguan Center of Scientific Research of the Central Bank of Nicaragua (CICNIC), 1973-1975.

Chief of the Division of Social Studies at the Department of Economic Studies of the Central Bank, 1976.

PROFESIONAL EXPERIENCE :

Director of the Socio-Demographic Studies on the Nicaraguan Family (Kap Study). Central Bank of Nicaragua and Nicaraguan Demographic Association. 1974.

Studies on Human Resources. Central Bank of Nicaragua. 1974-1975.

A Study about The Railroad Market in Nicaragua. Central Bank of Nicaragua. 1976

Adviser for The Organization of the National Seminar on Nutrition at the Ministry of Public Health. 1976.

Lecturer of the Nicaraguan Demographic Association, 1974 until present.

Director of the Rural Survey on Malnutrition. Ministry of Public Health-Manoff International Co. 1976.

Adviser for the Social Aspects Appraisal Artisan Project on the Community of San Juan de Oriente. Department of Technological Researches, Central Bank of Nicaragua. 1976.

Adviser of the Instituto de Bienestar Campesino (INVIERNO) (Institute for Rural welfare) - for the National Rural Survey. 1976.

A study of Social Feasibility of a Fishing Project at Puerto Morazán. Department of Technological Researches, Central Bank of Nicaragua. 1976.

Adviser for the Survey on the attitudes and integration level of the personnel, faculty and students of the Universidad Centroamericana. (At the present time).

Adviser of the Ministry of Public Health for the elaboration to AID of Proposal on a National policy of nutrition for the amount of six million dollars. 1976.

PUBLICATIONS

: The Nicaraguan Agriculture and the Agrarian Reform (Monograph). Washington, D.C. 1970.

The Colonial Period in Latin America: An essay of interpretation (Monograph). Philadelphia. 1972

'Group identification and Consciousness". Philadelphia. 1973.

Mass demonstration and Political deviance. Philadelphia. 1973.

Earthquake, Values and Norms of the Nicaraguan. Revista Encuentro No. 3. 1974.

Presentation of the Social prospects of Nicaragua for the lastrum 75-80. INCAE (Institute Centroamericano de Administración de Empresa. 1974.

Tradictional Political Conflicts in the Nicaragua Society. 1975.

Internal Survey of Situation and labor relations. Central Bank of Nicaragua. 1975.

An Appraisal of the Social Aspects comprised in the Central American Treaty of Economic Integration. 1976.

CONVENTIONS AND SEMINARS

ABROAD

: Seminar on Population Policies, World Population Council. Boca Ratón, Florida. 1973.

Seminar on Futorología. American Embassy, Panamá, Panamá. 1974.

Seminar on the Social Aspects of the Proyects on Economic Development. World Bank, San José, Costa Rica. 1974.

Presence at the First Congress of Central American Sociology. San José, Costa Rica. 1974.

Seminar on the Problems of enforcement of Population policies in Central America. San Salvador, El Salvador. 1974.

Presence at the annual meeting of the American Sociological Association. San Francisco, California. 1974.

Congress on Ecology and Natural Resources Conservation. San José, Costa Rica. 1975.

Seminar on Natural Disaster. Boulder, Colorado, USA. 1975.

VITA

NAME: Barbara L. Wolfe

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EDUCATION:

Univeristy of Pennsylvania, M.A. 1971, Ph.D. 1973

Doctoral Dissertation:

"A Socioeconomic Analyses of Family Building Behavior," 1973

Cornell University, B.A. 1965

HONORS:

Graduate: NDEA Title IV Fellowship  
NIH Traineeship

Undergraduate: Dean's List  
Omicron Delta Epsilon

PROFESSIONAL POSITIONS:

Research Associate  
Institute for Research on Poverty  
University of Wisconsin, 1976-

Assistant Professor of Economics  
Bryn Mawr College, 1973-1976

Economic Consultant  
Federal Reserve Bank of Philadelphia, 1972-1976

Consultant, National Institute of Education, 1976

Instructor, Univeristy of Pennsylvania, 1970-1972

## PAPERS AND PUBLICATIONS:

"Philadelphia's School Resources and the Disadvantaged" with Anita A. Summers, Federal Reserve Bank of Philadelphia, Business Review, March 1974.

