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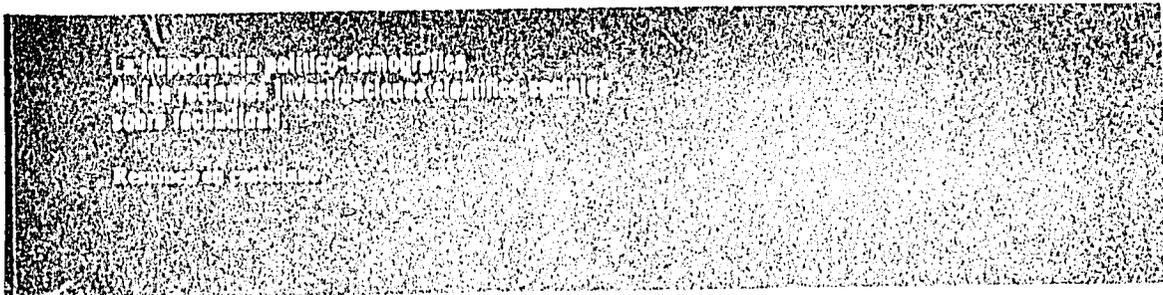
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INTERDISCIPLINARY COMMUNICATIONS PROGRAM
Southwestern Institution

L'importance politico-démographique
des récentes recherches sociales
sur la fécondité

Resume en français.



THE INTERDISCIPLINARY COMMUNICATIONS PROGRAM (ICP) is a private organization which aims to facilitate communication, exchange of ideas, and intellectual interactions among persons of different professions and disciplines who have, or should have, a common interest in a problem of common concern. It is associated with the Office of the Assistant Secretary for Science of the Smithsonian Institution. The programs of the Smithsonian Institution span the world's hemispheres, and are supported by private gifts and bequests as well as by public funds.

In June 1972, ICP undertook an integrated effort—the International Program for Population Analysis (IPPA)—to encourage members of the social sciences and humanities, particularly those from the developing countries of the Third World, to become involved in the study of problems and solutions of contemporary conditions related to population dynamics and population policies.

Several components make up IPPA:

- Support of short-term research projects on the social science aspects of population problems of developing countries that are amenable to change.
- A communications network—implemented by small workshops, and a publications program which includes a quarterly newsletter, conference proceedings, and occasional monographs—among researchers and decisionmakers interested in policy solutions to population problems.
- Technical resource facilities to aid and develop the community of interest in population concerns.

This monograph is the result of ICP's response to a direct request made by the U. S. Agency for International Development in early 1974. At the eighth ICP workshop/seminar on "Economic and Noneconomic Determinants of Fertility," convened for IPPA in the Spring of 1974, participants discussed aspects of this project. The publication is, of course, also a manifestation of IPPA's communications activity. It is hoped that it will prove useful to research workers and decisionmakers in the formulation and implementation of population policies which heighten the quality of national development through their effect on population dynamics.

The Policy Relevance of Recent Social Research on Fertility

Occasional Monograph Series

Number Two

An ICP Staff Report

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FOREWORD

This work began in early 1974 as a review and analysis of "selected research findings on socioeconomic and ecological variables and demographic variables with respect to policy relevance" at the request of the Office of Population of the U.S. Agency for International Development. In the course of carrying out this task, a somewhat broader mandate evolved so that this publication, although largely a commentary—but not a definitive work—on the state-of-art, also offers suggestions for future social science research on population.

The initial report (admittedly a first approximation) was offered for critical review to some members of the social science community in the summer of 1974. That report has been revised extensively in form and, to a lesser degree, in substance. However, certain generalizations remain pertinent.

- There is need for a holistic approach to the formulation of population policy. A dichotomy of development or family planning is unrealistic and self-defeating.

- The conceptualization of the determinants of fertility requires acceptance of the involvement of a multitude of factors that vary greatly in the intensity and direction of force they exert on fertility.

- A framework, or hierarchy, establishing ordered levels of methodologies and concepts for classifying social science research with respect to its value and validity to decisionmakers could be useful for strategic decisionmaking about research needs and priorities, as well as for evaluating research.

- The idea of a Population Impact Statement warrants consideration and requires conceptual and methodological refinement. Yet even before development of the concept of the Population Impact Statement, it is essen-

tial that planners and policymakers be aware of, and take into consideration, the implications of "non-fertility related" programs on population dynamics.

□ Communication loop-processes which achieve maximum exchange of pertinent, reliable, and useful information among social scientists and decisionmakers are fundamental requirements for the successful application of research findings to population problems. Existing communication processes should be improved; new directions should also be sought.

I consider it fortunate that the Interdisciplinary Communications Program was afforded the opportunity to undertake this review and analysis as a special task of its International Program for Population Analysis. I express my appreciation for the excellent and continuing support and encouragement of Steven W. Sinding and Carl J. Hemmer of the U.S. Agency for International Development, as well as my thanks for the cooperation of all ICP staff who contributed directly or indirectly to the preparation of this report.

M. C. Shelesnyak
Director

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PREFACE

When it comes to research, consensus on the phrase, "More research is needed" is easily achieved. This document does not propose a contrary opinion. Despite immense world interest in the population problem as demonstrated by the United Nations in naming 1974 as World Population Year, precious little is known about how governments can go about solving the problem. The imposition of public authority on private fertility decisions appears most unlikely; governments must work with their usual policy tools of public subsidies, incentives, and "jawboning" to turn private rights to public benefit.

The most substantial efforts to deal with the problem of rapid population growth have centered on reducing fertility by means of voluntary use of both private and official government family planning programs. These have been successful in many cases; nonetheless, thoughtful men and women have for some years considered what measures *beyond family planning* may also contribute to the public objective of many countries to reduce fertility and population growth. The search for viable policy strategies has led to examination of the determinants of fertility.

Fortunately, man and the students of man's behavior have moved well beyond the pessimistic conclusion of Malthus, who reasoned that fertility would always be high unless checked by moral restraints. We now know that family fertility decisions are responsive to a multitude of changes in the household environment and to changes in the attitudes and desires of family members themselves.

Theorizing about the determinants of fertility is an interesting and important exercise; however, it is not the subject of this report. The specific nature of the determinants of fertility is intricate and complex. Simultaneous changes in a number of factors associated with the process of

THE POLICY RELEVANCE OF RECENT SOCIAL RESEARCH ON FERTILITY

economic and social development tend to offset attempts to analyze the relative influences of each factor, and may result in contradictory evidence about how these various factors affect fertility.

In Chapter 1 we attempted to determine whether consensus or confusion currently prevails among investigations and investigators on the nature and extent of the relation of each of many variables to fertility. We reviewed and analyzed what may be regarded as primary documents—the original research papers in which social scientists present their findings and the methods they used. Each of these scientific papers offered us bits of information, verified by quantitative data, on the relationship between one or more independent socioeconomic, ecologic, and demographic variables and fertility. Some 300 bits of information were extracted from nearly 100 separate original sources and grouped together according to independent variable. The variables initially examined were gradually grouped into 18 categories and the findings on the relationship of each of the 18 variables to fertility are reviewed.

The subject of family planning programs and their relationship to fertility decline is dealt with in Chapter 2. Family planning is the workhorse of population policy. Most population money is spent on family planning programs; these programs are older, administratively more established, and much less subject to critical opprobrium than other population activities. The analysis of the literature on family planning programs for this chapter began with a broad view of what the evaluators are evaluating about these programs. In this review, we were faced with the fact that a broad diversity of activities reside under the generic family-planning umbrella. Further, the concerns of the evaluators proved to be wide-ranging and often lacking in significant agreement on such questions as definition of objectives, measurement of resource inputs and program outputs, analysis of administrative process and coordination within program components, and even on contraceptive practices involved. Many of the studies, however, did address a central question: Do family planning programs reduce fertility in the population as a whole? We took this as the central question guiding the analysis of the family planning literature in Chapter 2.

The organization of Chapter 3 was conceived in the following manner: Governments execute policies through action arms (ministries and programs) by the expenditure of resources (money, man-hours, and moral suasion) directed at solution of problems (high fertility). Research on some of the determinants of fertility should suggest action by ministries of education, public works, labor, finance, et cetera. The results of our review of social research suggest some immediate activities, which are presented in Chapter 3. A more important conclusion is that the design of future

Preface

programs of research must make explicit the connection between knowledge and action.

I express my thanks to the ICP secretarial staff, whose contributions from the early phases of gathering materials to final manuscript preparation, helped speed the report to final publication. For valuable comments on the initial project report that were useful in preparation of this final document, I am particularly grateful to Carl J. Hemmer, Steven W. Sinding, J. J. Speidel, Duff G. Gillepsie, John E. Lawson, Jr., and David E. Mutchler of the Office of Population, U.S. Agency for International Development; James A. Brown, Jr. of the Office of Program and Policy Coordination of the U.S. Agency for International Development; O. Harkavy of the Ford Foundation; Cecile De Sweemer of the Ford Foundation, Lagos; Bruce Herrick of the University of California at Los Angeles; Timothy King of the World Bank; and Everett M. Rogers of the University of Michigan.

In particular, the theme—Can the results of a specific research project yield actionable information?—examined in its many subtle details in a paper by Professor Warren Ilchman of the University of California at Berkeley, has done much to influence the scope and logic of the recommendations in this report. His paper will appear as a separate ICP/IPPA publication.

The usual caveats of responsibility apply.

William Paul McGreevey
23 August 1974

SUMMARY AND RECOMMENDATIONS

This report is designed to inform social scientists and policymakers about social research that can help a government decide how to employ resources in the most efficient manner to achieve population/development objectives. Featured in the report is an examination of the policy relevance of recent social research on fertility, as well as recommendations for future work by social scientists in the population field.

The literature on the determinants of fertility is treated in Chapter 1. More than 18 variables were analyzed. This review indicates that the adequacy of research is quite uneven on these variables. It is satisfactory on female education. It is fair on income, male education, employment, costs of children, infant mortality, and urban-rural differentials. It is poor or inadequate on such other variables as income distribution, economic development, socioeconomic status, employment of children, son preference, age and type of marriage, religion and traditionalism. However, some of these variables may not be subject to policy manipulation and, from that point of view, may not merit substantially more study; moreover, useful results are not likely to come from research methods which consider single variables. Multi-variate analysis which yields partial elasticities of fertility with respect to independent variables, and which allows the investigator to hold constant other variables, come as near as the population social scientist is likely to get to laboratory conditions needed to identify and isolate the role of single variables and hence of single policies. A summary of elasticities drawn from a number of studies which can be used to estimate the relative cost-effectiveness of alternative population policies is also presented in Chapter 1, but for the most part, the review demonstrates that researchers have been unable to measure or to quantify relationships which have been found, or to estimate costs of policies regarding these relationships.

THE POLICY RELEVANCE OF RECENT SOCIAL RESEARCH ON FERTILITY

The question of whether family planning programs reduce fertility is addressed in Chapter 2. Of 32 studies which analyzed the fertility-reducing impact of such programs, findings in three-fourths of the studies indicate that the programs did result in lower fertility for the community as a whole. Nineteen other studies were also analyzed for this chapter with respect to methodology and findings. In summary, it was found that family planning programs are successful where general conditions of rapid economic and social development prevail, and less successful in areas of economic stagnation. Despite the relatively high quality of research in this area, many of the researchers used inadequate measurement procedures and failed to consider such important exogenous variables as rising age of marriage and the use of non-program methods of contraception. Many studies were not designed to reject alternative hypotheses of the causes of fertility decline. Standardization of concept and measurement is necessary before meaningful comparisons between programs are possible. Additional research should be directed at identifying sources of success in successful programs and transferring successful technologies to other settings.

Recommendations for new areas for social research relevant to policy are contained in Chapter 3. Since the overarching problem in coping with population problems is how to turn public objectives into private action, the policymaker needs to know:

- How to mobilize more resources in pursuit of the goal.
- How to allocate those resources in the most effective manner among the several action arms of government.
- How to make resource use as efficient as possible in each of the action arms.
- How household decisions are made and how to influence them.
- How to assure that the total impact of government activities, including all the non-population projects of the public sector, is consistent with the goal of fertility reduction as well as with their own primary objectives.

Identification of the deficiencies and requirements in these knowledge areas leads to the following recommendations regarding future work by social scientists in the population field:

- 1) Some social science research efforts should be directed to investigations which will help support an increase in resources made available for population activities as part of development programs.
- 2) Careful study of whether programs other than family planning (such as incentive and bond schemes, improvements in women's status, education improvements, efforts to reduce infant mortality) can yield reductions of fertility at costs comparable to those of family planning programs.
- 3) Within the family planning evaluation field, better use should be made

Summary and Recommendations

of sophisticated methodology to assure that changes in fertility can be properly attributed to family planning services and to permit adequate measurement of the direct effect of the services; and more emphasis should be placed on management procedures that reduce program costs and improve program efficiency.

4) In studies of correlates of fertility, more attention should be paid to the elasticity of fertility with respect to specific variables which are policy-manipulable and which prior studies have suggested are significant, with special attention to the costs of policy alternatives in such other sectors as education, health, et cetera. Emphasis should be placed on new methods of data collection and new analytical techniques which focus attention at the level of the household. This approach requires special surveys of household budgets and increased in-depth analysis by anthropologists and psychologists.

5) Social science findings should help form the rationale for Population Impact Statements that reveal the effect on fertility of non-fertility government decisions.

Résumé en français

Le présent rapport est le fruit d'une étude initiale qui examine et analyse le bien-fondé de récentes recherches sociales sur la fécondité. Comme la dynamique de population est un domaine *dynamique*, ce rapport ne peut espérer être un résumé de la situation. Bien au contraire, il a pour objet d'informer sociologues et législateurs sur quelques-uns des travaux actuels en matière de recherche sociale susceptibles d'aider un gouvernement à décider comment utiliser efficacement les ressources dont il dispose pour atteindre les objectifs de population et de développement. Ses auteurs font également des recommandations pour l'exécution d'autres travaux de recherche utiles.

Lorsqu'on parle de recherche, il semble toujours facile de se mettre d'accord pour dire que "d'autres recherches sont nécessaires". Ce document ne propose pas une opinion contraire. Malgré l'immense intérêt porté par le monde au problème de la population, comme en témoigne par exemple le fait que les Nations Unies aient proclamé l'année 1974 Année mondiale de la population, on ne sait pas grand chose sur la façon dont les gouvernements intéressés peuvent résoudre ce problème. L'ingérence des pouvoirs publics dans les décisions privées en matière de fécondité semble extrêmement improbable; aussi, doivent-ils agir avec leurs instruments de politique habituels pour faire profiter le grand public des droits du citoyen.

Les efforts politico-démographiques les plus importants déployés pour résoudre le problème de l'expansion rapide de la population ont porté sur la réduction des programmes de planification familiale. Ces programmes ont dans de nombreux cas été couronnés de succès mais depuis quelques années déjà, des personnes avisées envisagent d'autres mesures qui pour-

Résumé en français

raient contribuer à l'objectif public de nombreux pays: réduire la fécondité et freiner l'expansion démographique.

La quête de stratégies viables a conduit à l'examen des facteurs qui déterminent la fécondité. Nous savons aujourd'hui que les décisions familiales dans ce domaine sont subordonnées à une multitude de changements qui surviennent dans le milieu ambiant ainsi qu'aux changements d'attitude et de désirs des membres de la famille eux-mêmes. (Il est heureux de constater que les étudiants du comportement de l'homme sont allés bien au-delà de Malthus pour qui la fécondité serait élevée à moins d'être contrôlée par des contraintes d'ordre moral.) Toutefois, la nature spécifique des déterminants de la fécondité est à la fois confuse et complexe. Les variations simultanées du nombre de facteurs liés au processus de développement économique et social contrebalancent l'influence relative de chaque facteur et présentent des preuves contradictoires sur la façon dont ces divers facteurs influencent la fécondité.

Méthodologie et résultats

Au chapitre 1, nous avons essayé de déterminer s'il existe actuellement parmi les enquêtes et chercheurs un consensus ou non quant à la nature et au rapport entre chaque variable et la fécondité. Nous avons étudié et analysé ce qui peut être considéré comme les documents de base, à savoir les communications initiales dans lesquelles les sociologues présentent leurs conclusions et décrivent les méthodes utilisées. Chacune de ces communications scientifiques fournissait des renseignements que venaient corroborer des données quantitatives sur les rapports existant entre une ou plusieurs variables socio-économiques, écologiques et démographiques et la fécondité. Quelque 300 brins d'information ont été extraits de près de 100 sources différentes puis groupés par variable indépendante. Les variables examinées initialement ont été classées en 18 catégories et les conclusions tirées du rapport entre chacune d'elles et la fécondité sont à l'étude.

Cette étude révèle que l'adéquation des recherches effectuées sur ces variables est assez inégale. Elle est satisfaisante dans le cas de l'éducation des femmes. Elle est juste dans celui des revenus, de l'éducation des hommes, de l'emploi, du coût des enfants, de la mortalité infantile et des différences entre les régions rurales et urbaines. Elle est médiocre ou insuffisante dans le cas d'autres variables comme la distribution des revenus, le développement économique, la situation économique et sociale, l'emploi des enfants, la préférence pour les garçons, l'âge au mariage et le type de mariage ainsi que la religion et le traditionalisme. Cependant, quelques-unes de ces variables peuvent ne pas être sujettes à une manipulation de politique, et de l'avis du législateur il se peut qu'elles ne doivent pas

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être l'objet d'une étude beaucoup plus approfondie tout comme d'ailleurs les méthodes de recherche qui ne tiennent compte que d'une variable. Les analyses à variables multiples qui donnent des élasticités partielles de la fécondité par rapport aux variables indépendantes et qui permettent au chercheur de maintenir constantes d'autres variables sont aussi proches que possible des conditions de "laboratoire" dont aura vraisemblablement besoin le sociologue de la population pour identifier et isoler le rôle de variables uniques et, partant, de politiques individuelles. On trouvera donc au chapitre 1 les élasticités tirées d'un certain nombre d'études et qui peuvent être utilisées pour estimer le coût-efficacité relatif d'autres politiques de population. Dans sa plus grande partie cependant, l'étude montre que les chercheurs n'ont été à même ni de mesurer ni de quantifier les relations identifiées ni encore d'estimer les coûts des politiques concernant ces relations.

La question des programmes de planification familiale et de leur rapport avec la fécondité est étudiée au chapitre 2. La planification familiale est le cheval de bataille de la politique de population. La plus grande partie des fonds de population sont affectés à des programmes de planification familiale; ces derniers sont plus anciens, administrativement mieux établis et beaucoup moins sujets à des reproches que d'autres activités de population. L'analyse des ouvrages sur les programmes de planification familiale a commencé par une idée générale de ce qu'évaluent ceux qui sont chargés de les évaluer. Au cours de cette étude, nous avons dû faire face à une vaste gamme d'activités qui relèvent de l'expression générique "planification familiale". De plus, les intérêts des évaluateurs se sont avérés extrêmement divers et n'ont pas fréquemment été l'objet d'un accord sur des questions comme la définition des objectifs, la mesure des ressources et des programmes, l'analyse du processus administratif et de la coordination au sein des composantes de programme, et même les méthodes de contraception en jeu.

Toutefois, bon nombre des études ont porté sur une grande question: "Les programmes de planification familiale réduisent-ils la fécondité de la population dans son ensemble?" Cette question a orienté notre analyse des 32 études qui ont examiné l'incidence des programmes de planification familiale sur la réduction du taux de fécondité, les trois quarts arrivant à la conclusion que ces programmes réduisaient la fécondité de la communauté dans son ensemble. Dix neuf autres études ont également été l'objet d'une analyse quant à leur méthode d'analyse et à leurs conclusions sur les variations du taux de fécondité. En règle générale, il a été constaté que les programmes ont plus de succès lorsqu'a lieu simultanément un développement économique et social rapide, et moins de succès lorsque l'économie est en stagnation. Malgré la qualité relativement élevée des

recherches, bon nombre des études ont utilisé des techniques d'évaluation inappropriées et n'ont pas tenu compte de variables exogènes comme l'âge du mariage et le recours à des méthodes de contraception qui ne relèvent pas des programmes. Parmi les conclusions du chapitre 2 figurent: a) il convient de normaliser concept et mesure avant de pouvoir procéder à des comparaisons éclairées entre les programmes de planification familiale, et b) d'autres travaux de recherche doivent viser à identifier les sources de succès des programmes qui en ont été couronnés et à transférer les techniques viables à d'autres cadres.

Le chapitre 3 porte sur les recommandations ayant trait aux nouveaux domaines des sciences sociales qui peuvent intéresser la politique de population. Comme le plus grand problème que posent les problèmes de population est de trouver un moyen de transformer des objectifs publics en actions de caractère privé, le chapitre précise que le législateur doit savoir:

- Comment mobiliser davantage de ressources à la recherche de l'objectif fixé
- Comment allouer ces ressources le plus efficacement possible entre les diverses branches d'action de l'Etat
- Comment rendre l'emploi de ces ressources aussi efficace que possible dans chacune de ces branches
- Comment sont prises les décisions des ménages et comment les influencer et
- Comment s'assurer que l'incidence globale des activités de l'Etat, y compris tous les projets du secteur public qui ne sont pas des projets de population, est compatible avec l'objectif même qu'est la réduction du taux de fécondité et avec leurs propres objectifs de base.

L'organisation du chapitre 3 a été conçue de la manière suivante: les gouvernements exécutent des politiques par le biais de branches d'action (ministères et programmes) en affectant des ressources (argent, hommes-heures et persuasion morale) à la solution de problèmes (taux de fécondité élevé). Les recherches sur quelques-uns des déterminants de la fécondité devraient proposer des mesures que prendraient les ministères dans d'autres secteurs: éducation, travaux publics, emploi, finances, etc.

Les résultats de notre étude des recherches sociales suggèrent en outre la réalisation de quelques activités de recherche immédiates. Toutefois, il y a lieu de tirer de ce rapport une conclusion plus importante encore, à savoir que la conception des futurs programmes de recherche doit rendre explicite le lien qui existe entre les connaissances et l'action.

Recommandations en matière de recherche

L'identification des lacunes et des besoins dans ces domaines de connaissances nous conduit aux recommandations ci-après sur la future méthode des travaux qui requièrent une étude particulière des budgets de la famille ainsi qu'une analyse approfondie du problème par des anthropologues et des psychologues.

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1) Une partie de l'énergie scientifique doit porter sur des recherches qui favorisent un accroissement des ressources disponibles affectées aux activités de population dans le cadre des programmes de développement.

2) Une étude soignée doit être entreprise pour déterminer si d'autres programmes que ceux de planification familiale (plans de stimulants et de bons, améliorations de la condition de la femme, modernisation de l'enseignement, réduction de la mortalité infantile) peuvent entraîner une réduction du taux de fécondité à des coûts comparables à ceux des programmes de planification familiale.

3) Dans le domaine de l'évaluation de la planification familiale, il convient de faire un meilleur usage des méthodes modernes pour s'assurer que les variations du taux de fécondité seront attribuées comme il se doit aux services de planification familiale et d'autre part pour permettre une mesure adéquate de l'impact direct de ces services. Il importe d'insister davantage sur les techniques de gestion qui réduisent les coûts des programmes et améliorent leur efficacité.