Comment on "The 'Women Issue' and Fertility", Concerned Demography, vol. 4, no. 1, Spring 1974.

"Intradistrict Distribution of School Inputs to the Disadvantaged: Evidence for the Courts" with Anita A. Summers, Research Paper, Federal Reserve Bank of Philadelphia, Fall 1974, and Journal of Human Resources, XI, Summer 1976, pp. 328-342.

Comment on "Effects of Economic Dependency on Labor Force Participation Rates in Less Developed Countries" by R. Bilborrow. Paper presented at EEA meeting, October 1974.

"A Socio-economic Analysis of Differential Family Size: The NBER-Thorndike Sample," Unpublished paper, October 1974.

"Equality of Educational Opportunity Quantified: A Production Function Approach" with Anita A. Summers, paper presented at the Econometric Society Winter Meetings, December 1974, and Research Paper, Federal Reserve Bank of Philadelphia, 1975. Highlighted in Today's Education, Nov./Dec., 1975, with comments by James S. Coleman.

"Which School Resources Help Learning? Efficiency and Equity in Philadelphia Public Schools" with Anita A. Summers, Federal Reserve Bank of Philadelphia, Business Review, February 1975.

Manual on Procedure for Using Census Data to Estimate Block Income, with Anita A. Summers, Federal Reserve Bank of Philadelphia, January 1975.

Block Income Estimates, City of Philadelphia--1960 and 1970, with Anita A. Summers, Federal Reserve Bank of Philadelphia, April 1975.

"Interrelations of Fertility and Women's Labor Force Participation, with Particular Emphasis on Education", paper presented at the Population Association of America Meetings, April 1975, and revised version, "The Effect of Education on Fertility and Women's Labor Force Participation", June 1975.

"Tastes in a Household Mode: The NBER-Thorndike Sample," Unpublished paper, September 1975.

## PAPERS AND PUBLICATIONS: (continued)

"Disaggregation in Analyzing Educational Equity Issues: Methods and Results", with Anita A. Summers, paper presented at the ETS-NBER Workshop on the Economics of Education, Princeton, N.J., October 1975.

"Tastes in a Household Model: An Application to Fertility Decisions", September 1976.

"Estimating Household Income From Location" with Anita A. Summers, Summer 1976.

"Do Schools Make A Difference?" with Anita A. Summers, Summer 1976.

## OTHER PROFESSIONAL ACTIVITIES:

Research and Adm. Asst., Economic Growth Centre, Yale Univ., 1965-1966.

Lecturer, World Affairs Council of Philadelphia, 1972, 1974.

Participant, ETS-NBER Workshop on Current Research in Economics of Education, October 1975.

Participant, Montly Seminar on Law and Social Science, sponsored by the Ford Foundation, 1975-1976.

Participant in Joint Project with School District of Philadelphia to evaluate the teaching of reading, 1975-1976.

Chairperson, Session on Regulation of Credit Discrimination in Banking, Eastern Finance Association, April 1976.

Faculty Research Grant, Bryn Mawr College, 1975-1976.

## CURRICULUM VITAE

### GENERAL INFORMATION

Name : Antonio Ibarra Rojas  
Birth Date :   
Birth Place :   
Status : Married  
Nationality : Nicaragua

### UNIVERSITY STUDIES

- 1965-1969 Preliminary-clinical cycle for the Medical career, Faculty of Medical Science. Universidad Nacional Autónoma de Nicaragua (Autonomous National University) León.
- 1969-1971 Candidacy Diploma of the Faculty of Economics, Political and Social Sciences. Catholic University of Louvain, Belgium. Equivalent degree, B.S. of the U.S.A.
- 1971-1974 First and Second Diploma (Licence) in Sociology at the Institute of Political and Social Sciences, Faculty of Economics, Political and social sciences. Catholic University of Louvain, Belgium. Equivalent degree. Master in Sociology in the U.S.A.
- 1974-1975 Third cycle special Diploma at the Institute of Developing countries studies of the Catholic University, Louvain, Belgium. Equivalent to the Doctoral Degree of the French third cycle on social Development of the Developing countries.
- 1974-1975 Conclusion of the Educational Academical Program of the State Doctorate in Sociology with the proposal of Doctoral thesis on the study of: Origins, formation and development of the working class in Central America from 1871 to 1975. Once approved my thesis to be exposed in the future as public dissertation my stay at the Catholic University of Louvain concluded as candidate for the Doctorate of state in sociology. Grade equivalent to the French Doctorate infieri.