4) Dans l'étude d'autres déterminants de la fécondité, il faut tenir davantage compte de l'élasticité de la fécondité par rapport à des variables spécifiques qu'il est possible de manipuler politiquement et que d'autres études ont considérées comme d'importance. Une attention particulière doit être accordée aux coûts d'autres politiques dans des secteurs comme l'éducation, la santé, etc. ainsi qu'aux nouvelles méthodes de rassemblement des données et nouvelles techniques analytiques qui centrent leur intérêt sur la famille. Cette méthode exige des anthropologues et des psychologues la réalisation d'études spéciales sur les budgets des ménages et d'une analyse de plus en plus approfondie.

5) Les résultats qu'obtiennent les sciences sociales devraient fournir l'assise de déclarations d'incidence démographique qui révéleraient l'effet qu'ont sur la fécondité les décisions de l'Etat prises hors cadre et qui découlent de besoins similaires aux conditions requises par la loi de l'environnement aux Etats-Unis.*

*Promulguée en 1969, la loi des Etats-Unis sur la politique nationale de l'environnement s'applique aux principales mesures de caractère fédéral qui peuvent considérablement affecter l'environnement, et notamment le financement de la construction d'autoroutes et d'usines de traitement des eaux résiduelles, la construction de bases militaires et l'autorisation de projets comme l'érection de centrales nucléaires. Aux termes de cette loi, l'agence gouvernementale responsable est tenue de décrire dans tous leurs détails les effets prévisibles des activités proposées sur l'environnement. Cette Déclaration sur l'incidence écologique doit être prise en considération par l'agence lorsqu'elle prend une décision concernant la mise en application de la proposition. Un certain nombre de projets—construction d'une autoroute inter-états en Virginie, ouverture d'un grand centre commercial dans le montagnes de Californie et construction de l'oléoduc Alaska—ont été interdits ou différés, les conditions requises n'ayant pas été remplies. Dans d'autres cas, des projets ont été fortement modifiés à la suite de la Déclaration.

Preoccupations universelles

Certaines généralisations sont pertinentes: • Il y a lieu d'aborder la formulation des politiques de population de manière globale: faire une dichotomie du développement économique ou de la planification familiale est irréaliste et voué à l'échec. • La conceptualisation des facteurs qui déterminent la fécondité exige des intéressés qu'ils acceptent la participation d'une multitude de facteurs dont l'intensité et les pressions qu'ils exercent sur la fécondité, varient considérablement. • Un cadre ou une hiérarchie, établissant des niveaux ordonnés de méthodes et de concepts destinés à classer les recherches sociologiques en fonction de leur valeur et de leur intérêt pour les législateurs, pourrait servir à la prise de décisions stratégiques sur les besoins et priorités de recherche ainsi qu'à l'évaluation même des recherches. • Avant même que ne soit mis au point le concept d'une Déclaration d'incidence démographique, il est essentiel que les planificateurs et les législateurs soient conscients et tiennent compte des conséquences que peuvent avoir les programmes qui ne sont pas liés à la fécondité, sur la dynamique de population. • La création de processus de rétro-communication pour permettre un échange maximal de renseignements pertinents, fiables et utiles entre les sociologues et les législateurs est essentielle pour assurer une application fructueuse des conclusions auxquelles sont arrivés les chercheurs, aux problèmes de population. Il importe enfin d'améliorer les processus de communication existants et de chercher de nouvelles orientations.

Resumen en castellano

El presente informe es producto de un estudio en el que se analiza la relevancia para la política demográfica de las recientes investigaciones científico-sociales de la fecundidad. Como la esfera de la dinámica de la población es, sin duda alguna, *dinámica*, no pretendemos en este informe resumir los últimos adelantos en esta materia. Se trata más bien de informar a los especialistas en ciencias sociales y a los que toman las decisiones políticas de algunas conclusiones de investigaciones que pueden ser útiles para el poder ejecutivo en el momento de decidir la manera de utilizar con la mayor eficacia los recursos disponibles para lograr los objetivos del desarrollo y demográficos. Los autores presentan también recomendaciones de posibles investigaciones útiles en materia de política demográfica.

Hablando de investigación nada más fácil que ponerse de acuerdo en que "hace falta más investigación" y el presente trabajo no contradice esa opinión. Pese al enorme interés mundial por los problemas de la población—¿no declararon las Naciones Unidas a 1974 Año Mundial de la Población?—se sabe poquísimo sobre lo que tendrían que hacer esos gobiernos para resolver esos problemas. Es poco probable que puedan invadir e inundar la esfera íntima de decisiones privadas sobre fecundidad con el criterio apabullante de lo público. Por eso mismo, los gobiernos tendrán que trabajar con los instrumentos administrativos existentes para que esas decisiones privadas resulten en beneficio público.

Los esfuerzos más serios empeñados frente al problema del rápido crecimiento demográfico se han concentrado en reducir la fecundidad mediante programas de planificación de la familia. Estos programas han

tenido éxito en muchos casos. No obstante, muchos hombres y mujeres precavidos han venido pensando si no habría otras medidas "más allá de la planificación de la familia" que puedan contribuir al objetivo público de muchos países que quieren reducir la fecundidad y el crecimiento demográfico. La búsqueda de estrategias ejecutivas viables ha conducido al examen de los determinantes de la fecundidad. Sabemos que la fecundidad de la familia depende de numerosísimos cambios en el medio ambiente de la familia en general y en las actitudes y deseos de los individuos que la componen en particular. (Por suerte, los que estudian el comportamiento humano han abandonado hoy día las conclusiones pesimistas de Malthus que creía que la fecundidad permanecería elevada a no ser que se la domesticase con frenos morales). Con todo, la naturaleza específica de los determinantes de la fecundidad es algo muy intrincado y complejo. Los intentos de analizar la influencia relativa de cada factor se ven contrarrestados por los cambios simultáneos en varios factores, cambios asociados con el proceso de desarrollo económico y social, con las consiguientes contradicciones en el material de evidencia sobre el modo en que esos diversos factores afectan la fecundidad.

Metodología y resultados

En el primer capítulo intentamos determinar si predomina hoy, entre las investigaciones y los investigadores, el consenso o, por el contrario, la confusión sobre la naturaleza y amplitud de la relación de cada una de las numerosas variables con la fecundidad. Analizamos lo que podríamos llamar documentos primarios, es decir, monografías originales en que los especialistas en ciencias sociales presentan sus conclusiones y sus métodos, cada una de las cuales contiene núcleos de información, verificados mediante datos cuantitativos, sobre la relación entre fecundidad y una o varias variables independientes de carácter económico-social, ecológico y demográfico. Extraemos así unos 300 núcleos de información agrupándolos por variables independientes. Estas las agrupamos en 18 categorías, pasando luego a examinar la relación de cada una de las 18 variables con la fecundidad.

Este examen revela que la investigación realizada sobre estas variables es muy desigual. Es satisfactoria en lo que se refiere a la educación de la mujer. Menos satisfactoria en lo que se refiere a ingresos, educación del varón, empleo, coste de los hijos, mortalidad infantil y diferenciales urbano-rurales. Es floja o francamente insuficiente en lo que se refiere a otras variables como distribución de ingresos, desarrollo económico, categoría socio-económica, empleo de los hijos, preferencia por hijos varones, edad en que se contrae el matrimonio y tipos del mismo, y, por fin, religión y tradición. Ahora bien, es posible que algunas de estas

Resumen en castellano

variables se escapen a la manipulación del ejecutivo, por lo que no merecerían que se les dedicase mucho más esfuerzo intelectual; tampoco lo merecen los métodos de investigación que se concentren en sólo una variable. Por el contrario, los análisis que operan con varias variables (análisis multivariantes), en la medida que nos dan elasticidades parciales de la fecundidad en función de variables independientes y en la medida, además, en que permiten al investigador "congelar" otras variables (manteniéndolas constantes) son los únicos que pueden poner al investigador de ciencias sociales de la población en una situación de "cuasilaboratorio", necesaria para identificar y aislar el papel de cada variable y, con ello, de cada decisión de política demográfica. Por consiguiente, en el primer capítulo resumimos estas elasticidades, extrayéndolas de una serie de estudios, que se pueden utilizar para calcular la eficacia de diversas políticas demográficas en función de lo que cuestan. En la mayoría de los casos, sin embargo, nuestro examen revela que los investigadores no han podido ni medir ni cuantificar las relaciones que han descubierto, ni, por tanto, proceder a una evaluación de los costos de las políticas basadas en esas relaciones.

En el segundo capítulo se habla de los programas de planificación de la familia en relación con el descenso o disminución de la fecundidad. La planificación de la familia es el único y consabido recurso de que en realidad dispone en la práctica la política demográfica. La mayor parte de los fondos disponibles se invierten en los programas de planificación de la familia. Estos programas tienen más años, están más arraigados en la administración del estado y son menos vulnerables a la crítica que otras actividades demográficas. Nuestro análisis de la bibliografía sobre planificación de la familia comienza con un examen general de lo que los evaluadores pretenden evaluar en estos programas. Nuestro examen revela la existencia de una gran variedad de actividades que se cobijan bajo el rubro de "planificación de la familia". Revela también que los evaluadores buscan muchas cosas y no suelen estar siempre de acuerdo sobre la definición de los objetivos, medición de insumos de recursos y productos de programa, análisis de procedimientos administrativos, coordinación de los componentes de un programa y ni siquiera sobre las prácticas anticonceptivas de que se trata.

Muchos de esos estudios, sin embargo, se plantean una cuestión básica, a saber, si los programas de planificación de la familia reducen la fecundidad de la población en su conjunto. Esta grave interrogante orienta el análisis de nuestro examen de los 32 estudios que analizan el impacto reductor de fecundidad de los programas de planificación de la familia y llegan a la conclusión de que los programas reducen en efecto, la fecundidad para la totalidad de la comunidad. Examinamos otros 19 estudios

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desde el punto de vista de método analítico y resultados sobre las variaciones de la fecundidad. En general, se puede decir que los programas tienen más éxito en condiciones generales de rápido desarrollo socio-económico y menos en áreas de estancamiento económico. Pese a la calidad relativamente elevada de las investigaciones muchos estudios emplean procedimientos inadecuados de medición y no tienen en cuenta importantes variables exógenas como matrimonios a edades cada vez más avanzadas y el uso de métodos anticonceptivos no programados. Entre las conclusiones a que se llega en el segundo capítulo figuran: a) es imprescindible unificar los conceptos y métodos de medición antes de poder comparar significativamente los programas de planificación de la familia, y b) es necesario investigar la identidad de las causas del éxito en los programas que lo tienen para poder transplantarlas a otras circunstancias.

El tercer capítulo recomienda nuevas esferas de investigación científico-social con relevancia político-demográfica. Como el problema fundamental en demografía consiste en lograr que las decisiones privadas resulten en beneficio público, se menciona que las autoridades responsables necesitan saber:

- Cómo movilizar más recursos para alcanzar ese objetivo.
- Cómo asignar esos recursos con un máximo de eficacia entre las diversas palancas ejecutivas del gobierno.
- Cómo maximizar la eficacia en cada una de esas palancas.
- Averiguar cómo toman las familias sus decisiones y cómo influir en ese proceso.
- Cómo conseguir que el impacto total de la múltiple acción gubernamental, incluyendo los proyectos no demográficos del sector público, sea compatible con el objetivo de reducir la fecundidad además de con sus propios objetivos.

El capítulo tercero está organizado en torno a las siguientes ideas: los gobiernos ejecutan sus políticas utilizando diversas palancas ejecutivas (ministerios y programas), invirtiendo recursos (dinero, horas de trabajo humano—horas hombre—y persuasión moral) con objeto de resolver ciertos problemas (exceso de fecundidad). La investigación de algunos de los determinantes de la fecundidad debe servir para indicar lo que tiene que hacerse con el programa de planificación de la familia normalmente pilotado por el ministerio de la salud. La investigación de otros determinantes debe indicarles a los ministerios otras posibilidades de acción en otros sectores como educación, trabajos públicos, empleo, finanzas, etc.

Recomendaciones de investigación

Los resultados de nuestro examen de las investigaciones científico-sociales sugieren, además, algunas actividades inmediatas, pero más importante aún es otra conclusión, a saber, que en la concepción de los futuros programas de investigación debe explicitarse el nexo entre conocimiento científico y acción. La identificación de las deficiencias y de

las necesidades en estas materias científicas nos llevan a las siguientes recomendaciones sobre el futuro enfoque de los trabajos que requieren estudios especiales de los presupuestos de la familia así como más análisis a fondo del problema realizados por antropólogos y psicólogos.

1) Parte de la energía científica debe concentrarse en investigaciones que apoyen un aumento de los recursos disponibles para actividades demográficas como parte de los programas de desarrollo.

2) Hay que estudiar cuidadosamente si, además de los de planificación de la familia, no habrá otros programas (como incentivos y bonos, mejoras en la situación social de la mujer, en la educación, reducción de la mortalidad infantil) que puedan reducir la fecundidad a costos comparables con los originados por los programas de planificación de la familia.

3) En el sector de evaluación de la planificación de la familia hay que usar mejor las sutilezas de la metodología para saber si las variaciones en fecundidad se deben de veras a los servicios de planificación de la familia y para poder medir adecuadamente el efecto directo de dichos servicios. Hay que insistir en procedimientos de gestión que reduzcan los costos y aumenten la eficacia de los programas.

4) Al estudiar otras determinantes de la fecundidad hay que tener más en cuenta la elasticidad de ésta ante otras variables manipulables mediante políticas y cuyo significado han descubierto estudios recientes. Hay que dedicar la atención debida a los costos de otras variantes o alternativas de política en sectores como el de la educación, salud, etc., haciendo hincapié en nuevos métodos de recopilación de datos y nuevas técnicas analíticas que concentren sus focos en la familia, estudiando especialmente el presupuesto de la familia y con más análisis en profundidad efectuados por antropólogos y psicólogos.

5) Los resultados obtenidos por las ciencias sociales que tengan su origen en requisitos análogos a los que exige la Ley del Medio Ambiente de Estados Unidos* contribuirán sin duda a sentar la base lógica de las

*La Ley Nacional del Medio Ambiente, de Estados Unidos, promulgada en 1969, tiene aplicación en todas las actividades del Gobierno Federal que puedan afectar de manera importante al medio ambiente, entre ellas la asignación de fondos para carreteras e instalaciones depuradoras de aguas residuales, construcción de bases militares y concesión de licencias para proyectos privados como centrales de energía nuclear. Conforme a esta legislación, se exige al organismo público responsable que prepare una declaración en la que se detallen los efectos previsibles de la actividad en proyecto en el medio ambiente. El organismo viene obligado, al adoptar una decisión sobre la puesta en práctica de la propuesta, a tener en cuenta esta Declaración de Impacto en el Medio Ambiente. Ha habido varios proyectos —la construcción de una carretera interestatal en Virginia, la inauguración de un extenso parque comercial en las montañas de California y la construcción del

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declaraciones sobre el impacto demográfico que ponen de manifiesto el efecto que surten en la fecundidad las decisiones gubernamentales no relacionadas con esta cuestión.

Preocupaciones universales

Empecemos por presentar algunos conceptos generales: • hace falta dar un enfoque total a la formulación de toda política demográfica puesto que el escindir esa totalidad en, por un lado, desarrollo económico y, por otro, planificación de la familia no es sino cerrar los ojos ante la realidad y estrellarse contra ella sin poder superarla, • para reducir a conceptos científicos los factores determinantes de la fecundidad hay que admitir toda una serie de factores o causas cuya influencia en la fecundidad varía enormemente en intensidad y ángulo de impacto, • sería muy útil para la estrategia de la investigación—para saber qué proyectos de investigación se han de aceptar y cuáles rechazar, y entre los aceptables cuáles son los prioritarios—así como para evaluar los resultados, disponer de un marco general de referencia que contenga una jerarquía, por así llamarla, de niveles metodológicos y categorías clasificatorias de las investigaciones realizables por las ciencias sociales, • aun antes de formular el concepto de una Declaración de Impacto Demográfico es fundamental que los planificadores y las autoridades competentes y responsables se enteren del impacto en la dinámica demográfica de todo programa concebido “sin relación con la fecundidad” y • para poder aplicar a los problemas demográficos las conquistas de la ciencia es absolutamente imprescindible establecer un sistema de vasos comunicantes por los que circule información pertinente, fidedigna y útil, entre los especialistas en ciencias sociales y los que toman las decisiones. A estos efectos hay que mejorar los canales existentes y crear otros.

oleoducto de Alaska—que se han visto interrumpidos o han sido rechazados por no haber cumplido este requisito. En otros casos, la Declaración de Impacto y el Medio Ambiente ha sido causa de que se hayan modificado considerablemente algunos proyectos.

CHAPTERS

1. SOME DETERMINANTS OF FERTILITY

IN THIS CHAPTER a number of variables which have been shown to be correlated with fertility are examined with particular attention to their potential relevance to decisionmaking for population policy and implementation.

Virtually all the variables discussed in this chapter are social indicators; that is, they summarize average or modal characteristics of large populations rather than of individuals. Thus, income distribution, infant mortality, educational level, labor force participation, et cetera, are all expressed as proportions or rates for total populations or segments of populations. As such, these aggregate indicators do not "explain" individual behavior. Rather, they serve the primary function of social indicators, which is to describe the main tendencies of a group or class of individuals. Since public policy must be directed not at individuals but at groups or classes, these indicators, rough and imprecise as they may be, are perhaps the best beginning toward a guide for social policy.

Frequent reference is made to the term *fertility*. In the interest of brevity, we have often left unspecified the fertility indicator to which this catchall term refers.* A study by Bogue and Palmore (1964) provides a justification

*The range of measures used to define the concept of "fertility" is illustrated by 11 of the fertility indicators used by analysts whose work is reviewed in this report. When necessary, we have indicated special problems of interpretation which attach to many of these indicators, which include:

- 1) *birth rate* (number of live births in one year per 1000 persons in the mid-year population; also known as "crude birth rate").
- 2) *age-specific birth rate* (number of live births per 1000 women in a given age group).
- 3) *children ever born* (total number of live births during lifetime of a woman).

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for this approach. They collected data for 50 countries for 1955-1960 and computed correlation coefficients between fertility measures. Between the birth rate, general fertility rate, and total fertility rate, the lowest correlation was .982. Correlations between these measures and the age specific fertility rates were never lower than .711 and were usually above .850. Correlation between the ratio of children ages 0-4 to women ages 15-49, and children ages 5-9 to women ages 15-49, was .958. Simple correlations between the birth rate, general fertility rate, total fertility rate, ratio of children ages 0-4 to women ages 15-49, and ratio of children ages 5-9 to women ages 15-49, varied from .886 to .964. These findings of high correlation formed a statistical basis for the assumption that minimal information is lost when speaking generically about fertility.

Two variables that one might expect to see investigated in this chapter do not appear: 1) migration and 2) status of women. Migration was excluded since it requires a separate investigation as part of a larger study of population dynamics and population policy. However, some attention was given to the problem by discussion of the findings from literature on rural-urban differences in fertility. Status of women, although an intrinsically important and independent problem, received treatment as part of other variables—female employment, education, and socioeconomic status since these indicator variables have been the subject of research in many studies.

PREVIOUS REVIEWS

A number of organized efforts to survey the correlates of fertility have appeared in recent years. Perhaps the most comprehensive is *Determinants and Consequences of Population Trends* (United Nations 1973). In 661 tightly printed, double-column pages, the UN document summarizes the current knowledge on virtually any aspect of population that a reader may care to study. A 43-page chapter reviews findings of research on fertility.

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- 4) *cumulative fertility rate* (number of births per 1000 women up to age x).
 - 5) *children ever born subsequent to a specific date of migration*.
 - 6) *mean number of children ever born per mother* (total number of live births divided by number of mothers in the population).
 - 7) *number of surviving children aged 10 years and younger*.
 - 8) *total number of births in one year divided by one-half the population in the 15-64 age group*.
 - 9) *total number of births in one year divided by male population in the 15-54 age group*.
 - 10) *mean total pregnancies* (total pregnancies of a sample of women divided by the number of women in the sample).
 - 11) *age-specific probability of live birth* (chance that a woman of a specified age group will have a child during a given year, expressed as a probability varying from zero to one; also known as "age-specific fertility rate").

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and bolsters the commentary with 367 footnotes referring in large measure to a literature developed in the last 20 years on this subject. Not much could be said about the correlates of fertility that is not covered in some way in this document. However, the author takes no clear evaluative position about the literature, preferring to be encyclopedic rather than analytic in approach.

A somewhat earlier survey prepared for AID/NESA (U.S. Agency for International Development/Near East and South Asia Bureau) by the Research Triangle Institute (1971) summarizes the literature in a manner similar to that used in this chapter; that review included some 274 citations of findings, with 46 percent of them based on data from the developed countries. A recent essay by Williams (1973) covers the literature on feedbacks from fertility to development. Several reviews made by T. Paul Schultz (1971^a, 1972^b, 1973, 1974) comment on the correlates of fertility as revealed in the many Rand studies sponsored by AID.

All these studies treated earlier writings in a reasonably comprehensive manner. Exigencies of time and space, therefore, led us to concentrate on recent works, some of which are still not published. This review of the correlates of fertility gives little attention to works published prior to 1968, touches but lightly on the massive literature treating the subject of the correlates of fertility in the developed countries (especially the United States), and, except in a few instances, does not exploit the rich literature of demographic history. Thus this chapter should be read in conjunction with the works cited above because they complement the findings presented here.

INCOME AND ITS DISTRIBUTION

A review of the literature relating fertility and income revealed that most studies failed to specify income with sufficient clarity to permit clearcut conclusions. Much theoretical work in developed countries has led to suitable definition of income for such analysis (T. W. Schultz 1973^a, 1974), but the theoretical work is more advanced than is careful, empirical research. Indeed, the empirical work which has been conducted has dealt primarily with U.S. data, and we will cite a few U.S. studies to indicate what may be accomplished in developing countries by using improved data.

Several projects are currently underway in developing countries which may prove of significant value for assessing the impact of income on fertility. A Rand group, sponsored by AID, is carrying out a study in Malaysia. A group, sponsored jointly by the World Bank and SUDENE, is doing a study in northeastern Brazil. These studies should permit specification of a model which will make it possible to assess the impact of income on fertility in a developing country. They should aid researchers and decisionmakers determine what policies would be most effective in reduc-

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ing fertility. These investigations should be watched closely as they proceed, to see whether some or all aspects of the research conducted in the two countries could be usefully applied elsewhere—for example, in Africa, where virtually no systematic study of income and fertility has yet been undertaken.

In this chapter, we turn first to the findings of those studies about the effect of income on fertility. Then we examine what research has to say about distributing more equitably the benefits of development.

Effect of Income on Fertility

Economists contend that the effect of increases in income should be to increase demand for goods, including children, and thus to increase fertility. How do economists then explain the apparent fact that fewer children are “purchased” by high-income couples?

An answer was first developed in a classic essay by Gary Becker (1960), and refined subsequently by Easterlin (1969), T. Paul Schultz (1971^a), Theodore Schultz (1973^{a,b}), Nerlove (1974). They distinguish between 1) the *income effect* which increases demand for children, and 2) the *price effect* or *substitution effect* which reduces the demand for children by increasing the price of children relative to other goods, thus inducing higher-income families to substitute other goods for children. These substitution effects operate through such factors as the increasing opportunity cost of women’s time as women increase their educational attainment and employment opportunities, the rising cost of children because they require more schooling at higher income levels, and the expanding appeal and availability of alternative uses of resources in increasing the “quality” of a few children (by giving them better nutrition, good health care and education) as opposed to increasing the quantity of “low-quality” children.

In developing countries, the substitution effect is most likely to take place with improved availability of health, educational, and other services which increase the cost of each child to the parents. Much of the research reviewed here, however, does not adequately distinguish between the pure income effect and the effect of these services on fertility, which, in fact, represent correlates of fertility discussed in other sections of this chapter. Research which enhances the distinction between income and price effects will help indicate what policy actions, other than family planning, have some probability of lowering fertility.

Analyses of the effect of income on fertility using cross-national data have had differing results, and indicate the difficulties posed by income-fertility research. Adelman (1963), in a study of 37 countries, found an overall positive relationship. However, she distinguished between Latin American and Asian countries where the relationship is positive, and developed countries where the relationship becomes negative after the age

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of 30 (p. 320 and p. 323). In contrast, Friedlander and Silver (1967) found a positive relationship in developed countries and a negative relationship in developing countries (p. 60). Heer (1966) did a multiple regression analysis of data from 41 countries, which yielded a positive, but not statistically significant, partial correlation of average per capita income and births per thousand people.

In a recent review of this topic, Simon (1974) concluded that international cross-section analyses may not offer efficacious means of separating income and substitution effects over time, space, and levels of development. Unfortunately the results of studies of individual countries are no more consistent (p. 169).

A sample of 641 women in Iran revealed an inverse correlation between income and fertility (Paydarfar and Sarram 1970, p. 694). Census and registration data from India for the years 1922-1960 also showed a negative income coefficient of $-.9290$ "indicating that a one percent increase in per capita income, on the average, would imply .9290 percent decline in the birth rate" (Krishnamurty 1966, p. 74). In these two studies, however, where a simple negative relationship was found, there was no systematic attempt to separate the pure *income effects* from the impact of *price effect* variables such as the education, occupation, and other socioeconomic characteristics of the women concerned. When Nerlove and Schultz (1970) did attempt to distinguish between income and price effects, using 1950 and 1960 Puerto Rico census data, they also found the negative relationship, and surmised that ". . . the number of children (not necessarily a quality-adjusted stock) was not a superior good in Puerto Rico during this stage of economic development . . ." (p. 48)

Where individual country data are disaggregated into income groups, the negative relationship is not always found. For example, in Turkey an overall negative relationship between family income and fertility emerged. The 1968 KAP survey data showed a slight *rise* in fertility ". . . among the wealthiest families in rural areas, although these increases are not subjected to tests of statistical significance . . ." (Bacon and Mason 1972, pp. 22-33). Differential effects within one country were also reported by Ben-Porath (1973) who found an inverse relationship of male earnings and number of children ever born of oriental Jews living in Israel, but statistically non-significant but positive relationship among couples of European origin (p. S216).

In an analysis of the 1968 National Demographic Survey in the Philippines, Encarnacion (1974) attempted both to separate out income and price effects and to distinguish among different levels of income. He found indications that, below a certain threshold, ". . . rising levels of income

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and education merely aggravate the population problem" (p. 23). In Figure 1, this threshold hypothesis is related to the opposing income effects and price effects. In the pre-threshold area (left of the threshold of modernization in Figure 1), improvements in the standard of living result in immediately higher fertility. At some level, i.e., to the right of that threshold, the price effects overcome the effects of income growth to produce the result of reduced fertility.

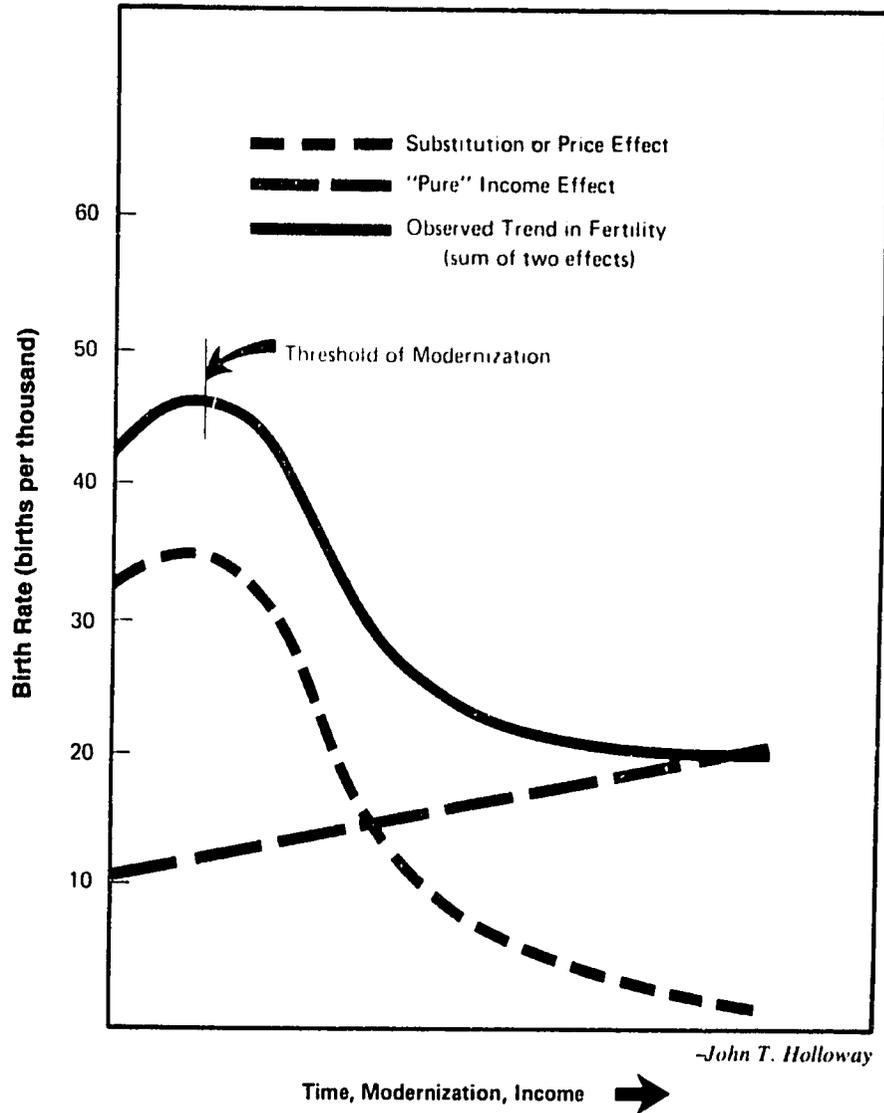
Mueller (1972) obtained somewhat similar results from analyzing 1969 survey data on Taiwan. Her study is of particular interest because, in addition to collecting data on income, husband's and wife's education, husband's employment and other characteristics, she developed an index for "perceived utility of children" and an index for "sensitivity to cost of children." The cost sensitivity index could be said to represent the substitution or price effect of increased income. Indeed, her analysis verified that the cost sensitivity index for a couple rises as the couple's income rises (pp. 380-387). Ideal family size falls as cost sensitivity rises (p. 398). Her analysis thus indicates that while persons with higher income desire fewer children, they do so more because of increasing sensitivity to the costs of children (substitution/price effect), than to the higher income per se (Table 7, p. 397).

The seemingly contradictory results of these various country studies may be partly explained by methodological difficulties. In addition to the failure of some investigators to distinguish between income and price effects, there is the difficulty they face of adequately measuring income, particularly for low-income families. Working with Costa Rica census data, Carvajal and Geithman (1973) found no significant correlation at all between income and fertility, but surmised that "the manner of estimating the income of the members of the labor force classified as employers and self-employed may not have been sufficiently accurate" (p. 34). They also point out the problem of utilizing current income as an estimate, since it may not reflect the permanent income to which consumers adapt their fertility behavior. These authors do find a statistically significant negative association of "relative income" (i.e., ratio of observed to expected income) and fertility. Other studies have pointed up yet another methodological complication: The effect of income differentials may be more or less important at different points in a couple's lifecycle. Cain and Weininger (1973) note, from working with U.S. census data, that "the strength of income among the younger age groups suggests that its major effect is on the timing of births rather than on completed family size" (p. 219).

Finally, several studies are of particular interest because of the conscious attempt of investigators to distinguish between income and price effects.

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Figure 1.
Fertility Trends as Affected by Income Effect
and Substitution or Price Effect in the
Process of Demographic Transition.



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Cain and Weininger's (1973) analysis of U.S. urban data shows that increased male income raises fertility (an addition of \$8,000 to \$12,000 for one more child) but that increased female income or female income potential lowers fertility to an even greater extent (\$4,000 increase for one less child) (p. 215). DeTray (1972) found that a one percent increase in male earnings resulted in increasing children ever born by .09; a similar rise in female earnings depressed children ever born by the higher rate of .30 (p. 37). These findings suggest the possibility of an heroic simplification in analyzing the effects of income on fertility: "Pure" income effects manifest themselves mostly through husband earnings; price/substitution effects manifest themselves mostly through the wife's earnings or earnings potential. As will be shown in subsequent sections dealing with female education and employment, the rising value of women's time increases the opportunity cost of children and induces them to shift attention away from childbearing and childrearing to other activities.

Effect of Income Distribution on Fertility

In a report on population policies and economic development released for the 1974 World Population Conference, the staff of the World Bank (1974) argues forcefully that the joint Bank objectives of slower population growth and more equitable distribution of the benefits of development are compatible (Ch. 4). Deriving information on the relative shares of income of different income classes of a country's population can be enormously difficult (Cassen 1974); however, indications are that distribution of income is more important in reducing fertility than is average per capita income. The World Bank report, in an analysis of 1960-1965 data on 64 countries, concluded that "the pattern of income distribution is at least as important as the rate of income growth for the decline in fertility," pointing out that elasticity of the general fertility rate with respect to changes in the share of income received by the poorest 40 percent of households was -.36, while the elasticity of general fertility rate to increases in average per capita income was little more than half as great, or -.20.

Kocher (1973), using cross-national data, compares countries in terms of an index of income inequality and fertility trends. He concludes that "there appears to be a rather close and consistent relationship between relative income inequality and fertility trends," i.e., that fertility has not been reduced where inequality persists (p. 63 and Table 4.1, pp. 64-65). Rich (1973) has concluded, from a simple correlation analysis of the relationship between per capita income of the lowest 60 percent of income earners and births per thousand population in 40 countries, that the increments of

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income going to that poorest group contribute more to fertility reduction than augmentation of average per capita income as a whole (p. 67).

International cross-sectional studies have serious intrinsic problems of data comparability and comparability; thus one must view these findings with caution. Further research could usefully be directed to building a bridge between the intensive and exacting micro-theorizing that is popular with some investigators (T.W. Schultz 1973^a, 1974), and the rather more ambitious general pronouncements about the efficacy of social reform and income distribution as tools for the reduction of fertility.

SOCIOECONOMIC CHANGE

The specific impact of income change and distribution on fertility decisions was discussed in the previous section of this chapter. In this section, we discuss the price/substitution effects on fertility of such changes as general economic development and improvements in socioeconomic status, education, and employment.

The greater the educational attainment of members of families, particularly when the mother and other women in the family have advanced schooling, the greater the tendency toward fewer children and smaller families. In the developing countries, these are the people who have climbed the ladder of success: The mere possession of advanced education—say, of university level—automatically places a family in a small elite. Less than one percent of the population of most developing countries are college graduates.

Is it the high level of education which has "caused" these people to have fewer children? Or did the climb up the ladder during the formative years induce parents to work hard to achieve educational goals *and* to have small families? These questions emphasize why the policy conclusions drawn from the observations of correlation must be tentative. Whether the socioeconomic correlates of fertility provide a true basis for policy formulation depends in large measure on the quality of theory analyzing the relationships observed.

Women with better education and employment have fewer children. But does that fact imply that funds directed to assist in the reduction of fertility should be spent providing women with more opportunities for education and employment? The literature is unfortunately silent on that question. No studies demonstrate whether any population-related activities, other than family planning, would serve as cost-effective means of achieving the goal of fertility reduction. Nonetheless, the studies reviewed below do point the directions in which future research may go to answer these policy question.

Economic Development

The process of economic development has traditionally been thought to cause a secular decline of fertility rates. This view is exemplified by the theory of the demographic transition and by several versions of threshold hypotheses (United Nations 1965). The basic premise of the demographic transition is that a country moves along the continuum from developing to developed status until it reaches a certain economic level, when fertility will begin to decline. Implicit in this theory is the argument that it is futile to attempt to control the birth rate through family planning *until* the country reaches the threshold.

Sweezy (1973) addresses himself to this point, stressing the need to reassess the basic validity of the demographic transition theory. To support his contention, he looks at the past situations in Portugal and Bulgaria. Both these countries experienced a decline in their birth rate without any transformation in terms of urbanization and industrialization. According to Sweezy, this was also the case in much of Eastern and Southern Europe. "The implication is that we may do better to seek the explanation of fertility decline in the absence of barriers to the spread of 'natural' desire to limit family size rather than in the development of economic and social conditions which produce a change in the value people place on children" (p. 11).

Sweezy further points out that there is a sizeable proportion of countries listed in the *World Population Data Sheet* (Population Reference Bureau 1974) for which there is no close correlation between the "degree of economic and social development and the level of fertility. . . . Second, many countries, or major parts of countries, like the south in Portugal, which are now included in the upper group, had already reached moderate to low levels of fertility at a much earlier stage in their economic and social development" (pp. 10-11).

To further emphasize his argument, Sweezy constructed a table listing two groups of countries: one group in which birth rates have been falling and are now at intermediate levels [Korea, Taiwan, Ceylon (Sri Lanka), Chile, and Costa Rica]; and the second group in which fertility is still high [Turkey, Mexico, Columbia, Peru]. Contrary to the assumptions based on the theory of the demographic transition, Sweezy found no great differences when comparing the gross national product of the two groups; and that "there is no evidence here of a definite threshold below which infant mortality must fall before significant decline of fertility is possible" (1973, p. 11).

Other investigators who look specifically at the general relationship between economic development and fertility come up with varied results. Using Mexican census data for 1940 and 1960, Zarate (1967b) found that

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progress in economic development was associated with early age at marriage and high proportions of married; both these factors are associated with higher fertility rates (p. 373). In Costa Rica, Carvajal and Geithman (1973) analyzed the relationship between household sanitation and fertility. "The fertility of the households whose toilet facilities made use of a sewer system was significantly lower than the fertility of the households whose toilet facilities consisted of a septic tank, at the .10 level of significance, and lower than the fertility of the households that had latrine toilet facilities or no toilet facilities, at the .05 level" (p. 42). In rural Ghana, couples in the least developed regions considered 13.2 children as the mean " . . . best number of children in completed family," while couples in the more developed regions considered 7.3 and 8.4 children as the mean "best number of children in completed family" (Caldwell 1967, p. 230).

Socioeconomic Status

A number of studies attempt to relate the independent variable, "socioeconomic status," to fertility. (Generally, socioeconomic status is defined in terms of other variables dealt with separately in this report, such as income, education of wife or husband, or occupational status.) Most studies indicate that, as socioeconomic status rises, fertility declines. A study by Khalifa (1973) in Cairo, in which he used husband's occupation and wife's education as an index for socioeconomic status, led him to conclude that "completed and expected completed family size decreases significantly with all the social and economic variables studied." Socioeconomic status and modernization prove to be very good predictors of fertility. The relationships were all linear" (pp. 442-43).

Rosen and Simmons (1971), using husband's occupational status in their study of Brazil, found that fertility declines somewhat with higher social status in all communities; however, there are differences between the industrialized and the non-industrialized communities. In the industrialized communities, "family size, already moderate in the lower class (3.5 to 3.3) declines further (between one-half and one child) in the middle and upper middle classes. Then, in the upper class there is a return to somewhat higher fertility." The pattern is much different in the non-industrialized communities where " . . . family size is large in the lower class (5.2 to 6.1) and despite some fluctuation it remains large in the lower middle and middle strata. However, in the upper middle stratum, family size declines rapidly and in the highest stratum it becomes very small (2.0 to 3.0) . . . " (p. 55)

Kupinsky (1971) used wife's education, family income, and husband's occupation to develop an index for socioeconomic status in the United States with 1960 data. He observed a consistent negative relationship

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between socioeconomic status and children ever born. The greatest differences occurred between low and medium status and after the age of 30 (p.359). Paydarfar and Sarram (1970) separated socioeconomic status into the components of income, occupation, and education and compared the component effects on fertility. Fertility was affected most by education, less by occupation and income (p. 699).

Miro and Mertens (1968) used 1959-1965 survey data on Latin American cities to ascertain the effect of husband's occupational status on fertility. They found that in the urban areas "... fertility tends to decrease as occupational level of the husband rises, although the differences are not as pronounced as for education . . ." (p. 109). In the rural areas, they found that couples in the agricultural category, particularly the lower level category, had the highest average number of children, p. 108).

In contrast to the above findings, Morgan (1974) analyzed survey data from Lagos, Nigeria and found no simple relationship between socioeconomic status and fertility. Using observed possessions in the home as the index for socioeconomic status, he concludes that fertility increases with higher education and social class up to "the level of five possessions," with an apparent decline only at the highest levels (p. 25). An important point to remember is that, in Nigeria, those people with five of the possessions observed (using Morgan's criteria) would not necessarily be labeled as "middle" or "upper" class in developed countries. Thus, the price or substitution effect may not have yet taken hold. With rising income levels, families may still have been concerned with acquiring as many goods as possible and not with the cost of children. As in the case of socioeconomic development, there may be a threshold or point of general economic development that has to be reached before rising socioeconomic status will begin to have a limiting effect on fertility.

Education

The inverse relationship of education to completed family size is one of the most clearcut correlations found in the literature. Education is almost always defined in terms of formal schooling and/or a simple distinction between the literate and non-literate. Unfortunately there is no research which clarifies what it is about schooling which tends to reduce fertility.

Using regression analysis of data from 85 countries at different levels of development, Friedlander and Silver (1967) found an inverse relationship between the birth rate and level of education. They caution, however, that education may be a proxy for contraceptive knowledge, costs of raising children, or changing attitudes toward birth control (p. 60).

Similarly, Nerlove and Schultz (1970) conclude from 1950 and 1960 Puerto Rican Census data that "... the coefficient for adult education is

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consistently negative and generally significant . . ." (p.48). Miro and Mertens (1968) report a threshold around the primary level of education: "Somewhere at the primary level, especially at the completed primary level, a large decrease in fertility occurs; differences for the secondary and higher levels are much less marked. Some cities even show a slight upturn at the university level." They conclude: "No other socioeconomic variable shows such clearcut negative relation to fertility as does education" (p. 106). This was true for both urban and rural-small urban areas.

Li (1973) found that in Taiwan, from 1964 to 1970, "In every year since 1964, mortality and educational development in combination helped to determine fertility. The multiple correlation coefficients are, without exception, statistically significant at the one percent level. The variation of the coefficients from 1964 to 1970 hardly suggests that these two independent variables in combination would become less important after the initiation of a family planning program" (p. 102). On a rural/urban continuum, he also found that 1) in the villages, the "effect of education on fertility was rarely significant, until the later periods;" 2) in the urban townships, education could be more important than infant mortality in affecting fertility decline; and 3) in the city districts, the effect of education may be stronger than in the townships (p. 104).

Using U.S. Census data, Cain and Weininger (1973) applied multiple regression analysis to 1940 and 1960 data and arrived at a negative relationship (usually significant) between education and fertility (pp. 212-4).

To avoid being lulled into complacency concerning education and fertility, it is important to observe that the above results are not totally conclusive. "At the earlier stages of economic development," writes one author, ". . . rising levels of income and education merely aggravate the population problem" (Encarnacion 1974, p. 23). This conclusion, based upon multiple regression analysis of 1968 Philippine data, raises the question whether there is some threshold below which education would increase fertility. Pre-threshold status could be the basis for explaining the case in Indonesia, where ". . . in urban areas, there appears to be a tendency for completed family size to rise with education, contrary to normal expectations. In rural areas, too, those with [some] education have higher completed family size than those with no education, but the better educated have, on the whole, slightly smaller families than those with only some primary education" (University of Indonesia 1974, p. 4).

Education: Males vs. Females

Most studies conclude that female education reduces fertility even more than male education. Freedman, Coombs, and Chang (1972) using 1965,

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1967, and 1970 KAP (Knowledge, Attitudes and Practice of Family Planning) surveys in Taiwan, found a negative relationship between wife's education and the mean number of children ever born. Whether adjusting for wife's place of residence or couple's ethnic background, the relationship was maintained. In 1967 the mean number of children born, adjusted for wife's place of residence and couple's ethnic background, was 4.7 children for wives with no education and 3.4 children for wives with senior high school or more education—a difference of 28 percent (p. 294). Freedman, Hermalin, and Sun (1971) found that in 1969, by holding age constant, the number of children ever born per ever married women (ages 25-44) generally tended to be higher for women of lower educational levels (p. 15). However, they cautioned that, since the less educated women have a greater tendency to be married, differences in marital status may account for some variation in total fertility. For instance, the difference in the total fertility rate between women who are senior graduates or higher, and illiterate women is 2.86, and the difference in the percentage of married women among the 20-24 age cohort of these two groups was 49.6 percent (senior graduate or higher: 24.5 percent, and illiterate: 74.1 percent) (1971, p. 33).

A negative relationship was also found in Thailand. Goldstein (1972), from an analysis of the 1960 Thailand Census, states that fertility is inversely related to educational level whether the indicator is literacy or number of years of school completed (p. 433). Analyzing the same Thailand Census, Maurer, Ratajczak, and Schultz (1973) came to a similar conclusion. They found that “. . . female education increases fertility in the 25-29 age cohort, but strongly depresses it thereafter.” In addition, they note that increased education of women may marginally reduce the proportion of women married, thus reducing fertility rates.

Multiple regression analysis of United Arab Republic 1960 Census data led Schultz and DaVanzo (1970^b) to project a 15 percent reduction in fertility if there are “reasonable changes” in female education and the number of unpaid family workers as a proportion of the labor force. “If the proportion of women with an intermediate certificate were to double in a decade from the 1960 national level of 2 percent to 4 percent, an associated reduction in surviving fertility of 2 to 5 percent might be anticipated in the short and long run according to the model estimates, as marriage rates would fall by about the same amount, and female activity in nonagricultural activities would approximately double” (pp. 46-47).

Similarly, Gendell (1967) found that in the Rio de Janeiro metropolitan area, women ages 20-50 with no education had an average of 3.33 children. These averages were steadily reduced to 1.05 children for women with completed secondary but less than 5 years of university education. Women

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with 5 or more years of university education averaged 1.21 children (p. 148). Using 1963-64 data in Israel, Ben-Porath (1973) also found a negative relationship between education and fertility, with the greatest decline in fertility between ". . . women with no schooling and women with some schooling—a difference of 1.0-1.4 children" (p. S216).

Omran (1973) found that, in Egypt in 1960, the average number of live births per woman declines as education increases: for illiterate women, the average number of live births per woman was 7.61; for women who had completed primary education, 6.70 live births; for women who had completed college, 3.58 live births (p. 105).

There are indications that better-educated women use contraceptives more effectively and tend to choose more effective contraceptives. This is true in Greece (Safilios-Rothschild 1972, p. 3). It was found to be true in the United States, where Michael (1973), using data from the 1965 National Fertility Study concluded that ". . . the wife's education level is quite systematically negatively related to the monthly birth probability: more-educated women, other things constant, achieve a lower risk of conception, on the average, when that risk is measured in terms of the contraceptive technique selected (including no contraception as one of the techniques)" (p. S151).