RESEARCH WORKS AT THE CATHOLIC  
UNIVERSITY OF LOUVAIN

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- 1969 A) The role of work in the historical formation of man. Faculty of Economics, Political and Social Sciences. U.C.L., Belgium.
- 1970 A) Studies of the Production models in the pre-industrial societies. Faculty of Economics Political and Social Sciences. U.C.L. Belgium.
- B) Comparative analysis of the Social Movements of El Salvador and Nicaragua during the crisis of the thirtieth's. Faculty of Economics Political and Social Sciences. U.C.L. Belgium.
- 1971 A) Critical study of developmental school in ethnology, from the contribution of Levi Strauss. Faculty of Economics Political and Social Sciences. U.C.L. Belgium.
- B) A Study of Primitive Christianity as a social conflicting movement. Institute of Political and Social Sciences. U.C.L. Belgium.
- C) Compared study of Self-Manegment in Alberia, Israel and Yugo-slavia. Institute of Political and Social Sciences. U.C.L. Belgium.
- 1972 A) A Study on the problems of objectivity in Social Sciences. Institute of Social and Political Sciences. U.C.L. Belgium.
- B) Social stratification and choice in the system of high school in France. Institute of Political and Social Sciences. U.C.L. Belgium.
- C) Social mobility of the emigrant workers of the mining Industry in Belgium during the period 1950-1970. Institute of Political and Social Sciences. U.C.L. Belgium.
- D) Language and its role in the formation of the social consciousness from the contribution of the linguistics schools of the east Europe. Institute of Social and Political Sciences. U.C.L. Belgium.
- 1973 A) Introduction to the critic of Max Weber from his book "The Protestant ethics and the Capitalist Spirit". Institute of Political and Social Sciences. U.C.L. Belgium.
- B) Compared study of the obstacles to the formation of an agricultural wage-earning class in Africa during the post war-period. Institute of Political and Social Sciences. U.C.L. Belgium.

- C) Pitrim Sorokin and the development of its sociological, thought in the stage of formation inside of his native country. Institute of Political and Social Science. U.C.L. Belgium.
  - D) Analysis of the development of the bananas enclave in Honduras from the Beginning of the century until the Second World War. Institute of Political and Social Science. U.C.L. Belgium.
  - E) Social Parameters of the Urban development in societies of centralized economies. Case study. Institute of Political and Social Sciences. U.C.L. Belgium.
- 1974
- A) Industrialization and formation of cultural Models in the Ecuadorian sierra. Institute of Political and Social Sciences. U.C.L. Belgium.
  - B) Evaluation of the Institute of Regional Development of the Brazilian Northeast. Institute of Political and Social Sciences. Institute of study of developing countries. U.C.L. Belgium.
  - C) Survey of the situation of the Asiatic Christian Churches. Institute of the Religion Sociology. Institute of Political and Social Sciences. U.C.L. Belgium.
  - D) The contribution to the Social theory of ideology on the work of W. Reich. Institute of Political and Social Sciences. U.C.L. Belgium.
  - E) Agrarian structures and social changes in Latin America during the XX century. Institute of Developing countries studies. U.C.L. Belgium.
- 1975
- A) An appraisal of the development politics of the non alienated countries. Institute of study of Developing countries. U.C.L. Belgium.
  - B) Compared study of the State role in the Industrial development of Zaire and Taiwan. Institute of study of developing countries.
  - C) Critical analysis of the Social Development theory of Charles Bethelleim. Institute of study of developing countries. U.C.L. Belgium.
  - D) Study of Alternative Policies for the Industrial development in developing countries. Institute of study of Developing countries. U.C.L. Belgium.

- E) Interpretative Analysis of Union development in Honduras during the period 1920-1969. Institute of study of Developing Countries. U.C.L. Belgium.
- F) The formations of the Urban Development in Developing countries. Institute of study of Developing Countries. U.C.L. Belgium.