T. Paul Schultz (1973) analyzed data from Taiwan's 361 administrative regions for late 1960s, concluding that female education reduces birth rates, except possibly for the ages 15-24 (p. S263). This conclusion is similar to one by Maurer, Ratajczak, and Schultz (1973). Interestingly, T. P. Schultz notes that this conclusion was reached only by using multiple regression and time series of cross sections. When he attempted the analysis using static cross-sectional evidence, he found *higher* birth rates for older educated women, but pointed out that this sort of finding ". . . cast doubts on the adequacy of static cross-sectional evidence of the economic determinants of fertility in a rapidly changing environment" (p. S254).

Finally, a few analysts underline the important distinction between husband's and wife's education. Bacon and Mason (1972) point out that, in Turkey, husband's education has a weaker influence than wife's (p. 21). Making use of U.S. 1960 Census data, DeTray (1972) notes a ". . . strongly negative coefficient for female education and a very weak positive coefficient for male education." He suggests that with earnings, full wealth, and female education held constant, changes in male education have little effect on numbers of children (p. 36). Maurer et al (1973) also point to the fact that ". . . by the end of a woman's childbearing years, men's schooling is associated with much higher completed fertility" (p. 31). And Morgan (1974) found in Nigeria that, holding constant husband's educational level,

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female fertility varied inversely with number of years of schooling. In contrast, when holding constant female educational level, fertility in the family varies *directly* with the husband's number of years of schooling (pp. 16-17). T. Paul Schultz (1973) also finds that, in Taiwan, husband's education is positively related to fertility, ". . . consistent with expectations that the income effect would exceed the substitution effect for the value of male time" (p. S263).

Of all the studies examined in this review, Harman's (1970) is unique in reporting a positive relationship between female education and fertility. From an analysis of a 1968 nationwide stratified sample in the Philippines for multiple linear regression, he concluded that the only age group with a statistically significant association (0.5 level) was the 20-24 age group, and this association was positive. All other age groups had insignificant positive or negative association, with the 35-39 age group coming closest to a significant-negative association (pp. 29-30).

These contradictory results suggest that the relationship between education of the female and fertility may, in reality, be an effect of age and age at marriage. This point was touched upon by Freedman, Hermalin, and Sun (1971) in their Taiwan study. Miro and Mertens (1968) also advise controlling for these two intervening variables (pp. 106-107).

An important element in the effect on fertility of education of the female is its relationship with economic activity of the female. Two questions must be asked with respect to this relationship: 1) What effect does increased female education have upon female participation in the labor force? 2) Is the observed relationship between female education and fertility independent of the effect of female labor force participation?

Gendell (1967) addresses himself to these points in a study in Brazil using 1950 Brazilian Census data. The data demonstrated a strong negative correlation ($-.73$) "between the fertility ratio and the percentage of women aged 10 years and more who were economically active, with the units of observation consisting of the 18 most urban . . . capital *municipios* . . ." (pp. 144-150). He also found that, in the metropolitan areas generally, there was a distinct positive association between the economic activity of women, ages 10 years and older, and female education level. In Guatemala City, Gendell, et al (1970) found, that women's economic activity had a negative association with fertility, independent of age, marital status, and educational level. However, educational level had a stronger net inverse relationship with fertility than economic activity (p. 279).

Harman (1970) concluded from 1968 survey data that, in the Philippines, educational level was positively related to women's participation in the labor force at all ages. "The coefficients indicate about two percentage points greater probability of participation for each additional year of

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education of women under 30, and a somewhat stronger education effect for women in their thirties" (p. 51).

Utilizing 1950 and 1960 U.S. Census data, Carleton (1965) found in Puerto Rico that, as education levels increased, more women were engaged in economic activity. There was no concentration of economically active women in the lower levels of education. "Because of the well-known inverse association between economic activity and fertility, the heavy concentration of economic activity among married women with more education has very interesting implications for differential fertility with respect to education . . . [a] really important differential does not put in an appearance until at least eight years of schooling has been completed; furthermore, the differential is very small between high school graduates and women with at least some higher education" (p. 236).

Employment

The literature relating fertility rates to types and levels of employment is best understood by distinguishing between employment of men, women, and children. Although not all the evidence is clearcut, the literature permits the following generalizations to be made:

- 1) There is no clear evidence that this type of male employment (agricultural, industrial) affects fertility consistently in either a positive or negative direction; or that a level of male employment (occupational status) affects fertility independently of associated factors of education and earnings.
- 2) Female employment depresses fertility only under very specific conditions—conditions which do not prevail in most developing countries.
- 3) Child employment increases fertility.

Male Employment

Within urban areas, an inverse correlation between fertility and male occupational status is often found. Using CELADE (Latin American Demographic Center) data for three Latin American cities, Miro and Rath (1965) find an "undeniable correlation, grouping occupations into higher nonmanual, lower nonmanual, and manual (p. 48). In Shiraz, Iran, Paydarfar and Sarram (1970) observe a "strong inverse relationship," grouping men into four categories: (a) professional, managerial and technical; (b) clerical, service, sales; (c) skilled and semi-skilled; and (d) unskilled. More than 60 percent of wives of group (a) husbands had two or three children; more than 60 percent of group (d) had five or more. They note that the variation of the mean of classes (b), (c), and (d) is small (pp. 697-698).

In a study based on 1960 census data from Egypt, Omran (1973) finds the inverse relationship in urban governorates, with men in the professional

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and administrative groups having the lowest parity, and the clerical group the second lowest. In the provinces, however, the relationship is not so clear, with ". . . the two top occupational groups showing nearly identical and universally high parity levels" (p. 108). He suggests that high fertility among professionals in the provinces may be due to the inclusion of many essentially clerical workers in the professional category, and not to genuine fertility differentials between comparable professionals in urban and rural areas.

Evidence of the expected inverse relationship is less clear in non-urban areas. Gendell (1967) reports that fertility and socioeconomic status (male occupational status) are *positively* associated in rural Brazil in 1940 and 1950, although, in the state largely comprised of the city of Rio de Janeiro (and, by implication, perhaps in metropolitan areas in general), he finds an inverse relationship. The positive relationship in rural areas could result from the income effect, i.e., rising income increasing fertility under certain conditions (p. 148). This position is supported by Omran's (1973) observation that farmers close to urban areas of Egypt, where farmer income is presumably higher, had higher fertility than farmers in isolated rural areas (p. 108).

None of the above studies utilize multiple regression techniques to control for variables such as income and education. One study which does employ these techniques on 1960 U.S. Census data, reveals that the inverse relationship washes out when the variables of income, earnings, and education are included. Furthermore, with 1940 data, the occupational variables were sometimes significant (grouped males and females), but their signs (the relationships) were opposite of what was expected (Cain and Weininger 1973, p. 212).

The relative unimportance of husband's occupational status compared with other variables is also suggested by the work of Mueller (1972) in Taiwan. She found that the effect of husband's occupational status on ideal family size is much less important than husband's education, wife's education, and indexes for perceived utility of children and sensitivity to costs of children (Table 7, p. 397).

The effect of industrialization, which presumably alters the structure of the labor force and thus changes persons' employment, is also unclear. Rosen and Simmons (1971) conclude from data on four Brazilian cities that industrialization reduces fertility and that the effect of community size (urbanization) is heavily dependent on its association with industrialization (pp. 53-54). Zarate (1967), however, finds a *positive* association between changes in urban fertility and changes in the percent of persons employed in the manufacturing sector for Mexico in 1940 and 1950. In 1960, the association becomes negative, but city growth rates and the proportion of

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females who are married are more closely related to fertility than is the percent of persons employed in the manufacturing sector (p. 363). Similarly, Janowitz (1973) finds no indication that increases in industrialization reduce fertility levels (p. 421).

Because the agricultural sector predominates in most developing countries, any fertility differential between farmers and persons of other occupations could be of policy interest. Although in many countries, rural fertility is higher than urban fertility, completed research studies do not permit the conclusion that agricultural activity itself encourages fertility, or that rural-urban differences are not due to other factors such as education, income, or housing conditions.

Omran (1973) notes the "surprising finding" that farmer fertility is relatively low in Egypt, holding a medium position relative to the other occupational groups (p. 108). Sweezy (1973) notes that fertility in Portugal in 1960 differs markedly between north and south, despite the fact that percentages of labor force in agriculture in both areas are almost identical—(57 and 58 percent) respectively; and that in early 20th century Bulgaria, fertility dropped (birth rate went from 42.1 to 30.3) although the percent of the economically active population engaged in agriculture (54 percent) was higher than in some developing countries in the 1970s (pp. 4, 8). T. Paul Schultz (1973) observes from data based on 361 Taiwanese administrative regions, 1964-1969, that "... changes in agricultural composition of the labor force are not apparently related to changes in birth rates" (p. S263).

Thus, findings concerning the relationships among types and levels of male occupations and fertility are confused and, in some cases, contradictory. The evidence suggests that other factors are more important than employment per se. Since many countries are likely to have continuing high proportions of their labor force in agriculture, it is encouraging to deduce from the evidence that 1) agricultural activity itself is not conducive to high fertility; and 2) fertility may be lowered by increasing income or education, or otherwise affecting the objective conditions of life for persons in the agricultural sector. The question arises whether different types of agricultural employment, different conditions of landholding, different patterns of labor and capital input, and different patterns of land inheritance may be important for fertility trends. For example, improved technology could raise the demand for daughters' labor, thus raising marriage age and lowering fertility. Gendell (1967) notes that agricultural employers have consistently lower fertility than agricultural employees in Brazil (p. 148). An investigation in East Pakistan (Stoeckel 1968) showed that: "In all

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years, with the exception of 1965, proportions of long-term adopters* who are cooperative members are higher than long-term adopters who are not cooperative members" (p. 47). The data Sweezy (1973) analyzes from Portugal and Bulgaria also suggest the possible different effects of different conditions within the agricultural sector (p. 4, 8).

Female Employment

Theories concerning the relationship between female employment and fertility have been developed by both economists and sociologists.

According to economists, when a woman works, she increases household income; this income effect induces increased fertility. However, the opportunity cost of children also increases; this price or substitution effect could lower fertility. The opportunity cost of children is, of course, lower for women who earn lower wages and for women for whom child care is available at little or no cost.

According to sociologists, women who have expanded opportunities to carry out various roles, including working outside the home, will have less inclination to devote themselves solely to home and children and will therefore have lower fertility. For women who have better jobs (more money, prestige, power), this effect will be heightened. A countervailing tendency is described for women whose work and home roles are "compatible," i.e., conveniently combined such as work on the family farm or in home manufacturing. For these women, the fact of their working will not affect fertility.

Easterlin (1969) has done a useful synthesis of these economic and social theories, and empirical data are, in general, consistent with these theories as developed. They indicate that, because of the present structure of the labor market for women in most developing countries, female labor force participation alone is not likely to lower fertility in the typical household.

Results of various studies using aggregate country data have led to contradictory conclusions. Nerlove and Schultz (1970) find in Puerto Rico that female labor force participation in 1950 and 1960 lowers fertility (p. 47). Carvajal and Geithman using Costa Rican data, DaVanzo with Chilean data, and Liu with Taiwanese data all concur with the findings of those from the Puerto Rico study. (Carvajal and Geithman 1973, p. 37; DaVanzo 1972, p. vi; Liu 1973, p. 173).

On the other hand, Harman (1970) finds insignificant positive or negative associations for most age groups in the Philippines (pp. 29-30). In Thailand,

*Long-term adopters are defined as users of conventional contraceptives for 13 months or more.

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Goldstein (1972) finds a positive association for the kingdom as a whole, i.e., working status *raises* fertility; using age-specific data, he finds a negative association up to the age of 30, but a positive association thereafter, with the differential between working and non-working women as high as 15 percent for women 45 and over (p. 425).

When controls are introduced for type of occupation and place of residence, the pattern becomes more clear. In their classic 1960 article analyzing fertility differentials by type of occupation of women in Japan, Jaffe and Azumi (1960) note that, for women who work at home, fertility is higher (for women in agriculture) and only slightly lower (for women in cottage industries) than fertility of women who do not contribute to family income. However, they find that among women who leave their home for work, fertility is "significantly lower" than among women in cottage industries; this finding holds for all areas and age groups (pp. 57-79). Stycos and Weller (1967) made the same finding in Turkey, and suggest that as long as the roles of worker and mother are compatible, employment status will not affect fertility.

Studies which distinguish between rural and urban residence indicate that, in rural areas, female labor either increases fertility or has no marked effect; in urban areas, it decreases fertility. This could be due to place of residence per se or to the greater tendency of urban work to take women out of the home. Goldstein (1972) notes that in Bangkok, the fertility level of economically active women is markedly below that of housewives, in contrast to the rest of Thailand (p. 427). Gendell, Maraviglia, and Kreitner (1970) found that, in Guatemala City, fertility was higher among inactive women, lower for active women, and lowest for the category of domestic servants, with fertility of live-in servants the lowest of all (p. 276 and p. 281). Miro and Rath (1965), describing the results of fertility surveys in three cities—San Jose, Panama City, and Rio de Janeiro—find that in the cities, women who do not work have higher fertility than women who do work (pp. 48-49). For rural and small urban areas in Chile, Colombia, and Mexico, Miro and Mertens (1968) conclude that there are no clearcut differences in fertility between working and non-working women (p. 113).

A similar pattern emerges from 1960 census data on 208 administrative districts of Egypt, separated into rural and urban areas and analyzed in terms of the relationship between female labor force participation and fertility (Bindary, Baxter, and Hollingsworth 1973, pp. 164-165). In rural areas, increased participation of women would increase fertility (income effect); in urban areas, increased participation would lower fertility (substitution effect). Similarly, Pinnelli (1971) reported findings based on a survey of women in Italy in the industrial north, rural north, industrial south, and rural south; she stated that the greatest differentials in fertility in the north

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occur between women doing permanent agricultural work and women doing permanent nonagricultural work, with housewives in a mid-position. The fertility rate for female agricultural workers is 135.0, for housewives 117.6, and for nonagricultural workers 75.0 (p. 609).

Perhaps of greater interest is the data cited in a number of these studies which indicate that fertility of working females in rural areas is higher than fertility of housewives (non-workers) in urban areas. This is not only true in northern Italy as noted, but also in Japan, where rural women engaged in agriculture had an average of 3.55 children compared to 2.83 children for non-working urban women (Jaffe and Azumi 1960, Table 2, p. 59). Furthermore, in Japan, the rural working women had more children than rural non-working women, possibly because higher family size created a need for more household income. In Thailand, children ever born per one thousand ever-married women was 4,508 for rural agricultural workers, 3,853 for other urban housewives, and 3,675 for Bangkok housewives. Also true for Thailand was higher fertility for rural agricultural workers than for rural non-agricultural workers—4,509 vs 4,349 (Goldstein 1972, Table 4, p. 426).

Using the Thailand data, Goldstein also compares fertility differentials for women in specific occupations in Bangkok with "the corresponding levels" among rural women. He finds that "... with the exception of the sales group, fertility in Bangkok is consistently and considerably lower." The conclusion is that "... the impact of urban and rural residence on fertility operates independently of the labour force status of the female population" (p. 430). Further indication that female labor force participation may not be a significant variable relative to other factors comes from comparison of fertility rates in northern and southern Portugal in 1960. Here, similar female labor force participation rates of 18 percent and 14 percent respectively, are associated with different fertility rates of .255 and .539 (Sweezy 1973, p. 8).

Thus, research findings indicate that in rural areas where the type of female labor is compatible with childbearing and the opportunity cost of working is low, fertility will *not* go down with high rates of labor force participation. In some cases, fertility may even go up, either because the increased income permits working mothers to enlarge their families or because the larger number of children draws the women into the labor force to increase family income. In urban areas, where work is not compatible with childbearing and where the opportunity costs of children are likely to be high (since returns to female labor are higher), labor force participation lowers fertility.

A few studies have further refined the urban data by differentiating among types of female employment. Goldstein predictably finds in Bangkok that the lowest fertility is among "professional and administrative

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workers" and the highest among "sales workers," mostly petty traders (Goldstein, 1972, Table 5, p. 429). The same comment may be applied here as to male employment, i.e., that apparent differences due to occupation might wash out if education and income were considered.

Others have analyzed the effect of different attitudes towards employment. In urban Greece, a study finds that women with "high work commitment" have fewer children and use birth control methods more effectively than women with "low work commitment" (Safilios-Rothschild 1972, pp. 11-12). Furthermore, "Fecund working women with low work commitment have about as many children as fecund non-working women" (p. 9). Similarly, Pinnelli (1971) found that ". . . fertility is lower for women [in Italy] who state that they work in order to be independent or because they are interested in their work than for women who only work because of economic necessity or for a higher standard of living." (p. 609). A New Delhi survey revealed that the fertility of working women who were uneducated was almost the same as that of nonworking women (Minkler 1970). Hass (1972) analyzed CELADE data on several Latin American cities and concludes that the wife's motivation for employment, her education, and her degree of approval of maternal employment exert greater influence on her fertility than her actual working or non-working status. She thus suggests that there may be ". . . little demographic value in . . . raising female employment rate as a means to lower the birth rate" (p. 125). The degree to which a woman approves of maternal employment may be of greater importance in lowering fertility.

Thus, some evidence indicates that, even in urban areas, the more educated women, working in well-paid and/or highly-satisfying jobs, are more likely to limit fertility to continue to work. For less educated women, it is not clear whether the causal direction is *from* large families *to* the necessity of working. The former group is demographically very small in developing countries; even in rich countries, the kinds of jobs which appear to affect family size desires of women are only a fraction of all available jobs.

The implication for policy is that, by itself, raising female employment rates is not likely to generate a reduction in fertility. One could conjecture that where fertility is beginning to fall, the independent encouragement of female employment might increase the rate of decline. There are indications that this happened in Taiwan, where nonagricultural employment of women rose by 130 percent, 1961-1967 (T. Paul Schultz 1973, p. S240). One could also conjecture that national efforts to "liberate women" through change in sex-role attitudes, such as appear to be taking place in China, could have an important effect on lowering fertility (Salaff 1972).

Child Employment

Relatively few studies have attempted to establish any relationship between the use of child labor and fertility. However, the evidence is conclusive where the attempt has been made.

Harman (1970), estimating equations by two-stage least squares (a multivariate statistical technique suitable for measuring the effects of variables that are simultaneously determined), develops a model using Philippine data to explore the effects of 1) age at marriage; 2) use of birth control methods; and 3) factors influencing family size, including residence, child safety factor, female labor force participation, and number of children in the labor force. He notes that ". . . the strongest confirmation of the determinants of family size is displayed by the positive coefficients for child labor force participation, indicating that where opportunities exist for children to help provide support for the family, the parents desire a larger family" (p. 35 and Table 2, p. 29).

DaVanzo (1972) finds a "strong positive relationship" between economic activity of children in Chile and fertility (p. 85). Mueller (1972) develops an index for "perceived utility of children" as an explanatory variable for desired family size, which she finds to be significant (beta coefficient values of 0.11 - 1.12) (p. 397). Kasarda (1971) analyzes data from 49 countries, correlating the percent of population under age 15 who were economically active in the 1960-1969 period with fertility measures, and finds a positive correlation (+0.54 with birth rate and +0.49 with child-woman ratio, significant to .001 level). Kasarda notes that, in agricultural countries, almost six times as many males and four times as many females are economically active between the ages of 10 and 14 as in industrialized countries (pp. 312-313).

We find little research on the relative merits of various policy alternatives for removing children from the labor force. Analyzing United Arab Republic Census data, Schultz and DaVanzo (1970^b) estimate that a decrease in the proportion of unpaid family workers in the labor force, brought through advances in women's intermediate education, would be associated with a decline in surviving fertility between 7 and 9 percent and a 2 to 6 percent decline in marriage rates (p. 47). However, the real extent to which compulsory schooling would be effective is not clear; even with 5 to 6 hours in school, children can still contribute to family income; indeed, in many countries, present educational policy is to encourage schooling by structuring vacations so that children will be available for work during labor-intensive seasons. Different improvements in agricultural technology could alternatively "free" children by decreasing the relative value of their labor, or encourage increased participation by increasing the value. Research on the importance of child labor relative to the importance of

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children as old age security is scarce. The need for family labor could increase age at marriage; this countervailing effect must also be measured.

THE VALUE OF CHILDREN

"The very rich," F. Scott Fitzgerald is supposed to have said, "are very different from you and me." And so too, the very poor. For one thing, they seem consistently to have more children. Not only do the poor get more children, they apparently want them. Berelson (1974b) makes the following comparison between developed and developing countries with respect to the impact on fertility of a voluntary family planning program:

In the developing world about 70 percent say they want no more children after the fourth; in the developed world about 70 percent say they want no more after the second. *If* the responses are genuine and *if* family planning programs could satisfy this demand—each *if* is substantial—then birth rates in the developing world would fall by some 9-12 points and in the developed world by 2-3 points (p. 30).

Fertility thus would fall in the developing countries, if family planning procedures would be made available, but many families would still want four children and the rate of population growth might still be on the order of 2 percent per annum.

The factors discussed in this section affect the period of susceptibility to pregnancy (age at and type of marriage), the utility of children to the family (costs of children and son-preference) and the chances of achieving family size goals from a given number of births (infant mortality).

Age at Marriage

Age of marriage figured prominently in the early theorizing about the determinants of fertility. The recent United Nations (1973) review of the population literature, notes:

Of the variables relating to nuptiality, age of marriage and the proportion of persons in a population who never marry are the two believed to be the most significant in accounting for observed variations in fertility levels (p. 79).

Age of marriage has the closest association with completed family size in high fertility countries. The European nuptiality/fertility transition occurred in four phases beginning with 1) high nuptiality and high marital fertility; followed by 2) low nuptiality and high marital fertility; then 3) low nuptiality and low marital fertility; and finally, 4) high nuptiality and low marital fertility. This pattern is ascribed to Western and Northern Europe. Eastern

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European countries made the transition by going directly from the first to the fourth stage (Ryder, cited in United Nations 1973, p. 81). The variability of nuptiality patterns and the apparent unpredictability of the relationships between these patterns and within-marriage fertility led Coale (cited in Behrman, Corsa, and Freedman 1969) to the following conclusions:

Fertility fell in Spain, Bulgaria, and other Southern and Eastern European countries when mortality was still very high; in many countries rural fertility declined as early and as much as urban fertility; in some countries industrialization was far advanced before marital fertility fell; in others a major decline preceded substantial industrialization. Catholics in the United States and the Netherlands have higher fertility than Protestants, but some Catholic populations, e.g., in North Italy — have fertility as low as any other in the world (p. 18).

Thus, considerable caution must be exercised when attempting to evaluate the potential significance of raising age of marriage (or increasing celibacy) as a policy measure designed to reduce fertility. Nonetheless, reference to changes in the age of marriage as a significant, explanatory determinant of fertility variation is sometimes made in the spirit of blind faith. To illustrate, the Khanna study of a birth control program in the Punjab of India states that the decline of the birth rate during the study period could be accounted for by the rise in the average age at marriage “ . . . from a mean of about 17.5 years at first cohabitation after marriage in 1956 . . . to more than 20 years by 1969” (Wyon and Gordon 1971, p. 298). Although the authors acknowledge that “the population of the study areas was too small, and the official records of births in larger regions too inaccurate, to demonstrate a significant change in birth rates as a result of a higher age at *muklawā*” (age of actual cohabitation), the authors give little attention to alternative hypotheses. They acknowledge that in 1956 the age of *muklawā* was 17.5 years; in 1959 it was 18.0 years (pp. 298 and 154). This difference cannot reasonably account for the decline of 6 points in the birth rate in the test villages during the same period. An attractive alternative hypothesis is that declines of infant and early child mortality resulted in prolonged breastfeeding periods and therefore, prolonged birth intervals. Since probabilities of survival from birth to age 2 were increasing during and after the study period (Table 41, p. 302), such an hypothesis is appropriate, although never mentioned.

Despite the caveats, age of marriage does correlate strongly with fertility in the developing countries where it has been studied. The association appears to be especially strong among the non-educated. Hassan's (1973) study of Cairo wives found that when holding constant a family's experience of child mortality, duration of marriage, religion, and education of

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mother, the average number of children ever born generally varies inversely with the wife's age at marriage. This relationship is strongest among the non-educated and moderately strong among the most educated; that is, women with secondary school education or more (p. 367). Harman's (1970) study of the Philippines found that in all age groups below age 35, later age of marriage was statistically associated with lower completed fertility at .01 level. "The length of marriage variable [cross-tabulated with age] has a large influence on total births for families in all age groups" (p. 46). A study of the Lagos, Nigeria metropolitan area found a significant (at the .001 level) association between age of first marriage and fertility (Morgan 1974, p. 26).

Farooq and Tuncer's (1973) multiple regression analysis of Turkish Census data indicates that "the marital rate, though not so significant as education, . . . will impart a direct depressing effect on the aggregate period fertility rate at any given time" (p. 29). Stoeckel's (1968) study of 22 villages in East Pakistan showed that, "the proportions of women married at age 15 years and over who are long-term adopters are higher than the proportions married under age 15 years" (p. 51).

Increased age of marriage operates to reduce fertility more through lessened exposure to intercourse. Marriage at older age also permits exposure to different influences which affect values, desires, and opportunities which have a bearing on willingness to practice contraception. Delayed marriage may also imply a motivation to space births and reduce fertility.

There is little prospect that government decrees requiring later age at marriage can serve as effective measures to reduce fertility. "In view of the difficulties of enforcing laws relating to age at marriage, passage of legislation altering the minimum marriage age is not necessarily an indication that changes will take place" (United Nations 1973, p. 659). Some social research has been directed toward revealing the determinants of age of marriage. Knowledge of those factors might lead to development of means that are effective in raising marriage age and hence in depressing fertility.

In a recent demographic survey in Indonesia, urban or rural residence was found to have a significant association with age of marriage. "Almost 80 percent of females ages 15-19 in the urban areas had never married compared with about 50 percent in the rural areas . . . Age at marriage in the urban areas has been rising very rapidly in recent years whereas, in rural areas, it has only increased slowly" (University of Indonesia 1974, p. 12).

Harman (1970) examined a number of factors which appear to determine age at marriage in the Philippines. Membership in a subfamily of an extended Philippine family in 1968 was significantly associated with higher

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age at marriage among women in the 20-24 and 25-29 age groups. Single family households tended to form at earlier ages, while joint shelter after marriage was found to be associated with 1-to-3 years later marriage age. Female labor force participation was "associated, on the average, with about one year older age at marriage." Finally, education "contributes up to a third of a year later marriage for each year of schooling . . ." (p. 46). Thus, increased age of marriage is found to be inversely associated with fertility, particularly in areas where women receive no education. Increased age of marriage is positively associated with urban residence, female labor force participation prior to marriage, joint household after marriage, and female education. In particular, housing in jointly shared shelters has had a significant impact in delaying marriage.

Although governmental decrees for later marriage may not necessarily be very effective means for reducing fertility, policy may be designed to affect the above variables in such manner as to raise age at marriage. In a recent review of nuptiality and population growth in the Maghreb and the Indian subcontinent, Lesthaegh (1971) observes:

Nuptiality changes can produce the same effect on birth and growth rates as changes in marital fertility; moreover, their effects during transition become apparent sooner since they increase the mean length of generation. . . . "An overall fertility reduction initiated by decreasing marital fertility . . . alone would fall considerably short of the targets in several developing nations, i.e., a reduction of the growth rate to 1.5 percent cannot be realized without a change in nuptiality as well (p. 430).

Clearly, explication of the variables which determine marriage age so that those which are amenable to variation with policy guidance can be identified, should receive attention in future population research.

Type of Marriage

A number of characteristics of marital states other than the age at which couples enter formal unions have been the subject of social research. For example, consensual union (cohabitation without Church or civil blessing) has been an important feature of marriage and family life in Latin America, where it usually has been associated with lower fertility than formal unions. In Puerto Rico, "an increase in legal marriages increases the birth rate by somewhat more than does an increase in consensual marriages, confirming that with appropriate allowances for interactions among household decisions, the secular shift from consensual to legal unions had contributed to an increase in birth rates, other things being equal" (Nerlove and Schultz 1970, p. 47). In Costa Rica, ". . . parents living in consensual union

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showed a statistically significant lower level of fertility than the rest of the population" (Carvajal and Geithman 1973, p. 40).

Another focus of sociological research is the quality and type of communication within marriages. A survey of couples living in Hong Kong revealed that "... women in families with high levels of husband-wife verbal interaction are the most likely to make a decision to act on their desire to limit and/or space their pregnancies. They thereby have fewer unwanted pregnancies..." (Mitchell 1972, p. 144). However, this satisfactory intra-family communication may be an effect of high income and educational levels of the spouses.

Cost of Children

In jest, perhaps, a well-known Austrian economist was heard to say some years back that the closest substitute for a third child is a baby grand piano. He was in effect ridiculing the "new home economics" theorists for their peculiar notions about the economic functions of children in the household. The theorists were not deterred by the scorn of practical men and have gone on to develop with considerable rigor the conditions affecting the demand for, and supply of, what are now called "child services." However, empirical research has not moved forward with the same alacrity. For some, even the theoretical work in "new home economics" of the so-called Chicago School (named for prominent faculty members of the University of Chicago including Becker, T. W. Schultz, and Nerlove) is less than satisfactory as theory—not to speak of the absence of empirical verification (Leibenstein 1974, pp. 466-70).

The essence of the theorizing is that families will tend to have fewer children as it becomes more expensive to have children. Friedlander and Silver (1967) interpret their cross-national econometric studies as revealing that "differences in the cost of children affect family size." They note further that "social reforms which reduce parental dependency on children during old age operate to reduce family size." A shakier conclusion is that "differences between urban and rural fertility may be explained by the relatively high costs of rearing children in urban areas and not by differences between the two areas in cultural factors or levels of contraceptive knowledge" (pp. 54-60). A study of Costa Rican data concludes that "the costs of having and rearing children increase (the quality-of-children argument) as the level of a household's income rises with respect to the income of its reference group, thereby acting as a deterrent to fertility" (Carvajal and Geithman 1973, p. 36). In a Taiwanese sample survey conducted in 1969, Mueller (1972) found that sensitivity to the cost of raising children was the best variable explaining ideal family size (p. 397). Other variables

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considered important in explaining ideal family size included husband's and wife's education, income, husband's employment status, and mass media exposure.

However, determination of the costs and benefits of children is extraordinarily difficult. Two experts working with Puerto Rican data unhappily concluded that "although we hoped to capture some elements of the costs of rearing children, . . . our analysis does not confirm a very strong effect More sophisticated analysis using data on factors affecting both the family demand for schooling and the community supply of school facilities would permit one to disentangle what we believe to be a potentially important determinant of desired family size" (Nerlove and Schultz 1970, p. 48). But, of course, the available census data were insufficient to permit the intricate analysis necessary to determine child costs, let alone the even more difficult determination of the benefits of children.

Since a number of policy options can tend to raise the costs of children (or reduce their benefits) and hence affect fertility, more careful research on this topic is essential. Presumably, clearer information on child costs will come from sample surveys currently underway in Malaysia and Northeast Brazil.

This subject also calls for cooperation and study by psychologists. In a recent review of the literature on psychology and population, Fawcett (1970) calls for ". . . offering alternative sources of satisfaction to re-channel reproductive motivations. The means by which this can be accomplished is likely to be through alterations in the society's system of rewards and costs To increase the range of options in the design of the population policies is perhaps the greatest need in the population field today and psychology, along with other social sciences, should face up to this major challenge" (pp. 121-122).

The costs of children can be increased by instituting compulsory schooling and school fees. The benefits of children can be reduced by prohibiting child labor. However, specific policy actions may not yield the desired results. For example, in rural societies which adapt the school year to the rhythm of work in agriculture, schooling and child labor may be complementary rather than competitive. In this, as in other policy areas, findings from social research do not yet justify costly new policy initiatives. Further research on the costs of children is in order.

Son Preference

One corollary of the theory of household decisionmaking is that son preference occurs because sons are expected to produce more benefits than daughters, either through working as child labor or providing eventual

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old-age security. From data based on a sample survey conducted in Taichung City, Taiwan, in 1962, Liu (1973) discovered that 83 percent of married women ages 20-29 stated that having a male heir was very important, 13 percent rated it moderately important, and only 4 percent said it was unimportant. He reports that in 1970, "the percentage currently using contraception and the length of the open birth interval were significantly greater and the percentage currently pregnant was lower for married women aged 20 to 29 who had achieved the ideal goal of having two sons than for those who had not" (p. 167). In another Taiwanese investigation, Freedman, Coombs, and Chang (1972) determined that the more that wives expected from their sons, the more likely they were to report a large family ideal (p. 288). "The proportions who want no more children increases rapidly with the number of living sons for couples with similar numbers of living children at each interview" (p. 289).

These findings from Taiwan might suggest lower fertility for families which already have two sons. However, Repetto (1972) has shown the opposite to be the case in India and other countries. In Lucknow, Uttar Pradesh, "There were no significant differences in mean total pregnancies or in mean total live births according to the sex composition of the first three children. In particular, women who had three sons, or two sons and a daughter, had just as many subsequent pregnancies as those who had three daughters" (p. 72). A review of survey data from Delhi State and Uttar Pradesh villages showed that "ironically, the 'ideal' sex composition, two surviving sons and a daughter, is associated with the largest number of subsequent pregnancies (4.29 subsequent pregnancies and 4.99 subsequent live births) instead of the smallest" (p. 73). Drawing on these data and additional information from East Pakistan, Repetto concludes that ". . . on the average, a family having all sons would have two more live births than one having all daughters . . ." (p. 75). It would appear that, in the lottery of life, winners (those fortunate enough to have sons at early parities) keep on playing the game, perhaps assuming that their number will continue to come up.

One conclusion from the findings is that mere elimination of son preference (were that possible by means of some policy initiative) would not necessarily yield reduction in fertility—at least not in the Indian subcontinent. The type of statistical analysis used by Repetto advances our understanding of the issue; it also suggests the advisability of applying sophisticated techniques to the study of this problem.

Infant Mortality

A controversy rages over the relationship between infant mortality and fertility. The divergence of opinions is reflected in the debate over the expediency of making further investments in health-related programs. The main question focuses on the effectiveness of these programs in automatically and quickly reducing fertility rates. The two extreme positions on the issue might be stated as follows:

1) Parents desire a certain completed family size with children who will survive to adulthood. As long as infant mortality rates are high, parents must have more births than their desired completed family size. Thus, expenditures to reduce infant mortality (through maternal and child health programs, health infrastructure and public works such as improved water system) are essential to reducing fertility.

2) Expenditures to reduce infant mortality will continue to have the backlash effect of speeding up rather than reducing the rate of population growth. While short-term humanitarian goals may seem to be served by such palliatives, health-improvement expenditures may be dissipated in the long run on an ever-growing population.

Are there research data available in the social science literature on the relationship between infant and child mortality and fertility to resolve this controversy? As in other cases examined here, the evidence is ambiguous, but the weight of scientific opinion seems to lie on the side of the view that reduction in child mortality does lead to reduction in fertility. However, as we point out in discussing recommendations for further research, the data do little to establish the quantity of resources that should be devoted to reducing infant mortality *as a means of* lowering the fertility rate.

Infant Mortality and Own-Family Fertility

The literature distinguishes between the response of a couple to the death of a child in its own family and the community-wide response to infant mortality. In a study based on a 1963 fertility survey in Cairo, Hassan (cited in Omran 1973) reports that ". . . those with no experience of child death reproduced to a number that just exceeded their expectations — perhaps to safeguard against expected loss. Women with experience of child deaths continued to reproduce until they achieved a comparable margin, but at a high level . . ." (p. 362). Among illiterate women, those who had experienced child death had 4.8 more children than their stated desired number of children; in contrast, illiterate women who had not experienced child death had but one more child than the desired number. Moreover, the study showed that the majority of child deaths come early in marriage and affect children born in marriage, thus motivating parents to

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have subsequent children as insurance against future child mortality (p. 358). Mothers experiencing no child mortality usually tended to desire fewer children than mothers experiencing child deaths; this was especially true for Muslim mothers, although it also held to a lesser degree for Christian mothers (p. 359).

In summarizing the results of a sample survey carried out in Ankara, Turkey in 1966, Bacon and Mason (1972) noted that ". . . those couples who have experienced an infant death both have and expect more children than do couples without such experience, even when controlling for socioeconomic differences and duration of marriage. They also find that couples who have experienced infant deaths space their children more closely" (p. 28).

In one of the few studies to examine the relationship between infant mortality and fertility in sub-Saharan Africa, Harrington (n.d.) explores the causal connection between the two phenomena. She observed from a review of KAP surveys of Ghana (1966), Upper Volta (1969), and Niger (1970), that ". . . in larger families the proportions of children dying in the early parities were considerably higher than those dying at these same parities in small families. It would seem then that it is the early experience of child loss that leads women to have larger families" (p. 24). A woman was more likely to have a subsequent birth if a previous child died, she was more likely to become pregnant again if that child had died between the ages of one and four rather than zero and one. This distinction in turn suggests the causal mechanism that ". . . the birth of the *second* child indirectly caused the death of the *first*" (p. 27). It is Harrington's view that this link occurs because of the extreme protein and caloric deficiencies in rural Africa; when a child can no longer depend on breastfeeding and other special attention because of the birth of a sibling, risk of death increases. Then a truly vicious circle prevails: high fertility produces high child mortality which, in turn, requires high fertility. The breaking of such a circle in the poorest regions of the world might result, at least for some period, in increased population growth.

In an unpublished report, Heer (1972) summarizes results of an investigation conducted in Taiwan on the relationship between fertility and infant mortality. He found that the average perception of child survival in two townships was "extremely accurate." However, because of low reliability of response, the perception of child survival did not prove to be a particularly important independent variable in explaining fertility behavior and attitudes. Nonetheless, certain gross patterns emerge: Women who perceive a 95+ percent survival of children to age 15 had fewer births after the second (and after the third as well) than did women who perceived 85

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per cent or less survival to that age. (p. 160) Heer summarizes his findings on own-family fertility in the following terms:

The individual experience of child loss among the first two or three births proved to be an important predictor of subsequent fertility. If all of the first three live births were dead one year following the third births, the number of subsequent children was 1.6 [times] greater than if none of the first three children had died by that time. Although subsequent fertility was greater when the number of early births who died was larger, couples did not fully compensate for their child loss. On the average, the subsequent fertility compensated for about 60 to 70 percent of the original child loss (p. 161).

Aggregate Patterns of Fertility and Infant Mortality

Several authors have explored variations in fertility and infant mortality in a number of international cross-section studies. Heer (1966) examined data on 41 countries in the early 1950s that indicated a significant correlation ($r=+0.7$) between fertility and infant mortality. In his multivariate analysis, he found a partial correlation coefficient of $+0.37$ which is also statistically significant (p. 440). Friedlander and Silver (1967) found ". . . strong support for the hypothesis that couples consciously adjust their fertility to achieve a given number of children who will attain adulthood" (p. 60). Gregory et al (cited in Williams 1973) employed simultaneous equations in their study, and conclude that the birth rate had a reduced-form elasticity with respect to infant mortality of $+0.18$, second only to the elasticity of literacy as a variable explaining fertility differentials (p. 44).

These cross-national observations are partially supported by data presented by Chandrasekhar (1972) on birth rates and infant mortality rates for 14 of the Indian states over the period 1951-61 in which he finds a low positive, but not significant correlation of 0.34 between the two variables (p. 261). Schultz and DaVanzo (1970) found that in East Pakistan, ". . . the expected number of children a mother is likely to bear in a five-year period increases by about half a child after she loses an infant if she is 15 to 19 or 30 to 39 years of age. The expected birth probabilities for a mother age 20-29 increases by about a third of a child subsequent to her loss of an infant" (p. 43). Their data are drawn from the University of Dacca Demographic Survey of East Pakistan conducted in 1961-62. The analysis also reveals something about son preference: "The reproductive response of a mother to the death of her child is somewhat more pronounced if she loses a boy than if she loses a girl, but the difference is less than cultural factors might have led us to expect" (p. 49).

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Heer (1972) offers the following analysis of the relationship between own-family child mortality and the experience of the community as a whole:

If the only effect of a reduced level of infant and child mortality were on those couples who actually experienced child loss, our findings indicate that the rate of natural increase would rise following a reduction in infant and child mortality. This is because couples who lost children did not fully compensate for that loss. On the other hand, if a high level of infant and child mortality in the community affects the behavior of couples who do not experience a child loss and serves to elevate their fertility, then a reduction in infant and child mortality might even reduce the rate of natural increase. The findings of our study give grounds for belief that the community level of infant and child mortality may have an independent effect on fertility; nevertheless, they do not give conclusive proof for such a hypothesis (pp. 165-6).

Investigators have not yet specified satisfactorily the mechanisms by which intra-familial experience of mortality impinges on the behavior of the community as a whole. Future research could perhaps usefully be directed at the specification of this relationship. Nonetheless, as the sense of confidence in the relationship between infant mortality and fertility has grown, social scientists have begun to examine with greater precision the timing and elasticity of that relationship. For example, T. Paul Schultz (1971^a) has refined his estimate of the lagged response of fertility to reductions in infant mortality. In a 1971 study using published data for the 361 administrative units of Taiwan for the years 1964-68, he found that 3 years elapsed between unusual decreases in child mortality and decreases in the birth rate (p. 25). Findings from Puerto Rican data suggest a 1-to-4-year lag. (Williams 1973, p. 47). In a recent article summarizing the state-of-the-art on the basis of data from Bangladesh, Puerto Rico, Taiwan, Chile, and the Philippines, T. Paul Schultz (1972^b) notes that:

Where fertility is measured as a birth rate or probability of birth, the multiple correlation is maximized by lagging the incidence of child mortality two to four years. This is, of course, roughly the average time required for a mother to bear another child (p. 7).

The elasticity of fertility with respect to infant mortality has special importance for policymaking because of the speed of the reactions. Harman (1970) found that more than two births will occur to compensate for each infant death in the Philippines. Conversely, " . . . a five percent decline in infant mortality rates would 'automatically' reduce births by nearly two percent" (p. 48).

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Some findings are not consistent with the general observation that fertility and infant mortality are positively associated. Carvajal and Geithman (1973) found no relationship between these variables in their multivariate analysis of data from the 1963 Census of Costa Rica (1973, p. 42). However, their fertility variable was the number of children 0-10 per thousand married women, a variable with distortion because of infant and child mortality. De Tray (1972) found a negative relationship between fertility and infant mortality in U.S. 1960 Census data. He suggests that ". . . the higher the probability of a child's dying the less likely parents are to invest large amounts of resources in that child . . ." (p. 42). Thus, in a rich country where childbearing is costly in terms of a potential mother's time, she will not make the investment of time if there is a high probability of child death. For the developing countries, however, it will be a long time before such considerations affect enough families to make them of great importance in reducing fertility.

The weight of these studies supports the first of the two positions stated toward the start of this section: Families do respond quickly to reductions in infant mortality, and they will normally respond sufficiently to bring the number of births back into line with desired family size. As fewer families experience child loss, and as that experience permeates the cultural milieu, the number of births will be adjusted downward by means of the mechanisms and means which families have to reduce their fertility.

Significant questions remain:

1) How can infant mortality be reduced? That question has been asked in extensive studies of such factors as health, nutrition, water supply, etc. In many countries, economic planners could probably make a fair estimate of the dollar cost of achieving a given percentage cut in infant mortality.*

That calculation having been made, one may turn to a still more vexing question:

2) How much should be spent to reduce infant mortality, so that both child loss and fertility would be reduced.

Expenditures to reduce infant mortality yield joint products,[†] i.e., two

*The health plan of the Government of Brazil, for example, has sufficiently well specified the relationship between infant mortality and disease so that an increment in the number of children served by uncontaminated water would yield a foreseeable decline in gastroenteritis as a cause of death. In contrast ". . . very little is known about relations between health inputs and outputs in India . . . Given a million dollars to spend in an Indian District, one simply would not know how to allocate it among various uses to maximize the reduction of mortality, though it would not be hard to find useful things to spend it on" (Cassen 1974, p. 45).

[†]Examples of joint products include freight haulage which requires the inevitable back-haul, i.e., the return of the carrier to the point of original loading. Grain and straw are the joint products of wheat cultivation and harvest.

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results of the inputs that cannot be separated. When joint products are produced, the share of the costs of production is determined by the relative demand for the products.

If there is substantial "demand" for reduced fertility as well as reduced infant mortality, one would expect that some part of the costs of reducing infant mortality should be paid out of funds devoted to assisting in the reduction of fertility. Depending on the elasticity of fertility with respect to changes in infant mortality, it should be possible to estimate how much of a reduction in fertility would ensue from a given cut in infant mortality. A national planning office could then, in principle, decide how much of its total resources devoted to fertility reduction should be allocated to the cause of reduction in infant mortality. An optimizing strategy would require that, at the margin, there would be no further opportunities to shift money from one program to another (e.g., from the family planning program to a maternal and child health program) to achieve a more cost-effective reduction of fertility. Further research that establishes the quantitative dimensions of the links between health-improvement expenditures, mortality decline, and fertility decline, would be useful. On the basis of such information, economic planners could make reasonable judgments about the allocation of current and investment expenditures.

OTHER VARIABLES

"Modernization," say the determinists, "will solve the population problem."

Perhaps so. But what is modernization? Urbanization is often used as a measurable substitute for modernization. In this section, therefore, the literature dealing with rural-urban fertility differentials is reviewed. Also discussed are related variables such as religion and "traditionalism." The conclusions of this review are summarized as follows:

1) Urban residence per se is not an important factor in reducing fertility. In fact, at certain levels of development, urban residence appears to increase fertility.

2) The urban-rural differentials that do exist are relatively unimportant in terms of overall high rates of fertility in the developing world.

The effect of urban residence on fertility is not nearly as important as is often assumed. Adelman (1963) analyzing data on 37 countries, found the expected inverse relationship between density and birth rates, although ". . . the over-all elasticity of birth rates with respect to population density is rather small" (p. 322). Friedlander and Silver (1967), also doing cross-national analysis, had similar results though, like Adelman they found that introduction of the variables of percent of the labor force in agriculture in a

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regression reduces the coefficients of population density (p. 53). Freedman, Coombs, and Chang (1972) found the inverse relationship held in Taiwan, even when adjusting for wife's education and ethnic background (p. 294). In contrast, Anderson (1973), working on data of a similar time period in Taiwan, concludes the education variable contributes substantially to differences in fertility, particularly in age groups below 30 (p. 13). Liu (1973) attributes some of the drop in fertility in the 20-24 age group to later age at marriage, but notes some heaping of births in the late 20s (p. 162). Carvajal and Geithman (1973 p. 39) find the expected inverse relationship in Costa Rica as does Goldstein (1973, p. 225) in Thailand.

In Turkey, standardizing for duration of marriage and age of the woman, Timur (cited in Bacon and Mason 1972) found mean number of children in metropolitan areas to be 2.7, and in villages of less than 2,000, 4.2 (p. 13). However, when controlling for western or non-western region of Turkey, the importance of size of community decreases; when the distinction between literate and non-literate women is introduced, the urban-rural differential is reduced by 50 percent (pp. 14-15).