RESEARCH WORKS PERFORMED IN OTHERS  
PRIVATE AND ACADEMICS INSTITUTIONS

- 1969 An appraisal of the programs of the students Social Welfare of the Universidad Nacional Autónoma de Nicaragua (Autonomous National University of Nicaragua).
- 1971 The Human Resources Prospective at a Central American area level in order to eliminate obstacles for the industrialization process, for the World Federation of Labor (C.M.T.) Brussels, Belgium.
- 1974 Statement of the measures concerning labor repression to the color worker in South Africa. For the World Federation of Labor (C.M.T.) Brussels, Belgium.
- 1975 Research on Social History of Latin America. For the program of Social History University of Frankfurt.  
  
The planning of the field work program of the Department of preventive medicine. Faculty of Medicine of the Autonomics University, Honduras.  
  
The situation of the Catholic Church and its introduction in Kempala-India. Contribution within a multidisciplinary team organized by the International Association of Socio-religious. Louvain, Belgium.

PROFESSIONAL EXPERIENCE

ACADEMIC

- A) Researche Assistant at the Institute of Studies of Developing Countries. 1974-1975. U.C.L. Belgium.
- B) Assistant for the Degree thesis Seminars at the Institute of Political and Social Sciences. 1974-1975. U.C.L. Belgium.
- C) Assistant of professor Luis Vilate in the Department of Social Sciences University of Frankfurt. Federal Republic of Germany. 1975.

- D) Professor of Sociology at the Faculty of Sciences and Literature of the Autonomous National University of Nicaragua. 1975-1976. Managua, D. N.
- F) Profesor of the Social History of Law at the Faculty of Juridical Sciences of the Central American University. Managua, D. N. 1975.
- G) Professor of Social Stratification of the Sociology scholl. Facultad de Humanidades, Universidad Centroamericana (Faculty of Humanities of the Central American University). Managua, D. N. 1976.

#### PROFESSIONAL ACTIVITIES IN THE PUBLIC SECTOR.

- A) Sociological adviser of the Secretaría de la Presidencia de la República. 1975. (of the Secretary's office of the Presidency) 1975.
- B) Sociological Adviser for the Program Inter-Ministerial, P.S. 75 as a consequence of the drought and its effects on the rural population of the country. 1975.
- C) Sociological analyst of the Social studies and Infrastructure Division of the Department of Economic Studies, Central Bank of Nicaragua, 1976.
- D) Consultant of the Ministry of Public Health for the organization of the Second National Seminar on Nutrition of the child and the family. 1976.
- E) Lecturer at the Second National Seminar on Nutrition of the child and the family, about the patterns of nourishing consumption and demographic factors. As to the Thematic of socio-cultural factors, habits and belief on its consequences about the situation.
- F) Sociological adviser in the negotiation of the A.I.D. loan on the implementation of the national policy of nutrition sponsored by the Government of Nicaragua. 1976.
- G) Adviser and Consultant of the Instituto de Bienestar Campesino (INVIERNO) (Institute for the farmer welfare) for the elaboration and the test of the survey on the situation of the farmer population at the Region 5 of the country. 1976.

#### SOCIOLOGICAL RESEARCHES PERFORMED DURING 1976.

- A) Participation in the Research with survey on the passenger transportation in public vehicles at the Pacific area of Nicaragua.

This research that concluded in all its steps until its interpretative aspect was carry out in request of the Central Bank of Nicaragua.

- B) Participation in the Research of the Social Feasibility of the Program, Development of the clay handicraft in San Juan de Oriente, in request of the Central Bank of Nicaragua and the Banco Nicaraguense.
- C) Co-Director in the Research of Social participation of Puerto Morazan Fishermen, in order to assess the social barriers of the Program, Development of the shrimp culture in basins, in request of the Central Bank of Nicaragua.
- D) Participation in the Research on Social integration of all the components of the University Community of the Universidad Centroamericana (Central American University).
- E) Personal research of my Doctoral thesis on the establishment and distribution of the industrial working class in Nicaragua during the last lustrum and its level of union organization.
- F) Research on the attempts of union formations at the Mantica Supermarkets during the period post-earthquake, of Managua.
- G) Participation in the Project of Research of the urbanization process in Central America sponsored by the Consejo Superior Universitario de Centro América (Central America University Superior Council).