A study by the Demographic Institute of the University of Indonesia (1974) found at each level of education, urban fertility was above rural fertility in that country (p. 6). The staff noted, as did Liu, lower percentages of married women in the younger urban cohorts. Omran (1973) concludes for Egypt that urban fertility probably exceeds rural fertility since, in analyzing vital statistics by governorates, he found that the urban governorates of Cairo, Alexandria, Port Said, Ismailia, and Suez have higher fertility than do predominantly rural governorates (p. 100). In an analysis of fertility determinants in Egypt and other areas of the Arab Middle East, Schultz and DaVanzo (1970^b) also note a higher level of fertility in Cairo and Alexandria than in the rest of the country, up to the age of 35 and a lower level thereafter. They point out that the ". . . higher fertility observed among the urban than among the rural population contradicts the traditional view that urbanization hastens the demographic transition to low birth rates" (p. 18). They further note that even when controlled for education ". . . rural fertility levels appear only marginally to exceed urban fertility levels . . ." and that among the totally illiterate, urban fertility ". . . still exceeds rural by a significant margin" (p. 18).

The possibility that urban fertility could be higher than rural fertility, particularly among the least educated, is also suggested by data from Nigeria. Olusanya (1971) found progressively higher fertility as size of community increased; and Morgan (1974), comparing fertility in Lagos, the largest city of Nigeria to that found by Olusanya in smaller cities, found Lagos rates to be highest of all (p. 11).

In a recent monograph, Kuznets (n.d.) prepared an in-depth analysis of

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urban-rural fertility differentials. He questions the quantitative importance of urban-rural differentials. The differences between urban and rural fertility rates *within* countries are insignificant compared to the much larger difference *between* developing and developed countries (p. 8, Table 1). If "rurality" is associated with high fertility and "urbanity" with low fertility, ". . . the rural population of the DC's is far more urban than the urban population of the LDC's . . ." (p. 8). He calculates that the total contribution of intranational (urban-rural) differentials within the countries to the overall spreads is only between 3.5 and 9 percent depending on the fertility measure used (p. 60). If fertility is to decline within developing countries, it must decline dramatically in both rural and urban areas. He concludes: "A shift in the rural-urban proportions, while the intra-rural and intra-urban fertility rates remain unchanged, will have but a minor effect" (p. 8). He states that even more disturbing is the *rise* in fertility rates that has occurred over time in developing countries, so that the increase has ". . . compensated for what should have been the depressing effect of the rise in the share of the urban population" (p. 64).

Apparently, urbanization per se is not modernization as Iowa farmers are more "modern" with regard to fertility than Bogota or Delhi residents. A few studies have attempted to define "modernization of outlook" and to compare fertility behavior in terms of modern attitudes. Having developed an index of traditionalism among women through a questionnaire on employment of married women outside the home, as well as the participation of women in politics and other similar topics, Miro and Rath (1965) find a clear relationship between traditional attitudes and increasing family size in three Latin American cities (p. 53). Carvajal and Geithman (1973) found that households with radios tended to have fewer children than households without, and that ". . . as the distance from the household to market centers increased and thus traditionalism was more likely to guide family behavior, a higher level of fertility was recorded" (p. 39). They do not appear to have tested for multicollinearity.

Interestingly, religion, sometimes associated with traditionalism, does not appear to exert any particular influence once educational and income differences often associated with religion are eliminated. Arowolo (1973) concluded in a study of fertility among Muslims throughout the world that religion per se was not an important determinant.

Holding own-family's experience of child mortality, duration of marriage, wife's age at marriage, and education of mother constant, Hassan (1973) found in Cairo that no clear trend emerges of Muslim fertility exceeding Christian fertility (p. 367). Morgan (1974) also found no significant relationship between fertility and religion in his analysis of prospective data in Lagos, Nigeria. In contrast, Stoeckel (1968) found that in East

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Pakistan, from 1962 to 1966, “. . . the proportion of Hindus who are long-term adopters are higher than the proportions of Muslims” (p. 49).

INTERPRETING THE ELASTICITIES

The work of the scientist for the use of the policymaker is not complete when some sort of correlation, whether positive or negative, has been established between a certain variable and fertility. Neither is it complete when the scientist has determined that there is a causal relation between that variable and fertility.

Useful and necessary from the point of view of the policymaker is the next step: Determination of the sensitivity of fertility to various socioeconomic changes or the extent to which a change in one factor will cause a change in fertility.

Table I lists a number of independent variables with estimates of the partial elasticities of fertility with respect to those variables as found in various studies we have examined.* These are partial elasticities; i.e., the elasticity for each variable assumes that all other variables are held constant. A portion of this table was developed by Williams and Keeley; Keeley (1974) discusses several of the simplifying assumptions which underlie the rankings, e.g., that all variables are exogenous, that the elasticities are assumed to remain constant, and that temporal relationships and interactions between variables are ignored (pp. 24-25). A more complex version was prepared by T. Paul Schultz (1973, pp. S271-4).

In our Table, different variables are held constant in the regressions in different studies; definitions of variables differ from one study to another; different sources of data are used. The Table should be used with diffidence; in particular, elasticities should not be compared across different studies except to illustrate range and variation in estimates. The Table is presented to illustrate the potential value of determining partial elasticities. This potential is best illustrated within any study where the effects of two different independent variables on fertility can be compared. For example, Repetto (cited in World Bank 1974) found that the elasticity of fertility with respect to changes in the percent of income going to the poorest 40 percent of the population was much higher, $-.36$, than its elasticity with respect to increases in average per capita income, $-.20$ (p. 147). T. Paul Schultz (1967) found in a study of Puerto Rican data much higher elasticities of fertility with respect to female education, $-.20$, and child enrollment, $-.26$, than with respect to female labor force participation, $-.10$. These findings

*For example, the extent to which an increase in the educational level of a country's population would increase or decrease general fertility is known as the elasticity of fertility with respect to education; it is the ratio of the percentage change in education to the percentage change in fertility.

Table 1.
Estimates of Various Elasticities of Completed Fertility
With Respect to Eleven Independent Variables

Variables	Author and Country of Study													
	Carleton (1965) Puerto Rico	De Tray ^a (1972) U.S.	De Tray (1973) U.S. 1960 Census	Freiden (1974) U.S.	Goldstein (1972) Thailand	Gregory et al (1972) Multi- national	Krishna- murti (1966) India	Maurer et al (1973) Thailand	Repetto (1974) 40 countries	Schultz (1967) Puerto Rico	Schultz (1971a) Taiwan	Schultz (1971b) Colombia	Tabah (1963) Chile	Willis (1973) U.S.
Per Capita Income									-.20					
Income Per Worker			-.07	-.1			-.9 ^b						-.22	-.06
Income Distribution ^c									-.36					
General Education									.12 ^d to -.19					
Female Education	-.18	-.36	-.32	-.30	-.12			-.30		-.20	-.05			-.412
Female L.F.P.										-.1				
Female Earnings		-.28												
Male Earnings		+.09												
Child Enrollment										-.26	-.20	-.05		
Infant Mortality							+.18		+.40 ^e	+.40				
Density Percent in Urban Areas		-.16	-.16								-.02			

^aTable 5, Regression #2

^bPer capita income.

^cIncrease in income to poorest 40% of population.

^dNewspaper circulation per thousand persons.

^eLife expectancy; sign reversed for comparability.

Note: See "Works Cited, Charts" in back of book for full references.

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suggest that if the three variables considered by Schultz were equally subject to policy influence, greater results in terms of fertility reduction could be achieved with the first two variables than with the last.

In most of the empirical studies surveyed, the statistical techniques used assume that the response of fertility to the explanatory variables is linear or log-linear (Williams 1973). The result is that at the level of the individual family, no allowance is made for discontinuities, or a threshold in a given effect, e.g., that education becomes important after a minimum level is reached. This occurs partly because the use of aggregate, rather than individual household, data often makes it difficult to determine the extent to which a general increase in education or in income is distributed among households.

From the point of view of the policymaker, determination of elasticities makes it possible to make decisions about what socioeconomic policies are more or less likely to have an impact on fertility. (Information on elasticities forms part of the basis for population impact statements discussed in Chapter 3). Of course, further steps are also required. Certain policy changes may be more easily adopted than others for political or administrative reasons. Moreover, the costs of certain changes vary and must be taken into account. Though the elasticity of female education to fertility may be high, it does not follow that increasing female education is the most efficient manner of reducing fertility. Education is an expensive and long-term solution to population problems, and policy areas with lower elasticities may be more worthwhile because they involve much lower costs and shorter time spans.

We know of no studies which specifically compare the advantages of various policy strategies, taking into account the sensitivity of fertility to certain policy changes *and* the costs (political as well as financial), of those changes. This combination of elasticity and expenditure considerations, we call "economizing." It is the next logical step in population policy formation.

2. THE EFFECTIVENESS OF FAMILY PLANNING PROGRAMS IN REDUCING FERTILITY

THE QUESTION SEEMS SIMPLE ENOUGH: Have family planning programs reduced fertility in developing countries? But the answer is complicated. Essentially, an evaluation of the impact of family planning on fertility must assess what caused an event not to occur. Acceptable evaluation analysis requires that the analyst establish with a high degree of certitude what would have happened *without* as well as what happened *with* the family planning program.

Acceptable evaluation thus requires much more than simply measuring *what happened*, because what happened was the result of a congeries of factors that included the passage of time, changes in age structure, age of marriage, educational levels, and economic opportunities in addition to the family planning program. To separate out the specific impact of a family planning program, one must try to estimate how events would have proceeded in the absence of the program.

Inasmuch as the analysis and evaluation of family planning programs is a major field in itself and cannot be reviewed here in its entirety, the analysis in this chapter is directed only at determining whether social scientists who have evaluated family planning programs have reached warranted conclusions as to whether the program did lead to reduced fertility for the population of the country or region as a whole. Several studies demonstrate conclusively that fertility of program participants (acceptors) is significantly below the age-specific fertility rates for women (couples) who are not participants. However, it is assumed that a major program objective is not only to lower fertility among participants but also to reduce fertility in general. To the extent that programs substitute modern for traditional

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means of contraception and encourage earlier and more frequent marriage (and hence the risk of pregnancy), they will have little impact on fertility within the community as a whole.

In this report, we have not attempted to analyze either the quantitative dimensions of fertility reduction caused by family planning programs or the benefits in numbers of births averted which have been ascribed to these programs in many studies. We recognize that the term *family planning program* covers a multitude of disparate activities ranging from comprehensive high-quality programs providing all the services and technology currently available to assist couples to control their fertility, to humble information and communications campaigns run, at very low cost, to raise consciousness about the possibility of fertility control. A satisfying analysis of this broad gamut of programs lies well beyond the scope of this report.

By far the major component of population policy today is the family planning program. It is supported in large part because of a belief that expenditures on such programs yield real benefits in terms of reduced fertility. Valuable, to be sure, are such additional benefits as increased female control over their own bodies, the ability of families to plan and control their personal destinies, and the added pleasure associated with assurance that sexual pleasure need not imply an unwanted pregnancy. But these benefits could not justify the expenditure of millions of dollars of international development assistance. Thus the acid test of the family planning program is whether that program is the cause of a significant fertility decline. A secondary but nonetheless worthy question is whether family planning programs achieve the goal of reduced fertility at an acceptable cost.

Because of the predominant role of family planning programs in population policies, it is fair to ask that scientific investigation demonstrate that it is the programs, and not other changes, that are causing the declines in fertility observable in developing countries. In the course of these investigations, the studies gain in "power" as they are able to reject alternative hypotheses as to the causes of fertility decline. An investigation which demonstrates a correlation over time between the provision of family planning services and fertility decline may support the hypothesis that the services caused the decline; however, it does not assist in rejecting any of the myriad alternative hypotheses on the causes of the decline, such as increased age at marriage, higher levels of female education, lower infant mortality. A methodology is powerful if it enables the investigator to reject all but one or a few hypotheses. Thus in Table 2 we have characterized 32 investigations by their power to reject alternative hypotheses. *Strong* studies are those which use a methodology that takes into account many of the alternative hypotheses about causes of fertility decline; *weak* studies

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are weak only in the sense that they may not take such variables into account. Thus terms *strong* and *weak* refer not to the quality of the research effort but to the ability to reject alternative hypotheses.

This categorization by methodology does not take into account a number of other problems connected with the analysis and evaluation of family planning programs. One of the more significant problems is the difficulty of assembling satisfactory data on program performance, other variables, and fertility change. The use of different fertility indicators, although among themselves highly intercorrelated, may introduce consistencies merely by misspecification of the variables. Data on program performance often require the use of small samples to determine such key facts as the continuation rate for pills and IUDs (Seltzer 1973). However, rather than go into detail on all the problems which multiply the difficulties of rejecting alternative hypotheses, we now move on to consider the principal conclusions of the studies analyzed.

Of 32 studies which offered explicit conclusions about the impact of family planning programs on fertility, 24 concluded that the family planning programs did reduce fertility for the target population as a whole. Of the 32 studies, only seven were judged to have strong methodologies; six of those concluded that family planning programs did lower fertility; the singular exception was the Wyon and Gordon* study of the Khanna project. The authors argue that the Khanna program offered high quality services, yet it did not result in lower fertility. Since it operated in the 1950s, it depended primarily on foam tablets and condoms, (with some use of withdrawal, rhythm, and abstinence) and hence did not have available the more sophisticated technology available today.

The six studies which used a strong methodology and did find that the family planning program led to a reduction of fertility all dealt with the Taiwanese program. More sophisticated methodologies may be in use in that country because of the greater availability and quality of data. Multivariate statistical models are voracious consumers of statistical data; few countries yet have accurate year-to-year information on birth rates, socioeconomic characteristics of the population, and program activities in a form susceptible to this method of analysis. As T. Paul Schultz (1973) and others point out, the use of multivariate statistical analysis on cross-sections of aggregate data—361 Taiwanese municipalities in 1968, for

*Wyon and Gordon (1971), *The Khanna Study*, and a companion piece (Mamdani 1972), were the two works most cited by a group of social demographers asked by us to list important references. In Spring 1973, Professors Henry Moseley and Ismail Sirageldin recommended *The Khanna Study* to a seminar group at the School for Advanced International Studies, Johns Hopkins University, as the methodologically best family planning program evaluation then available.

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example—may seriously bias the results in such manner as to underestimate the importance of some slowly changing variables, while overestimating the importance of somewhat more rapidly changing ones.

The use of test and control groups is consistent with the social scientists' effort to approximate laboratory conditions. Such studies, of which the Khanna Study is an outstanding example, are expensive in terms of time spent. In planning future research, scientists must strike a balance between the advantages of these powerful methodologies and their costliness and limited applicability where data are not available. As long as it is deemed necessary to demonstrate that family planning programs work, some studies of high-quality programs in difficult situations—i.e., in settings in which one could not easily assert that other changes are causing fertility decline—would seem warranted. Attention, however, must also be given to other research approaches which produce useful results for immediate application. These approaches include many of those to be discussed.

Table 3 presents, in summary form, 51 studies classified by method of analysis used and by major world region in which the research was conducted. Of the studies conducted, 80 percent were in Asia, an appropriate percentage in a region where official family planning programs have had a longer and more active history than in other world regions. No studies included sub-Saharan Africa (there was one in Tunisia, however). There were only seven for the Americas, with one in Greenland and another in Puerto Rico. This analysis did not include any of the many studies on the United States. The grouping of the studies in Table 3 should not be interpreted as indicating that a given study did not use methods other than the one by which it has been classified. What appeared to be the principal contribution of each study, with respect to its methodological approach, was used by us as a guide for categorizing the whole work. Since completing this chapter, we have examined briefly a recent review of some parts of the family planning evaluation literature by T. Paul Schultz (1974). His review uses essentially the same categorization of works in this field as that followed in this chapter, and his conclusions about future directions in research, though not examined by us in detail, seem broadly consistent with those suggested here.

ESTIMATING BIRTHS AVERTED

The difference between the real and hypothetical outcome of a family planning program is the estimate of births averted by the program. Guided by this approach, the analyst estimates how many births *would have occurred* had there been no family planning program. This estimate is then compared with the number of births observed. This effort to contrast what

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Table 2.
Thirty-Two Evaluations of Family Planning Programs,
Identified by Scientific Conclusions Regarding Program Effect on
Fertility and Power* of Methodology Used

CONCLUSIONS	POWER OF METHODOLOGY		TOTAL
	Strong	Weak	
Program concluded to have reduced fertility	6 ^a	18 ^b	24
Program concluded not to have reduced fertility	1	7 ^c	8
TOTAL	7	25	32

*Criteria for power of methodology are discussed in Chapter 2.

Note: See "Works Cited, Charts" in back of book for key to Table.

Table 3.
Fifty-One Evaluations of Family Planning Program
Effects on Fertility, Identified by World Region
and Method of Analysis Used

REGION	METHOD OF ANALYSIS					TOTAL
	Estimates of births averted	Time series analysis without test and control groups	Matching Studies	Multiple regression analyses	Controlled experimental studies	
Asia	8 ^a	19 ^b	4	7 ^c	2 ^d	40
America	2 ^e	5 ^f	0	0	0	7
Africa	0	1 ^g	0	0	0	1
International Multinational	1 ^h	1	0	1 ⁱ	0	3
TOTAL	11	26	4	8	2	51

Note: See "Works Cited, Charts" in back of book for key to Table.

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happened with what would have happened introduces a flavor of *iffi*-ness into the analysis.

In a competent and comprehensive overview of this topic, Nortman (1971) writes, "In the absence of empirical data on past and likely future fertility of acceptors and the lack of information on what distinguishes the continuing contraceptive user from the discontinuer, findings are speculative." (p. 164). Not all analysts have been so cautious. Kwon (1972) writes of Korea that "... if there had not been IUDs up to 1970, the 1970 fertility would be 15 percent higher than it was" (pp. 70-71). "About 49 percent of the fertility decline is attributable to factors other than direct effect of the programme . . ." writes one analyst of a Barbados program, thus suggesting that 51 percent of the decline may be attributed to the effects of the program (Balakrishnan 1973, pp. 359-360).

Simmons (1971) undertakes a different approach to estimating births averted. He asserts that, in the Indian context, there is little reason to believe that significant social and economic changes have occurred which could lead to lower fertility. Using Potter's method,* (see Behrman, Corsa, and Freedman 1969, pp. 413-434), he estimates the number of births prevented by IUDs and sterilization, but he observes that the "... potential fertility of the IUD adoptors is difficult to estimate" (p. 52). Undeterred, he goes on to estimate not only how many births were averted, but how much each averted birth was worth (7,800 rupees at 1967-68 price levels) and thus the total benefits of the program. His calculation leads to the conclusion that the return to expenditure in 1969-70 was of the order of 40 times the cost of the program (Table IV-5, p. 93).

One wonders how a program which is alleged to have yielded such returns could come under any criticism; the contrast between Simmons' findings and those of micro-level analyses, such as the Khanna Study, certainly brings his conclusions into question.

Consistent with the difficulties of this approach is the fact that most

*Potter's method of estimating births averted per first segment of IUD (i.e., prior to accidental pregnancy, expulsion or removal) is based on the idea that contraception, by lowering "natural fecundability," tends to prolong stays in the fecundable state. Such an interruption of the pregnancy-delivery-amenorrhea-fecundability-pregnancy cycle at least temporarily suspends the childbearing process.

Births averted, then, is the ratio of the average length of the interruption (prolongation of stay in the fecundable state, corrected to allow for any or all of the following: possible disruption of marital union during use of the device; sterility; overlap between amenorrhea and contraceptive practice; and accidental pregnancies) to the average duration per birth that might have been required in the absence of the IUD (pp. 417-418).

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investigators are more cautious. Chow (1968) for example, observed a decline in the Taiwanese birth rate between 1963 and 1967, a period when IUD insertions were increasing. He writes, however, ". . . the question whether some or all of the fertility decline would have happened in the absence of the IUD programme cannot be answered by the above analysis"; i.e., his own study (p. 357). Writing a year later with two colleagues, he does assert that ". . . despite an impressive fertility decline among the matches, the net demographic impact of the IUD program is still apparent" (Chow, Chang and Liu, 1969, p. 6).

For a study of Tunisia, 1964-68, Lapham (1970) established a decline in the birth rate over the 5-year period, and attempted to explain the 24,000 births averted by births which would have occurred except for changes in age at marriage (-9,300); use of contraception (-8,800); and changes in the age structure of the population (-4,200). He goes on to suggest that ". . . 31 percent of the estimated 28,257 couples using contraception in mid-1967 would have had a baby." (p. 251).

In an analysis of the Singapore Government Family Planning Program, Wolfers (1970) found that "overall fertility has declined by 30.3 percent from the 1965 level and 44,800 births have been 'saved'." He concludes, moreover: "A little less than 50 percent of the observed decline appears to be the direct result of . . . family planning activities" (p. 2360). These observations are patently not a comparison of Singapore *with* and *without* a family planning program, but a comparison of Singapore in 1965 with Singapore in 1969, i.e., after a host of other changes have occurred.

Two studies offer specific estimates of program costs incurred for each birth averted. Analyzing the Philippines program, Osteria (1973) found that, at constant prices, one birth averted cost \$11.01 in 1966-67, \$5.82 in 1968-69, and \$8.86 in 1970-71 (p. 195). Kee and Tee (1972) concluded from their study of 1967-70 data on the Singapore program that the average cost of preventing one birth by all methods was \$91. The pill, IUD, condom, and other methods cost \$114, \$45, \$54, and \$70 respectively (p. 10). In a study of an integrated health/family planning program in Etimesgut District, Turkey, Fisek (1974) estimated that 1,482 births were averted and 776 lives saved—the former through the program's family planning component, the latter through its maternal and child health care service. The total expenditures on the program, from initiation of construction in 1965 through 1972, was \$978,000. If half of that total is attributed to the family planning component, the cost per birth averted may be estimated as \$330 (p. 210).

These estimates indicate the wide range of apparent costs per birth averted of family planning programs. Very high costs can be justified for pilot programs (such as that in Etimesgut, Turkey) when they have the potential for teaching participants and others how to achieve efficient new

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means of reducing fertility. In general, however, a principal aim of population program administration—and hence a subject of evaluation of programs—must be to reduce costs by increasing cost-effectiveness. Correct estimation of births averted by programs, and accurate accounting of costs incurred, are essential to program improvement.

TIME SERIES ANALYSES

Many of the studies reviewed can be characterized as time series analyses, i.e., investigations of changes over time of one or more variables. In the majority of the 26 studies placed in this category, researchers examine the changes over time of family planning programs and their measured input and outputs, and the overall national or regional fertility rate. Both program activities and certain demographic variables (age at marriage, parity) which may, as they change, influence the course of fertility, are examined in several studies.

In addition to the problem of poor data and a frequent lack of standardized measurement, many investigators tended to equate the coincidence of change were not taken into account in many of these studies, the asserted They observed fertility change in the population of concern over a period of several years, noted the growth of program outputs (acceptors, couple-years of protection, et cetera), and argued that there is a connection between the two, with the program causing all or part of the fertility decline. Since other variables which may have caused the observed fertility change were not taken into account in many of these studies, the asserted impact of the program on fertility cannot be taken at face value.

Interview data gathered in 1966 in Chile led investigators to conclude that " . . . a family planning program has markedly reduced the fertility of a working-class community in Santiago after only 13 months of operation" (Faundes-Latham, Rodriguez-Galant, and Avoñdana-Portios, 1968, p. 135). Others noted a decline in Taiwan's birth rate from 35.6 in 1963 to 27.2 in 1970 (Worth, Watson, and Han 1971, p. 64). Saha (1971) found that the birth rate of one of five units in a rural area in West Bengal, India declined from 42.3 in 1963 to 35.0 in 1968 (p. 15). In Pakistan, "the smallest percentage change took place in rural West Pakistan (4 percent); more in both urban and rural East Pakistan (10 percent and 12 percent, respectively) and most in the city of Karachi, West Pakistan (19 percent), where the greatest concentration of family planning services were actually located" (Wishik, Johnson, Pasquariella, Helbig, Ramaprasad, and Chen (1971, p. 1087).

According to Sivin (1971), contraceptive use provided by 62 postpartum program hospitals in 11 countries (Hong Kong, Indonesia, Philippines,

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Thailand, Iran, Pakistan, Turkey, Colombia, Mexico, Puerto Rico, and Venezuela) contributed to 55.8 percent of an observed fertility decline during 1966-69 (p. 256). Four studies of South Korea's program—all of which failed to consider exogenous variables—inferred various degrees of program effectiveness (Kim, Ross and Worth 1972, p. 170). In estimating the effects of various non-program factors on fertility, Yang, Chang and Worth (1972) concluded that family planning was responsible for but 11 percent of the decline of South Korea's birth rate from 42 to 29 in the decade 1960-70. Worth et al (1971) found 19 percent, 21 percent, and 17 percent of the national, urban, and rural fertility declines, respectively, to be attributable to family planning and abortion. "Without the family planning program, the rural fertility decline would have been only a fraction of the urban decline. Virtually no commercial contraceptive outlets existed in rural areas before the program began, and there still are few" (p. 60).

In East Pakistan, the phenomenon of a 27 percent decline in total fertility during the period 1958-67 associated with an "organizer" (indigenous worker) approach, and a 13 percent decline during 1964-65 and 1966-67 associated with a commercial distribution approach, led Stoeckel and Choudhury (1969) to conclude that "... the impact of the 'organizer' family planning as well as the commercial distribution program ..." had been demonstrated (pp. 15-16). Also basing conclusions on changing rates over time, the authors of a study of Athoor Block, India, during 1964-69, stated: "A large decline in fertility especially among older and high parity women, suggests the possibility of the impact of the organized family planning programme carried out in the area" (Gandhigram Institute of Rural Health and Family Planning 1973, p. 29). A study of the Hong Kong program led Freedman et al (1969) to conclude: "While a sharp increase in activity in 1965 was followed in 1966 by a sharp fertility decline, a lessening in the pace of its accomplishments in 1966 was followed by a reduction in the rate of fertility decline in 1967 . . . it seems implausible that it would have happened suddenly at just this time and in this pattern without the Association's IUD program" (p. 12). Despite a reversal of fertility decline during 1971 and 1972, Loh (1973) concluded that Singapore's National Family Planning Programme "... has achieved some measure of success in the first five years" (p. 8). Berg (1972) attributed a decline in absolute numbers of births in one district of South Greenland during 1967-70 to the information and education program and to personal communication with the women in the area (p. 14).

Several investigators do indicate awareness that the coincidence of time series is not, by itself, sufficient to suggest a causal relationship between

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program inputs or outputs and fertility change in the population as a whole. Freedman, Hermalin, and Sun (1971) write: "It is difficult to make any precise assessment of the extent to which the family planning program is responsible for the fertility decline between 1961 and 1970 . . . 40 percent of the decline may be attributable to change in age and marital status distributions. Of the remaining 60 percent, part is attributable to non-program birth control, especially abortion. To an unknown extent the program acceptances are substitutions for other actions that might have had a similar effect" (pp. 17-18). Ram (1971) calculated a reduction in birth rates from 41.6 in 1961 to a maximum of 39.35 in 1967-68 associated with India's program, and acknowledged " . . . it is too early to draw any meaningful conclusion, because the program got underway in a meaningful way only after 1965-66, and secondly, the effect of other methods besides sterilisation and IUDs has not been studied here" (pp. 47-50).

Still others concluded that certain national programs had little or no effect in reducing fertility. Studying a program conducted in two rural areas in Ceylon during 1958-65, Hyrenius and Ahs (1968) found that fertility decline in the Buddhist area was not statistically significant, and concluded that a 12 percent decline in marital fertility in the Hindu area was a statistical illusion rather than evidence of program effectiveness (pp. 8, 11). Burki's (1973) vision of the Pakistani program was unqualified: "The fertility level in 1972 remained the same as in 1961, demonstrating the program's failure to achieve its objective" (p. 34). Chow (1970), a principal in the well-known Taichung, Taiwan intensive family planning program, speculated that " . . . a considerable portion of past fertility decline may have been due to general economic development, and to delayed marriage . . ." (p. 349). Li (1973), writing three years later, discounts the effect of the program in precipitating fertility decline: "The programme in the Taichung area began in February 1973, or more than a decade after the initial decline of fertility [in 1951]." He goes on to note that " . . . the acceleration in the decline before and after the programme was roughly the same . . ." (pp. 100-101).

Based on a correlation analysis of couple-years protection and fertility decline in Trinidad and Tobago, to the exclusion of exogenous socioeconomic variables, Thein (1970) found that the largest contribution to fertility decline was made with oral contraceptives and condoms, both of which were to a large extent distributed not by an official program, but rather by the private sector (p. 14). Similar conclusions, based on a consideration of certain demographic (but not other socioeconomic) variables in Costa Rica were reached by Reynolds who stated: "Between 1959-1969 fertility . . . declined because of fewer women entering into sexual unions, increased voluntary sterilization, and increased use of

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contraceptives. The program had nothing to do with the first two factors, which may have accounted for 30-40 percent of the decline. It also had nothing to do with increased use of traditional methods (condoms, rhythm, withdrawal), and provided only about one-quarter of the orals used . . . " (Reynolds 1973 p. 314).

The observations and opinions expressed in many of these studies are interesting and useful beginning points for more systematic research on the fertility effects of family planning programs. The evidence of conflicting reports may be due to different levels of program performance in different countries or to different initial dispositions of the observers. In any case, a much more systematic methodology is necessary if the true measure of program effectiveness is to be taken. Moreover, in many cases, such methodology can aid in identifying those problems with extant programs which, when solved, will yield more satisfactory results.

We turn now to a review of matching studies which offer a more certain estimate of family planning program effectiveness.

MATCHING STUDIES

One procedure for establishing the specific role of one variable in a complicated situation is to set up test and control groups that are matched by several criteria. Changes observed in the test group (fertility decline, for example) may then be compared with the control group and the difference attributed to the test variable (family planning services offered to the test group). However, matching studies also have methodological problems. For example, they cannot necessarily estimate substitution effects, i.e., the tendency of program acceptors to be drawn predominantly from groups who would have used non-program methods of contraception. Another problem was demonstrated in an analysis of West Malaysian fertility, where the authors could not assess the impact of family planning on fertility: they acknowledged that while fertility after the acceptance of the program declined, the lack of standardized age data concealed any specific program/effect (Johnson, Ann, and Corsa 1973, p. 86).

On the other hand, Bang's (1966) study of a program in South Korea, where the control was a county with a less "intensive" program rather than a group of non-acceptors, led him to conclude that between 1962 and 1964 the intensive program " . . . achieved a greater response in fertility and related matters. This success is attributed to a larger staff directed at a smaller population, better transportation for staff, more intensive education, free supplies delivered monthly to the doorstep, careful initial approaches to village leaders, and the focusing of greater attention on women" (p. 12). Takeshita, Peng, and Liu (1964) matching foam and

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condom acceptors against non-acceptors in eight townships in Taiwan during 1960-62, found that, on the basis of live births per 100 woman-years, the expected post-acceptance birth rate was 20.2, while the actual rate for cases was 13.5, and for matches, 17.1 (p. 231). On the basis of a study of IUD acceptors matched against non-acceptors in four townships in Taiwan conducted during 1964-66, Chow, Chang, and Liu (1969) revealed that fertility decline among cases was 80 percent (contrasted with 48 percent for matches); they also found that the percentage decline of expected fertility caused by the program (termed the "index of fertility decline") was 61 percent. These findings were qualified by the authors' acknowledgement of two weaknesses: 1) the failure to match non-acceptors for contraceptive use; and 2) the likelihood that acceptors with higher-than-average fertility had self-selected into the program (p. 2).

MULTIPLE REGRESSION ANALYSES

Multiple regression analyses, which can hold constant a variety of such external factors as non-program birth control, migration, and numerous indices of modernization, provide more justification for attribution of fertility changes to program inputs than do studies which do not introduce test and control groups. Of eight such analyses which we examined, one yielded the result that no conclusions regarding program effectiveness could be drawn. In summary of a study of 361 administrative townships investigated during 1965-66, the staff stated: ". . . a number of other factors may be important in the observed relationship, such as differences in use of other contraceptive methods or abortion, normal yearly fluctuations in births, etc., but these factors are difficult or impossible to measure" (Taiwan Provincial Department of Health 1973, p. 92). However, since this finding was contained in a summary only, there was no indication of the variables measured; therefore, the validity of the study is difficult to assess.

On the other hand, Han (1972) was able to conclude that the influence of family planning for Seoul, South Korea, in 1971 was negligible: ". . . the induced abortion experience rate . . . explains 24 percent of the birth rate (decline), whereas IUD or oral pill practice rates individually have almost no influence on birth rates" (p. 95). This analysis measured techniques of fertility control only, not exogenous variables. It cannot be considered an appropriate means of analyzing family planning effectiveness, but only of comparative contraceptive techniques.

A third conclusion, yielded by six analyses which regressed various indices of family planning inputs and outputs, fertility outcomes, and exogenous socioeconomic variables in Taiwan, was that certain elements of

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a family planning program contributed to fertility decline among certain groups during certain time periods. These qualified conclusions were the result of regressing refined measures over time, in the attempt to assess the relative influence of both family planning and other variables on fertility change.

In the first of two areal analyses of fertility in Taiwan, Hermalin (1968) conducted a path analysis which distinguished urban from rural areas. Regressing IUD acceptance against the variables of worker ratio, doctor ratio, density, death rate, education of women, and prior fertility (included in one model, omitted in another), he found direct program effects to be more pronounced in the urban areas, while indirect effects were strong in the rural. Both models yielded results for 1961-68, demonstrating that "... the program has a significant additional effect even where the socioeconomic factors are operating" (p. 10). From a second study regressing fertility and the variables of female adult educational level, percentage of young women in secondary education, male labor force in agriculture and fishing, and child mortality, this author concluded that "... a significant negative relation between acceptance rates and ... fertility ... was found in *each* of the years, with the exception of two years at ages 20-24" (Hermalin 1972, p. 22)

In a series of econometric analyses of 361 small administrative regions in Taiwan, T. Paul Schultz (1969) identified the marginal returns of three classes of field workers in "equilibrium" and "disequilibrium" communities. An early study led him to conclude that for 1964-67 "... a more balanced distribution of program staff between VHEN (Village Health Education Nurse) and PPHW (Pre-Pregnancy Health Worker) would have been more cost-effective" (p. 52). In a later study, he found that for 1964-69 "... employment of one class of field worker diminishes the effect of the other within a specific region; that is, one class of worker is to some degree a substitute for the other class of field worker" (1972a, p. vii). He also concluded: "Allocations of family planning field personnel are shown to have exerted twice the effect in reducing birth rates among older women in ... 'disequilibrium' communities than in the 'equilibrium' communities" (p. vi). Based on the probability that "... estimates based on a single cross-section are seriously biased" (pp. v-vi), he also analyzed program results among specific age groups over time, and concluded: "Since the program appears to facilitate an increase in birth rates among some younger women, the long-run effects of the program on fertility may be understated unless births are disaggregated by the mother's age" (pp. v-vii). He also inferred that "... more intensive efforts of field workers are subject to diminishing returns whether spread out over time or not" (p. vii).

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These multiple regression analyses thus offer the prospect of yielding credible program evaluation and also of identifying strong and weak aspects of program operations. These methodologically sophisticated approaches to family planning evaluation should be extended to future research.

CONTROLLED EXPERIMENTAL STUDIES

In contrast to the numerous analytical and quasi-experimental studies, only two controlled experimental studies are reported in the literature. The great effort and expense required in these types of studies partly explain the paucity of such research, which is otherwise well-suited to the task of assessing the impact of a family planning program on fertility. Furthermore, such studies are difficult to conduct in countries with national family planning programs since, theoretically at least, all communities are likely to be exposed to a program. In addition, replication may be impossible (United Nations, ECAFE 1970, p. 51).

Summarizing a long-term pilot study, Freedman and Takeshita (1969) investigated Taiwan's Taichung experiment. Their analysis, as they readily admit, might not account for all possible substitution effects. "The initial effect of the large-scale adoption of the IUD in Taichung in 1963 apparently was to speed up the decline in fertility that was already under way there before the program began" (p. 147). They concede that "... even for 1963-64 we cannot conclusively demonstrate that the acceleration might not have occurred without the program" (p. 308).

The second experimental study, an assessment of the Khanna study of 10 test villages in Punjab State in India (Wyon and Gordon 1971) came to a more firm conclusion, namely, that the long-term experiment in family planning was a failure. The authors' follow-up of the study found that "... from the measures of fertility currently available, the 1956-59 birth control had little cumulative effect on the test population" (p. 300). They concluded that the program "provided new methods of birth control for old, but offered little else to modify the total circumstances in which the Punjabis considered and decided the merits not only of method, but how much birth control to apply" (pp. 311-312).

SUMMARY

It may seem a dreary recital—this detailing of the difficulties of carrying out successful evaluations of family planning programs. But the spirit is not unlike that expressed by Berelson (1974a):

... the causal analysis of fertility changes is extremely difficult to

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carry out with definitive results . . . the detailed evaluation of today's (family planning) programs in lowering birth rates, after three or five or eight years of operation, is full of technical problems: how to collect good data to start with, how to disentangle program effect from everything else that is going on, how to identify the precise conditions under which it occurs, how to handle the indirect and the substitution effects (p. 7).

Moving somewhat beyond the data itself, it may be worthwhile to assert a positive result: Family planning programs have contributed to fertility reduction in those areas where modernization was well underway and where the administrative, political, and social setting was favorable to the implementation and diffusion of a family planning program. Conversely, family planning programs have been less successful in promoting fertility decline in areas where poverty and traditionalism are widespread and where administrative, political, and social underdevelopment stand as obstacles to program implementation and diffusion.

Because of their use of superior methodology, the studies by Wyon and Gordon in India, and by Schultz and Hermalin in Taiwan, offer clear evidence of these two contrasting situations. Indian conditions, in the 1950s may not have been conducive to fertility decline. Even recently, family planning programs have shown little impact on aggregate fertility. Simmons (1971), writing of the 246 Indian districts most strongly associated with acceptance of sterilization, notes that ". . . the general prevailing social and economic conditions are not yet favorable for a fertility decline in India" (p. 119). Even with India-wide expenditures on family planning that amounted to several percentage points of the Government of India's development budget, "the percentage reduction in the birth rate is so small that it might well not be noticed . . ." (p. 89). A more recent statement by Cassen (1974) does support the notion that a million or more births have been averted annually by the Indian program over the past few years; however, that number is so small relative to total births that the return to the Indian investment in this activity seems unsatisfactory (p. 38).

Burki's (1973) views on the situation in Pakistan complement those of analysts who have examined India. Despite a massive program in the 1960s and early 70s, "the fertility level in 1972 remained the same as in 1961 . . . Most of the large number of acceptors reported by the family planning clinics already had large families . . . The family planning program had not reached its target group: young couples just beginning to have children" (p. 34). Thus in the words of the investigators, the effectiveness of family planning appears to have been minimal in these two large countries.

In Taiwan, the application of multivariate statistical analysis—a technique which makes it possible to approximate answers to "what if"

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questions—has revealed a definite impact by the family planning program in reducing fertility. Even there, the analysts tend to ascribe a good share of fertility reduction to other changes—increasing age at marriage and recourse to induced abortion having been mentioned by several investigators (Hermalin 1968; Freedman, Hermalin, and Sun 1971). Yet other factors may be able to explain the relative success of the Taiwanese experience and the relative failure of the Indian and Pakistani experiences. Comparative study could prove fruitful.

A catalogue of successes and failures is not in itself useful unless it points the way toward research strategies which will enable social scientists to help program administrators turn relative failure into relative success. Perhaps the most useful next phase of research will be honing and refinement of the research tools and concepts. Some analysts proceed from a knowledge of the fertility-limiting capacities of certain contraceptive agents and the "expected" fertility of users to get at births averted. Chow (1968) writes that "... the number of births averted by a first segment of IUD ... ranged between 0.43 to 0.94" (pp. 357-8). Others begin at a macro-social level with complex statistical models relating fertility levels to family planning programs when other variables are "held constant." Anker (1974) in a statistical analysis of data from 76 countries, writes that "... family planning programmes had a significant, negative effect on the birth rate" (p. 29). Although it would seem these analysts come to the same conclusion, one cannot be entirely sure that the epidemiologist and the econometrician would recognize the sameness of conclusions. It thus seems essential that work in this field become more systematic. The following are items for immediate concern in terms of measuring program output:

- 1) Agreement on the methods of measurement and the meaning of an averted birth.
- 2) Study of the degree to which public sector, official family planning programs merely substitute modern for traditional methods of contraception.
- 3) Analysis of efficient mix of inputs into programs. More or fewer doctors? Use midwives? More motivators? More communication?
- 4) Refinement of the link between an acceptor or a user and births averted.

Little has been written about costs of operations of programs, and this review has not concentrated on costs. Certainly in the early phases of operation of new, innovative activities, insistence on careful cost-accounting can do more harm than good if it stifles fresh ideas and approaches. But family planning programs have now passed through their

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earliest years and must begin to respond to criteria of cost-effectiveness. A paramount question, and a theme appearing throughout this report, is: Are the resources devoted to these programs in this manner yielding as much or more as could be gotten from alternative use of funds directed at the goal of fertility reduction? As in the hierarchy of research findings discussed in Chapter 3, research on expenditures and economizing action is a necessary next step to making family programs more effective.

3. AGENDA FOR RESEARCH

IN THE FOREGOING TWO CHAPTERS, consideration was given to some principal correlates of fertility and the apparent effectiveness of family planning programs in reducing fertility. What conclusions derive from this review of current research? What future research will yield information that will help decisionmakers guide the allocation of resources available for population programs?

Research "needs" do not exist independent of decisionmakers and their goals. A demographer may sense a need to improve the quality of his data, but that need is quite different from the decisionmaker's need which is explicitly restricted to information that will assist in making better decisions. Only when the needs of decisionmakers and others are the same is this discussion of "needs" for research relevant to the needs of others. This perspective indicates why so little attention is paid in this report to data deficiencies, a problem well-illustrated in a recent summary by Seltzer (1973). Further data-gathering is obviously warranted on many counts unrelated to the needs of decisionmakers, but even for them, data deficiencies can be serious impediments to making good decisions.

In this report, we address the relationship between fertility and a variety of factors over which governments exercise considerable domain. This evaluation of research on the determinants of fertility is implicitly addressed to the possibility of altering household fertility decisions by altering public policies which impinge on households. Unfortunately, very little of the work reviewed in Chapter I actually provides information useful to policymakers. In an attempt to illustrate the shortcomings, we have developed and will discuss a hierarchy of social science findings.

As shown in Table 4, the first step in understanding social process is

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observation, or awareness, of the many non-empirical statements about the relationship between fertility and other variables; which are not the subject of this review. A second step in understanding is the use of *simple correlation*, in which an attempt is made to systematize the variables. A third step is *multiple correlation*, with which the social scientist is able to examine the simultaneous impact of several variables on fertility.

A fourth step is *causation*: an argument to indicate the direction of causality among variables, and to clarify whether observed correlations might either be spurious or the effects of still more fundamental causes. The policymaker will wish to know whether a specific policy-initiated action will, in fact, yield a planned outcome. Until social scientists can give evidence of causation, decisionmakers can have little confidence in their recommendations.

A fifth step in Table 4 is the calculation of an *elasticity*. An elasticity of fertility with respect to an independent variable is the ratio of the percentage change in fertility (other factors held constant) to the percentage change in the independent variable. This quantification of the relationship between fertility and other variables is the nearest social scientists have come to satisfying the information needs of policymakers. Elasticities offer governments a useful means by which to decide among different policies, because they make it theoretically possible to quantify fertility responses to a wide range of components of government programs in health, education, employment, human resources, public works, and even taxation. The closing pages of Chapter 1 discussed ways of interpreting and using elasticities as a means of estimating the fertility impact of various government programs other than family planning. For many of the variables treated as determinants of fertility in Chapter 1, no calculations of elasticities have as yet been attempted. In many cases where elasticities *are* estimated, the specific variables treated are not sufficiently disaggregated to be useful to the policymaker. Examples of an inadequate disaggregation are expenditures on primary as opposed to secondary and higher education, or on maternal and child health units as opposed to improved water supplies. The limitations in usefulness of elasticities, particularly as presented here comparing different studies, are discussed at the end of Chapter 1.

At the next step in our hierarchy is *expenditure*, defined as the extent to which a change in public-sector spending would yield a change in fertility. At this level, the researcher would not only determine that education reduces fertility (correlation and causation) to a given extent (elasticity), but that a given amount of spending on education would result in a given reduction in fertility (economizing). Estimation of expenditure effects is presently performed in the case of other public decisions: The decision

Agenda for Research

Table 4.
A Hierarchy of Research Findings
Addressed to Public Policy

TYPE	CHARACTERISTIC	EXAMPLES
1. Observation	Awareness of a relationship between fertility and some other variable without specific examination of the nature, direction or strength of the relationship	Many non-empirical statements exist; none were examined for this review.
2. Simple Correlation	Findings of relationship between a single ecological variable or a single personal or social characteristic and fertility; suggests a targeting procedure for population policy.	Goldstein (1972, 73) Harrington (n.d.) Miro & Mertens (1968) Sweezy (1973)
3. Multiple Correlation	Findings of relationship between multiple ecological, personal and social characteristics and fertility which may suggest targeting procedure for population policy.	Adelman (1963) Heer (1966) Repetto (1972) Ben-Porath (1973)
4. Causation	Demonstration of correlation plus reasoned argument for the direction and scope of causation in such form as to indicate that a given policy act would produce fertility change in a predictable direction.	Gendell (1967) Hassan (1973) Mueller (1972) Rosen & Simmons (1971)
5. Elasticity	Given correlation and causation, an elasticity offers a specific prediction that a stated percentage change in an independent variable would produce a given percentage change in fertility.	Can & Weninger (1973) Williams (1973) I. Paul Schultz (1973)
6. Expenditure	At this level of analysis one could predict that a stated percentage change in public sector expenditure would produce a predicted fertility reduction.	(See Table 5) None reviewed
7. Economizing	Research demonstrating that a given balance of resources between sectors could not be replaced by any alternative, more cost-effective mix of expenditures.	None reviewed

Note: See "Works Cited, Charts" in back of book for full references.

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whether to build a dam to provide for irrigation depends on estimates of the resulting improvements in agricultural output as well as the costs of construction. Though the procedure is manifestly more difficult with regard to fertility, it is not impossible.

After understanding is reached of the effect of expenditures in different public sectors on fertility, it is then conceptually possible to move to the highest level in the scheme—*economizing*, defined as balancing spending among different programs in a manner to optimize use of funds for the fertility reduction objective. Economizing provides assurance that no better policy outcome could be produced by altering the balance of resources between activities.

The manner in which the literature on the determinants of fertility is distributed within the hierarchy reveals 1) the absence, among the studies we reviewed, of any of the types of *expenditure* or *economizing*; 2) the few studies which estimate elasticities and, of those, the failure of some to estimate elasticities of variables which are manipulable by policymakers; and 3) the fact that most studies fall in the categories of causation and of simple or multiple correlation.

In Table 5, our review of the determinants of fertility is summarized. The Table presents 1) the nature of the relationship between fertility and 18 independent variables, i.e., whether the relationship is direct (positive) or inverse (negative); 2) the elasticity of fertility with respect to eight of those independent variables; and 3) the adequacy of research on each variable.

The first column in Table 5 offers the most elementary information about the determinants of fertility, i.e., whether the relationship is direct or inverse. Even at this simplest level, the results of research are still tentative in many cases. Although we reviewed 18 studies which discuss the relationship of income to fertility, analysts have been unable to specify empirically the direction of that relationship. Much of the problem lies in the difficulty of defining income properly and in separating out the effects of income change from other variables because of high intercorrelation. The indeterminacy of the relationship with economic development may have similar roots, viz., that economic development as a variable lumps together changes that have opposite effects on fertility—with positive effects dominating on some occasions and in some circumstances, and with inverse effects dominating in others. Type of marriage is indeterminate because the term includes disparate meanings of the word "type": in one case, it may refer to the legal status of marital unions; in another, to the quality of relationship between husband and wife with respect to communication within the family and decisionmaking.

The relationship of three other variables to fertility was found to be either positive or neutral; these were male education, male employment,

Table 5.
Summary of Findings on the Correlates of Fertility:
Direction of Relationship, Averages of Elasticities,
and Adequacy of Research

INDEPENDENT VARIABLE	Nature of the relationship with fertility*	Elasticity (computed average from studies cited)	Adequacy of research
<i>Income and its Distribution</i>			
Income	?	-.24 ^a (6) ^b	Fair
Income Distribution		.36 (1)	Poor
<i>Socioeconomic Change</i>			
Economic Development	?	--	Poor
Socioeconomic Status		--	Poor
Education and Literacy		.15 (1)	Fair
Female		-.25 (9)	Good
Male	+ or 0	--	Fair
Employment			
Male	+ or 0	+.09 ^c (1)	Fair
Female		-.19 ^d (2)	Fair
Rural	+ or 0		
Urban	-		
Children	+		Poor
<i>Value of Children</i>			
Age at Marriage		--	Poor
Type of Marriage	?	--	Poor
Costs of Children and Childbearing	-	--	Fair
Son Preference	- or 0	--	Poor
Infant Mortality	+	+.33 (3)	Fair
<i>Other Variables</i>			
Urban/rural Differentials	0	-.11 ^e (3)	Fair
Religion	0	--	Poor

NOTES:

* (+) symbol is used if the relationship to fertility is direct, (-) symbol if the relationship to fertility is inverse, (0) symbol if there is no relationship to fertility, and (?) symbol if the relationship to fertility is indeterminant.

^aElasticities for per capita income and income per worker.

^bNumbers in parentheses indicate number of elasticities found.

^cElasticities for male earnings.

^dElasticities for female earnings and female labor force participation.

^eElasticities for percent of population in urban areas.

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and rural female employment. Findings about male socioeconomic variables are probably unspecific because it is difficult to separate out the effects of education and employment per se from income. Certainly there seems little reason to suppose a priori that more educated men would tend to have larger families; however, more educated men tend to have higher income, and the higher income may make it feasible to have and support somewhat larger families. Men with higher occupational status may also be able to support larger families with the higher income that goes with that status. But again, one anticipates that empirical research, if properly designed to separate out the independent effects of income, education, and occupation, would reveal that men with higher levels of education and in high-status occupations would have fewer children. Since public policy can be designed to affect one or more of these variables without having to change all elements in the environment, social research should be directed to defining the independent roles of these determinants of fertility. To date, specific characteristics of *males* seem not to offer much of a guide to policy.

Son preference also has a somewhat unclear relationship to fertility. Studies in India indicate that when a couple has achieved a hypothetical goal of two live sons, they tend to have higher fertility thereafter. In contrast, Taiwanese experience shows that couples having achieved the goal of two live sons have lower fertility thereafter. Further study of these relationships would seem to be in order.

On such questions as urban/rural fertility differentials and the role of religion, the results are also unclear. In Latin America, urban fertility is substantially below rural fertility. The differences disappear in Asia and Africa. Further, the impact of urban residence on fertility washes out when other variables (income, education, and occupation) are considered. Religion and, more broadly, culture, play some role in fertility, but since religious belief and custom would not normally fall within the province of government policymakers, it has been given little attention in this report.

Although characteristics of males offer little guidance as to the determinants of fertility, characteristics of females—particularly education, income, and occupation—do tend to be correlated with fertility behavior. More studies have been conducted of female education and employment and their relation to fertility than of any of the other variables considered in Table 5; the survey in Chapter 1 cites 20 studies dealing with each.

Age at marriage, costs of children, and infant mortality were considered together under the rubric, "The Value of Children," for the following reason: Household decisions among the poor are made on bases that seem still to be poorly understood by social scientists. These decisions must logically include the formation of unions (families) as well as decisions to

bear children. Custom may well dictate age at marriage in a traditional society, but as change begins—as it has throughout the developing world—these customs may also evolve gradually to respond to altered conditions of life. All evidence points to the fact that as age at marriage rises in a society, fertility falls. Moreover, rising age at marriage is associated with improvements in female education and employment. Although governments have been largely unsuccessful in prohibiting early marriage, policies which change conditions of education and employment may have an impact on age at marriage and hence on fertility. This area of interconnected causal links has not been explored with the thoroughness necessary for the development of effective population policies.

Research on the implications of changing levels of infant mortality has been quite effective in demonstrating that, in the long run, lower infant mortality will result in lower fertility. Yet that research has not advanced to the additional step of indicating how much resources devoted to health improvements for mothers and children are needed to achieve stated goals of reduced mortality and fertility.

If costs of children (because of compulsory schooling and school fees, for example) are higher, then couples tend to have fewer children. Conversely, where children tend to work in the labor force and produce income, fertility is higher. However, there is little detailed research to demonstrate exactly how couples respond to variations in the costliness of children. Special situations exist in many of the developing countries in which governments have imposed schooling requirements, limited family benefits for high parity children, and reduced income tax deductions for numbers of children. Although each of these situations offers opportunities for study, we found virtually no studies of these policies-in-action.

Thus, the relative poverty of research on these determinants of fertility, despite the significant and welcome advances to which we have devoted much discussion of Chapter 1, demonstrates that more research is needed in this area.

The state-of-the-art is somewhat better in relation to those variables which have been sufficiently well specified to enable social scientists to estimate the elasticity of response of fertility to changes in those independent variables. Our review in Chapter 1 uncovered 29 elasticities drawn from 14 studies concerning 8 different independent variables. These are the variables which have been subjected to the most careful social science scrutiny; moreover, it has been possible to move from merely indicating the direction of relationship to estimating the degree of responsiveness.*

*Near the completion of this report, we came upon a recent summary of elasticities using both developing and developed country data (T. Paul Schultz 1974, pp. 34-37). The ranges of elasticities may be compared with the averages presented in Table 5.

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However, female education was the only variable for which we found a fairly large number of elasticity estimates. Even in that best of all cases, one cannot be sure that these elasticities would be applicable to all situations. However, our specification of a hierarchy of research findings does suggest that of the social research we have reviewed, the calculation of such elasticities has the highest probability of being directly useful to the formulation of population policy.

Finally, in Table 5 we have characterized research on each of 18 variables with respect to whether the adequacy of research is good, fair, or poor. Three criteria were used to prepare an unweighted index of research examined on the determinants of fertility:

- 1) The number of studies cited concerning the relationship of each variable listed in Table 5, and discussed in Chapter 1, to fertility.
- 2) The number of elasticities calculated on each variable and presented in Table 5.
- 3) A subjective evaluation of the degree to which each of the 18 variables might be subject to policy manipulation.

Each variable was scored (1, 2, or 3) on each of the three criteria and summed ratings yielded an unweighted ranking. These scores were then grouped as to whether the degree of adequacy was good, fair, or poor. This procedure takes into account the quantity of research on each variable, the "quality" measured by the ability to ascend the hierarchy presented in Table 4 (the more elasticity estimates, the higher the quality), and the policy relevance indicated by the degree to which the variable might be altered by policy intervention. The reader will recognize that, although we have made these criteria explicit and verifiable, they are still obviously subjective.

The review in Chapter 1 suggests that many socioeconomic variables, which seem important with regard to fertility, could be better understood and utilized by decisionmakers if more exacting research were carried out. Population research at all levels is welcome; however, the needs of decisionmakers will be best served by intensified research efforts at levels 5, 6, and 7 (elasticity, expenditures, economizing) of the hierarchy in Table 4. For example, female education has one of the most consistent and strongest relationships to fertility and, therefore, is an area where work of the elasticity/expenditure/economizing type is in order. The review also points toward the importance of income distribution, an area in which research today is restricted by the inadequacy of currently available aggregate data. Finally, the extant research suggests the importance of variables whose impact is best measured at the household level; these include age of marriage, infant mortality, and costs of children. As in the case of income distribution, currently available data from censuses and

other national data collections are not adequate to answer questions concerning the decision within individual households to have or not have an additional child. Work on most variables in Table 5 is noted as poor or fair. This is not to underrate the professionalism of the work on correlates of fertility but, rather, to underline its inadequacy in terms of the needs of policymakers.

RECOMMENDATIONS

The overarching problem in population policy is how to turn public objectives into private action. It is at the interface between two decision systems that one must look, Janus-like, toward the public policy decision system and toward the household decision system. It is then the nexus of these two decision systems that brings into play, not the imposition of public will on private behavior, but the creation of consensus between those who exercise a public mandate and those who must be assisted or induced to bring private action into accord with general will.

How is this objective realized? Resources (human, financial, moral, political and administrative) are channeled through programs which have impact on household decisions. The programs might have direct impact in the form of family planning programs that provide assistance to couples to limit their fertility; or as incentive payments and bond schemes which alter the relative advantages and disadvantages of having children. Other programs have indirect impact on fertility — altering the level of education, employment opportunities, and health in the community-at-large in such manner as to reduce the perceived value or desirability of large families.

Mobilization of Public Resources

Of 10 countries listed in a recent survey, only two (India and Mauritius) devoted more than one percent of the national budget to family planning; only two percent of total official development assistance given by OECD (Organization of Economic Cooperation and Development) countries to the developing countries is devoted to population activities (Berelson 1974^b, p. 41). It would seem easy to make a good case that more internal and external resources (human, political, moral and administrative resources as well as money) should be devoted to population activities. Although this task is not directly related to the determinants and consequences of fertility trends, it is within the purview of social science research. Yet little attention has been given to the means by which more resources could be generated.

Several projects now in progress are directed principally at generating a rationale for more resources and support for fertility reduction. With AID

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support, GE TEMPO has developed several generations of the TEMPO economic demographic model, designed to demonstrate to governments the budgetary implications and difficulties of rapid population growth (Holmes 1971; Enke 1973). The World Employment Programme of the ILO (International Labor Office) has developed a simulation model, BACHUE, for the interrelationships between rapid population growth and current and future employment problems. It should also prove useful in analyzing the means and implications of increased female labor force participation with respect to future fertility (International Labor Office 1973^b). The U. S. Bureau of the Census has developed sophisticated models for individual countries to assess the impact of alternative population growth rates on other economic planning variables. The work is carried out by the Socio-Economic Analysis Staff of the ISPC (International Statistical Programs Center) at the Census Bureau.

Some smaller projects also have resource mobilization as their central goal; these include the International Population Policy Consortium and the California Institute of Technology/American University Field Studies reports (Brown and Sweezy 1972, 1973; Brown, Holdren, Sweezy and West 1973). A more focused effort at resource mobilization encompassing inputs from several disciplines is the IPPA (International Program for Population Analysis) of the ICP (Interdisciplinary Communications Program), Smithsonian Institution; this program aims to focus attention sharply on communication—via small workshops, specific country presentations to AID and embassy missions where little support now exists for population programs, and generalized publications to scholars and decisionmakers in developing countries. IPPA supports research of social scientists in developing countries so that results can be transmitted to policymakers directly.

A special task within the area of resource mobilization is a study of the interplay between the provision of external assistance for population matters and the generation of internal public funds for that purpose. How can donors assure that their support does not *substitute* for, but instead *complements*, local resources? This perennial problem should be the subject of constant review by social scientists within terms of reference set by the policymakers for international donors. Future research on this topic could be devoted to examining the reasons for success in successful cases, i.e., those situations in which increased financial, moral, and administrative resources were provided by national governments to the population policy arena in a manner which complemented external assistance. It may also be useful to examine cases of failure, as suggested by Burki (1974) in the case of Pakistan.

Allocation of Resources:

Family Planning and Other Than Family Planning

The policymaker needs to know how much fertility reduction can be achieved for each dollar's expenditure. He needs to know whether programs of incentives, health care, and education can yield roughly the same return as do expenditures in family planning programs. Yet, as the hierarchy of research findings in Table 4 illustrates, social research has not to date focused on the questions which the policymaker poses. The calculation of elasticities of fertility with respect to various correlates appears to move social research in the direction of answering the essential questions. It is now important to conduct research on the efficacy of alternative actions: incentive schemes, whether tied to immediate rewards or delayed payments; population education programs; subsidies to private programs; efforts to raise the status of women, improve their educational levels and offer them jobs; and general institutional development of population-related organizations in the developing countries. A general overview of the cost effectiveness of alternative population activities is essential to understand whether some funds can usefully be shifted to other activities from the current principal use of population funds in family planning programs. Since these other activities (education, health improvements, and incentives) yield additional benefits unrelated to population change, they must be examined as an integral part of overall social and economic development planning.

Program Efficiency

Because of the dominant role that family planning programs play in formulation and implementation of population policy, the evaluation of these programs is an art unto itself. This review does suggest that in some cases at least, studies carried out with AID support by the Rand Corporation, by the Taiwan Population Studies Program at the University of Michigan, and by the Columbia University Evaluation Group have yielded valuable suggestions about how to improve family planning programs. Coordination and expansion of family planning evaluation would yield benefits in terms of improved program operation. Up to now, however, the link between program outputs measured directly and the ultimate goal of fertility reduction has not been firmly established.

Findings from analysis and evaluation of current family planning programs reveal little on three critical issues:

1. What fertility-reduction results could one anticipate from a "quality" family planning program?
2. How cost effective are existing *and* quality family planning programs?

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3. Are there means of reducing fertility that are more cost-effective than family planning programs?

Findings that family planning programs reduce fertility are insufficiently specific about the quantitative dimensions of the decline. Still more difficult is the effort to estimate how much better off a family, nation, or the world may be for having fewer people in it.

Perhaps the salient conclusion one must reach from this brief overview is that a good deal more sophisticated (and unfortunately, expensive) research is called for in this area. The studies mentioned above include nationwide investigations only for India, Korea, Singapore, and Taiwan. Analysis and evaluation of large programs in Indonesia and the Philippines certainly seem warranted. A recent and excellent overview of the Philippine program suggests a number of fruitful lines of inquiry for future evaluation (Laing 1973). It would prove useful to examine closely cases of success to find ways to transfer technology from good programs to weak programs.

As certain governments, particularly those in Asia which have the more established and advanced population policies, endeavor to develop population activities other than family planning, such new programs of incentives, old-age security, no-birth bonuses, job creation for women, must be watched closely and scrutinized with one question in mind: Do these programs yield as much for each dollar spent as do the family planning programs? Insofar as these programs produce benefits in addition to fertility reduction they are useful; however, it is their fertility impact which must be the chief concern of the social scientist monitoring such programs for the policymakers. Virtually no studies have been published on the effectiveness of the few such experiments currently underway. More work is warranted to verify the impact of these "other than family planning" programs.

The Household Decision System

The literature summarized in Chapter 1 suggests that in deciding the number of births they will have, couples respond to the advantages and disadvantages of having children. Not surprisingly, the facts which couples take into account in making their decisions are too many, too disparate, and too complex to be dealt with by any single social science discipline, let alone in any single interview schedule or sample survey. Because of the enormousness of the task of understanding and of influencing family decisions, research on this question has been compartmentalized and not always well coordinated. Too often, the policymaker is unable to interpret the policy relevance of the investigator's findings.

Agenda for Research

Too little of the research work published on household decisionmaking is based on primary data. Most of the elasticities derived from multiple regression analyses (see Table 1) are based on cross-section or time series data derived from published census and other materials; very little of the research is based on direct interview data. Those studies based on formalized questionnaires may also fall short of explaining fertility behavior, since the questioner asks on a particular day about a whole range of past and future actions which the interviewee himself may understand only dimly at the time of the interview. Many of the KAP surveys conducted over the past decade did not inquire about income and other variables which may play significant roles in determining family fertility.

Perhaps the most intensive studies of why people have children are conducted by anthropologists and psychologists who attempt participant observation over long periods of time, as well as in-depth psychological testing, to obtain a clearer vision of the determinants of behavior. Currently, these styles of research seem to offer a better channel to understanding household behavior. However, little has been published on the intensive, in-depth approach to understanding fertility behavior. The results of work by such specialists could be useful in the design and operation of family planning programs. The involvement of anthropologists and psychologists has also been limited in outlining the determinants of fertility which might be subject to policy influence. A major task is to make the results of studies by these professionals understandable to policymakers and other social scientists so that those results can be taken into account in the formulation of policy.

Two unusual sample survey projects are currently underway—one in Malaysia by a Rand group sponsored by AID, the other in Northeast Brazil by a World Bank/SUDENE group sponsored by the World Bank and the Government of Brazil. In both studies, attempts will be made to estimate the sources and uses of resources within households and to determine how fertility choice behavior is affected by both resource constraints within the family and the options that exist outside. The two groups have maintained close contact with a view to achieving some degree of cross-national comparability of results. The pilot survey in Northeast Brazil has been completed, and preliminary review indicates that the survey information is useful for further analysis. Unlike the many studies of the correlates of fertility which have had to depend on data that was assembled for purposes other than explaining family behavior, the survey instruments in these cases were designed explicitly to aid in understanding such determinants of fertility.

The World Bank and AID are also cooperating in an effort to achieve comparability of design in future sample survey instruments. This effort,

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combined with the successful progress on the World Fertility Survey* should yield considerable improvement in the available data for future analyses of family decisionmaking.

Household decisionmaking could be usefully explored in "special" contexts; namely, those situations notable for their success in achieving fertility decline. Examples include the control over access to social services in Singapore, social security and delayed marriage incentives in Mauritius, paramedical health services and relatively high rate of infant survival in Sri Lanka. Study of these particular population policy situations may yield clues to success in other environments; spreading information about the success of certain developing countries could have a salutary effect on the willingness of others to adopt effective population policies.

The Population Impact Statement

Most public-sector resources, whether generated internally or through external development assistance, are expended without regard to their impact on population dynamics. A major hydroelectric project in Paraguay, government assistance to the Green Revolution in the Punjab, land reform and rural development in Venezuela—these projects have population implications that are unwatched and unanalyzed. The importance of these projects would preclude their abandonment even if they stimulate more rapid population growth. However, it might be possible for social scientists to determine that modifications in project design could yield a more favorable (or less unfavorable) impact on fertility and population growth. If adequate research could be carried out, such research would be worthwhile. At the very least, the policymaker should seek to assure himself that the public sector is not robbing Peter to pay Paul or that one branch of government is not creating the basis for a population explosion while another is trying to contain it.

Most government actions produce a number of products or outputs simultaneously. Education may reduce fertility, and at the same time it raises skill levels, increases productivity, and makes better citizens and informed voters. Fertility reduction has to take its place along with other policy goals. The population impact statement could be designed in a way that is analogous to the Environmental Impact Statement* in the United States. Its purpose would be to assist in shaping projects in a manner that

*The World Fertility Survey, based in London, is a major international research program to collect information on human fertility behavior under agreement with governments and organizations. It is conducted with the assistance of the United Nations and the International Union for the Scientific Study of Population.

Agenda for Research

is demographically favorable. The environmental protection issue* offers one possible model for integrating the goal of fertility reduction into the total picture.

A parallel between the Environmental Impact Statement and the proposed Population Impact Statement can be drawn only in concept; a great deal of quantitative information, not now in existence, would have to be assembled. Suppose, for example, a government is about to undertake a policy of capital-intensive, Green Revolution—development in agriculture. What is the population impact of this strategy? It could lead to a proletarianization of the rural labor force which, in turn, could induce higher fertility than might otherwise prevail. A population impact study might, however, suggest a redesign of the project to encompass more labor absorption (perhaps involving women's work outside the household) and hence promote reduced fertility. Or it might suggest the need for specific population components of the overall program (family planning and maternal and child health clinics) that could offset the pronatalist aspects of the project.

Population impact statements might be important for the following kinds of projects: rural development, expansion of educational facilities, health programs, sanitation and related public works projects, employment-creation efforts in rural and urban areas, changes in tax incentives and disincentives, industrialization programs as they affect the labor-intensiveness of manufacturing activities. The list could go on. Unfortunately, there is virtually no research by social scientists in this area.

One would err in not seeking those specific government projects that are amenable to design change and have an impact on fertility so that the total effect of public activities is directed toward the goal of fertility reduction. Today's correlates of fertility are the result of yesterday's public policy. As pointed out in the Summary and Recommendations at the beginning of this monograph, social research on the determinants of fertility—completed, current, and future—can help a government decide how to employ resources in the most efficient manner to achieve population/development objectives.

*The U.S. National Environmental Policy Act of 1969 applies to major Federal actions that may significantly affect the environment, including the funding of highways and sewage plants, construction of military bases, and licensing of such private projects as nuclear power plants. Under the terms of this legislation, the responsible government agency is required to draw up a statement detailing the foreseeable effects of the proposed activity on the environment. This Environmental Impact Statement must be taken into consideration by the agency when making its decision on implementing the proposal. A number of projects—the building of an interstate highway in Virginia, the opening of a large commercial park in the California mountains, and construction of the Alaska oil pipeline—have been blocked or delayed because of failure to comply with this requirement. In other cases, projects have been substantially modified as a result of the Environmental Impact Statement.

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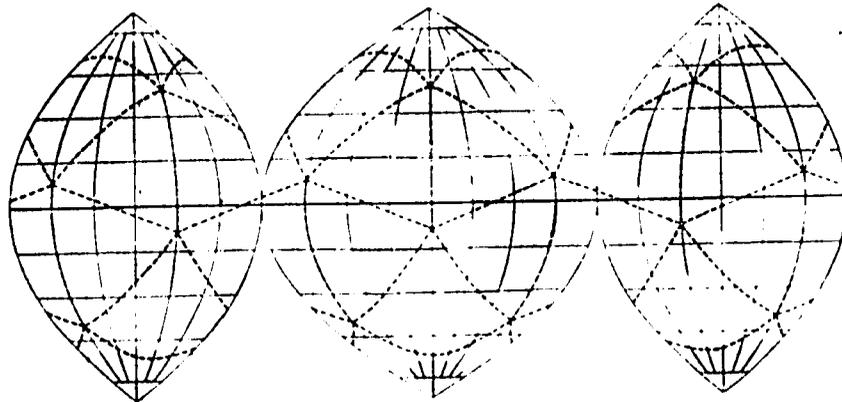
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